1647

ROBERTSON
Dunmore
25 Bonnethill Road
PITLOCHRY
PH16 5ED
SCOTLAND

SEE ALSO

PRO SUPPLY 5/349

PAT Nos 25993/4

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836, HOLBORN.

Marks & Clerk,
Consulting Engineers &
Chartered Patent Agents.

G. CROYDON MARKS, A.M.I.C.E., M.I.M.E.
DUGALD CLERK, M.I.C.E., F.C.S.
EDWARD C. R. MARKS, A.M.I.C.E., M.I.M.E.
M. ATKINSON ADAM, B.Sc., A.M.I.C.E.

BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

27th. Janry. 1904.

R. Robertson Esq,
Messrs Robertson & Rintoul.

Dear Sir,

Re French Patent No.329,540 of 19-2-03.

We have received your letter of yesterday's date, enclosing cheque value £6-18-0, being £5-0-0 in payment of the current annuity on the above patent, and the balance of £1-18-0, in settlement of our account.

Enclosed please find formal receipt for your remittance.

We are at once paying the annuity on this patent, and will send you in a few days the official receipt.

We are, Dear Sir,

Yours faithfully,

Marks & Clerk

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BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

18, Southampton Buildings,
Chancery Lane,
London, W.C. 29th. Janry. 1904.

Messrs. Robertson & Rintoul.,

Dear Sirs,

Re French Patent No. 329540. 19/2/03.

We have now pleasure in enclosing herewith the official receipt for the payment of the current annuity on the above patent, which kindly acknowledge in course of post, and oblige.

Yours faithfully,

Marks & Clerk.

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BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

January 30th, 1904

W. Rintoul Esq.,
Messrs. Robertson & Rintoul,
4, Sewardstone Road,
Waltham Abbey.

Re Acetone.-

Dear Mr. Rintoul,-

We have had a further request from the German Patent Office in this matter, wishing some further particulars for the description in the case. They wish, ~~for example~~, some figures as to the loss in sodium bi-sulphate by oxidation in the process, and also to know at what temperatures the process is carried out in practice. They appear now to recognise the patentability of the first claim. Please let me have this information at your early convenience.

I have been hoping to arrange for yourself and Dr. Robertson to come up with me to the Camera Club, but have unfortunately been laid up with influenza. I am now quite better, and hope you will be able

W. Rintoul Esq,

to come up with me soon. On Thursday, Feb. 4th, the subject is: "Amiens and its Cathedral", by the Rev. T. Perkins, M.A.; and on Monday, Feb. 8th, we are to have Edgar Wallace lecturing on "The Great Dominion" (Canada). I shall be glad to know if you have any preference as to these evenings. Please see Dr. Robertson, and arrange which will suit you best.

Yours very truly,

M. Atkin Jon Adam

Please forgive my mixing business and personal matters in this way I am very pressed just now. I trust Mrs Rintoul is now quite better and Mrs Wm Rintoul keeping well M. A. A.

TELEGRAPHIC ADDRESSES:
WESTFIELD, LONDON.
" LIVERPOOL.
" CHILWORTH.
" WHALEY BRIDGE.

MILLS:
Chilworth, Surrey.
FERNILEE, DERBYSHIRE.

OFFICES:
Head Office: LONDON.
Local Office: LIVERPOOL.

LETTERS MUST BE ADDRESSED TO THE COMPANY ONLY, AND NOT TO INDIVIDUALS.

TELEPHONE No. 3168, GERRARD.

The Chilworth Gunpowder Company, Limited,

54, PARLIAMENT STREET, S.W.,

LONDON, 4th. Febr. 1904.

Dr. Robert Robertson, D.Sc., F.I.C.
4, Sewardstone Road
WALTHAM ABBEY
Essex.

Dear Sir,

Major Nathan has been good enough to send me your memo of 1st of February re the Acetone Patent and has asked me to communicate with you and Mr. Rintoul. I am glad to hear that about 35 tons of Acetone have been recovered and that the process works perfectly satisfactory.

I have been asked if not very large quantities of Bisulphite of Sodium are required in working the process which would render the same very expensive.

Can you do anything at the War Office that the same comes to a decision respecting the English Patents? I do not know if the War Office has any voice in the matter as regards foreign patents. So far I have only inquiries from the German factories and I do not know if the Austrian Nobel Co is using Acetone but I am making requires as to this.

Yours faithfully.

E. Kraftmeier

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836, HOLBORN.

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Consulting Engineers &
Chartered Patent Agents.

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M. ATKINSON ADAM, B.Sc., A.M.I.C.E.

BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

18, Southampton Buildings,
Chancery Lane,
London, W.C. January 16th. 190 3

Messrs Robertson & Rintoul.

Dear Sirs,

Re Appln. No. 25994/01 "Manufacture of explosives, celluloid and the like".

We have pleasure in enclosing herewith the Official notice of grant of extension of time for one month for the issue of the acceptance certificate on the above mentioned application.

Under this extension, the complete specification is due for acceptance on the 19th February 1903.

We are, Dear Sirs,

Yours faithfully,

Marks & Clerk

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836, HOLBORN.

Marks & Clerk,
Consulting Engineers &
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BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

December 22nd, 1902.

W. Rintoul Esq.,
Messrs. Robertson & Rintoul,
4, Sewardstone Road,
Waltham Abbey.

Dear Mr. Rintoul,

Thanks for yours of yesterday's date. The Acceptance sent you is the Acceptance of your apparatus specification, and I understood definitely from you that you did not wish an American Patent on the apparatus. I fear I assumed at the same time that that meant that you did not wish any foreigns at all on the apparatus invention. The acceptance of your specification, however, does not form publication which would bar you in Germany, as it is only a printed specification which can thus effect a bar in Germany. Your specification will not be published till the 8th January, and any foreign patents which you may wish should be filed before that date. I shall be glad if you

W. Rintoul Esq.

will let me know whether you wish any or not. In both Germany and Austria the Law specifies that the only bar to novelty is a printed specification, so that the matter is quite clear. There is, however, no time to be lost in letting us know if you desire any foreign patents on the apparatus. As you will remember, the Acetone patent in this country was definitely delayed for the twelve months on account of the fact that the American patent has not yet been granted.

Yours very truly,

Mr. Atkinson Adam

per P.E.P.

4, Sewardstone Road,
Waltham Abbey,
Essex.

R. ROBERTSON, D.Sc., F.I.C.
W. RINTOUL, F.C.S.

24th Decr. 1902.

Dear Mr. Adam,

Many thanks for yours of yesterday's date. Have discussed the matter with Dr Robertson & come to the conclusion that, if we do go in for Continental Pats, we will do as in America i.e. ~~both process & apparatus where they can be as a method of carrying it out~~ apply for process only & if possible quote the apparatus ~~Combined & stating that, process only~~. So that the only thing to watch is that there is no disclosure which would affect this procedure

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836. HOLBORN.

Marks & Clerk.
Consulting Engineers & Chartered Patent Agents.

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DUGALD CLERK, M.I.C.E., F.C.S.
EDWARD C. R. MARKS, A.M.I.C.E., M.I.M.E.
M. ATKINSON ADAM, B.Sc., A.M.I.C.E.

BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

18, Southampton Buildings, Chancery Lane,
London, W.C.

12th. Feb. 1903.

W. Rintoul Esq.

Dear Sir,

Re Application No. 25994/01.

We purpose filing a further application for delay of acceptance on the above case on Monday next the 16th. instant unless we receive instructions from you that you do not wish any further delay obtained upon the application. The U. S. Patent having now been allowed there is no need to further delay the British case in connection therewith as the issue of the patent can be obtained within about a month whereas the British Patent cannot be issued for more than two months yet. If, however, you are still considering the question of filing further foreign applications on the invention it will be desirable to delay the British case another month and also to delay paying the final fee on the U. S. Application until the foreign applications are sent forward.

Please note that no delay of acceptance in England beyond the 19th. March prox. can be obtained.

We await your reply, and remain, Dear Sir,

Yours faithfully,

Marks & Clerk

German Claims.

1. The process for the recovery of acetone from admixture with air characterised by bringing the mixture into intimate contact with a solution of a bisulphite and subsequently separating the acetone.

2. In the process for the recovery of acetone claimed in claim 1., the method of separating acetone from the solution of a bisulphite characterised by direct distillation of the compound, practically all the acetone coming over before any substantial decomposition of the bisulphite has taken place and recovering the small amount of sulphurous acid which does come over by the addition of an alkali, before final rectification of the acid.

3. In the process for the recovery of acetone claimed in claim 1, the method of separating acetone from the solution of a bisulphite, characterised by distilling the compound with sufficient alkali to form sulphite, the acetone being condensed and rectified.

4. In the process for the recovery of acetone claimed in claim 1, the method of separating any sulphate which may form, characterised by cooling the liquor, when the sulphate being only sparingly soluble at low temperatures, crystallises out.

5. In the process for the recovery of acetone claimed in claim 1, the method of preventing undue evaporation of the bisulphite liquor, characterised by saturating with moisture the air to be treated before it comes into contact with the bisulphite solution.

Copy

Translation

R. 17814. IV/12c

Berlin 28th March 1903

The examination of the application filed on 18/2/03, entitled:-

"Process for regaining of acetone in the production of explosives, Celluloid or such like."

has resulted as follows:

In the opinion of the examiner for explaining and defining the subject of the application, it is to be borne in mind in the description, that it is known in drying smokeless powder, to obtain the acetone of condensation arising by cooling, by absorption devices, especially with water (compare for example, German Specn. No. 110285 9/78, page 2, column 2, line 11, and the British specn. No. 22190/1896, page 2, line 47). For deciding on the subject of the invention it should in the first place be indicated, whether the employment of sodium bi-sulphite as an absorption medium, compared to that of water, presents a new technical effect, and how this was established.

Again reference is made to the fact, that in the opinion of the examiner, claim 3 is not admissible, since the separation of acetone from acetone sulphurous acid sodium is quite generally known (compare for example, Beilstein, Handbook of organic Chemistry, 3rd Edition, 1902, page. 152 at the top).

A period of one month is granted for replying or for filing new papers.

Imperial Patent Office

To Messrs R Robertson & W Rimbout.

Copy.

Robertson & Rintoul's applcn. R.17814. IV/12c.

-Reply to Official Letter of March 28/03.

In reply to Examiner's letter of above date applicants desire to submit the following explanatory statement.

In the manufacture of smokeless powders & the like in which acetone is used as the solvent, the material after being pressed into the required form is exposed to the action of the air in a drying room to which the workmen have free access at all stages of the drying process. The evaporated acetone is thus present in the air in an extremely attenuated condition and applicants believe that no practical process has hitherto been proposed for its recovery. Applicants, after much experimenting, have been forced to abandon water as the absorption medium owing to the very large quantities it is necessary to deal with and the low efficiency of the recovery making its application hopeless from a practical point of view.

They have found, however, that the use of a bisulphite solution is free from these objections, practically the whole of the acetone being recovered and they are prepared, if the Examiner considers it desirable, to submit the results of their experiments in support of the above statement.

Claim 3 is cancelled herewith in view of the Examiner's remarks.

Applicants respectfully solicit a reconsideration of the case.

Copy.

Translation.

R. 17814 IV/12c

Berlin 26th May 1903.

The continued examination, having regard to the petition of the 2nd May last, of the application - R. 17814. IV/12c - filed on the 18th Feby 1903, has resulted as follows:

On the base of the petition of the 2nd May last the primary examiner cannot recognise that there is a technical advance basing a patentability of the subject of the application. You are therefore required to bring forward the proof of a technical advance by presenting, as mentioned, the results of experiments, described in detail.

You are granted a period of one month for setting this decision.

Imperial Patent Office

To Messrs Robertson & W. Pinlow.

4 S. R
WA.
23/6/53

Dear Mr Adam,

We enclose herewith ~~the~~ your docket relative to our German applications, with a reply which we have made to their last objections; also under separate cover two ~~to~~ sketches & a photo which are referred to in the same reply.

Hoping the reply meets with your approval

Yours faithfully

RR

A

Description of apparatus and procedure for spray experiments.

Fig. (1)

a — small glass tube with fine nozzle leading absorbent solution from reservoir.

b — glass tube conveying air under pressure, forming a jacket for a & with nozzle set to make a spray with solution leaving nozzle of a

c — large bottle acting as air reservoir.

d — pressure gauge, graduated in atmospheres, with lower open end dipping into water contained in c. ~~Found by experiment, 1 atmosphere = 517 litres per hour.~~

e — vaporiser; acetone from a burette allowed to drop slowly over a plug of cotton wool.

f — tube conveying spray into shallow layer of solution contained in

g — glass cylinder with constant level arrangement for solution at bottom, and cotton wool plug dampened with solution at top.

The requires pressure of air having been developed in c by means of an air-pump delivering through the side tube of b, absorbent solution was allowed to flow through a at a fixed rate & was converted into a spray by adjusting the nozzles of a and b. The vol. of air issuing from the jet was found by experiment to be = 517 l. p. hr. The spray discharging behind the first constriction of f produced a slight air current (measured before experiment) in e towards f, and this current carried with it the vapour of acetone formed by the evaporation of a measured quantity of liquid on the plug of cotton wool in e. The spray was led beneath the surface of a shallow layer of absorbent solution kept at constant level in g, and was there to a great extent condensed, the finer mist being further reduced by passing through a cotton wool plug dampened with solution at the top of g. Further modifications for the purpose of more completely reducing the mist consisted in the use of glass heads & of metallic gauze traps in g.

After each experiment the ~~solution in g was distilled~~ acetone retained by the absorbent was estimated, by ~~specific gravity, if water was used,~~ analysis, ~~and by a distillation with excess of sodium carbonate with determination of specific gravity of distillate, if solution of sodium bisulphite was used.~~ By this means and the ~~percentage of recovery was obtained~~ acetone.

(B)

B. Experiments with absorption Towers.

Description of apparatus used and procedure followed.

~~The two absorption towers used in these expts~~

The apparatus used in these experiments is shown ~~in~~ diagramatically in Fig 2 & 3 & in photographs Fig 4, It consists of a vaporiser (a), two absorption towers (b) & (c) and aspirator (d).

(a) Vaporiser - The liquid acetone was allowed to flow at the required rate from a burette, down the sides of a large glass U tube surrounded by a jacket of warm water. It was at once ~~vaporised~~ converted into vapour and became mixed with the air stream which also entered the apparatus by this U tube.

(b)(c) Absorption Towers. The only difference between the two absorption towers used was that the one (b) was ~~singly~~ doubly, ~~strung~~ and the other (c) ~~doubly~~ singly strung, with the fibres or strands carrying the absorbent. A description of one tower will therefore suffice. The singly strung tower (c) consisted of a tall shell or box closed at the top and resting in a ~~shallow~~ lead tray. across two opposite sides of the shell were fixed at regular intervals two series of cross pieces so arranged that those on one side were intermediate in level with those on the other. a series of strands of cotton or wool was threaded over these cross pieces in a zig zag manner as shown in Fig 3. The individual strands were placed side by side with very small ~~intervals~~ spaces between, so that each time they crossed the tower a closely threaded screen was formed. The ~~top~~ upper ends of these strands passed over the edge and lay on the bottom of a shallow lead tray at the top of the tower into which the absorbent liquid was delivered ~~by~~ at the required rate by a glass funnel fitted with a ~~clip~~ cock. ~~The absorbent liquid was allowed to run slowly into the shallow~~

Fig. 2 shows a section of ~~the~~ a tower at right angles to those in Fig 3.

~~lead tray at the top of the tow~~

In the doubly stiny towers, (b) a second series of stands left the upper lead tray at the opposite side from the first, and followed a similar zig zag course down the tower, the screens thus formed intersecting and passing through the first series in the centre of the tower, thus exposing ~~passing~~ double the absorptive surface for the same ~~space~~ size of apparatus. A photo of a double stiny tower as used is shown in Fig 4.

(d) aspirator. This consisted of a ~~large~~ zinc lined and hermetically sealed wooden tank of 170 litres ~~100 litres~~ capacity fitted with an outlet cock and gauge ~~head~~ glass.

Method of using the apparatus. When an experiment was to be made the absorbent to be used was allowed to flow slowly into the lead trays at the top of the towers whence it flowed or syphoned down the zig zag stands until these were quite saturated. The aspirator (d) was then filled ~~as~~ with water and coupled to the towers in the manner shown. The outlet cock of the aspirator was opened and air drawn through the whole apparatus in the direction indicated by the arrows. The acetone was then introduced into the vaporiser and the rates of flow of air, acetone and absorbent liquid regulated so as to produce the conditions ~~required for the experiment~~ it was desired to investigate. The solutions issuing from the bottom of the towers ~~at the bottom~~ were collected and analysed to ascertain the amount of acetone absorbed.

C

Blowing Experiments.

The object of these experiments was to compare the effects of water + acetone with bisulphite solution and acetone, and to see whether the acetone bisulphite compound was a party of both compound or not.

Rapid stream of air were led through solutions of acetone in water and bisulphite solution under identical conditions and the solutions analysed at various periods.

For the results see table C p. 5

A

no of experiment	date	air pressure. lbs per sq in.	Vacuum at vapour in cms of water	Solution used: nature	Solution used: flow c.c. per min	Seal inches	Concentration of acetone vapour	Ratio – acetone : bisulphite	Ratio – acetone : liquid	acetone recovered %	Remarks
V	–	20	3 1/8	water	2	1/2	% by vol. 0·743	–	1 : 12·5	16·5	Cotton wool plug: constant-level seal
VI	10/1/00	14	8	water	2	1/2	0·743	–	1 : 12·5	11·5	Cotton wool plug damped, " "
XII	–	14	–	30% Bis.	2	1	0·692	1 : 4·02	1 : 13	85·8	" " " ; glass heads
XIV	20/4/00	14	3–4 1/4	30% Bis.	2	none	0·743	1 : 4·68	1 : 15	68·7	Trays + heads

B

no of experiment	Concentration of acetone vapour % by volume: 1st Tower	2nd Tower	Absorbent: nature	strength	Ratio – acetone by weight : absorbent solution by volume: 1st Tower	2nd Tower	Total	Acetone recovered %: 1st Tower	2nd Tower	Total	% of possible recovered in second tower
XXXI	1·00	0·31	$NaHSO_3$	30%	1 : 9·3	1 : 37·7	1 : 21·3	68·9	19·5	88·4	62·4
XXVII	1·00	0·91	water	–	1 : 8	1 : 12·5	1 : 19·4	8·2	12·2	20·4	13·3
XXXIII	1·00	0·92	water	–	1 : 8	1 : 12·4	1 : 19·4	7·8	16·6	24·4	18·0
XXXVII	0·50	0·13	$NaHSO_3$	30%	1 : 67	1 : 46·9	1 : 17·9	74·0	5·2	79·2	20·0
XXXVIII	0·50	0·41	water	–	1 : 37·6	1 : 37·7	1 : 61·5	38·6	13·7	50·3	22·5

C

Temperature of Experiment	Duration of experiment	Solution treated. 30% bisulphite containing 14% of acetone: Loss of acetone %	water containing 58% of acetone: Loss of acetone %
16° C	24 hours	–	60 %
"	48 hours	–	98 %
"	72 hours	none	99·5 %
37°–40° C	2 hours	none	10 %
"	6 hours	–	45 %
"	9 hours	7 %	80 %

In every case air was blown through the solutions at a quick rate & care was taken to make the experiments with bisulphite & with water on strictly comparable lines.

of working the process to 300,000

D. Results on the large scale.

A plant which embodies the features of the towers for absorption of acetone described under B & using 30% bisulphite soda solution has now been running intermittently for 20 one months & it has been most successful, and careful tests have brought out the following results. About 50,000 Kilos of acetone of the highest quality have been recovered from air containing the vapours in an attenuated form; in treating the large quantity of 200,000 litres of air per hour practically no acetone escapes condensation in the absorption in the process, 96% of that entering the apparatus having been found by analysis to be retained. The direct distillation process has been found most advantageous on the large scale, the bulk of the acetone being eliminated with only a trifling loss of sulphurous acid which is recovered by soda. The process of cooling the liquors bisulphite liquor containing acetone has proved successful in eliminating the small amount of sulphate formed.

E. General results. Criticism of the Foregoing Results.

(A). The superiority of the use of bisulphite The original idea in the experiments with sprays was to ensure good contact of acetone vapour with absorbent without heading back the gas current. Experiments (see Fig 1 and Table A) with water & with sodium bisulphite on strictly comparable lines were carried out & the great advantage of the bisulphite is at once apparent from the two figures given. Taking the mean of the two experiments with bisulphite solution, the recovery with this absorbent is six times that with water. The last two bisulphite results is low owing to loss by fine spray. The difficulty of reducing this spray led to the next series of experiments.

(B). In these experiments (see Table B and Figs. 2 & 3 & 4) acetone in a numbers XXXI, XXXII & XXXIII were done

are under comparable conditions in every respect the only variant being the absorbent. It will be seen from the table of results that the recovery with bisulphite solution is four times that with water, the recovery with of the very highly attenuated vapour which reaches the second tower being remarkably (0.3% by volume) being remarkably high with bisulphite, water in this case the only case of the second tower only doing one fifth as well although the concentration of vapour is sixteen as great.

In experiments XXXVII. + XXXVIII which are also under the same conditions the variants being the nature absorbent and the quantity of absorbent, it is seen that even with a quantity of water nearly four times that the volume of the bisulphite solution used, the recovery with bisulphite solution is 1.6 times that by water. The volume of water required for this superior result is excessive so as to form an impracticable amount to handle in practice.

(C). The superiority of bisulphite solution & the impracticability of the use of water finds an explanation in the greater affinity of acetone for the former liquid and an illustration of this is found in the results of Table C. From this table Here the effect of blowing air through bisulphite solution at the ordinary temperature is to remove none of the acetone in 72 hours, whereas practically all the acetone is eliminated from water solution in that time. At such a temperature as would occur in practice in a drying stove for explosives (37° to 40°C) in 9 hours only a trace of the acetone is removed from the bisulphite solution, whereas 80% is eliminated from water solution. Therefore however much water be used, the whole of the acetone could never be recovered, as it can with bisulphite.

(D) The results on the large scale manufacturing scale show that the claims put forward in the are upheld in every particular.

It should be mentioned that experiments under A and C are on the laboratory scale; B on the semi-manufacturing scale and D on the largest manufacturing scale.

It is ~~therefore~~ clear that ~~the~~ a great technical advance has been made by ~~this~~ the process, as it has accomplished a result hitherto considered impossible owing to the attenuation of the volatile vapour in its admixture with air.

Copy. 21st Oct: 1903.

Dear Mr. Adam.

Re German "Acetone" application.

Yours favour of 21st + enclosure duly to hand. We take it that the examiner's position is that as, say, ammonia is recoverable by absorption in sulphuric acid and subsequent liberation. the recovery of acetone by bisulphite is not a "new effect". We have not looked up the reference to Muspratts Chemie but will do so.

In any case, however, one could not reason out the bisulphite recovery of Acetone from the analogy of ammonia + acid, because the acetone vapour is present in a large excess of an oxidising medium - air, and the absorbent now proposed is a readily oxidisable substance. Indeed we know of expert chemists who had been deterred from trying the reaction by this consideration alone.

Practically the whole of the acetone present in the air treated is recoverable by our process. No other method either mechanical or absorbent has approached this efficiency and none is so economical. Possibly this may constitute a "new technical effect" in the eyes of the examiner.

Re N.G. Watts Method Patent.

I expect to see Major Nathan about this on Monday morning + will probably call on you in the afternoon.

Yours sincerely

(Sgnd.) Wm Rintoul.

Walter Adam. Esq:
18 Southampton Bldgs:
EC.

Copy.

Feb: 1st 1904.

Dear Adam.

Many thanks for yr letter of Saturday's date.

As regards the question of loss of sodium bisulphite by oxidation we are fortunately in a position to supply accurate figures, as all the crystallized sodium sulphate which has been formed during prolonged working of the process on a manufacturing scale has been collected and weighed. For a total recovery of about 35 tons of Acetone there has been lost by oxidation 1.3 % of the total solid sodium bisulphite used. The smallness of this loss may be appreciated if we point out that this amounts to only ½ per ton of acetone recovered, the market value of which is £50.

In reference to the temperature at which the process is carried out in practice, we have hitherto been dealing with an acetone-air mixture entering the absorbing apparatus at a temperature of 50° C.

We have also worked at much lower temperature than this and have no doubt that higher temperatures could be used without resorting to artificial cooling of the gases.

Camera Club. Feb: 8th. ------.

Yours etc:

(Signed) W. Ramsay.

W. A. Adam. Esq.

18 Southampton Bldgs.

W.C.

Copy.

29th October 1903.

Dear Mr Adam.

Re German 'acetone' application.

Referring to yr: letter of yesterday's date, if there is any chance of endangering the chief claims, we would rather let the one referring to sodium sulphite crystallization go, but if this can be made good without such danger, so much the better.

Sodium sulphite is much less soluble in a bi-sulphite solution saturated with acetone than in the same bisulphite solution without acetone.

The following experiment bears on this point. In a solution of 30% bisulphite saturated with sodium sulphate at 0°c. there was added sufficient acetone to saturate, or combine with, all the solid bisulphite present. On again cooling the mixture to 0°c, a large deposit of sodium sulphate crystals was obtained.

We can give you further expts: on this point if necessary, but this may be enough for the present purpose.

Yours very sincerely.

(signed) W. Ramsay.

M. A. Adam. Esq:

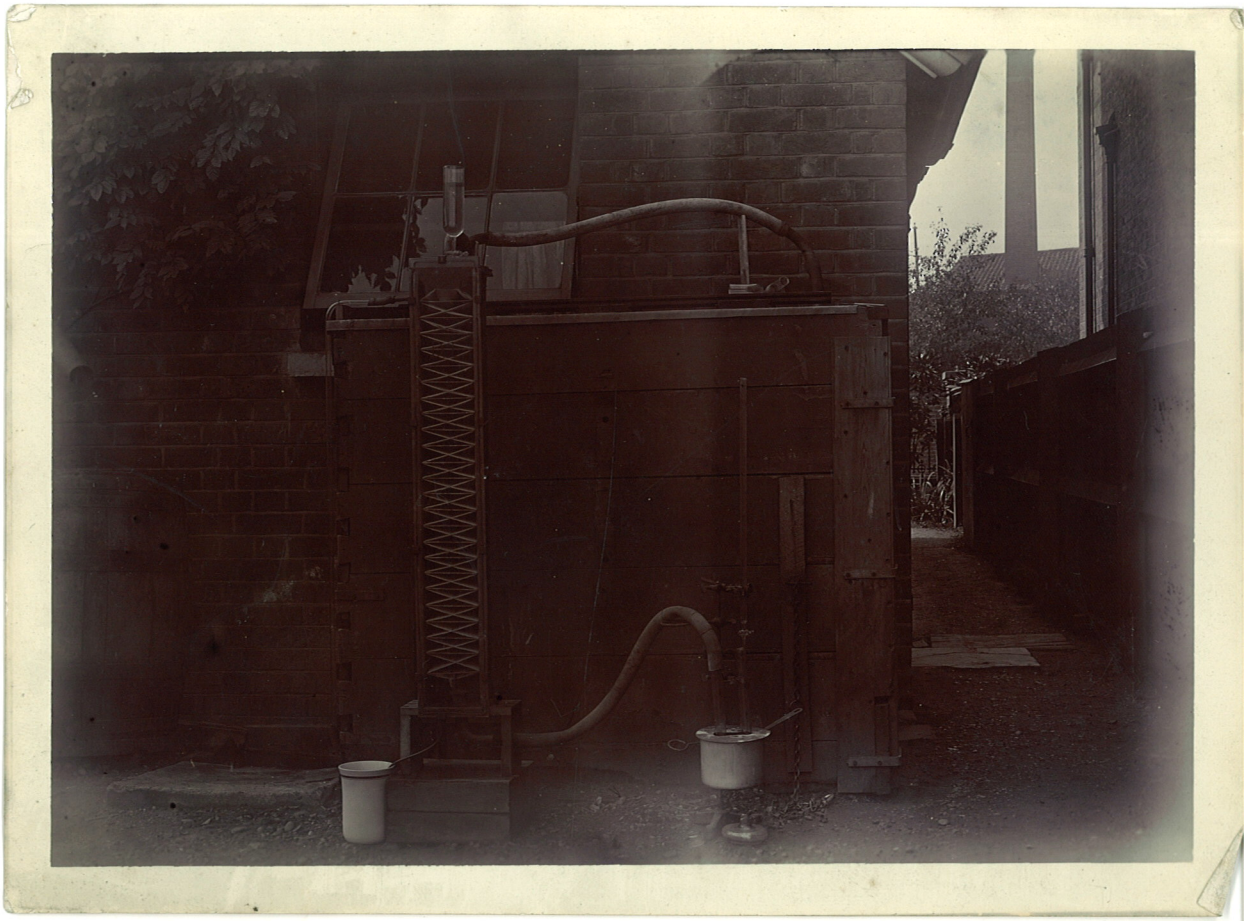
1 & 3 Southampton Bldgs: W.C.

4 Lewandstone Rd
W.A.
20-Apr-'03

F. Adam,

In reply to your letter of the 16th inst., I have
to the Superintendent of our Factory in reference to the
visit to the acetone Recovery Plant. He
objections to our showing the plant, and leaves
arrange a date to suit your people. Will
before please fix a suitable time with them and
know on what day by what train they will come, that
arrange for someone to meet them? You might
me know the names & designations of the
tatives for the Superintendent's information.

Yours sincerely
L. W. R.





Additional notes on the foregoing.

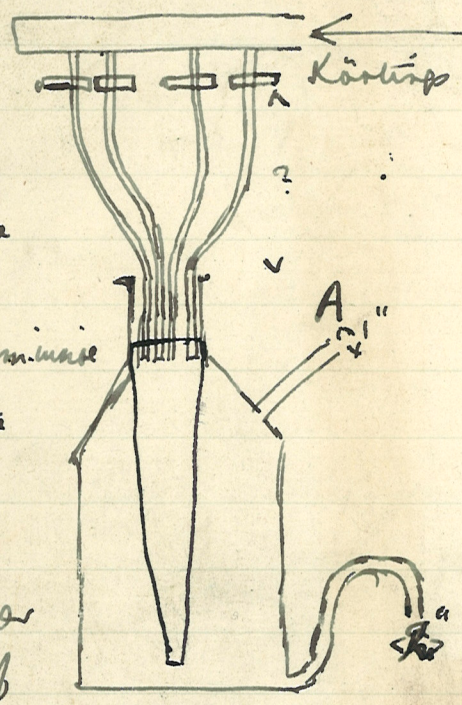
~~XIX~~. LX.

To face page 1 of "Expt on absorption &c" — on 10/11/02

Even before heating was started the smell of acetone in the stove was very powerful.

Towards the end of the experiment the temperature at the top of the stove was 45°C.

Method of producing suction



East London water at high pressure was used to work the pumps which had exhaust water pipes of ¾" long + ⅜" diameter

The method of estimating the amount of air sucked by pumps was to affix a hose at A dead the end under a balanced carboy full of water & immersed in a pneumatic trough.

The tower used was the lead towers with glass front described "DL" in Vol I of Experiments.

At the commencement of the experiment a sample of air taken from the same position as the end of the pipe leading to the absorbing towers viz. at the top of the racks in centre of stove near the steam pipes, flashed ~~on letting~~ with a lighted taper but without a loud report, a condition which from experience gained in former experiments probably meant ~~that~~ 5% by volume or 55 grains of acetone per cub. ft present in the air. ~~At the end of~~ shortly after the experiment a sample of the air burnt with slowly descending horizontal

flame which occurs when 3% by volume of acetone or 33 grains per cb. ft. are present. Taking the average of these the amount of acetone in the air treated is 201 grams or 3102 grains. As the estimation of acetone showed 201·6 grams the claim opposite for a recovery of at least 80% is justified.

Details of "direct distillation" expt.

550 cc of solution after experiment { SO_2 — 0·16%. $NaHSO_3$ — 25·70 Na_2SO_4 — 1·29 } was distilled for 30 minutes without dilephlegmator; the temperature of vapour being 62°C. at start 96° when no further difference in temperature was seen in condenser

After distillation

the volume was 381 cc of { Na_2SO_3 3·78 $NaHSO_3$ 28·50 Na_2SO_4 1·91 }

The distillate of aqueous acetone containing SO_2 was in volume 169 cc

The loss of SO_2 is thus found:— 550 cc containing 88 grams SO_2 at start

381 cc " 74 " " " finish

Loss of SO_2 14 grams = 24·3 gr $NaHSO_3$

or 10 parts by wt SO_2 or 16·3 parts $NaHSO_3$ per 100 parts acetone recovered.

As regards oxidation, the calculations are:

Percentage Na_2SO_4 in original on T.S. 3·60% after absorption 4·75%

This is = 2·35 grams SO_2 oxidised = 3·82 gr $NaHSO_3$ oxidised

or = 1·17 parts SO_2 " or = 1·91 parts $NaHSO_3$ " per 100 parts acetone

Fuller details of analyses are:—

	Original soln	Soln after absorption	Washings of foregoing	Soln after direct distn
SO_2	0·20%	0·16%	0·25%	—
$NaHSO_3$	30·84	25·70	5·09	28·50
Na_2SO_3	—	—	—	3·78
Na_2SO_4	1·16	1·29	0·56	1·91
Total solids (including SO_2)	32·20	27·15	5·90	34·19
cc obtained		1195	2240	
containing T.S.		326·6	132·1	
		458·7 grams		

Acetone recovered by 458·7 gr was 201·6 grams ∴ ratio 2·3 : 1.

A further run was made with the towers, using about 25000 cc of 30% bisulphite solution, the stone by this time having run over 20 hours. The solution from a run of 18 hours in which the 2000 cc of the soln was passed down the towers per hour was directly distilled

and the acetone obtained mixed with the distillate from the quantitative estimation, the distillate from half the quantitative expt, directly distilled, the distillate from the combined washings from both experiments. The combined distillates were ~~neutralised~~ rendered alkaline with Na_2CO_3 & distilled with a Glinsky deflegmator the distilling flask resting in a water bath. The distillate obtained was treated with $CaCl_2$ & the supernatant layer redistilled when about 260cc acetone of constant b.p. of about 56° came over.

This acetone has a gravity of 0·796 & stood a Kmno4 test of one 4 hours. However, it was found to be above specification in acidity, viz., 0·028% as HAc. It was therefore redistilled with solid K_2CO_3, some $CaCl_2$ and the calculated amount of KOH to neutralise the acid. This treatment failed to neutralise it, the distillate still showing 0·021% as HAc. An analogous treatment to that on the large scale was then resorted to i.e. the acetone was diluted with half its weight of water, 0·3% KOH added & distilled after deboration with $CaCl_2$, fresh $CaCl_2$ being used in the distilling flask. The acetone recovered had then the low acidity & the other characteristics of the Report.

Heat Test of Cordite made with Recovered Acetone

Portions of the same sample of Cordite Paste were made into Rifle Cordite, using in one case the Recovered Acetone as above, and in the other, some of the acetone in current use – Domier's Const. 198.

H.T. @ 180°F.

Cordite made with Recovered Acetone — 60 min.
" " " Trade " — 60 "

18/1/02.

Royalties

			Tons
C & Co.	25/11/12	54.15.6	66.45
	9/1/13	54.7.8	66.21
	10/4/13	35.19.4	43.91
	24/7/13	7.4.5	8.84
	20/3/15	25.2.0	30.24
	12/4/15	2.18.10	3.60
	25/10/15	12.4.11	
	26/1/16	26.1.11	31.15
	10/4/16	12.11.3	15.046
	4/7/16	4.4.6	5.092
	~~7/10/16~~	~~12.4.11~~	12.757
	30/3/17	10.13.1	

THE CELLULOID COMPANY

EXECUTIVE OFFICES

30 TO 36 WASHINGTON PLACE

NEW YORK

M.C. LEFFERTS, PRESIDENT
HENRY RAWLE, VICE PRESIDENT
WM. EUGENE PULIS, VICE PRESIDENT
NATHAN M. CLARK, VICE PRESIDENT
C. MONTGOMERY, SECTY. & TREAS.

TRADE MARK
"CELLULOID"
CABLE ADDRESS
"CELLULOID"
TELEPHONE
CONNECTION

June 14, 1920.

Messrs. R. Robertson & W. Rentoul,
29 Charlton Road,
Black Heath,
London, S.E. 3,
England.

Gentlemen:

Referring to your favor of 26th instant.

We have not made use of your process for the recovery of Acetone since our last report to you, March 30, 1917. In fact, the plant has been dismantled and out of use since that time.

If later we resume making use of the process, we will communicate with you regarding same.

Very truly yours,

Carleton Montgomery,
TREASURER.

CM:S

Experiments on Bisulphite compd XX
" " " " analysis XLVI
" oxidation of solution LII
" " " — LIII, LV LVI, LVII, LVIII
" solution of kettles, mist XIX
" vacuum XV
" with 30% kettles, in Tower S XXIII
" " water in Tower D XXIV
" absorbing towers XXV

Glass coil XIX
Gravity, sheet flow rates ?

Jets ~~at absorption section bottom of tower~~ ~~water~~ ~~XX~~ I, V, VI, X, XII, XIII, XIV, XV
~~water~~ XVIII
~~XX~~ XV

Lead towers, description of LIV

Magnesium bisulphite over absorption of gas by, formation of — LVI LVIII
metals — action of gases on
mist, solution of XVI
XIX

Oxidation of solution — see under "Experiments on oxidation of solution"

Photographs of apparatus. XXVII, LIV, LV
Potassium bisulphite, absorption of gas by, formation of LVII & LVIII

Recovery of acetone by direct steam flow XLI, XLII, XLVII
Reduction of kettles, mist XIX
Resume — Semi-manufacture. Calls for XXII page?
Specific forms of acetone solution ?
Sprays — description of LV
— see also "absorption of acetone by spray"

Index keys

No. Date

Acetone - absorption — see under absorption. —

~~Apparatus — for water absorption — description~~ — ~~IV~~

Acetone — compd with halides — XX

— sp. gr of solutions — ? XLVI

action of halides on metals. ~~XVI~~ VII

Air — current of through acetone —

alcohol — absorption — see under absorption. — XXI

Analysis of Bisnephites — XLV

— XLI

— Bisnephite compd with acetone — XLVI

Apparatus — for water absorption — description — IV

— tower exhst — XXVII

— — XLIV

Aspirator — ~~XXV~~

Beads — X XII + XII

Bulbs — expts. with see "absorption of air vapour" — XXVII

~~Bisnephite~~

~~Calculation of~~ on halides — ~~XI~~

Bisnephites, Iodo, for semi manuf't exhst. — XVI

, action on metals, see "absorption factors by, see "absorption"

, compd with acetone — XX

, analysis of — XCVI

, oxidation of — XLV

, notes on — XI

See "Sodium bisnephite" — L I, CII, CIII, CV, CVIII

Calculations on halides — XL

Compound of acetone and bisnephite, for semi manuf't exhst — XXII — {XX, XCVI

Cooling, halides, calc^n with & without ac^n — XCIII

Coil; glass — XIX

Cotton wool — V, VI, X, XII, XIII

Description of app for straining — IV

Tower exhs. — XXVII

DC Tower — CIV

Direct distillation of halides, calc^n corrd ac^n — {XLI, XCII, XCVII

Double strong lead tower — CIV

Drawings of apparatus — ①

Effect of current of air through acetone calc^n — V II

" " cooling halides with & without acetone — ~~XCVIII~~

Effects, absorption (see under absorption)

① I, IV, V, X XIII, XV, XXVII, L II

Second Demonstration of absorption & Recovery of Acetone from the atmosphere of a conducted stove by means of process of Prov. Patents nos. 25993 and 25994 of 1902

On 24/1/02 a repetition under ~~similar~~ conditions similar to those detailed in Report of 11/1/02 was made of this method of recovery of acetone at No. 4 ~~Conducted~~ Dry Stove.

~~The result of the experiment~~

To check the total amount of acetone present in the air of the stove numerous estimations were made ~~both~~ before the commencement of the experiment, during its course and at the finish. Shortly before starting the concentration was 3·2 % of acetone by volume, ~~then~~ at the middle of the run it was well over 3 percent ~~but~~ at the finish it was found to be 4·1 per cent.

As before, a quarter of the used solution was distilled with Sodium Carbonate & 200 cc of a distillate of a sp. gr. of 0·9673 at $\frac{15·5°C}{15·5}$ were obtained. This is equal to ~~4·35 %~~ 234 cc of or 187 grams of acetone recovered. To produce this result 446 grams of Sodium bisulphite in ~~25~~ 30 % solution were employed, that is in the ratio of 2·4 parts bisulphite to 1 part by weight of acetone.

A comparison of the ~~total~~ amount of acetone entering the ~~stove~~ stove in the gaseous state as estimated above, with the amount of acetone obtained shows that over 90 % of the possible ~~amount~~ was absorbed & recovered.

As regards oxidation of the bisulphite in the process of absorption of acetone, this was found to occur only to the extent of a fraction of a per cent.

The result of this ~~trial~~ is therefore to ~~confirm~~ confirm in every respect the ~~two~~ trials of 10/1/02.

DWS

Use of recovered acetone for the manufacture of cordite.

A portion of the acetone recovered by this process, was used to make cordite in a 1lb incorporator. Portions of the same samples of cordite ~~paste where used~~ and mineral jelly were used in two experiments. In the first the recovered acetone was used for gelatinisation while in the second some of the current supply (Dorset Con. 158) was employed. The incorporated material was pressed into cordite – size 3 1/4 – dried for 10 hours. The results of heat test are as follows:–

	MT. at 180°F.
Cordite made with recovered acetone	60'
– – – Trade –	60, 5-8'.

26/1/12

4

CONTRACTORS TO ADMIRALTY,
WAR OFFICE, PUBLIC AUTHORITIES, &c.

TELEGRAPH: "FRASER, DAGENHAM."
TELEPHONE No. 93 ROMFORD (3 LINES).

POST.—PLEASE ADDRESS ALL COMMUNICATIONS TO

W. J. FRASER & Co., LTD.,
ENGINEERS.

DAGENHAM,
ESSEX.

COLONIAL BRANCHES AND AGENCIES:
AUSTRALIA—F. H. FRASER, HOSKINS BUILDINGS, SPRING STREET, SYDNEY
NEW ZEALAND—S. I. CROOKES, 14, PALMERSTON BUILDINGS, QUEEN STREET, AUCKLAND.

September 30th. 1912.

IN REPLY PLEASE REFER TO T.C.P.

DAGENHAM STATION
30 MINUTES FROM
FENCHURCH STREET,
L. T. & S. R

Dear Dr. Robertson,

We have arranged with the Board of Trade to loan the Acetone Recovery Model to the Board of Education to be exhibited in the Science Museum, South Kensington, and are sending a general description on to them of the Apparatus.

Yours truly,

T. C. Palmer

Dr. Robertson,
29, Charlton Road,
Blackheath, S.E.

29 Charlton Road, Blkhth
8th Oct 1912

Dear Willie,

Was glad to see yours again after so many months. I was North for a few days only, and as the Great North Road was under water, I did not drive there. So I went only down to Crail for a little golf, but it rained solidly. My father keeps fairly well, but he is undoubtedly failing.

We had a most interesting and enjoyable time in Lübeck of which I shall give you a description when you come South. K. has gone over to Ireland & is in Belfast at present. Thence she is going to Portarlington to visit some of branch of the family which bifurcated about the 16th century!

You put me in a somewhat difficult position as I dont know who Fraser's clients are. If they are private individuals I dont see any objection to asking the S. of S. if the plant at W.A. can be seen, explaining that this is an outcome of the exhibit of the model of our plant by the Board of Trade at Turin & Brussels.

If, on the contrary they have any official connexion I want to be entirely out of the matter, both as regards running the negociations and as to any profits that may arise. In the event of your approaching the S. of S. on the latter basis, it should be explained that the matter is entirely in your hands without my participation in any form.

I dont know how the C. & H. plant goes now. When Rennie left he was satisfied that every trace of acetone that entered the towers was recovered. But their yield was not as good as at W.A., due, I believe to their having ~~too small~~ pipes immediately from the stoves — contrary to my advice. I shall write MacDonald

if perchance he is Rome & find out how they are doing.

I am glad to hear your tower is working & hope the improved H.T.'s are considered worth the outlay!

I had a very enjoyable week-end in Sussex with Davidge who has a P. & M. also. The weather was delightful & the country looking lovely. Only once we had slight tyre trouble.

I hope you are all very fit. The Kiddies here are flourishing.

Glad to see you when you come South.

Yrs. R. Roberts

W. RINTOUL. F.I.C.

LAURISTON,
ARDROSSAN,
AYRSHIRE.

6. 10. 12

Dear Bob,

What's come over you this long time? We have been expecting you to turn up one day on the jigger all last month, but no luck so far. I can only suppose the weather has been too rotten, or else you kept to the East side of the county. I should like to have shown you my new Heat-Test Lab. which is now in full blast & working a fair treat. Using the Scrubber with water only, sends the H.T. up about 5° min. in clear weather.

Hope you had a good holiday this year & enjoyed yourselves in Germany.

Just had a letter from Fraser & Co re Acn. Pde. Their client writes –

"I am in receipt of a letter inform me about the progress in negotiations re this plant. They state however that no business will result if you cannot give –

(1) an estimate of cost of plant for an assumed quantity to be treated.

(2) That your friends give a guarantee that the plant they offer to make the designs for, will really work & work satisfactorily, if it is impossible to see the plant working."

etc. etc. (of no moment).

I am telling Palmer that we are quite prepared to give estimates for plant in this country if they give us the conditions to be met.

Also that being private individuals we cannot very well give guarantees but we are willing to use all our influence to obtain permission for their representative to see our plant at work in this country. Further we can inform them that we designed and erected the plant for the British Govt and that this plant has been working satisfactorily for six or seven years recovering from 300 to 400 tons of acetone per year.

Do you think there would be any harm in my writing to the S. of S. telling him the circumstances of the case and asking permission for a representative to visit W.A.?

If that wont work we might try C & H but I dont know if their plant is working yet or if it is one we should care to show. What think ye?

I should say as soon as I can access one of the many Palmer wires that chased me while yachting, I wired him that we were prepared to submit designs & instructions for 2 s 0s So its worth trying to do a deal.

I expect to be in London very shortly & hope to see you

Love to the family Yrs H.P.

ARDEER FACTORY,

Stevenston 6 · 12 · 1912

AYRSHIRE. N.B.

Dear Bob,

Very good brig. Have ackd as enclosed.

Damn the W.O.

Yrs W.P.

ALL BUSINESS LETTERS TO BE ADDRESSED TO THE COMPANY.

HEAD OFFICE,
195 West George Street,
GLASGOW.

TELEGRAPHIC ADDRESS.
"NOBEL, STEVENSTON."

CONTRACTORS
TO HIS MAJESTY'S
GOVERNMENT.

Nobel's Explosives Company Limited.

ARDEER FACTORY,

Stevenston, AYRSHIRE, N.B.

7th November 1912.

Dr. R. Robertson,

29 Charlton Road,

Blackheath, LONDON, S.E.

Dear Bob,

The Celluloid Company I have written to, as per copy enclosed herewith.

Many thanks for Petrol results which I have noted.

Don't think I am likely to be South for some time. The weather here is very mild now. Why not come up for a week & have some Golf?

Nothing further from Palmer

Yrs

W.P.

2

29, Charlton Road,
Blackheath,
London.S.E.
7th November, 1912.

Messrs The Celluloid Company,
30, Washington Place,
New York. U.S.A.

Dear Sirs,

On referring to our Agreement with you regarding the use of our process for acetone recovery, we notice (Clause VII) that you will compute the royalties provided for as soon after the first days of January, April, July and October as may be possible, prepare verified statements, and mail these to us, together with drafts on London for the amount due to us. Might we call your attention to the fact that we have not yet received the October statement, in which you will doubtless include the amount due for the previous quarter.

We trust that the process is working satisfactorily and that you are entirely satisfied with our method of recovery.

We are, dear Sirs,
Yours faithfully,

P P & W P

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

November 26th, 1912.

Messrs. Robertson & Rintoul,
29 Charlton Road,
Blackheath,
London, S. E.,
England.

Gentlemen:-

Your favor of the 7th instant was duly received and contents noted. We were chagrined to find that we had been remiss in furnishing you the statement of acetone recovered in accordance with the agreement existing between us, and we thank you for calling our attention to the oversight. It was for several reasons that the matter was overlooked. The delays and interruptions incident to getting the plant in operation have made it seem of so recent completion, that we had lost sight of the fact that the statement period had come around and passed.

We now enclose a duly verified statement showing the quantity of acetone recovered since the plant was first put in operation until the end of the quarter, September 30th, 1912. We trust you will find this statement in form to fully meet your requirements. If this should not be the case, please advise us in order that subsequent reports may conform to your wishes.

On the quantity of acetone recovered there is due for royalties, the sum of $265.80. We herewith hand you draft on London for the equiva-

Messrs. Robertson & Rintoul.

lent of this amount, or £54.15.6. Kindly acknowledge the receipt of this payment.

Very truly yours,

TREASURER.

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

Statement.

Amount of acetone recovered under the process for which license was given to this Company by Messrs. Robertson & Rintoul under an agreement bearing date of July 12th, 1911.

From the beginning of the operation of the plant
To the 30th day of September, 1912, inclusive,
Sixty-six and 45/100 (66.45) tons.

I hereby certify that the above is a full and true statement and in testimony thereof I have hereunto affixed my official signature and the seal of the Company this 25th day of November, 1912.

Secretary.

Sworn to before me this
25th day of November, 1912.

NOTARY PUBLIC, No. 3182, New York County, N. Y.

29th Charlton Road,

Blackheath,

KENT.

5th December, 1912.

Gentlemen,

We duly received your letter and emclosures of the 26th ult. for which we are much obliged. We are pleased to learn that you have already recevered a material quantity of acetone, and we trust, therefore, that our process is proving satisfactory.

The verified statement of account which you enclose with your letter gives all the information we require, and we are quite agreeable that subsequent reports should be made in the same style.

We have pleasure in enclosing our receipt for the sum of $265.80 on account of royalties due up to the 30th September, 1912.

Yours faithfully,

R.P.& W.P.

Messrs The Celluloid Co.,

30-36 Washington Place,

New York.

29th Charlton Road,

Blackheath,

KENT.

5th December, 1912.

Received from

Messrs The Celluloid Co.,

30-36 Washington Place,

New York,

U.S.A.

the sum of $265.80 in payment of royalty due under agreement up to the thirtieth day of September, 1912.

R. P. & W. P.

5.12.1912

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

TRADE MARK "CELLULOID"

January 9th, 1913.

Messrs. Robertson & Rintoul,
29 Charlton Road,
Blackheath,
London, S. E.,
ENGLAND.

Gentlemen:-

We herewith hand you statement of the amount of acetone recovered by your process, under the agreement existing between us, for the quarter from October 1st, 1912, to December 31st, 1912, duly certified, which we believe you will find in order.

We also hand you draft on London for the equivalent of $264.85 in payment of the royalty due you according to the amount recovered.

Yours truly,

Charles D. Montgomery

TREASURER.

Cheque for £54.7.8 recd 20/1/13

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

TRADE MARK "CELLULOID"

Statement.

Amount of acetone recovered under the process for which license was given to this Company by Messrs. Robertson & Rintoul under an agreement bearing date of July 12th, 1911, for the quarter

From October 1st, 1912,

to December 31st, 1912, inclusive,

Sixty-six and 21/100 (66.21) tons.

I hereby certify that the above is a full and true statement and in testimony thereof I have hereunto affixed my official signature and the seal of the Company this 9th day of January, 1913.

C. Montgomery

Secretary.

Sworn to before me this
10th day of January, 1913.

M. W. Morris

Notary Public Kings County,
Certificate filed in New York County No. 2...
Register No. 4068.

29, Charlton Road,

Blackheath,

London.S.W.

21st January, 1913.

Dear Sirs,

We have the honour to acknowledge receipt of your favour of the 9th instant enclosing draft under the agreement existing between us for the quarter ending 31st December, 1912.

/. We have pleasure in enclosing our receipt for this amount.

Yours truly,

R. W. Parr

Messrs The Celluloid Company,

30-36 Washington Place,

New York.

29, Charlton Road,
Blackheath,
London.S.W.

21st January, 1913.

RECEIVED THE SUM OF £ Fifty four pounds seven shillings & eight pence

from

Messrs The Celluloid Company,
30-36 Washington Place,
New York,

as amount due under agreement for the quarter ending 31st December, 1913.

B.B.R. & W.L.

£ 54.7.8

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

April 10, 1913.

Messrs. Robertson & Rintoul,
29 Charlton Road,
Blackheath, London, S. W.,
England.

Gentlemen:

We herewith hand you statement of the amount of ACETONE recovered by your process under the agreement existing between us, for the quarter from January 1st to March 31, 1913, inclusive, duly certified, which we believe you will find in order.

We also hand you draft for £35.19.4. in payment of the royalty due according to the amount recovered.

Yours very truly,

SECRETARY

Enclosure

Cheque sent Paid into W. A. & S. Bank
RR.
19/4/13

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

April 10, 1913.

The Celluloid Company by its Secretary hereby certifies:

That the amount of ACETONE recovered under the process for which license was given by Messrs. Robertson & Rintoul under the agreement bearing date of July 12, 1911, for the quarter

From January 1st, 1913,

To March 31, 1913, inclusive,

Was forty-three and 81/100 (43.81) tons.

SECRETARY

Sworn to before me this 10th of April, 1913.

Notary Public Kings County,
Certificate filed in New York County No. 22,
Register No. 4068.

29,Charlton Rd.,

Blackheath,

KENT.

21st April,1913.

Gentlemen,

We duly received your letter of the 10th instant with enclosures, and have pleasure in handing you our receipt for the draft forwarded on account of royalties.

Yours very truly,

R.R.& W.C.

Messrs The Celluloid Company,

30 - 36 Washington Place,

New York.

29, Charlton Road,

Blackheath,

KENT.

21st April, 1913.

RECEIVED FROM Messrs The Celluloid Company of New York, the SUM of £35.19.4 (Thirty five pounds nineteen shillings & 4d ·) in payment of royalties due for the quarter ending March 31st, 1913.

R.P. & P.P.
Clerk
£35.19.4
21.4.13

W. RINTOUL, F.I.C.

LAURISTON,
ARDROSSAN,
AYRSHIRE.

24th July, 1913.

Dear Bob,

I have dealt with the Celluloid Company's communications as requested, and enclose copies of papers herewith. I am sorry to see that the use of acetone in celluloid manufacture is apparently diminishing.

I regret to hear that the weather with you was not all that could be desired, but I should think it would most likely improve now, as the weather here is of the best and apparently quite settled. I hope you will have a very enjoyable holiday and be able to explore the country, which is new to me, pretty thoroughly.

I am off for the North to-night, but am not particularly looking forward to a 20 hours' journey. My address for the next fortnight will be Lochboisdale Hotel, South Uist, and after the 9th of August I shall be at the Taynuilt Hotel for either a fortnight or three weeks, I am not sure which.

Ever yours,

WR

Dr. R. Robertson,
Langland Bay Hotel,
Near Swansea.

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

July 11, 1913.

Messrs. Robertson & Rintoul,
29 Charleton Road,
Blackheath, London,
S. W. England.

Gentlemen:

We herewith hand you statement of the amount of acetone recovered by your process under the agreement existing between us from the quarter from May 1, 1913 to June 30, 1913 inclusive, duly certified, which we believe you will find in order.

We also hand you draft for £7.4.5, in payment of the royalty due according to the quantity of acetone recovered.

Very truly yours,

Secretary.

Forwarded cheque to W.A. 22/7/13

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

The Celluloid Company, by its Secretary, hereby certifies:

That the amount of acetone recovered under the process for which lisence was given by Messrs. Robertson & Rintoul, under an agreement bearing date of July 12, 1911, for the quarter

From April 1, 1913

To June 30, 1913 inclusive

Was Eight and 84/100 (8.84) tons.

Secretary.

Sworn to before me this 11th day of July, 1913.

Notary Public, New York County, N. Y.
New York County No. 2412,
New York Register No, 3049,

29, Charlton Road,

Blackheath.
S.E.

24th July, 1913.

Gentlemen,

We are obliged for your favour of the 11th instant enclosing a statement of the amount of acetone recovered from April 1st to June 30th, and draft for £7.4.5 on account of royalty due. We have pleasure in enclosing our receipt for this amount.

Yours truly,

R.R. & W.P.

Messrs The Celluloid Company,

30-36, Washington Place,

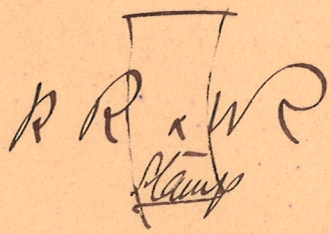
NEW YORK.

29, Charlton Rd.,

Blackheath.
S.E.

24th July, 1913.

Received from Messrs The Celluloid Company, New York, the sum of £7.4.5d (seven pounds, four shillings and five pence) in payment of royalty due for the quarter ending 30th June, 1913, under an Agreement bearing date of July 12th, 1911.



£7.4.5d.

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

The Celluloid Company, by its Secretary, hereby certifies:

That the amount of acetone recovered under the process for which license was given by Messrs. Robertson & Rintoul, under an agreement bearing date of July 12, 1911, for the quarter

From October 1, 1914,

To December 31, 1914,

Was Thirty and 245/1000 (30.245) tons.

The Celluloid Company.

C. Montgomery
Secretary.

Sworn to before me this 20th day of March, 1915.

William E. Hutchinson
NOTARY PUBLIC,
Kings County, Certificate filed in New York County.
Kings County, No. 107, Kings Register, No. 6033.
New York County, No. 190, New York Register No. 6203.

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

30 TO 36 WASHINGTON PLACE

NEW YORK

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

March 20, 1915.

Messrs. Robertson & Rintoul,
29, Charlton Road,
Blackheath, London, S.E.,
England.

Gentlemen:

We herewith hand you statement of the amount of acetone recovered by your process, under the agreement existing between us, for the quarter from October 1st, 1914 to December 31st, 1914, inclusive, duly certified, which we believe you will find in order.

Rec'd & cheque sent R.R. 20/3/15

We also hand you draft for Twenty-five pounds, two shillings, Sterling, (£25.2.0), which is in payment of the royalty due according to the quantity of acetone recovered.

As you are aware, there has been no return made since the one dated July 11th, 1913, and covering the quarter from April 1st to June 30th, 1913. In explanation of this we beg to say that we were so unfortunate as to lose the contract of a very large customer who practically took our entire output of the material in which we used acetone. Since that time we have made so little of the material that it has not been considered economy to attempt to recover any of the acetone, and the Acetone Recovery Plant has been entirely shut down. Recently we made a new contract with a new customer and were beginning to use considerable quantities of acetone when the present war interfered with our shipments. We expect to be able to revive this business as soon as it is possible for us to resume shipping.

Trusting that this letter, together with the enclosed statement and draft, will reach you safely, we are,

Yours very truly,

Treasurer.

CM/M
Enclosures 2:

Dear W. W.D. You please send them a nice typed reply to this satisfy letter. It comes opportunely as W.D. are dunning me for £28 in Patent Fees!

W R 20/3/15

3rd April, 1915.

Gentlemen,

We are in receipt of your favour of the 20th ultimo enclosing cheque for £25.2/- on account of royalty due to us for the quarter ending 31st December,1914. We have pleasure in enclosing our formal receipt herewith.

We have to thank you for your courtesy in explaining the reasons why no returns have been made since the date of 11th July,1913. We trust that your expectations of being able to revive this business may be satisfactorily realised.

Yours very truly,

B.K. & W.P.

Messrs The Celluloid Company,
30 to 36 Washington Place,
New York.

Received from Messrs The Celluloid Company, 30 Washington Place, New York, the Sum of Twenty-five Pounds Two Shillings (£25.2/-) sterling in payment of royalty due for the quarter ending 31st December, 1914.

P R & W.

3rd April, 1915.

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

April 12, 1915.

Messrs. Robertson & Rintoul,
No. 29, Charlton Road,
Blackheath, London, S.E.,
England.

Gentlemen:

We herewith hand you statement of the amount of acetone recovered by your process, under the agreement existing between us, for the quarter from January 1st, 1915, to March 31st, 1915, inclusive, duly certified, which we believe you will find in order.

We enclose draft for Two pounds, eighteen shillings, and ten pence sterling (£2.18.10) in payment of the royalty due, according to the quantity of acetone recovered.

Kindly acknowledge receipt.

Yours very truly,

C. Montgomery

Treasurer.

CM/M

Enclosures:

Dear Ws
Will you pl. acknowledge this large sum!
Return paper.
R.R.
Look in Cable Co notes
at this rate! W.P. 4/15

M. C. LEFFERTS, PRESIDENT D. G. MAYNARD, VICE PRESIDENT H. RAWLE, VICE PRESIDENT C. MONTGOMERY, SECTY. & TREAS.

THE CELLULOID COMPANY

EXECUTIVE OFFICES

TELEPHONE CONNECTION
CABLE ADDRESS "CELLULOID"

TRADE MARK "CELLULOID"

30 TO 36 WASHINGTON PLACE
NEW YORK

The Celluloid Company, by its Secretary, hereby certifies:

That the amount of acetone recovered under the process for which license was given by Messrs. Robertson & Rintoul, under an agreement bearing date of July 12, 1911, for the quarter

From January 1, 1915,

To March 31st, 1915,

Was Three and 602/1000 (3.602) tons.

SECRETARY

Sworn to before me this 12th day of April, 1915.

NOTARY PUBLIC,
Kings County, Certificate filed in New York County.
Kings County, No. 107, Kings Register, No. 6038.
New York County, No. 100, New York Register No. 6296.

29, Charlton Rd.,

Blackheath.

LONDON.

1st May,1915.

Messrs The Celluloid Company,

30 to 36 Washington Place,

NewYork.

Dear Sirs,

We are much obliged for your letter of the 12th ultimo enclosing statement of the amount of acetone recovered by our process for the quarter from January 1st,1915 to March 31st, 1915, and also cheque for £2.18.10, the receipt for which is enclosed.

Yours faithfully,

W.R. & W.P.

29, Charlton Road,

Blackheath,

LONDON.

Received the Sum of Two pounds, eighteen shillings and ten pence (£2.18.10

from Messrs The Celluloid Company, 30 to 36 Washington Place, New York, in

payment of royalty due for the quarter from January 1st,1915 to March 31st,1915

under the Agreement dated 12th July,1911.

R R & W.S.

1st May,1915.

1d Stamp

1/5-

£ 7 due RR bal on RR

Statement of affairs RR & WR 21/6/15

Received

2/2/13	Purnie	1. 2. 6
12/7/13	Celluloid Co.	7. 4. 5
14/8/13	C&H Royalty	1. 17. 10 less tax deducted
20/8/14	C&H "	6. 16. 0 less tax deducted
21/1/14	From Fraser	20. 12. 9
23/7/13	Celluloid Co.	7. 4. 5
20/3/15	"	25. 2. 0
21/4/15	"	2. 18. 10
2/9/14	Kynoch (profit	95. 0. 0
		167. 18. 9
		54
		113. 18. 9
~~23/1/13~~	~~Previous balance~~	~~7. 14. 6~~
		~~121 13 3~~

To WR £50
RR £50 — 100
13. 18. 9

RR has drawn £13 besides the £50 forms this D a/c

The account is thus made up of Balance 1. 6. 11
Due from RR 13.
14. 6. 11 — paid in 16/11/15

For Income Tax purposes.

Recoverable of Patent fees 23/1/14 £ 26. 0. 0
28/1/15 £ 28. 0. 0

~~Taxable~~ ~~Total~~ Profits (to be halved) before declaration

14/8/13	W.O.P. 84/R/2196 (M&OF.)	1. 17. 10 — royalty less income tax, Curtis Harvey [£2. 0. 0 before tax taken off]
20/8/14	" 84/R/2196 (WCW)	6. 16. 0 — " " " " " [7. 8 before tax taken off]
21/1/14	84/R/3267 (M&OF)	20. 12. 9 — " " " " W.H.T. Fraser. [21. 18. 4 before tax taken off]
2/9/14	Kynochs — to ~~be~~ profit	95. 0. 0

On 15/11/15

Balance in bank	3. 1. 11
C&H.	12. 4. 11
Celd	24. 9. 3
	39. 5. 1
Paid in by RR (drawn above)	13
	52. 5. 1
15/11/15 Cheque to WR	50. 0. 0
Balance in bank.	2. 5. 1

Joint acct on 15/11/15 — Balance bank 2. 5. 1
Due from RR. 50. 0. 0
15/11/15 Joint value of acct 52. 5. 1

(National)
TELEPHONE No 4452 AVENUE (2 LINES)
TELEGRAPH,— Fraser Engineer London.

2

98. Commercial Road East,
London, E.

The Director General Army Finance

D^r to W. J. Fraser & Co^s Ltd

ENGINEERS.

BANKERS:
"LONDON JOINT STOCK BANK."

Copy

1911			Cost.			Charged			Profit			Royalty		
June	30	By Royalties, Rentals, under terms of												
		" License relating to patents												
		" No^s 25993 & 25994/01												
		" A. H. Smith & Co Don Brewery Sheffield	157	2	2	175	15	.	18	12	10	9	6	5
		" Nobels Explosives Co Stevenston	268	1	5	387	10	.	119	8	7	59	14	4
		" " " " "	16	14	5	20	..	.	3	5	7	1	12	9
												70	13	6
		Less Tax @ 1/2 £										4	2	6
												66	11	.

TELEPHONE 93 ROMFORD (3 LINES).
TELEGRAPH, — *Fraser, Dagenham.*
Post. —— *Please address all Communications to the Company.*

W. J. FRASER & Co. LTD.

Dagenham,
Essex,
7th Febry 1913

To Dr R. Robertson

Dear Sir,

Enclosed we have the pleasure to hand you Cheque value One Pounds two shillings and 4d pence in settlement of your account against us ~~to~~ as per enclosed Cr Note ~~19~~

A ~~stamped~~ receipt per return will oblige (~~on enclosed P/c~~)

Yours faithfully,
W. J. Fraser & Co Ltd
pro R.J.

£ 1 2 6

acknd 8/2/13

ES).

Dagenham. Essex February 3rd. 1913.

arlton Road, Blackheath, S.E.

to W. I. Fraser & Co. Ltd.

ENGINEERS.

CREDIT NOTE

of £2. 5. 0 as per account below

srs. E. S. Spencer Ltd.

Purine January 1st. to December 31st.

	£		
	1	2	6
Firs	11	14	0
	4	10	0
	6	15	0
	22	19	0
s	10	12	7
	1	15	2
10. 12. 7	2	13	1
22. 19. 0	2	5	11
Profit	5	12	3

Dagenham,
Romford, Essex.

21st January 1914

M^r Dr Robertson

In account with W. J. Fraser & Co^y Ltd

TERMS, NETT CASH MONTHLY A/c. ENGINEERS.

1913				
July 18	By Profeto on Purine	1	15	0
1914 Jany 16	" " "		16	8
		2	11	8
1913				
April 30	To Patent Tax	1	16	10
			14	10

acknowledgement of cheque 4/2/14
Form^d cheque to J.S. Bank 4/2/14

E.&O.E.

(National)
TELEPHONE Nº 93 ROMFORD (3 LINES).
TELEGRAPH,— *Fraser. Dagenham.*

Dagenham. Essex
Romford.

Dr. R. Robertson, 29, Charlton Road, Blackheath, S. E.

Cr by ~~Dr~~ to W. J. Fraser & Co. Ltd

ENGINEERS.

BANKERS:
"LONDON JOINT STOCK BANK."

1914 **CREDIT NOTE**

Jan.	16	By One half of £1. 13. 4 as per account below				
		" from Messrs. E. S. Spencer Ltd.			16	8
		" Sales of Purine July 1st. to December 31st. 1915				
		" 6 Firks	5. 8. 0			
		" 3 "	3. 7. 6			
		" 4 Kils	9. 0. 0	17	15	6
		" Materials	8. 6. 1			
		" Carriage	1. 9. 0			
		" 25% on £8. 6. 1	2. 1. 6			
		" 10% on £17. 15. 6	1. 15. 6			
		" Balance Profit	4. 3. 5	17	15	6
		40% on £4. 3. 5		1	13	4

E & O.E.

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.,

and the following number quoted.

84/R./3111. (M.G.O.F).

War Office,
London, S.W.
6th August, 1912.

Sir,

With reference to War Office letter of 2nd October last, notifying you that the renewal fees on patents Nos. 25993 and 25994/01 had been paid by this Office, I am directed to inform you that, as no payment is due to you on account of royalties in connection with the licences held by Messrs. W.J.Fraser & Company Ltd., and Messrs. Curtiss & Harvey Ltd., for the half year ended 30th June last, from which the sum can be deducted, you are now requested to be good enough to pay the amount due from Mr. Rentoul and yourself.

A receivable order for £22 (Twenty two pounds) is accordingly enclosed.

I am,

Sir,

Your obedient Servant,

Arthur E Turner

For the Assistant Financial Secretary.

Replied 13/9/12 – sending cheque.

R. Robertson Esq., M.A., D.Sc., F.I.C.,
Research Department,
Royal Arsenal,
Woolwich.

RR
13/9/12

Note: This cheque was not acknowledged, but was drawn at W.H. T S Bank on 16/9/12.

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.,

and the following number quoted.

War Office,

London, S.W.

84/R./3111. (M.G.O.F.)

2nd December, 1912.

Sir,

I am directed to forward herewith a Receivable Order for £24 (Twenty-four pounds) in respect of renewal fees which have been paid by this office on patents 25993 and 25994/01 for the 12th year, and to request you to be good enough to refund the amount due from Mr. Rintoul and yourself.

I am,

Sir,

Your obedient Servant,

Arthur E. Turner

for the Assistant Financial Secretary.

R. O. No. 1728 of date 27/11/12 £4.0.-
To the Chief Cashier Bank of England
Cheque sent 6/1/12
Letter with duly Balance sent 6/1/12

R. Robertson, Esq., M.A.,D.Sc.,F.I.C.,
Research Department,
Royal Arsenal,
Woolwich.

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.,

and the following number quoted.

84/R/3111. (M.G.O.F.)

War Office,
London, S.W.

14th January, 1913.

Sir,

I am directed to acknowledge with thanks receipt of cheque for £24 (Twenty four pounds), which was forwarded by you to the Chief Cashier, Bank of England, in payment of renewal fees on patents 25993 and 25994/01, on behalf of Mr. Rentoul and yourself.

I am,

Sir,

Your obedient Servant,

S. Dawnewther

For Assistant Financial Secretary.

R. Robertson Esq.,
M.A., D.Sc., F.I.C.,
Research Department,
Royal Arsenal,
Woolwich.

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.,

and the following number quoted.

84/R./3367. (M.G.O.F.)

War Office,
London, S.W.
21st January, 1914.

Sir,

In reply to your letter of 6th instant, I am directed to inform you that the sum of £20.12.9 (twenty pounds, twelve shillings and nine pence) is due to you from Messrs W.G.Fraser & Co., for the last half year. No money is available for deduction in respect of the payment received from Messrs Curtiss & Harvey as the whole of the Acetone recovered by that firm for the half year ending 31st December was from explosives supplied to the Government.

A Receivable order for £5.7.3 (five pounds, seven shillings and three pence) is enclosed - in cancellation of the one for £26 (twenty six pounds) which accompanied War Office letter of 1st October, 84/R./3111 - being the balance of the amount due from Mr Rintoul and yourself for renewal fees on patents 25993/01 and 25994/01.

I am,

Sir,

Your obedient Servant,

Sent cheque 5.7.3 WB RE 24/1/14

S. Dawnay

for the Assistant Financial Secretary.

R.Robertson Esq., M.A., D.Sc., F.I.C.,
Research Department,
Royal Arsenal,
Woolwich.

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.,

and the following number quoted.

84/R/3196 (M.G.O.F.)

Income tax complete at 1/7/14 Letter not included.

War Office,

London, S.W.

14th August, 1913.

Sir,

I am directed to forward herewith a draft for £1.17.10. (One pound seventeen shillings and tenpence) being the amount of royalty - less income tax - due to Mr. Rintoul and yourself, in connection with the licence granted to Messrs. Curtiss & Harvey Limited for the use of patents 25993 and 25994/01.

The quantity of acetone recovered in connection with the manufacture of explosives for non-government use was 3,600 lbs for the half year ending 30th June 1913.

Mr. Rintoul has been informed that the draft has been forwarded to you.

I am,

Sir,

Your obedient Servant,

B.E. Holloway

for the Assistant Financial Secretary.

R.Robertson Esq., M.A. D.Sc. F.I.C.
Research Department,
Woolwich.

18/8/13 Sir — on behalf of Mr. Rintoul I have back/draft for one pound 17/10 royalty less I.T. from C & H. forwarded by W.O. on 14/8/13

E. & O.E. R.R.

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.

and the following number quoted.

84/R/3196 (M.G.O.F.).

War Office,
London, S.W.

28th August, 1914.

Sir,

I am directed to forward herewith a draft for £6.16.0 (six pounds sixteen shillings) being the amount of royalty - less income tax - due to Mr.Rintoul and yourself in connection with the licence granted to Messrs Curtis's and Harvey Limited for the use of patents 25993 and 25994/01.

The quantity of acetone recovered in connection with the manufacture of explosives for non-government use was 13,000 lbs. for the half-year ended 30th June, 1914.

Mr. Rintoul has been informed that the draft has been forwarded to you.

I am,

Sir,

Your obedient Servant,

P. Dawnay

for the Assistant Financial Secretary.

R.Robertson, Esq., M.A.,D.Sc.,F.I.C.,
Research Dept.
Royal Arsenal,
Woolwich.

Acknowledged
21/8/14
Forwd & T.S. Bank W.B.
21/8/14

Any further communication on this subject should be addressed to—

The Secretary,
War Office,
London, S.W.

and the following number quoted.

84/R/3432 (M.G.O.F.)

War Office,
London, S.W

28th January, 1915.

Sir,

I am directed to inform you that no payment of reyalty is due to you or Mr. Rintoul in respect of your patents 25993 and 25994/01 for the half-year ended 31st December, 1914, as Messrs W. G. Fraser & Co. recovered no Acetone during that period and the whole of the Acetone recovered by Messrs Curtis's & Harvey was from explosives supplied to the Government.

Renewal fees amounting to £28 were paid in September last, and a deduction of 3/- was made from royalty claimed from Messrs Curtis's & Harvey in adjustment of Income tax in respect of the payment made to you for June quarter, 1914.

A Receivable Order for £28. 3. 0 (twenty eight pounds three shillings) is accordingly forwarded herewith, and I am to request you to be good enough to refund the amount due from Mr. Rintoul and yourself.

I am,

Sir,

Your obedient Servant,

for the Assistant Financial Secretary.

R. Robertson, Esq., M.A., D.Sc., F.I.C.,
Research Department,
Royal Arsenal,
Woolwich.

Formal cheque on RRTWR 30/3/15

Any further communication on this subject should be addressed to:-

The Secretary,
War Office,
London, S.W.,

and the following number quoted.

War Office,
London, S.W.

84/R./3196. (F.5.).

12th October, 1915.

Sir,

I am directed to enclose herewith a draft for the sum of £24.9.3. being the amount of royalty - less income tax - due to Mr. Rintoul and yourself in connection with the licence granted to Messrs. Curtis's and Harvey, Ltd., for the use of patents 25993 and 25994/01, and to state that Mr. Rintoul has been informed accordingly.

The quantity of acetone recovered in connection with the manufacture of explosives for non-Governmental use was as follows :-

From 1st January to 5th April 1915 ... 22,946 lbs.
From 6th April to 30th June 1915..... 25,324 "

I am,

Sir,

Your obedient Servant,

B. E. Holloway

for Assistant Financial Secretary.

R. Robertson, Esq.,
M.A., D.Sc., F.I.C.,
Research Department,
Royal Arsenal,
Woolwich.

13/10/15

29 Charlton Rd.
Blkhth. SE.

22/1/12

My dear Willie,

I have been going over our joint accounts & you may like to have a statement of how matters stand.

The last settlement you will remember was on 6/5/11 when we were all square with a small balance (£3.11.10 in favour)

Since then the profits have been:—

Profit — Smith's (Sheffield) & Nobel's 2 plants (Shrs 1/4) nett	£66.11.1
Profit — Celluloid Co's experiments	501.12.2
Profit — Curtis's & Harvey	89.16.6
Profit — Purvis	2.19.9
Royalty — Celluloid Co to Sept. 1912	54.15.6
Royalty — Do. to Dec. 1912	54.7.8
	£770.2.8
Less Patent Fees (2yrs)	46
Total Profit	£724.2.8

On Dec 6, 1911 you had £300 from a/c, and I also £300 at that time. I propose now to divide £120, and send you herewith Cheque for £60 (sixty).

It may be of interest to note that our total profit to date is £4397.1.4.

Palmer has an order for an air machine (Brewers)

I hope Lottie & the second son are going strong.

Yours R. Robertson

29 Charlton Rd
Blackheath S.E.
6th May 1911

Dear Willie

I have been making up our accounts & you may care to have a note of how things stand at date.

General account

Expenditure £ 318 " 17 " 8½ Receipts £ 3976 " 8 " 6½

Profit £ 3657 . 10 . 10

Breweries (air machines)

Expenditure £ 19 " 1 " 0 Receipts 17 " 19 . 6

1 Deficit 1 " 1 . 6

[½ value of petrol machine to credit]

Celluloid — Expts. Guttmann

Expenditure £ 13 . 14 . 7 Receipts nil

Deficit 13 . 14 . 7

Air sterilising — Acct.

A few small items outstanding (if search)

The current account has a small balance in favour.

Yours R. R.

Mrs Bell

29 Chanter Rd.

In making out return for Income Tax I have overlooked ~~an~~ a few shillings of my joint account, since the last settlement

The following Investments should be shown here.

5/Jy/13	Income	1. 5. 6	25/1/14 Pat. Fees	£ 26. 0. 0
15/J/13	Ullswater Co	2. 4. 2		
14/8/13	6 1/2 Perpetual	1. 12. 10	28/1/- " "	28. 0. 0
30/8/14	6 1/2 Perpetual	6. 16. 0		£ 54. 0. 0
31/1/14	Treasury	30. 15. 0		
23/Ap/13	Ullswater Co.	2. 4. 2		
30/3/12	" "	25. 5. 0		
15/11/12	" "	5. 18. 10		
3/Jy/14	Mineral (Indpt)	92. 0. 0		
		157. 18. 4		
		3-4		
		113. 18. 4		

I am sending you a cheque for £ 30 taking £ 30 unpaid. This will leave a balance of about £ 20 in hand.

The above proofs to return corrected.

For Income Tax purposes I am declaring on the last items ~~the~~ Income/Dividend or ~~the rates~~ - that is or half the Tax

14/8/13 N. 0. 7. 8d/R/31d 6(Mgoff) £ 1. 12. 10 Perpetual, 6½% Tax was deducted

[= £ 3. 0. 0 gross]

30/1/14 Nat. 8d/R/33 5(Mgoff) — £ 25

31/1/14 Provincial Freight Corp (¾) £ 6. 16. 0 - Perpetual 6½% Tax deducted

[= £ 9. 15. 4 gross]

30/8/14 Nat. 8d/R/31d 6(Mgoff) £ 30. 15. 4 - Perpetual. Treas. Tax deducted

[= £ 3. 8. 0 - gross]

3d/1/14 Pat. Fees £ 26 + other returns in 28/1/15 Pat Fees £ 28

29 Charlton Road.
Blackheath S.E.
26/11/11

Dear Willie

Re. Curtis's & Harvey's. C. & H. have come to terms. (I shall send you correspondence tomorrow, as some of it is at Woolwich) I have gone over the Description and amended it & put C. & H. I have also been going through the drawings & am making arrangements for prints & getting them altered where necessary by Williams and coloured by Phillips. I should be glad to get the 2 typed copies as soon as you conveniently can get them done.

Re Guttmann's neutralising tower. I have been down at Limehouse five or six evenings working on this nuisance. After several adjustments & alterations the thing worked finally in a way that showed promise, that is we got acetone over of about 60% with low acidity & fair Kmno4 test (for the dilution). It showed it work, but what is worrying Pollitt is the material in which to make it. The lead is rapidly attacked by hot HCl & silica ware, if it could be made big enough is not above suspicion for practical working. We had also a very large flow of NaOH, & the fumes of this would, one would think be a serious item

on the large scale where an earthenware filter bowl was used. I shall go over the details when you come up next. (When will that be?)

Re accounts. There does not seem much use in leaving £600 in the W.A. bank so I enclose cheque for £200 and shall also draw £200.

Yrs sincerely

R Rabertson

LONDON JOINT CITY & MIDLAND BANK LIMITED
WITH WHICH IS INCORPORATED

The London Joint Stock Bank Limited.

Waltham Abbey Branch.

LETTERS TO BE ADDRESSED
"THE MANAGER".

Waltham Abbey, 25th May 1920
Essex.

Sir R. Roberts on,
29. Charlton Road,
Blackheath, S.E. 3

Dear Sir,

In reply to your letter of even date I find, as you say, that the last credit received on the joint account of yourself & Wm Rintoul was £10-13-1 in April 1917.

As I pointed out to Wm Rintoul there is no need to close the account if it is likely to be required but, it has been a long while dormant and, sometimes these small outstanding balances get over-looked.

Yours faithfully

J. P. Brown

Manager

Very glad to hear from you again
Kindest regards
WR

Private Correspondence R.R. & W.R. — re affairs.

1. R.R. & W.R. work statement of a/cs to date — 6/5/11, 21/1/13
2. Fraser's Statement of profit. — 6/11
3. Patent fees. Payment.
4. Fraser — models at S.K. — 30/9/12
5. Acct's — W.R. & R.R.
6. Chenot — see W. & F. II
7. Re Ellenborough Co.
8. C. & S. profit
- Knocks Profit £95

Advantages of Patents 25993 & 25994 of 1901.

Importance of Recovery of Acetone

Economy. Acetone a costly substance & used to the extent of 16½% of Cordite made.

Strategic value owing to Foreign sources of supply etc.

Reduction of reserve stocks.

The Bisulphite method is the only practical one extant.

It recovers over 80% of the acetone used.

It is easily adapted to existing drying stoves.

It is inexpensive in erection and upkeep.

The quality of the recovered acetone is better than the finist commercial product.

Practically all the acetone present in the stoves is recovered.

It is applicable to other industries.

Indian Patent — No 507 of 02

Approval to patent in India. S. of S. reserving similar rights to those here. 20/2/02
Application for leave to file in India. 13/11/02
Indian application filed. (Improvs. relating to the manuf. of peptonis, albuminates &c) 22/12/02

Indian Patent 507/1902 issued — 1 comprising document. 11/8/03

American Patent.

Filed — 10/10/82
Allowed — 27/1/03

French Patent

Filed — 19/2/03
Application allowed by French P.O. No. 329540. — 3/6/03

German Patent

Filed — 18/2/03

Any *further* communication respecting this matter should be addressed to—

THE PRINCIPAL,
COMMERCIAL DEPARTMENT,
(INTELLIGENCE BRANCH),
BOARD OF TRADE,
73, BASINGHALL STREET,
LONDON, E.C.

And the following number should be quoted :—

C.I.B. 2557

Telegraphic Address.

ADVANTAGE, LONDON.

BOARD OF TRADE,

COMMERCIAL DEPARTMENT,

(INTELLIGENCE BRANCH),

73, BASINGHALL STREET,

LONDON, E.C.

July 5 1904

Sir,

With reference to previous correspondence on the subject of the production & uses of Acetone in the United States, Germany & France, I now beg to state that a report has this morning been received here from the British Commercial Agent at Chicago on the subject of the use of Acetone in the ~~United States~~ country, copy of which I have pleasure in enclosing herewith.

This, with the exception of the further particulars relating to the use of Acetone in Germany, which as you were informed on the 25th ult. were being obtained for you & which it is hoped will soon be received, completes the data for which you originally applied.

I am Sir,
Your Obedient Servant
Thos. Worthington

Acknd 9/7/04

Robert Robertson Esq
4 Sewardstone Rd
Waltham Abbey.

Copy

Report on Acetone. by U.S. Comm. Attache at Chicago.

There does not appear to be any means for ascertaining what quantity of acetone is used in the United States.

This chemical is used in the manufacture of so many articles that it is impossible to say exactly what the total quantity used may be. It is employed in the manufacture of chloroform, iodoform, Sulphonal, for denaturating grain alcohol, in making Smokeless powder, & as a solvent in several of the arts.

In 1900 which is the latest date for which there are statistics, the quantity of acetone used in the manufacture of smokeless powder was about twenty-four tons. There is little doubt that the consumption now is much greater on account of smokeless powder supplanting rapidly black powder for military sporting purposes.

In 1900 there were 3 establishments making acetone. The quantity manufactured was 731½ tons, valued at $178,666.

Acetone is manufactured on a commercial scale from acetate of lime which is a by-product obtained in connection with the destructive distillation of wood.

The manufacture proceeds in two stages: First, the production of crude wood alcohol or wood spirit & crude acetate of lime; second, the refining of alcohol, the refining of the acetate of lime, or the production of acetic acid or acetone.

The refining processes are usually carried out at other works than those in which the crude materials are

are produced.

According to the Census Report of 1900 there were in that year 93 wood-distilling establishments in the United States which produced among other things 38 761 tons of acetate of lime, valued at $ 981,256.

The quantity of acetate of lime exported in 1900 was 21.335 tons, leaving only 17.426 tons for home consumption.

Before the introduction of the by-product process of manufacture, the importation of acetate of lime amounted, it is said, to as much as 1300 tons per annum.

In 1890 the quantity of acetate of lime manufactured in the United States was only 11.954 tons, valued at $315.420.

During the last 10 months the exportation of acetate of lime has been at the rate of 28,356 tons per annum.

The importation & exportation of acetone does not appear separately in the statements of imports & exports compiled by Collectors of Customs of the United States as rendered to the Bureau of Statistics. It may be presumed therefore, that only small quantities are handled.

Chicago January 10

Ed L. Sherman Bell.

[Second Edition.]

N° 25,994 A.D. 1901

Date of Application, 19th Dec., 1901

Complete Specification Left, 16th Sept., 1902—Accepted, 19th Feb., 1903

PROVISIONAL SPECIFICATION.

"Improvements relating to the Manufacture of Explosives, Celluloid and the like."

We, ROBERT ROBERTSON, and WILLIAM RINTOUL, Analytical Chemists, both of Oxford Villas, Waltham Abbey, in the County of Essex, do hereby declare the nature of this invention to be as follows:—

Our invention relates to the recovery of acetone used as a solvent in the manufacture of explosives, celluloid and the like. For example, in the manufacture of cordite, when the kneading has been completed, and the cold pressed, the cordite retains a large proportion of the solvent which is then driven off in drying houses or stoves, and is usually lost.

Again in the manufacture of water-proof fabrics or materials which are made by impregnating or coating a sheet of suitable material with a nitro-cellulose the best solvent known is acetone but this owing to its cost could not be commercially employed as no practicable method of recovering the acetone used in such a manufacture existed.

The object of our invention is to recover the acetone which is used in such manufactures and exists in the drying stoves or enclosures in a state of comparatively great attenuation, mixed with air.

Now, it is well known that acetone combines with bisulphites, such as bisulphite of sodium, potassium, magnesium, calcium, *etc.*, when the acetone is mixed with solutions of the salts. Considerable difficulties, however, occur in the application of this reaction to the practical recovery of acetone, as employed commercially in the manufacture of explosives and the like, owing to the comparatively great state of attenuation of the acetone vapour in air.

Our invention is based on the fact which we have discovered that such solutions of bisulphites are capable of, under suitable conditions—for example, by means of a gas scrubbing process—extracting a large proportion of the acetone vapour from a mixture with air, even though the vapour be only present in a state of great attenuation.

Our invention therefore consists in a process for the recovery of acetone existing as vapour in mixture with air, by causing the mixture to come thoroughly into contact with solutions of bisulphites, such as bisulphite of sodium, and potassium, and subsequently distilling the bisulphite compound either directly, with subsequent rectification in the presence of an alkali, or by the addition of an alkali, and subsequent distillation.

Our invention further consists in a method of removing the greater part of the sulphate from the bisulphite solution containing acetone by cooling the latter. Our invention also consists in applying our acetone recovery process to the manufacture of materials or articles in which a dissolved nitro-cellulose or its equivalent is employed.

In carrying our invention into effect, according to one modification, we employ a solution of thirty parts by weight of sodium bisulphite in 100 parts by volume of solution. This strength of solution is not essential although we find it very suitable; but if weaker solutions be employed, a larger volume of liquid

has to be handled. The solution of bisulphite of soda must be caused to come thoroughly in contact with the mixture of acetone vapour and air which is to be treated. We prefer to employ for this purpose one or more towers in which the solution is caused to trickle slowly down over a series of threads passing back and forth, and up through which the mixture of acetone and air is passed. A very thorough contact is thus secured between the vapour and air, and the absorbing solution. The solution which is drawn off is then treated for recovery of the acetone, as is further described below.

According to another modification of our invention, we cause the bisulphite solution to come thoroughly into contact with the air and acetone vapour mixture by means of spraying. The bisulphite solution is injected in the state of a fine spray into the mixture, and may be condensed by baffling it against the strands of a tower such as we have above described, or by passing it through a coil or in any other suitable manner. This spraying process may be used either by itself, or it may be used in combination with the tower process we have just described.

In order to prevent undue evaporation of the bisulphite liquor, we prefer to saturate the air with moisture before treatment, either by means of a tower through which water is passed, or by other suitable means.

For the recovery of the acetone from bisulphite solution, the bisulphite compound may be distilled with sufficient alkali to form sulphite, and the acetone condensed and rectified in the usual way; or it may be treated by the following process, which we have found specially suitable. We have found that on direct distillation, without the addition of any alkali, practically all the acetone has distilled over before any substantial proportion of the bisulphite present has become decomposed, and the small amount of sulphurous acid which is driven over can be recovered as sulphite by the addition of an equivalent quantity of alkali to the distillate before final rectification of the acetone. This method has the great advantage that it does not involve the conversion of all the bisulphite into sulphite, and the greater part of the solution is available again for absorption preferably after treatment with a relatively small quantity of sulphurous acid.

During the time the bisulphite solution is exposed to the oxidising action of the air, a certain amount of oxidation to sulphate takes place. If this sulphate were allowed to accumulate, it might interfere with the action of the absorbent. We find, however, that the sulphate formed is only slightly soluble at moderately low temperatures, in a solution of bisulphite containing a small quantity of acetone. If, therefore, after being sufficiently saturated with acetone vapour in the tower, the solution is cooled down somewhat, the excess of sulphate crystallizes out, leaving the solution sufficiently free from sulphate for further use in the towers, after the acetone has been distilled off.

It will be obvious that the mixture of acetone vapour and air might be made to come in contact with the gas by means of ordinary scrubbing towers, or by bubbling the air through a series of vessels containing the bisulphite solution, without departing from our invention.

In applying our invention to manufactures in which nitro-cellulose is dissolved in acetone we arrange the drying stoves and it may be the coating impregnating or spraying machines where such are employed in enclosures so that the air charged with acetone may be drawn off and treated as above described.

Dated this 19th day of December, 1901.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.,
13, Temple Street, Birmingham, and
25, Cross Street, Manchester,
Agents.

COMPLETE SPECIFICATION

"Improvements relating to the Manufacture of Explosives, Celluloid and the like."

I, ROBERT ROBERTSON and WILLIAM RINTOUL Analytical Chemists, both of Oxford Villas, Waltham Abbey, in the County of Essex. do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Our invention relates to the recovery of acetone used as a solvent in the manufacture of explosives, celluloid and the like. For example, in the manufacture of cordite, when the kneading has been completed and the cold pressed, the cordite retains a large proportion of the solvent which is then driven off in drying houses or stoves, and is usually lost.

Again, in the manufacture of water-proof fabrics or materials which are made by impregnating or coating a sheet of suitable material with a nitro-cellulose, the best solvent known is acetone but this owing to its cost could not be commercially employed as no practicable method of recovering the acetone used in such a manufacture existed.

The object of our invention is to recover the acetone which is used in such manufactures and which exists in drying stoves or enclosures in a state of comparatively great attenuation, mixed with air.

Now it is well known that acetone combines with bisulphites, such as bisulphite of sodium, potassium, magnesium, calcium, *etc.*, when the acetone is mixed with solutions of the salts. Considerable difficulties, however, occur in the application of this reaction to the practical recovery of acetone, as employed commercially in the manufacture of explosives and the like, owing to the comparatively great state of attenuation of the acetone vapour in the air.

Our invention is based on the fact which we have discovered that such solutions of bisulphites are capable under suitable conditions—for example, by means of a gas scrubbing process—of extracting a large proportion of the acetone vapour from a mixture with air, even though the vapour be only present in a state of great attenuation.

Our invention therefore consists in a process for the recovery of acetone existing as vapour in mixture with air, by causing the mixture to come thoroughly into contact with solutions of bisulphites, such as bisulphite of sodium or potassium and subsequently distilling the bisulphite compound either directly with subsequent rectification in the presence of an alkali, or by the addition of an alkali and subsequent distillation.

Our invention further consists in a method of removing the greater part of the sulphate from the bisulphite solution containing acetone by cooling the latter. Our invention also consists in applying our acetone recovery process to the manufacture of materials or articles in which a dissolved nitro-cellulose or its equivalent is employed.

Referring to the accompanying drawings:—

Figure 1 is an elevation and

Figure 2 is a plan of one general arrangement of apparatus suitable for the carrying out of our process.

According to one modification, the air mixed with acetone is led from the drying house or enclosure, *a*, through a pipe b^1 to the bottom of a scrubbing tower c^1 from the top of which it is led through another pipe b^2 to the bottom of the next tower c^2 and so on through as many more towers as are necessary to carry out the process. The air may be drawn through the towers by any suitable form of aspirator or ejector, *d*. The solution of bisul-

phite of soda is stored in a tank, e^1 which may be conveniently supported on the wall of the drying stove; from this tank it passes through a pipe, f^1 to the top preferably of the tower from which the air finally issues, and after passing through this tower and coming into intimate contact with the mixture of air and acetone to be treated, passes away from the bottom of the tower to a vessel h^1 constructed on the model of an ordinary Wolff's bottle; or montajus; compressed air may be used to force the liquid back from this vessel through the pipe i^1, to a second tank e^2 the cycle being repeated through the other towers. The solution which is finally drawn off is then treated for the recovery of the acetone as is described below. Similar parts are indicated in the drawing by the same letter with a different numerical suffix.

For the purpose of bringing the bisulphite of soda solution thoroughly into contact with the mixture of air and acetone to be treated, we prefer to employ towers in which the solution is caused to trickle slowly down over a series of threads passing back and forth and up through which the mixture of acetone and air is passed, according to our Patent No. 25993 of 1901.

The solution we prefer to employ consists of thirty parts by weight of sodium bisulphite in a hundred parts by volume of solution. This strength of solution is not essential though we find it very suitable; but if weaker solutions be employed, a larger volume of liquid has to be handled.

According to another modification of our invention, we cause the bisulphite solution to come thoroughly into contact with the air and acetone vapour mixture by means of spraying. The bisulphite solution is injected in the state of a fine spray into the mixture and may be condensed by baffling it against the strands of a tower such as we have above described or by passing it through a coil or in any other suitable manner. This spraying process may be used either by itself or it may be used in combination with the tower process we have just described.

In order to prevent undue evaporation of the bisulphite liquor, we prefer to saturate the air with moisture before treatment, either by means of a tower through which water is passed or by other suitable means.

For the recovery of the acetone from the bisulphite solution after it has passed through the towers, the liquid is passed into a still, k, connected to a condenser l. This part of our process may be effected in several ways; for instance, the solution containing the bisulphite compound may be distilled with sufficient alkali to form sulphite and the acetone condensed and rectified in the usual manner, or it may be treated by the following process, which we have found specially suitable.

We have found that on direct distillation without the addition of any alkali, practically all the acetone has distilled over before any substantial quantity of the bisulphite present has become decomposed and the small amount of sulphurous acid which is driven over can be recovered as sulphite by the addition of any equivalent quantity of alkali to the primary distillate before final rectification of the acetone. This method has the great advantage that it does not involve the conversion of the bisulphite into sulphite and the greater part of the bisulphite solution is available again for absorption, preferably after treatment with a relatively small quantity of sulphurous acid.

During the time the bisulphite solution is exposed to the oxidising action of the air, a certain amount of oxidation to sulphate takes place. If this sulphate were allowed to accumulate, it might interfere with the action of the absorbent. We find, however, that the sulphate formed is only slightly soluble at moderately low temperatures, in a solution of bisulphite containing a small quantity of acetone. If, therefore, after being sufficiently saturated with acetone vapour in the tower, the solution is cooled down somewhat, the excess of sulphate crystallizes out, leaving the solution sufficiently free from sulphate for further use in the towers, after the acetone has been distilled off.

It will be obvious that the mixture of acetone vapour and air might be made to come into contact with the gas by means of ordinary scrubbing towers

or by bubbling the air through a series of vessels containing a bisulphite solution, without departing from our invention.

In applying our invention to manufactures in which nitro-cellulose is dissolved in acetone whether it be the manufacture of explosives, celluloid, waterproof fabrics or otherwise, we arrange the drying to take place in enclosures so that the air charged with acetone may be drawn off and treated as above described.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulphite and subsequently separating the acetone.

2. In the process for the recovery of acetone claimed in Claim 1, the method of separating acetone from a solution of bisulphite consisting in distilling the compound directly, practically all the acetone coming over before any substantial decomposition of the bisulphite has taken place, and recovering the small amount of sulphurous acid which does come over by the addition of an alkali, before final rectification of the acetone.

3. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulphite and subsequently separating the acetone by distilling the compound with sufficient alkali to form sulphite, the acetone being afterwards condensed and rectified.

4. In the process for the recovery of acetone claimed in Claim 1, the method of separating any sulphate that may form by cooling the liquor, the sulphate being only sparingly soluble at comparatively low temperatures and therefore crystallising out.

5. In the process for the recovery of acetone claimed in Claim 1, the method of saturating with moisture the air to be treated, before it comes into contact with the bisulphite solution, whereby undue evaporation of the bisulphite liquor is prevented.

Dated this 16th day of September 1902.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.
13, Temple Street, Birmingham, and
30, Cross Street, Manchester,
Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.
[G. 7221—125—5/1903.]

A.D. 1901. Dec. 19. Nº. 25,994.

ROBERTSON & *another's* Complete Specification.

(1 SHEET)

(2nd Edition)

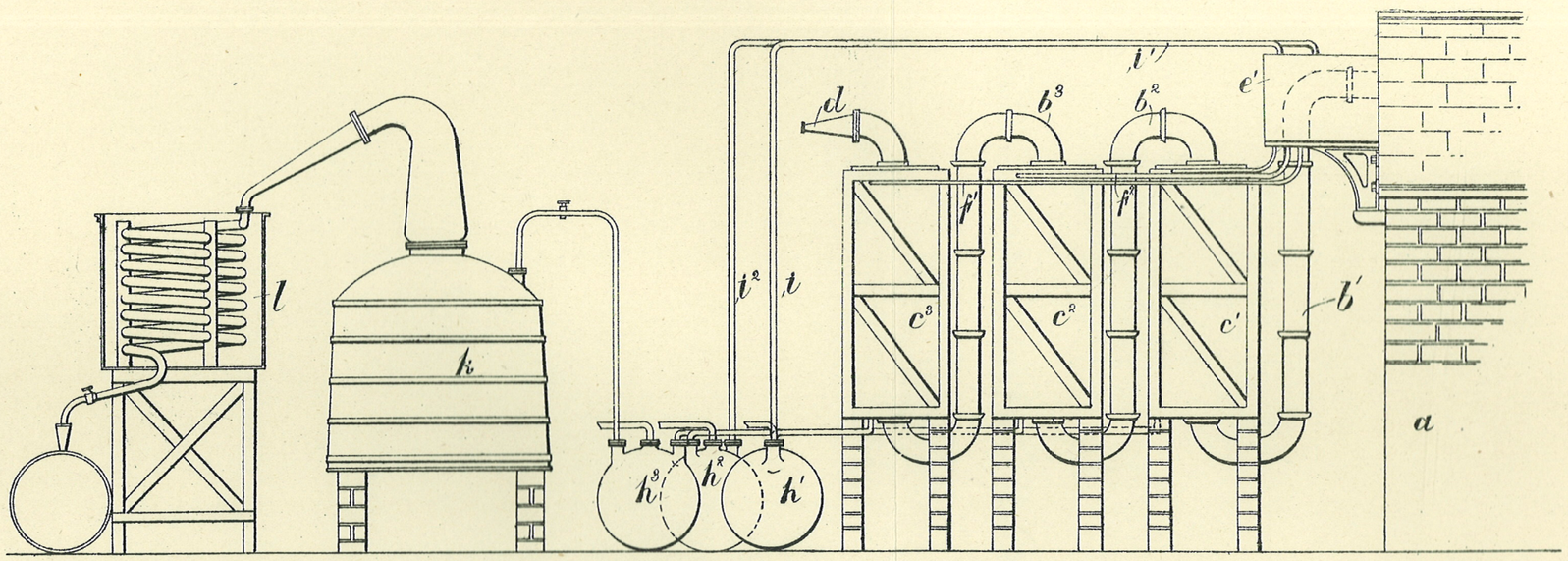


Fig. 1.

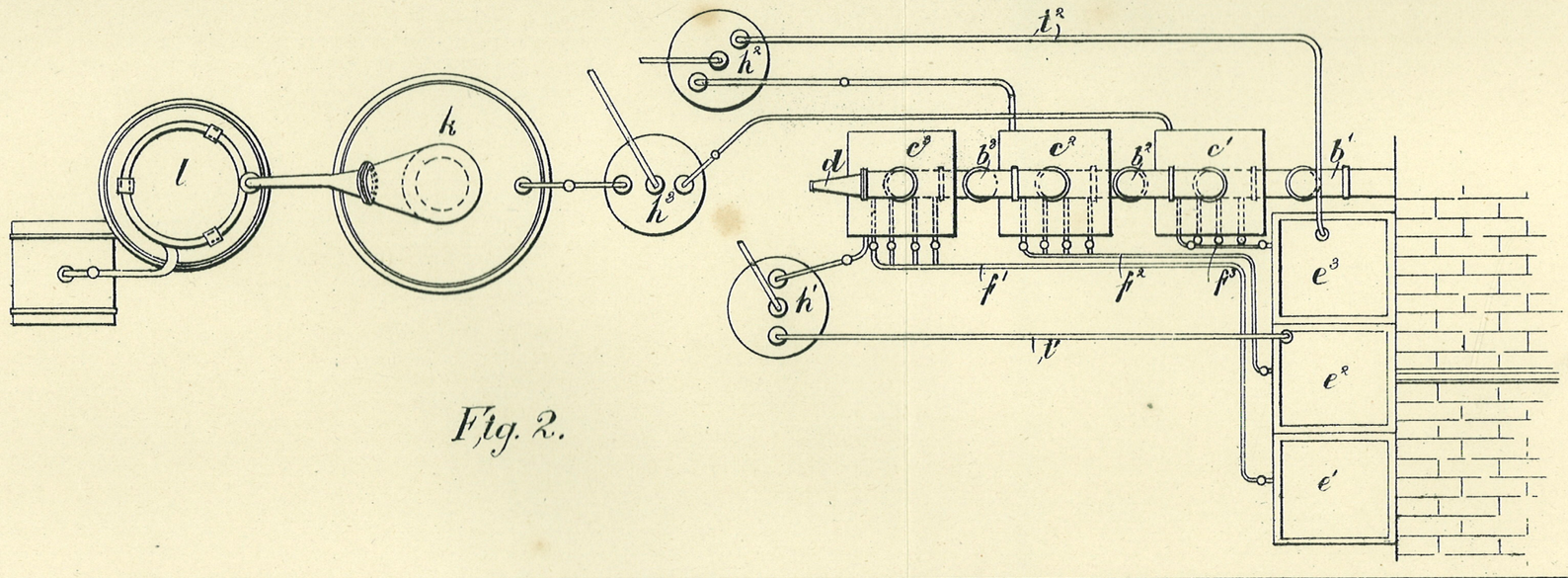


Fig. 2.

[*This Drawing is a reproduction of the Original on a reduced scale.*]

Malby&Sons, Photo-Litho.

KAISERLICHES PATENTAMT.

AUSGEGEBEN DEN 24. SEPTEMBER 1904.

PATENTSCHRIFT

— № 154124 —

KLASSE 12 o.

ROBERT ROBERTSON UND WILLIAM RINTOUL IN OXFORD VILLAS, WALTHAM ABBAY.

Verfahren zum Wiedergewinnen von Aceton aus einem Gemisch mit Luft.

Patentiert im Deutschen Reiche vom 19. Februar 1903 ab.

Die vorliegende Erfindung bezieht sich auf das Wiedergewinnen von Aceton, das als Lösungsmittel bei der Herstellung von Explosivstoffen, Zelluloid und dergl. benutzt worden ist. Bei der Herstellung von Cordit z. B. hält nach dem Kneten und Pressen des Fadens das Cordit eine große Menge des Lösungsmittels zurück, das in Trockenhäusern oder Öfen auszutreiben ist und gewöhnlich verloren geht.

Andererseits ist bei der Herstellung von wasserdichten Stoffen, welche durch Überziehen oder Imprägnieren einer Lage geeigneten Stoffes mit Nitrocellulose gefertigt werden, Aceton das beste bekannte Lösungsmittel, aber es wird wegen seiner Kostspieligkeit nicht benutzt, weil bisher das Wiedergewinnen des Acetons in solchen Betrieben nicht möglich war.

Diese Aufgabe zu lösen, ist das vorliegende Verfahren bestimmt, indem es gestattet, das Aceton wiederzugewinnen, welches in Trockenöfen oder -räumen in verhältnismäßig starker Verdünnung mit Luft gemischt ist.

Es ist nun durch Laboratoriumsversuche bekannt, daß sich Aceton mit Bisulfiten verbindet, wie mit Natrium-, Kalium-, Magnesium-, Calciumbisulfit, wenn das Aceton mit Lösungen dieser Salze gemischt wird; aber man hielt eine wirtschaftliche Benutzung dieser Reaktion zum Wiedergewinnen von Aceton im großen nicht für durchführbar, wenn es sich um die Herstellung von Explosivstoffen und dergl. handelt, weil hier das Acetongas so stark verdünnt der Luft, also einem oxydierenden Stoffe, beigemengt ist und das Absorptionsmittel selbst ein leicht oxydierbarer Stoff ist. Aus diesem Grunde lassen sich gewisse bekannte Verfahren zum Wiedergewinnen, wie z. B. von Ammoniak durch Absorption in Schwefelsäure und darauf folgendes Abscheiden, nicht als Analogien für die vorliegende Aufgabe heranziehen. Andererseits hat der Versuch, Wasser als Absorptionsmittel des Acetons anzuwenden, keine brauchbaren Erfolge gezeitigt, weil zu außerordentliche Wassermengen im Verhältnis zum wiederzugewinnenden Aceton notwendig wurden und weil zu viel Aceton dabei verloren ging.

Die vorliegende Erfindung stützt sich auf die Beobachtung, daß jene Bisulfitlösungen unter gewissen, für den Großbetrieb passenden Bedingungen — z. B. mit Hilfe eines Gaswaschverfahrens — fähig sind, eine bedeutende Menge von Acetongas aus einer Mischung von Luft auszuziehen, selbst wenn sich das Gas in einem Zustand großer Verdünnung befindet. Es gelingt damit, das Aceton so gut wie vollständig wiederzugewinnen.

So haben Versuche dargetan, daß im Vergleich zur Bisulfitlösung unter den sonst genau gleichen Arbeitsbedingungen Wasser in vierfacher Menge nur $^5/_8$ des Acetons wiedergewinnen läßt. Außerdem zeigten die Versuche die größere Verwandtschaft des Acetons zur Bisulfitlösung bei solcher Tem-

peratur, wie sie in Trockenöfen für Explosivstoffe benutzt zu werden pflegt, nämlich 37 bis 40°. Es stellte sich beim neunstündigen Durchblasen von Luft durch Bisulfitlösung und durch Wasser mit Aceton heraus, daß nur 7 Prozent Aceton aus der Bisulfitlösung, dagegen nicht weniger als 80 Prozent aus dem Wasser verschwunden waren. Es folgt daraus, daß mit einer noch so großen Menge Wassers der gesamte Acetongehalt nicht wiedergewonnen werden kann, wogegen die Anwendung der Bisulfitlösung praktisch gar kein Aceton der Absorption entgehen läßt.

Das Wesen der vorliegenden Erfindung besteht demnach in einem Verfahren, Aceton, welches als Gas in Mischung mit Luft vorhanden ist, wiederzugewinnen, indem man die Mischung in innige Berührung mit Bisulfitlösungen bringt und dann das Bisulfitgemenge entweder unmittelbar mit darauf folgender Rektifikation in Anwesenheit von Alkali destilliert oder ein Alkali hinzufügt und darauf Destillation vornimmt.

Der Verlust, den das Natriumbisulfit durch Oxydation erleidet, spielt bei der Durchführung des Gesamtverfahrens keine wesentliche Rolle, denn er beschränkt sich auf 1,3 Prozent, so daß die Kosten nicht den hundertsten Teil des Gewinnes an zurückerhaltenem Aceton betragen.

Es empfiehlt sich, das Verfahren mit einer Anfangstemperatur des Acetonluftgemisches von etwa 50° auszuführen, doch lassen sich auch erheblich geringere oder höhere Temperaturen anwenden.

Das neue Verfahren ist auch zum Wiedergewinnen von Aceton bei der Erzeugung von Gegenständen oder Stoffen anwendbar, wo gelöste Nitrocellulose oder äquivalente Stoffe benutzt werden.

Die beiliegenden Zeichnungen dienen zur Veranschaulichung des neuen Verfahrens. Sie zeigen in Ansicht und Grundriß eine Anlage, die zur Ausübung des Verfahrens benutzbar ist.

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Die schließlich abgezogene Lösung wird zum Wiedergewinnen des Acetons weiter behandelt. Um die Natriumbisulfitlösung in innige Berührung mit dem Gemisch von Luft und Aceton zu bringen, sind vorzugsweise Türme anzuwenden, wo die Lösung über eine Reihe von Horden im Zickzackweg langsam niederrieselt, und zwar gemäß der britischen Patentschrift 25993 v. J. 1901.

Eine geeignete Lösung besteht in 30 Gewichtsteilen Natriumbisulfit auf 100 Volumenteile der Lösung; diese Konzentration ist nicht erforderlich, aber sehr zweckmäßig, und wenn schwächere Lösungen angewendet werden, müssen größere Flüssigkeitsmengen zur Wirksamkeit kommen.

Gemäß einer anderen Ausführungsform der Erfindung läßt man die Bisulfitlösung in feinen Strahlen mit dem Luft- und Acetondampf in innige Berührung kommen, indem man die Strahlen am Fuß eines Turmes wieder sammelt, durch Prellwände kondensiert, durch eine Schlange laufen läßt oder dergl. Dieses Sprühverfahren kann entweder allein oder in Verbindung mit dem beschriebenen Gaswaschen benutzt werden.

Um unnötiges Verdampfen der Bisulfitflüssigkeit zu vermeiden, ist es zweckmäßig, die Luft vor der Waschung mit Feuchtigkeit zu sättigen, entweder mit Hilfe eines Turmes, durch den Wasser läuft, oder durch andere geeignete Vorrichtungen.

Um das Aceton aus der Bisulfitlösung zu gewinnen, nachdem diese durch die Türme gelaufen ist, läßt man die Flüssigkeit in eine Blase k, die mit einem Kondensator l verbunden ist. Dieser Teil des Verfahrens kann in verschiedener Weise ausgeführt werden, z. B. kann die das Bisulfitgemenge enthaltende Lösung mit einer genügenden Menge Alkali destilliert werden, um Sulfit zu bilden und das Kondensieren und Rektifizieren des Acetons in der gewöhnlichen Weise zu bewirken, oder es kann das folgende, besonders günstige Verfahren ausgeübt werden.

Es hat sich herausgestellt, daß bei der unmittelbaren Destillation ohne Beifügung von Alkali praktisch das Aceton überdestilliert ist, bevor irgend eine weitere Menge des vorhandenen Bisulfits zersetzt wird, und die geringe Menge von schwefliger Säure, die übergetrieben wird, kann als Sulfit durch

Hinzufügung einer äquivalenten Menge von Alkali zum ersten Destillat vor der endgültigen Rektifikation des Acetons wiedergewonnen werden. Dieses Verfahren hat den großen Vorzug, daß die Umwandlung des Bisulfits wegfällt und der größere Teil der Bisulfitlösung wieder zur Absorption zur Verfügung steht nach zweckmäßiger Behandlung mit einer verhältnismäßig geringen Menge von schwefliger Säure.

Während der Zeit, wo die Bisulfitlösung der oxydierenden Wirkung der Luft ausgesetzt wird, findet eine Oxydation zu Sulfat in gewissem Umfange statt. Wenn dieses Sulfat sich ansammeln könnte, würde es die Wirkung des Bisulfits beeinträchtigen. Es zeigt sich aber, daß das gebildete Sulfat bei verhältnismäßig niedrigen Temperaturen nur wenig löslich ist, wenn es sich in einer Lösung von Bisulfit mit einer geringen Menge von Aceton befindet. Wenn man daher die Lösung, nachdem sie genügend mit Acetondampf gesättigt ist, ein wenig kühlt, so kristallisiert der Überschuß an Sulfat aus und läßt die Lösung hinreichend frei von Sulfat zur weiteren Benutzung in den Türmen zurück, nachdem das Aceton abdestilliert ist.

Man kann auch die Behandlung der Mischung von Aceton und Luft in gewöhnlichen Waschtürmen vornehmen oder man bläst die Luft durch eine Anzahl von Gefäßen mit Bisulfitlösung.

Bei der Anwendung der Erfindung auf Betriebe, wo Schießbaumwolle in Aceton aufgelöst ist, wenn es sich z. B. um die Herstellung von Sprengstoffen, Celluloid, wasserdichten Stoffen oder dergl. handelt, wird das Trocknen in Räumen derart vorzunehmen sein, daß die mit Aceton vermischte Luft abgezogen und in der geschilderten Art behandelt werden kann.

Patent-Ansprüche:

1. Verfahren zum Wiedergewinnen von Aceton aus einem Gemisch mit Luft, dadurch gekennzeichnet, daß man die Mischung in innige Berührung mit einer Lösung von Bisulfit bringt und dann das Aceton abscheidet.

2. Zur Ausführung des Verfahrens nach Anspruch 1 behufs Trennung des Acetons von der Bisulfitlösung die unmittelbare Destillation des Gemenges, bei welcher praktisch das gesamte Aceton übergeht, bevor eine wesentliche Zersetzung des Bisulfits eintritt, wobei die geringe Menge schwefliger Säure durch Beigabe von Alkali wiedergewonnen wird, bevor die endgültige Rektifikation erfolgt.

Hierzu 1 Blatt Zeichnungen.

BERLIN. GEDRUCKT IN DER REICHSDRUCKEREI.

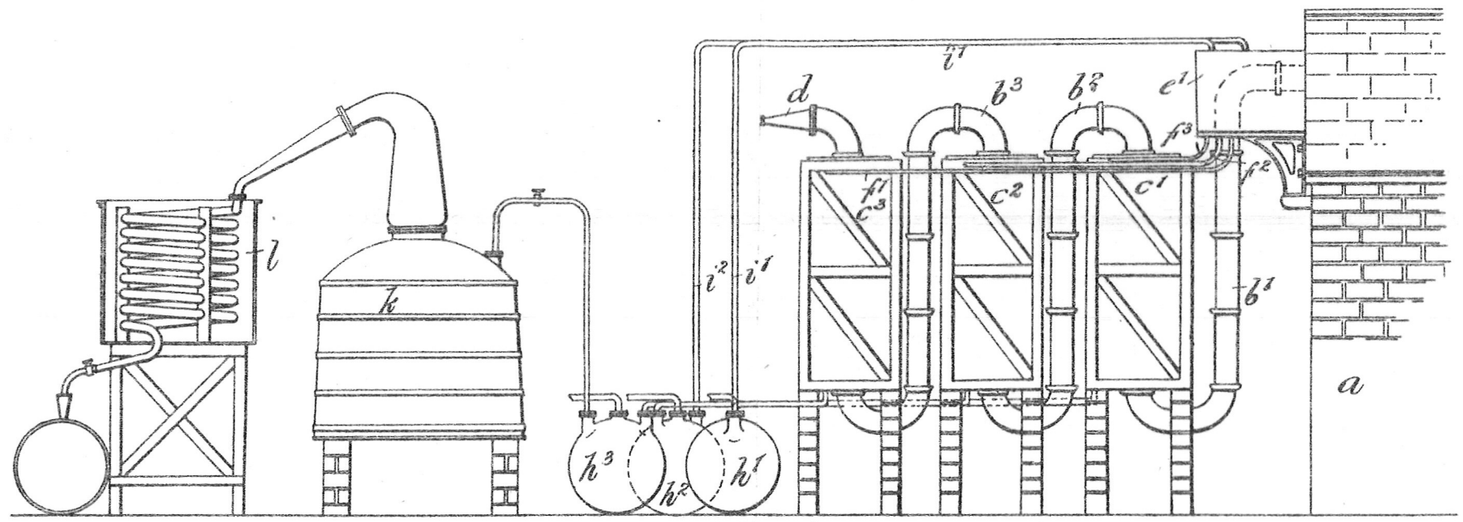


Fig. 1.

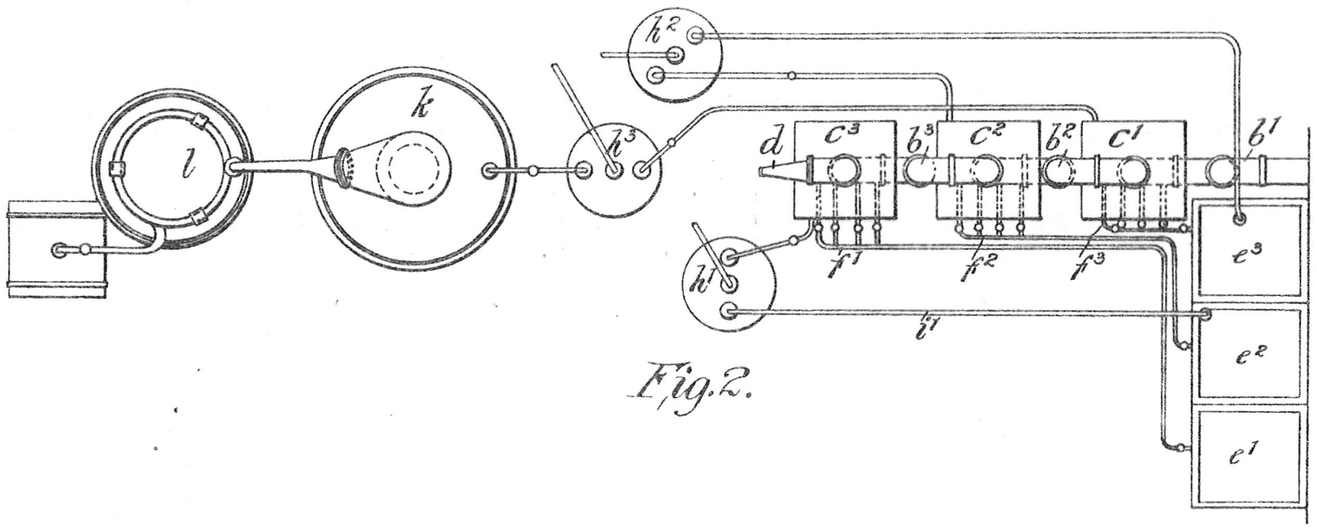


Fig. 2.

Zu der Patentschrift

№ 154124.

PHOTOGR. DRUCK DER REICHSDRUCKEREI.

KAISERLICHES PATENTAMT.

AUSGEGEBEN DEN 24. SEPTEMBER 1904.

PATENTSCHRIFT

— № 154124 —

KLASSE 12 o.

ROBERT ROBERTSON UND WILLIAM RINTOUL IN OXFORD VILLAS, WALTHAM ABBAY.

Verfahren zum Wiedergewinnen von Aceton aus einem Gemisch mit Luft.

Patentiert im Deutschen Reiche vom 19. Februar 1903 ab.

Die vorliegende Erfindung bezieht sich auf das Wiedergewinnen von Aceton, das als Lösungsmittel bei der Herstellung von Explosivstoffen, Zelluloid und dergl. benutzt worden ist. Bei der Herstellung von Cordit z. B. hält nach dem Kneten und Pressen des Fadens das Cordit eine große Menge des Lösungsmittels zurück, das in Trockenhäusern oder Öfen auszutreiben ist und gewöhnlich verloren geht.

Andererseits ist bei der Herstellung von wasserdichten Stoffen, welche durch Überziehen oder Imprägnieren einer Lage geeigneten Stoffes mit Nitrocellulose gefertigt werden, Aceton das beste bekannte Lösungsmittel, aber es wird wegen seiner Kostspieligkeit nicht benutzt, weil bisher das Wiedergewinnen des Acetons in solchen Betrieben nicht möglich war.

Diese Aufgabe zu lösen, ist das vorliegende Verfahren bestimmt, indem es gestattet, das Aceton wiederzugewinnen, welches in Trockenöfen oder -räumen in verhältnismäßig starker Verdünnung mit Luft gemischt ist.

Es ist nun durch Laboratoriumsversuche bekannt, daß sich Aceton mit Bisulfiten verbindet, wie mit Natrium-, Kalium-, Magnesium-, Calciumbisulfit, wenn das Aceton mit Lösungen dieser Salze gemischt wird; aber man hielt eine wirtschaftliche Benutzung dieser Reaktion zum Wiedergewinnen von Aceton im großen nicht für durchführbar, wenn es sich um die Herstellung von Explosivstoffen und dergl. handelt, weil hier das Acetongas so stark verdünnt der Luft, also einem oxydierenden Stoffe, beigemengt ist und das Absorptionsmittel selbst ein leicht oxydierbarer Stoff ist. Aus diesem Grunde lassen sich gewisse bekannte Verfahren zum Wiedergewinnen, wie z. B. von Ammoniak durch Absorption in Schwefelsäure und darauf folgendes Abscheiden, nicht als Analogien für die vorliegende Aufgabe heranziehen. Andererseits hat der Versuch, Wasser als Absorptionsmittel des Acetons anzuwenden, keine brauchbaren Erfolge gezeitigt, weil zu außerordentliche Wassermengen im Verhältnis zum wiederzugewinnenden Aceton notwendig wurden und weil zu viel Aceton dabei verloren ging.

Die vorliegende Erfindung stützt sich auf die Beobachtung, daß jene Bisulfitlösungen unter gewissen, für den Großbetrieb passenden Bedingungen — z. B. mit Hilfe eines Gaswaschverfahrens — fähig sind, eine bedeutende Menge von Acetongas aus einer Mischung von Luft auszuziehen, selbst wenn sich das Gas in einem Zustand großer Verdünnung befindet. Es gelingt damit, das Aceton so gut wie vollständig wiederzugewinnen.

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Das neue Verfahren ist auch zum Wiedergewinnen von Aceton bei der Erzeugung von Gegenständen oder Stoffen anwendbar, wo gelöste Nitrocellulose oder äquivalente Stoffe benutzt werden.

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Gemäß der dargestellten Ausführungsform wird die mit Aceton gemischte Luft aus dem Trockenhaus a durch ein Rohr b^1 zu dem Boden eines Waschturmes c^1 geleitet, von dessen Kopf durch ein anderes Rohr b^2 zu dem Boden eines folgenden Turmes c^2 usf. durch eine beliebige, zur Ausführung des Verfahrens notwendige Zahl von Türmen. Die Luft kann durch die Türme mittels irgend einer geeigneten Saug- oder Ejektoreinrichtung d befördert werden. Die Lösung von Natriumbisulfit ist in einem Behälter e^1 aufgespeichert, der zweckmäßig an der Wand des Trockenhauses befestigt ist. Von diesem Behälter gelangt das Bisulfit durch ein Rohr f^1 zu dem Kopf des Turmes, von wo die Luft entweicht, und sie läuft durch diese Türme, indem sie in innige Berührung mit der Mischung von Luft und Aceton gelangt, tritt am Boden des Turmes in ein Gefäß h^1 nach Art der gewöhnlichen Woolff'schen Flaschen und wird durch Preßluft in dem Rohr i^1 nach einem zweiten Behälter e^2 gedrückt, um die anderen Türme zu beschicken.

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Man kann auch die Behandlung der Mischung von Aceton und Luft in gewöhnlichen Waschtürmen vornehmen oder man bläst die Luft durch eine Anzahl von Gefäßen mit Bisulfitlösung.

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2. Zur Ausführung des Verfahrens nach Anspruch 1 behufs Trennung des Acetons von der Bisulfitlösung die unmittelbare Destillation des Gemenges, bei welcher praktisch das gesamte Aceton übergeht, bevor eine wesentliche Zersetzung des Bisulfits eintritt, wobei die geringe Menge schwefliger Säure durch Beigabe von Alkali wiedergewonnen wird, bevor die endgültige Rektifikation erfolgt.

Hierzu 1 Blatt Zeichnungen.

BERLIN. GEDRUCKT IN DER REICHSDRUCKEREI.

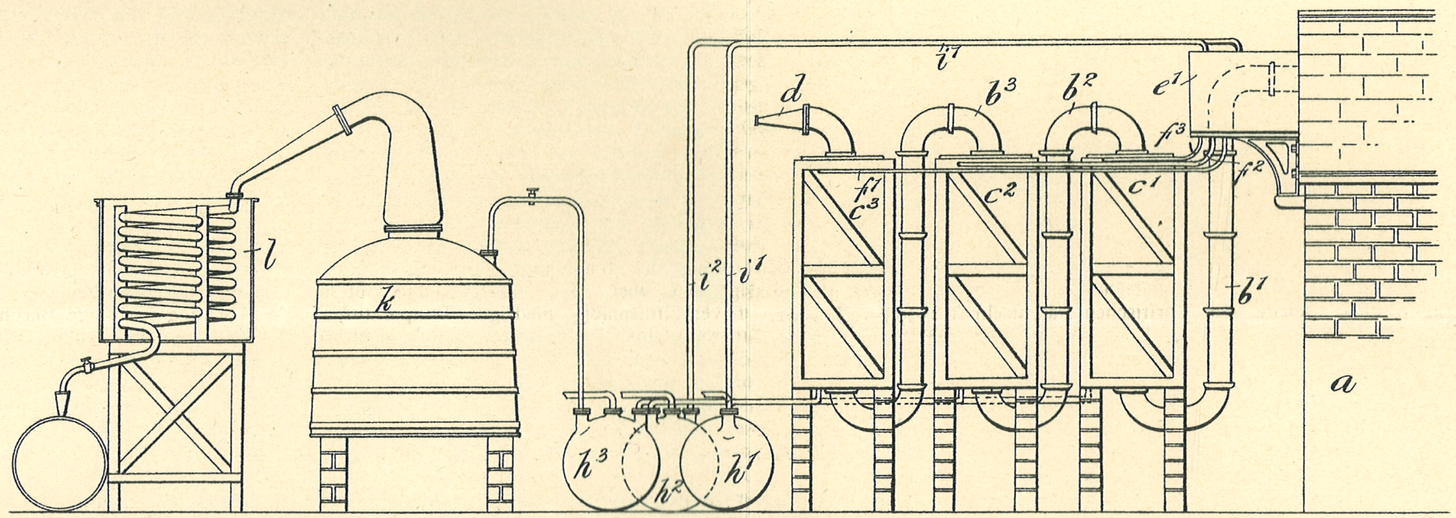


Fig. 1.

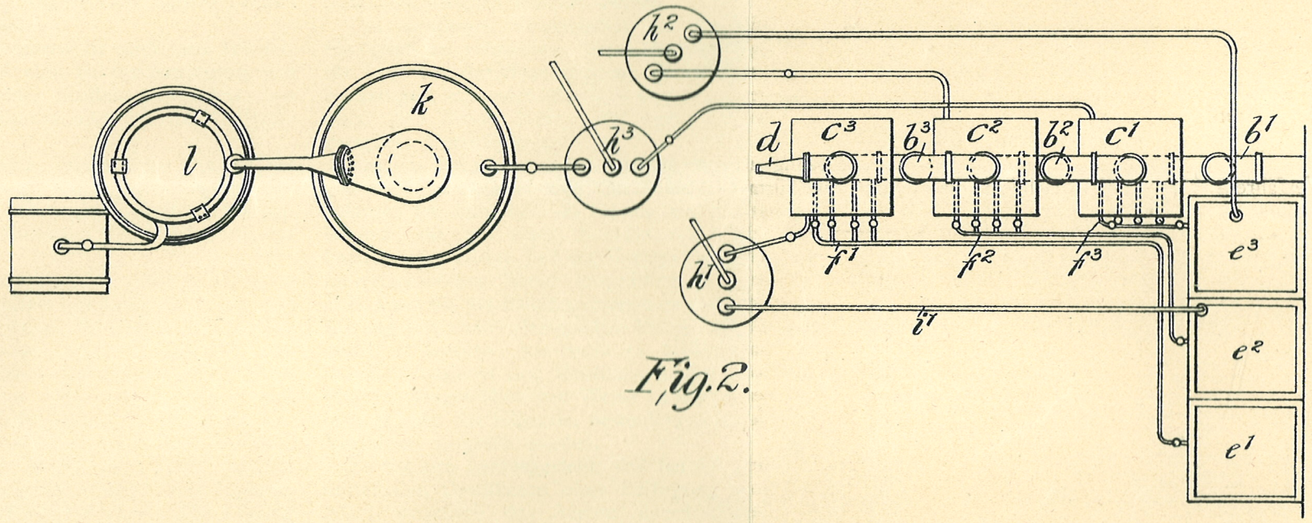


Fig. 2.

PHOTOGR. DRUCK DER REICHSDRUCKEREI.

Zu der Patentschrift

№ 154124.

vate firms.

11/01

– "not grant exclusive rights to the use of the Patent to any one other than the S.P.S. without special permission."

. D.90. "a licence should not be given to one individual to the exclusion of another"

3. D.S.O. "question of licence under consideration, but pending any further instructions, which it may subsequently be decided to issue. Dr. R. Thr. W.P.R. may be informed that if any firm expressed a wish to use the Patent in question, a report to that effect may be made to this office"

We called attention of Messrs Andre', Perks, Master Hale + Kraftmeier to the Proviso

Supt. gave his view re D.S.O's. memo.

D.S.O. requires information – "What royalties you consider should reasonably be charged to Salonac, Nobels, Curtis & Harvey. if granted licences to manufacture under No. 25994 of 01.

": Having regard to importance, saving, excellence of product, practicability of working, min. royalty £6 per ton of acetone recovered.

also consider £1 for use of plant (Pat. 25993).

Presume that sufficient safeguards, by agreement or otherwise will be included in connection with collection of the royalties.

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enade
est. year 2200 tons (present normal)
ade@½ more 3300
Place 5500 – containing 2365 tons acetone of which 1200 tons is recoverable @£3 a ton saving
= £36,000 a year.

calc of royalty.

m.D.

mkd. 35 tons week = 44 tons
½ more 66
= 3300 tons year
of acetone 1320 tons
acetone 660 tons
private firms 110 tons year
tons a week – average for each
rivate firm

For 2 tons week :–

3 men @ 35/-	£5 · 5	
1 man @ 40/-	2	
	7 · 5	
Indirect expenses @ 75%	5 · 18	
	12 · 3	

wages for 1 ton	£	6 · 2	0
Loss of solution per ton		2 · 2	0
Clean coal		1 · 0	0
amortisation @ 5% on £2500 – per ton		1 · 0	0
	£	10 · 4	

acetone @ £50 per ton – £10 – £6 (royalty) = £34

~~20~~ 40 £6 is 20% of nett profit.
or 15% of gross —

Re Private firms.

84 R 2530 — 12/11/01 "not grant exclusive rights to the use of the Patent Dam one other than the S.S. without special permission."

20/2/02. D.G.O. "a licence should not be given to one individual to the exclusion of another"

12/6/03. D.f.o. "question of licence under consideration, but pending any further instructions, which it may subsequently be decided to issue. Dr. R. Thos W.R. may be informed that if any firm expressed a wish to use the Patent in question, a report to that effect may be made to this office."

17/6/03. We called attention of Messrs André, Parks, Marten Hale & Kraftmeier to the Procedure

2/7/03. Supt. gave his view re D.f.o's. memo.

8h R 2638 D.f.o. requires information — "What royalties you consider should reasonably be charged to Lahonae, Nobel's, Curtis & Harvey. if granted licences to manufacture under No. 25994 of 01.

Reply to above: Having regard to importance, saving, economy of product, practicability of working, min. royalty £6 per ton practically nil.
also consider £1 for use of plant (Pat. 25993).
Presume that suitable safeguards, by agreement or otherwise will be included in connection with collection of the royalties.

C/O

·/8

M.D. to be made
W.S.T. max 2200 tons (present normal)
Trade @ ¼ more 3300
Total 5500 — containing 2365 tons acetone of which 1200 tons is recoverable @ £5 a ton saving = £36,000 a year.

Basis for calculating royalty.

		M.D.
Normal Mkt.	35 tons week =	44 tons
Trade at ¼ more		66
Trade 3300 tons year		
Containing acetone 1320 tons		
Recoverable acetone 660 tons		
among 6 private firms 110 tons/year		

Say 2 tons a week — average for each private firm

For 2 tons week:—

3 men @ 35/-	£ 5 · 5	
1 man @ 40/-	2	
	7 · 5	
Indirect expenses @ 75%	5 · 18	
	12 · 3	

Wages for 1 ton	£	6 · 2 · 0	
Loss of solution per ton		2 · 2 · 0	
Clean coal.		1 · 0 · 0	
Amortisation @ 5% on £2500 - per ton		1 · 0 · 0	
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KAISERLICHES PATENTAMT.

AUSGEGEBEN DEN 24. SEPTEMBER 1904.

PATENTSCHRIFT

— № 154124 —

KLASSE 12 o.

ROBERT ROBERTSON UND WILLIAM RINTOUL IN OXFORD VILLAS, WALTHAM ABBAY.

Verfahren zum Wiedergewinnen von Aceton aus einem Gemisch mit Luft.

Patentiert im Deutschen Reiche vom 19. Februar 1903 ab.

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Andererseits ist bei der Herstellung von wasserdichten Stoffen, welche durch Überziehen oder Imprägnieren einer Lage geeigneten Stoffes mit Nitrocellulose gefertigt werden, Aceton das beste bekannte Lösungsmittel, aber es wird wegen seiner Kostspieligkeit nicht benutzt, weil bisher das Wiedergewinnen des Acetons in solchen Betrieben nicht möglich war.

Diese Aufgabe zu lösen, ist das vorliegende Verfahren bestimmt, indem es gestattet, das Aceton wiederzugewinnen, welches in Trockenöfen oder -räumen in verhältnismäßig starker Verdünnung mit Luft gemischt ist.

Es ist nun durch Laboratoriumsversuche bekannt, daß sich Aceton mit Bisulfiten verbindet, wie mit Natrium-, Kalium-, Magnesium-, Calciumbisulfit, wenn das Aceton mit Lösungen dieser Salze gemischt wird; aber man hielt eine wirtschaftliche Benutzung dieser Reaktion zum Wiedergewinnen von Aceton im großen nicht für durchführbar, wenn es sich um die Herstellung von Explosivstoffen und dergl. handelt, weil hier das Acetongas so stark verdünnt der Luft, also einem oxydierenden Stoffe, beigemengt ist und das Absorptionsmittel selbst ein leicht oxydierbarer Stoff ist. Aus diesem Grunde lassen sich gewisse bekannte Verfahren zum Wiedergewinnen, wie z. B. von Ammoniak durch Absorption in Schwefelsäure und darauf folgendes Abscheiden, nicht als Analogien für die vorliegende Aufgabe heranziehen. Andererseits hat der Versuch, Wasser als Absorptionsmittel des Acetons anzuwenden, keine brauchbaren Erfolge gezeitigt, weil zu außerordentliche Wassermengen im Verhältnis zum wiederzugewinnenden Aceton notwendig wurden und weil zu viel Aceton dabei verloren ging.

Die vorliegende Erfindung stützt sich auf die Beobachtung, daß jene Bisulfitlösungen unter gewissen, für den Großbetrieb passenden Bedingungen — z. B. mit Hilfe eines Gaswaschverfahrens — fähig sind, eine bedeutende Menge von Acetongas aus einer Mischung von Luft auszuziehen, selbst wenn sich das Gas in einem Zustand großer Verdünnung befindet. Es gelingt damit, das Aceton so gut wie vollständig wiederzugewinnen.

So haben Versuche dargetan, daß im Vergleich zur Bisulfitlösung unter den sonst genau gleichen Arbeitsbedingungen Wasser in vierfacher Menge nur $^5/_8$ des Acetons wiedergewinnen läßt. Außerdem zeigten die Versuche die größere Verwandtschaft des Acetons zur Bisulfitlösung bei solcher Tem-

peratur, wie sie in Trockenöfen für Explosivstoffe benutzt zu werden pflegt, nämlich 37 bis 40°. Es stellte sich beim neunstündigen Durchblasen von Luft durch Bisulfitlösung und durch Wasser mit Aceton heraus, daß nur 7 Prozent Aceton aus der Bisulfitlösung, dagegen nicht weniger als 80 Prozent aus dem Wasser verschwunden waren. Es folgt daraus, daß mit einer noch so großen Menge Wassers der gesamte Acetongehalt nicht wiedergewonnen werden kann, wogegen die Anwendung der Bisulfitlösung praktisch gar kein Aceton der Absorption entgehen läßt.

Das Wesen der vorliegenden Erfindung besteht demnach in einem Verfahren, Aceton, welches als Gas in Mischung mit Luft vorhanden ist, wiederzugewinnen, indem man die Mischung in innige Berührung mit Bisulfitlösungen bringt und dann das Bisulfitgemenge entweder unmittelbar mit darauf folgender Rektifikation in Anwesenheit von Alkali destilliert oder ein Alkali hinzufügt und darauf Destillation vornimmt.

Der Verlust, den das Natriumbisulfit durch Oxydation erleidet, spielt bei der Durchführung des Gesamtverfahrens keine wesentliche Rolle, denn er beschränkt sich auf 1,3 Prozent, so daß die Kosten nicht den hundertsten Teil des Gewinnes an zurückerhaltenem Aceton betragen.

Es empfiehlt sich, das Verfahren mit einer Anfangstemperatur des Acetonluftgemisches von etwa 50° auszuführen, doch lassen sich auch erheblich geringere oder höhere Temperaturen anwenden.

Das neue Verfahren ist auch zum Wiedergewinnen von Aceton bei der Erzeugung von Gegenständen oder Stoffen anwendbar, wo gelöste Nitrocellulose oder äquivalente Stoffe benutzt werden.

Die beiliegenden Zeichnungen dienen zur Veranschaulichung des neuen Verfahrens. Sie zeigen in Ansicht und Grundriß eine Anlage, die zur Ausübung des Verfahrens benutzbar ist.

Gemäß der dargestellten Ausführungsform wird die mit Aceton gemischte Luft aus dem Trockenhaus a durch ein Rohr b^1 zu dem Boden eines Waschturmes c^1 geleitet, von dessen Kopf durch ein anderes Rohr b^2 zu dem Boden eines folgenden Turmes c^2 usf. durch eine beliebige, zur Ausführung des Verfahrens notwendige Zahl von Türmen. Die Luft kann durch die Türme mittels irgend einer geeigneten Saug- oder Ejektoreinrichtung d befördert werden. Die Lösung von Natriumbisulfit ist in einem Behälter e^1 aufgespeichert, der zweckmäßig an der Wand des Trockenhauses befestigt ist. Von diesem Behälter gelangt das Bisulfit durch ein Rohr f^1 zu dem Kopf des Turmes, von wo die Luft entweicht, und sie läuft durch diese Türme, indem sie in innige Berührung mit der Mischung von Luft und Aceton gelangt, tritt am Boden des Turmes in ein Gefäß h^1 nach Art der gewöhnlichen Woolff'schen Flaschen und wird durch Preßluft in dem Rohr i^1 nach einem zweiten Behälter e^2 gedrückt, um die anderen Türme zu beschicken.

Die schließlich abgezogene Lösung wird zum Wiedergewinnen des Acetons weiter behandelt. Um die Natriumbisulfitlösung in innige Berührung mit dem Gemisch von Luft und Aceton zu bringen, sind vorzugsweise Türme anzuwenden, wo die Lösung über eine Reihe von Horden im Zickzackweg langsam niederrieselt, und zwar gemäß der britischen Patentschrift 25993 v. J. 1901.

Eine geeignete Lösung besteht in 30 Gewichtsteilen Natriumbisulfit auf 100 Volumenteile der Lösung; diese Konzentration ist nicht erforderlich, aber sehr zweckmäßig, und wenn schwächere Lösungen angewendet werden, müssen größere Flüssigkeitsmengen zur Wirksamkeit kommen.

Gemäß einer anderen Ausführungsform der Erfindung läßt man die Bisulfitlösung in feinen Strahlen mit dem Luft- und Acetondampf in innige Berührung kommen, indem man die Strahlen am Fuß eines Turmes wieder sammelt, durch Prellwände kondensiert, durch eine Schlange laufen läßt oder dergl. Dieses Sprühverfahren kann entweder allein oder in Verbindung mit dem beschriebenen Gaswaschen benutzt werden.

Um unnötiges Verdampfen der Bisulfitflüssigkeit zu vermeiden, ist es zweckmäßig, die Luft vor der Waschung mit Feuchtigkeit zu sättigen, entweder mit Hilfe eines Turmes, durch den Wasser läuft, oder durch andere geeignete Vorrichtungen.

Um das Aceton aus der Bisulfitlösung zu gewinnen, nachdem diese durch die Türme gelaufen ist, läßt man die Flüssigkeit in eine Blase k, die mit einem Kondensator l verbunden ist. Dieser Teil des Verfahrens kann in verschiedener Weise ausgeführt werden, z. B. kann die das Bisulfitgemenge enthaltende Lösung mit einer genügenden Menge Alkali destilliert werden, um Sulfit zu bilden und das Kondensieren und Rektifizieren des Acetons in der gewöhnlichen Weise zu bewirken, oder es kann das folgende, besonders günstige Verfahren ausgeübt werden.

Es hat sich herausgestellt, daß bei der unmittelbaren Destillation ohne Beifügung von Alkali praktisch das Aceton überdestilliert ist, bevor irgend eine weitere Menge des vorhandenen Bisulfits zersetzt wird, und die geringe Menge von schwefliger Säure, die übergetrieben wird, kann als Sulfit durch

Hinzufügung einer äquivalenten Menge von Alkali zum ersten Destillat vor der endgültigen Rektifikation des Acetons wiedergewonnen werden. Dieses Verfahren hat den großen Vorzug, daß die Umwandlung des Bisulfits wegfällt und der größere Teil der Bisulfitlösung wieder zur Absorption zur Verfügung steht nach zweckmäßiger Behandlung mit einer verhältnismäßig geringen Menge von schwefliger Säure.

Während der Zeit, wo die Bisulfitlösung der oxydierenden Wirkung der Luft ausgesetzt wird, findet eine Oxydation zu Sulfat in gewissem Umfange statt. Wenn dieses Sulfat sich ansammeln könnte, würde es die Wirkung des Bisulfits beeinträchtigen. Es zeigt sich aber, daß das gebildete Sulfat bei verhältnismäßig niedrigen Temperaturen nur wenig löslich ist, wenn es sich in einer Lösung von Bisulfit mit einer geringen Menge von Aceton befindet. Wenn man daher die Lösung, nachdem sie genügend mit Acetondampf gesättigt ist, ein wenig kühlt, so kristallisiert der Überschuß an Sulfat aus und läßt die Lösung hinreichend frei von Sulfat zur weiteren Benutzung in den Türmen zurück, nachdem das Aceton abdestilliert ist.

Man kann auch die Behandlung der Mischung von Aceton und Luft in gewöhnlichen Waschtürmen vornehmen oder man bläst die Luft durch eine Anzahl von Gefäßen mit Bisulfitlösung.

Bei der Anwendung der Erfindung auf Betriebe, wo Schießbaumwolle in Aceton aufgelöst ist, wenn es sich z. B. um die Herstellung von Sprengstoffen, Celluloid, wasserdichten Stoffen oder dergl. handelt, wird das Trocknen in Räumen derart vorzunehmen sein, daß die mit Aceton vermischte Luft abgezogen und in der geschilderten Art behandelt werden kann.

Patent-Ansprüche:

1. Verfahren zum Wiedergewinnen von Aceton aus einem Gemisch mit Luft, dadurch gekennzeichnet, daß man die Mischung in innige Berührung mit einer Lösung von Bisulfit bringt und dann das Aceton abscheidet.

2. Zur Ausführung des Verfahrens nach Anspruch 1 behufs Trennung des Acetons von der Bisulfitlösung die unmittelbare Destillation des Gemenges, bei welcher praktisch das gesamte Aceton übergeht, bevor eine wesentliche Zersetzung des Bisulfits eintritt, wobei die geringe Menge schwefliger Säure durch Beigabe von Alkali wiedergewonnen wird, bevor die endgültige Rektifikation erfolgt.

Hierzu 1 Blatt Zeichnungen.

BERLIN. GEDRUCKT IN DER REICHSDRUCKEREI.

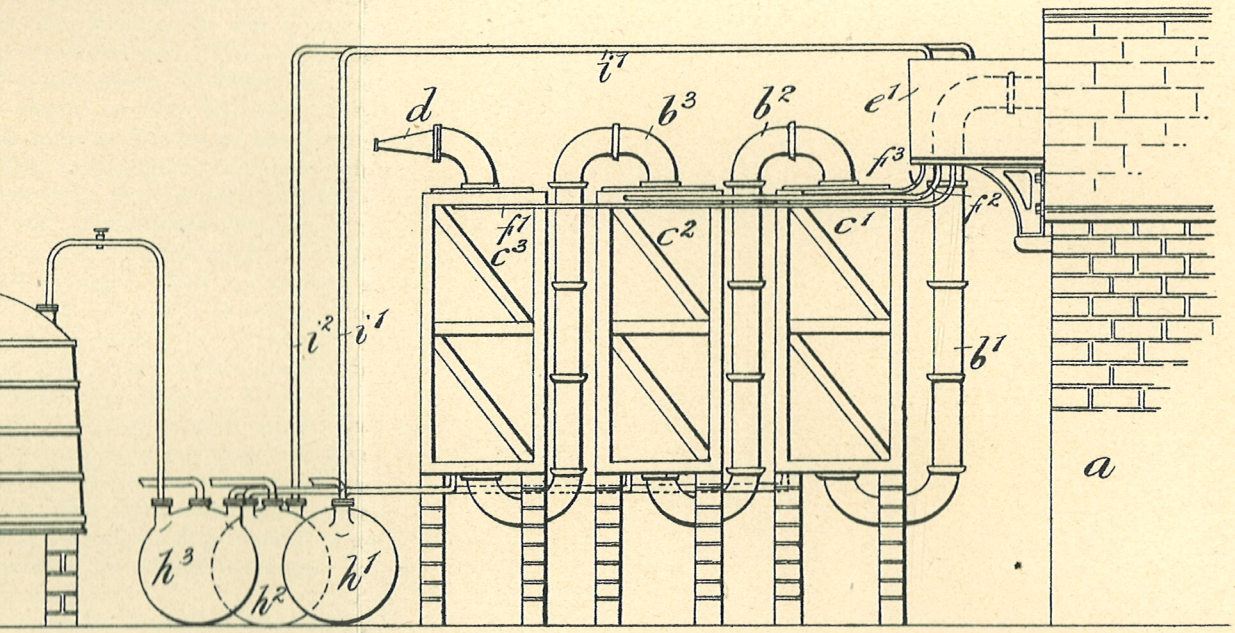


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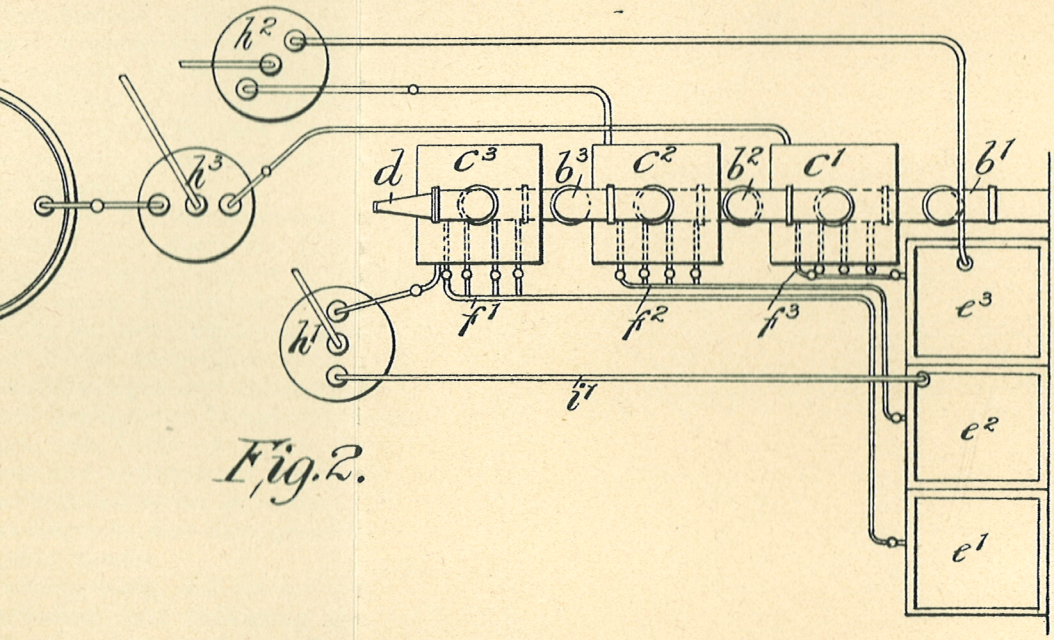


Fig. 2.

Zu der Patentschrift

№ 154124.

PHOTOGR. DRUCK DER REICHSDRUCKEREI.

KAISERLICHES PATENTAMT.

AUSGEGEBEN DEN 24. SEPTEMBER 1904.

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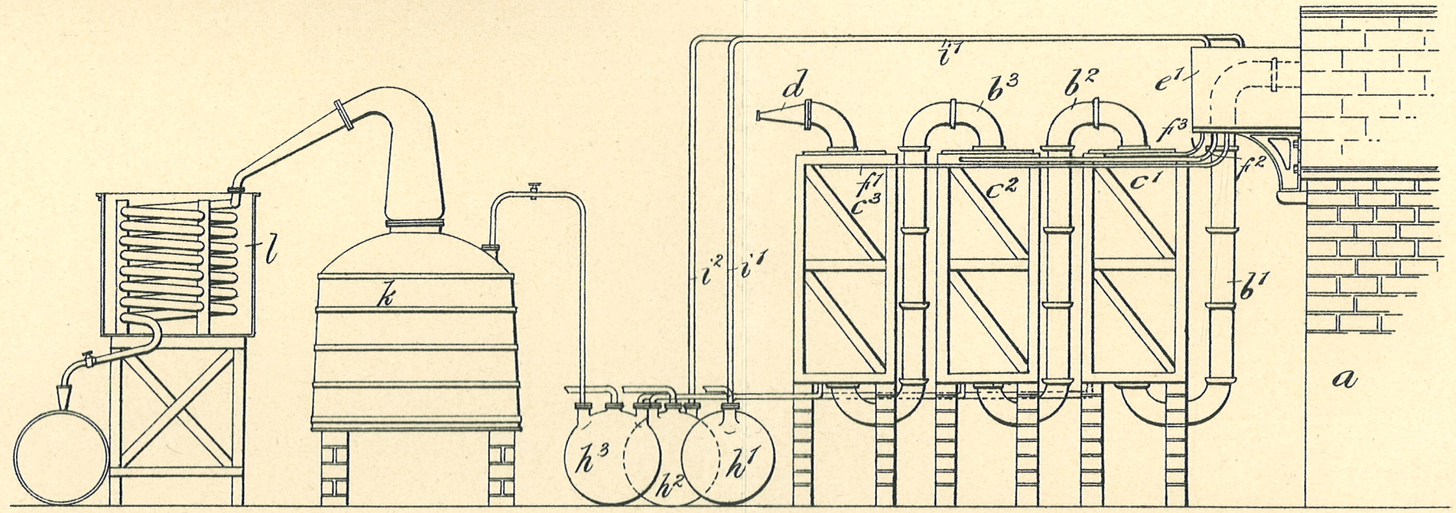


Fig. 1.

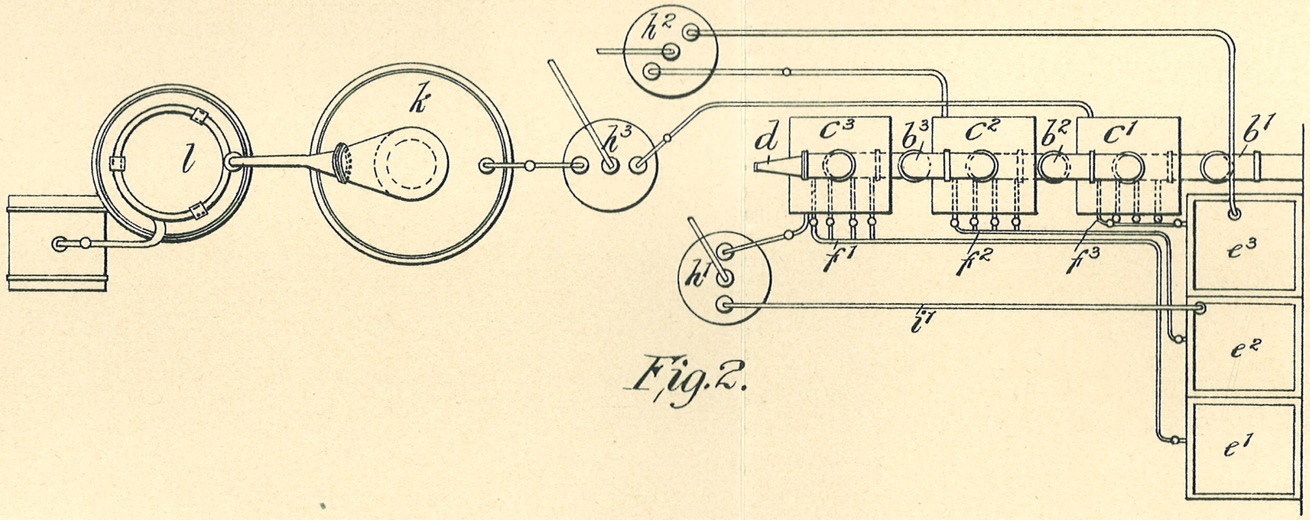


Fig. 2.

PHOTOGR. DRUCK DER REICHSDRUCKEREI.

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Andererseits ist bei der Herstellung von wasserdichten Stoffen, welche durch Überziehen oder Imprägnieren einer Lage geeigneten Stoffes mit Nitrocellulose gefertigt werden, Aceton das beste bekannte Lösungsmittel, aber es wird wegen seiner Kostspieligkeit nicht benutzt, weil bisher das Wiedergewinnen des Acetons in solchen Betrieben nicht möglich war.

Diese Aufgabe zu lösen, ist das vorliegende Verfahren bestimmt, indem es gestattet, das Aceton wiederzugewinnen, welches in Trockenöfen oder -räumen in verhältnismäßig starker Verdünnung mit Luft gemischt ist.

Es ist nun durch Laboratoriumsversuche bekannt, daß sich Aceton mit Bisulfiten verbindet, wie mit Natrium-, Kalium-, Magnesium-, Calciumbisulfit, wenn das Aceton mit Lösungen dieser Salze gemischt wird; aber man hielt eine wirtschaftliche Benutzung dieser Reaktion zum Wiedergewinnen von Aceton im großen nicht für durchführbar, wenn es sich um die Herstellung von Explosivstoffen und dergl. handelt, weil hier das Acetongas so stark verdünnt der Luft, also einem oxydierenden Stoffe, beigemengt ist und das Absorptionsmittel selbst ein leicht oxydierbarer Stoff ist. Aus diesem Grunde lassen sich gewisse bekannte Verfahren zum Wiedergewinnen, wie z. B. von Ammoniak durch Absorption in Schwefelsäure und darauf folgendes Abscheiden, nicht als Analogien für die vorliegende Aufgabe heranziehen. Andererseits hat der Versuch, Wasser als Absorptionsmittel des Acetons anzuwenden, keine brauchbaren Erfolge gezeitigt, weil zu außerordentliche Wassermengen im Verhältnis zum wiederzugewinnenden Aceton notwendig wurden und weil zu viel Aceton dabei verloren ging.

Die vorliegende Erfindung stützt sich auf die Beobachtung, daß jene Bisulfitlösungen unter gewissen, für den Großbetrieb passenden Bedingungen — z. B. mit Hilfe eines Gaswaschverfahrens — fähig sind, eine bedeutende Menge von Acetongas aus einer Mischung von Luft auszuziehen, selbst wenn sich das Gas in einem Zustand großer Verdünnung befindet. Es gelingt damit, das Aceton so gut wie vollständig wiederzugewinnen.

So haben Versuche dargetan, daß im Vergleich zur Bisulfitlösung unter den sonst genau gleichen Arbeitsbedingungen Wasser in vierfacher Menge nur $^5/_8$ des Acetons wiedergewinnen läßt. Außerdem zeigten die Versuche die größere Verwandtschaft des Acetons zur Bisulfitlösung bei solcher Tem-

peratur, wie sie in Trockenöfen für Explosivstoffe benutzt zu werden pflegt, nämlich 37 bis 40°. Es stellte sich beim neunstündigen Durchblasen von Luft durch Bisulfitlösung und durch Wasser mit Aceton heraus, daß nur 7 Prozent Aceton aus der Bisulfitlösung, dagegen nicht weniger als 80 Prozent aus dem Wasser verschwunden waren. Es folgt daraus, daß mit einer noch so großen Menge Wassers der gesamte Acetongehalt nicht wiedergewonnen werden kann, wogegen die Anwendung der Bisulfitlösung praktisch gar kein Aceton der Absorption entgehen läßt.

Das Wesen der vorliegenden Erfindung besteht demnach in einem Verfahren, Aceton, welches als Gas in Mischung mit Luft vorhanden ist, wiederzugewinnen, indem man die Mischung in innige Berührung mit Bisulfitlösungen bringt und dann das Bisulfitgemenge entweder unmittelbar mit darauf folgender Rektifikation in Anwesenheit von Alkali destilliert oder ein Alkali hinzufügt und darauf Destillation vornimmt.

Der Verlust, den das Natriumbisulfit durch Oxydation erleidet, spielt bei der Durchführung des Gesamtverfahrens keine wesentliche Rolle, denn er beschränkt sich auf 1,3 Prozent, so daß die Kosten nicht den hundertsten Teil des Gewinnes an zurückerhaltenem Aceton betragen.

Es empfiehlt sich, das Verfahren mit einer Anfangstemperatur des Acetonluftgemisches von etwa 50° auszuführen, doch lassen sich auch erheblich geringere oder höhere Temperaturen anwenden.

Das neue Verfahren ist auch zum Wiedergewinnen von Aceton bei der Erzeugung von Gegenständen oder Stoffen anwendbar, wo gelöste Nitrocellulose oder äquivalente Stoffe benutzt werden.

Die beiliegenden Zeichnungen dienen zur Veranschaulichung des neuen Verfahrens. Sie zeigen in Ansicht und Grundriß eine Anlage, die zur Ausübung des Verfahrens benutzbar ist.

Gemäß der dargestellten Ausführungsform wird die mit Aceton gemischte Luft aus dem Trockenhaus a durch ein Rohr b^1 zu dem Boden eines Waschturmes c^1 geleitet, von dessen Kopf durch ein anderes Rohr b^2 zu dem Boden eines folgenden Turmes c^2 usf. durch eine beliebige, zur Ausführung des Verfahrens notwendige Zahl von Türmen. Die Luft kann durch die Türme mittels irgend einer geeigneten Saug- oder Ejektoreinrichtung d befördert werden. Die Lösung von Natriumbisulfit ist in einem Behälter e^1 aufgespeichert, der zweckmäßig an der Wand des Trockenhauses befestigt ist. Von diesem Behälter gelangt das Bisulfit durch ein Rohr f^1 zu dem Kopf des Turmes, von wo die Luft entweicht, und sie läuft durch diese Türme, indem sie in innige Berührung mit der Mischung von Luft und Aceton gelangt, tritt am Boden des Turmes in ein Gefäß h^1 nach Art der gewöhnlichen Woolff'schen Flaschen und wird durch Preßluft in dem Rohr i^1 nach einem zweiten Behälter e^2 gedrückt, um die anderen Türme zu beschicken.

Die schließlich abgezogene Lösung wird zum Wiedergewinnen des Acetons weiter behandelt. Um die Natriumbisulfitlösung in innige Berührung mit dem Gemisch von Luft und Aceton zu bringen, sind vorzugsweise Türme anzuwenden, wo die Lösung über eine Reihe von Horden im Zickzackweg langsam niederrieselt, und zwar gemäß der britischen Patentschrift 25993 v. J. 1901.

Eine geeignete Lösung besteht in 30 Gewichtsteilen Natriumbisulfit auf 100 Volumenteile der Lösung; diese Konzentration ist nicht erforderlich, aber sehr zweckmäßig, und wenn schwächere Lösungen angewendet werden, müssen größere Flüssigkeitsmengen zur Wirksamkeit kommen.

Gemäß einer anderen Ausführungsform der Erfindung läßt man die Bisulfitlösung in feinen Strahlen mit dem Luft- und Acetondampf in innige Berührung kommen, indem man die Strahlen am Fuß eines Turmes wieder sammelt, durch Prellwände kondensiert, durch eine Schlange laufen läßt oder dergl. Dieses Sprühverfahren kann entweder allein oder in Verbindung mit dem beschriebenen Gaswaschen benutzt werden.

Um unnötiges Verdampfen der Bisulfitflüssigkeit zu vermeiden, ist es zweckmäßig, die Luft vor der Waschung mit Feuchtigkeit zu sättigen, entweder mit Hilfe eines Turmes, durch den Wasser läuft, oder durch andere geeignete Vorrichtungen.

Um das Aceton aus der Bisulfitlösung zu gewinnen, nachdem diese durch die Türme gelaufen ist, läßt man die Flüssigkeit in eine Blase k, die mit einem Kondensator l verbunden ist. Dieser Teil des Verfahrens kann in verschiedener Weise ausgeführt werden, z. B. kann die das Bisulfitgemenge enthaltende Lösung mit einer genügenden Menge Alkali destilliert werden, um Sulfit zu bilden und das Kondensieren und Rektifizieren des Acetons in der gewöhnlichen Weise zu bewirken, oder es kann das folgende, besonders günstige Verfahren ausgeübt werden.

Es hat sich herausgestellt, daß bei der unmittelbaren Destillation ohne Beifügung von Alkali praktisch das Aceton überdestilliert ist, bevor irgend eine weitere Menge des vorhandenen Bisulfits zersetzt wird, und die geringe Menge von schwefliger Säure, die übergetrieben wird, kann als Sulfit durch

Hinzufügung einer äquivalenten Menge von Alkali zum ersten Destillat vor der endgültigen Rektifikation des Acetons wiedergewonnen werden. Dieses Verfahren hat den großen Vorzug, daß die Umwandlung des Bisulfits wegfällt und der größere Teil der Bisulfitlösung wieder zur Absorption zur Verfügung steht nach zweckmäßiger Behandlung mit einer verhältnismäßig geringen Menge von schwefliger Säure.

Während der Zeit, wo die Bisulfitlösung der oxydierenden Wirkung der Luft ausgesetzt wird, findet eine Oxydation zu Sulfat in gewissem Umfange statt. Wenn dieses Sulfat sich ansammeln könnte, würde es die Wirkung des Bisulfits beeinträchtigen. Es zeigt sich aber, daß das gebildete Sulfat bei verhältnismäßig niedrigen Temperaturen nur wenig löslich ist, wenn es sich in einer Lösung von Bisulfit mit einer geringen Menge von Aceton befindet. Wenn man daher die Lösung, nachdem sie genügend mit Acetondampf gesättigt ist, ein wenig kühlt, so kristallisiert der Überschuß an Sulfat aus und läßt die Lösung hinreichend frei von Sulfat zur weiteren Benutzung in den Türmen zurück, nachdem das Aceton abdestilliert ist.

Man kann auch die Behandlung der Mischung von Aceton und Luft in gewöhnlichen Waschtürmen vornehmen oder man bläst die Luft durch eine Anzahl von Gefäßen mit Bisulfitlösung.

Bei der Anwendung der Erfindung auf Betriebe, wo Schießbaumwolle in Aceton aufgelöst ist, wenn es sich z. B. um die Herstellung von Sprengstoffen, Celluloid, wasserdichten Stoffen oder dergl. handelt, wird das Trocknen in Räumen derart vorzunehmen sein, daß die mit Aceton vermischte Luft abgezogen und in der geschilderten Art behandelt werden kann.

Patent-Ansprüche:

1. Verfahren zum Wiedergewinnen von Aceton aus einem Gemisch mit Luft, dadurch gekennzeichnet, daß man die Mischung in innige Berührung mit einer Lösung von Bisulfit bringt und dann das Aceton abscheidet.

2. Zur Ausführung des Verfahrens nach Anspruch 1 behufs Trennung des Acetons von der Bisulfitlösung die unmittelbare Destillation des Gemenges, bei welcher praktisch das gesamte Aceton übergeht, bevor eine wesentliche Zersetzung des Bisulfits eintritt, wobei die geringe Menge schwefliger Säure durch Beigabe von Alkali wiedergewonnen wird, bevor die endgültige Rektifikation erfolgt.

Hierzu 1 Blatt Zeichnungen.

BERLIN. GEDRUCKT IN DER REICHSDRUCKEREI.

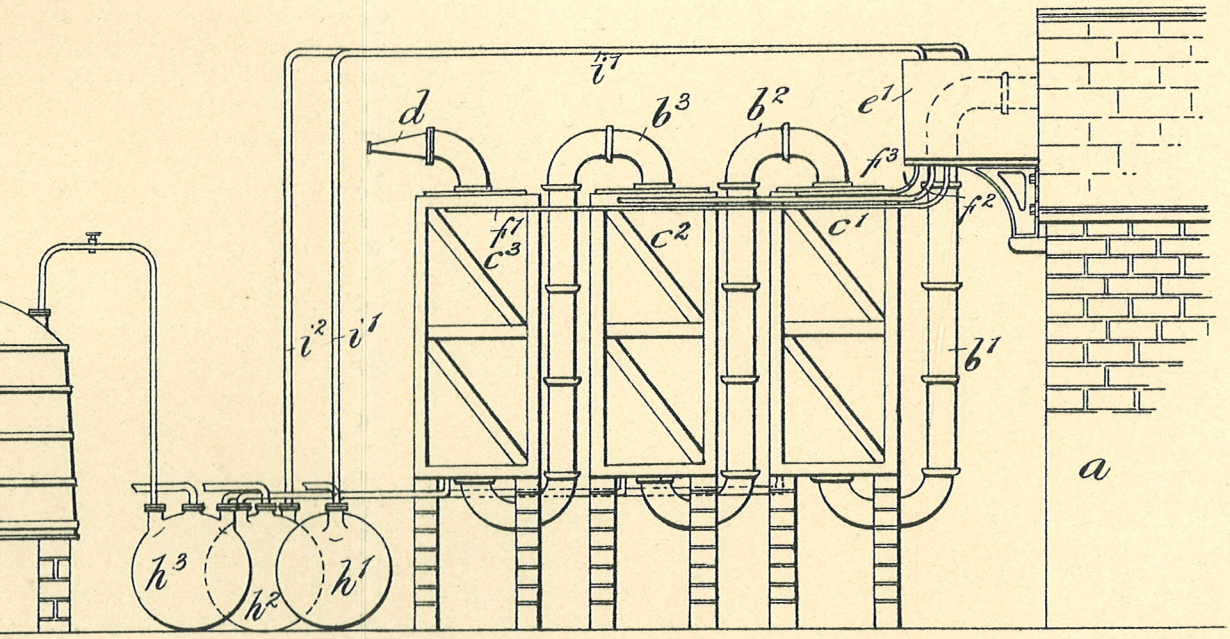


Fig. 1.

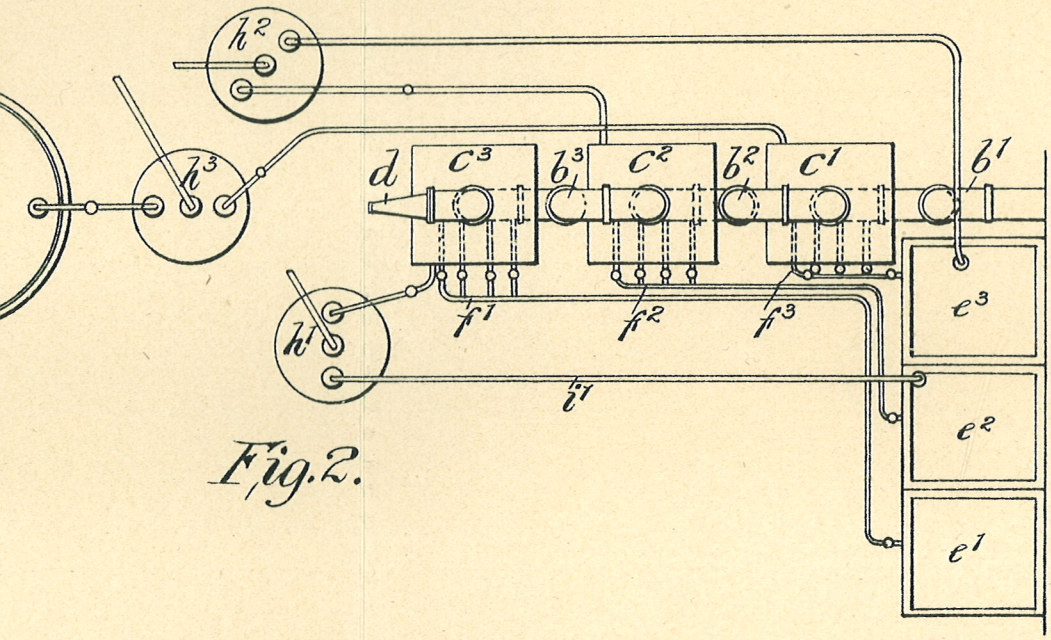


Fig. 2.

Zu der Patentschrift

№ 154124.

PHOTOGR. DRUCK DER REICHSDRUCKEREI.

[Second Edition.]

N° 22,190 A.D. 1896

Date of Application, 6th Oct., 1896
Complete Specification Left, 6th July, 1897—Accepted, 24th July, 1897

PROVISIONAL SPECIFICATION.

Improvements relating to the Manufacture of Explosives.

We, George Kynoch and Company Limited, and Allan Thomas Cocking, both of Lion Works, Witton, in the County of Warwick, Manufacturers, do hereby declare the nature of this invention to be as follows:—

This invention relates to the production of cordite and other explosives, our object being to provide an improved apparatus for rapidly and safely drying such material and for effectually recovering the solvent used in its manufacture.

In the application of our invention we employ a drying chamber consisting of a cylindrical vessel of cast iron or other material containing a number of copper or other pipes of such a length and so coiled that each pipe several times traverses the chamber in a longitudinal direction. Each of the coils are preferably independent and each has inlet and outlet cocks on the exterior of the chamber. The coils are supported in a horizontal position within the chamber by a framing consisting preferably of light channel or angle iron bars suitably connected together.

The cordite or other material to be dried is packed in removable trays which rest upon and are thus in direct contact with the coils within the chamber. When the full trays are placed in position the hinged end cover or door of the chamber is closed and secured, and a vacuum is then created within the chamber by means of a duplex type or other suitable vacuum pump. Hot water is then admitted to the coils by the inlet cocks the temperature of such water being regulated to suit the different stages of drying. The vacuum or drying chamber is fitted with a suitable thermometer to register its interior temperature, and also with a safety valve.

The acetone or other solvent vapour is driven off by the heat transmitted by conduction from the hot water pipes or coils to the material and such vapour is drawn away from the vacuum chamber through a suitable main to a condenser wherein it is cooled and a partial condensation effected, and from thence it passes into the vacuum pump. The solvent condensed flows into a receiver where it accumulates and is drawn off when necessary.

The vapour passing through the vacuum pump is delivered into a second condenser which is open to the atmospheric pressure and thus the acetone or other vapour is more readily condensible then in the first or preliminary condenser. The solvent from this condenser passes into the receiver connected with it to be drawn off as required. The air escaping from the top of the receiver if containing any vapour may be conveyed to a water scrubber.

The hot water for the coils within the vacuum chamber is supplied from a suitably elevated tank wherein the water is heated preferably by means of a steam coil. The cold or return water from the vacuum or drying chamber flows into a

low level tank or sump from whence it is returned to the high level tank by a pump or steam jet to be again used as a means for conveying heat to the drying chamber.

We isolate the drying or vacuum chamber of our improved apparatus and we so arrange the vacuum pump, condensers, receivers, and other parts as to permit of very ready and effective control.

By our invention we dry the cordite directly by conduction, the hot water pipes heat the gauze by conduction and the gauze heats the cordite also by conduction This feature we find to be necessary to successfully dry cordite.

By our invention we also secure the maximum of work for the dimensions of the vacuum pump, using the condenser before as well as after the vacuum pump.

Dated this 6th day of October 1896.

MARKS & CLERK,
18, Southampton Buildings, London, W.C., and
13, Temple Street, Birmingham, Agents.

COMPLETE SPECIFICATION.

Improvements relating to the Manufacture of Explosives.

We, GEORGE KYNOCH AND COMPANY LIMITED, and ALLAN THOMAS COCKING, both of Lion Works, Witton, in the County of Warwick, Manufacturers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This Invention relates to the production of cordite and other explosives, our object being to provide an improved apparatus for rapidly and safely drying such material and for effectually recovering the solvent used in its manufacture.

In the application of our invention we employ a drying chamber consisting of a cylindrical or other vessel of cast iron or other material containing a number of lodges or shelves in metallic connection with the walls of the drying chamber. This drying chamber we surround with a water jacket, which water jacket can be heated to any desired extent, but we find 150 degrees F. to be the best temperature of the water for producing the maximum rate of drying with safety. We prefer to use a number of drying chambers all having one water jacket in which they are immersed or having water jackets supplied with hot water from one tank.

The cordite or other material to be dried is packed in removable trays which rest upon and are thus in direct contact with the metallic conducting surfaces within the chamber. We preferably use perforated conducting shelves, to allow of free circulation within each chamber, and we also arrange that our removable trays are perforated, or sometimes formed of a material such as wire gauze.

The acetone or other solvent vapour is driven off by the heat transmitted by conduction from the hot water jacket, and the vapour is drawn away from the vacuum chamber through a suitable main to a condenser wherein it is cooled, and a partial condensation effected. Thence it passes into the vacuum pump. The vapour passing through the vacuum pump is delivered into a second condenser which is open to the atmospheric pressure, and thus the acetone or other vapour is more readily condensible than in the first or preliminary condenser. The solvent from this condenser passes into the receiver connected with it to be drawn off as required. The air escaping from the top of the receiver if containing any vapour may be conveyed to a water scrubber.

The hot water for the water jacket surrounding the vacuum chamber is supplied from a suitably elevated tank wherein the water is heated preferably by means

of a steam coil. The cold or return water from a vacuum or drying chamber flows into a low level tank or sump, from whence it is returned to the high level tank by a pump or steam jet, to be again used as a means of conveying heat to the drying chamber.

By our invention we dry the cordite directly by conduction the hot water jacket heats the walls of the chamber and the metallic shelves are heated by conduction from the walls, and so the cordite trays themselves are heated by conduction from the shelves and the cordite is dried. This feature of heating the cordite by conduction from the metal surfaces we find to be necessary for successfully drying cordite. We prefer, however, to pass a small air current through the apparatus, as we find that this assists in carrying away the vapour and drying the cordite.

Referring to the two accompanying sheets of drawings which illustrate one method of carrying our invention into effect.

Figure 1 is a section through a vacuum drying chamber, showing the water jacket surrounding the chamber, and the pipe connections to the vacuum main.

Figure 2 is a front elevation, showing one of the closing doors in position, and a front view of the vacuum chamber with its shelves and the door removed.

Figure 3 is a front view of the door with its bolts on a larger scale.

Figure 4 is a vertical section through one pair of bolts and the central handle; and

Figure 5 is a section through a separator intended to separate out nitro-glycerine from the vapours as they pass on their way to the vacuum pump.

The vacuum chamber A, Figures 1 and 2, has metal shelves A^1 arranged in metallic contact with its walls. The chamber is surrounded by a water jacket B, which jacket is preferably continuous, surrounding a series of chambers such as A. A connecting pipe A^2 connects the interior of the vacuum chamber A by way of a stop valve A^3 with the vacuum main C. This main leads into the separator D. and the vacuum pump exhausts from that separator by way of a pipe E, Figure 5. The arrangement, however, may be reversed, and the vacuum pump may exhaust by way of the bent pipe at the top of the separator, and the vapours may enter the separator at E.

The vacuum chambers A are provided with strong air tight doors F made air tight by suitable rubber packing, and these doors are held in position by four tapered bolts F^1, which bolts are simultaneously shot into position by means of one handle F^2. Each vacuum chamber is supplied with a vacuum gauge G and a thermometer H. The thermometer preferably passes through into the water jacket. The apparatus acts as follows:—

Upon the shelves A^1 are laid a number of metal trays containing the cordite or like material to be dried. The door F is then placed in position and firmly fastened. Connection is then made with the vacuum main by way of the valve A^3 and the vapour at once begins to rise from the cordite in the metal trays. The temperature of the water jacket is raised preferably to 150 F., and at this temperature the cordite rapidly dries without blistering or other inconvenience, the heat being supplied to the cordite by the metallic contact of the trays with the shelves, and the metallic contact of the shelves with the walls of the chamber. Some slight amount of nitro-glycerine is carried through the vacuum main C, and it is deposited in the separator D. The acetone vapour then proceeds to the vacuum pump and is condensed after compression and cooling in a separate condenser.

As any suitable vacuum pump and condenser may be used for the purpose of this invention, no drawing has been supplied of either.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. In cordite and like drying apparatus heating the cordite within a heated vacuum chamber by metallic contact with the cordite and that chamber, substantially as herein described.

2. The method of and apparatus for drying cordite and like substances under reduced pressure, substantially as hereinbefore described.

Dated this 6th day of July 1897.

MARKS & CLERK,
18, Southampton Buildings, London, W.C., &
13, Temple Street, Birmingham, Agents for the Applicants.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.—1897.
[G. 3681—125—8/97.]

(2nd Edition)

Fig. 1

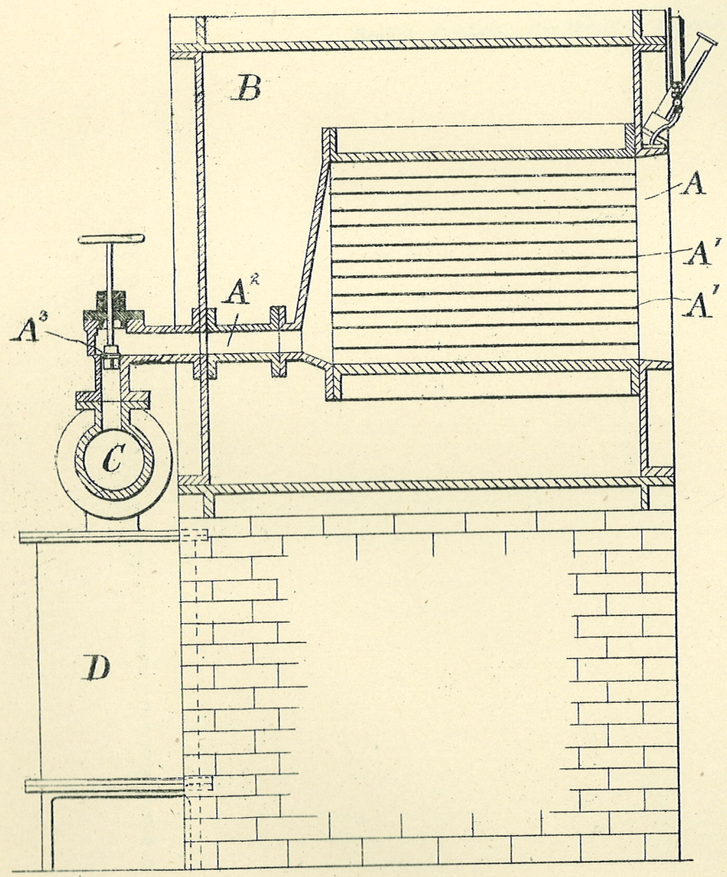
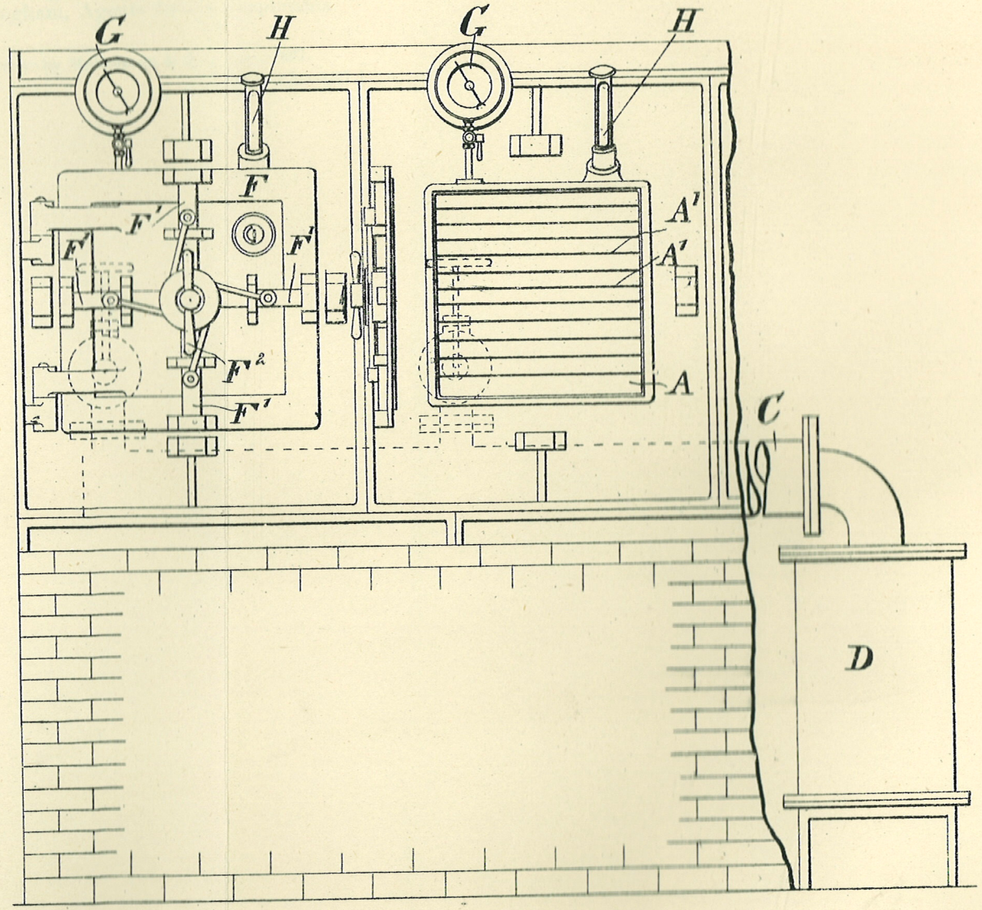


Fig. 2.



[This Drawing is a reproduction of the Original on a reduced scale]

Malby & Sons, Photo-Litho.

[Second Edition.]

N° 3020 A.D. 1903

Date of Application, 9th Feb., 1903
Complete Specification Left, 9th Dec., 1903—Accepted, 9th Feb., 1904

PROVISIONAL SPECIFICATION.

Improvements in and relating to the Manufacture of Nitro-glycerine.

We, FREDERIC LEWIS NATHAN, Major in the Royal Artillery, JAMES MILN THOMSON, Manager, and WILLIAM RINTOUL, Chemist, all of the Royal Gunpowder Factory, Waltham Abbey, in the County of Essex, do hereby declare the nature of this invention to be as follows:—

This invention relates to improvements in the manufacture of nitro-glycerine, and its object is to prevent the formation and separation of nitro-glycerine in the waste acids after the nitro-glycerine initially formed in the nitrating vessel has been separated and removed.

We have found that if, after the nitration of the usual proportion of glycerine in a charge of nitrating acids, and after the separation and removal of the nitro-glycerine formed, a relatively small quantity of water be added to the resultant waste acid, all further formation and separation of nitro-glycerine is thereby practically prevented, even although the mixture be subjected to a considerable degree of cold for a protracted period. The strength of the waste acids is only very slightly reduced, so that their separation and reconcentration are not affected.

The discovery of this fact enables us to modify the present process of manufacturing nitro-glycerine so as to entirely dispense with the tedious and expensive operation of "after-separation", and to simplify the plant required for the manufacture.

The invention consists in the addition of a relatively small quantity of water, to the waste acids resulting from the formation of nitro-glycerine, so that further formation of nitro-glycerine in these waste acids is prevented.

By this invention the process of "after-separation" is dispensed with, and the acids may be safely stored in tanks or the like without requiring the usual continuous watching and care.

The invention may be conveniently carried out in the apparatus described in the Specification of our Patent No. 15983 of 1901. With such an apparatus, after the required amount of glycerine has been nitrated, and separation and removal of nitro-glycerine has been effected in the manner described in the above-mentioned patent, a small quantity of the clear waste acid used for displacing the nitro-glycerine is run off at the bottom of the apparatus in order to lower the level of its contents. Air stirring and cold water circulation are then started, and a quantity of water equal to about one *per cent* of the weight of waste acids formed by nitration is slowly added by injection or otherwise.

The addition of this small quantity of water gives rise to only a slight rise in temperature.

When the temperature has again been lowered by the cooling coils, the air stirring is stopped, and a further quantity of displacing acid is admitted in order to remove by displacement any small quantity of initially formed nitro-glycerine which may have been adhering to the coils and sides of the vessel and which would be disturbed by the agitation with compressed air.

[*Price* 8*d*.]

When this has been effected, the whole of the acids are ready for de-nitration, or can be safely stored, until required, in any ordinary storage tanks without further precaution such as continuous watching, as is now required.

By this means the operation known as "after-separation" is eliminated, and the combined nitrator separator described in Patent No. 15983 of 1901 is rendered at once available for the nitration of another charge of glycerine.

While this invention is particularly suitable for use in conjunction with the apparatus of our former patent hereinbefore referred to, it can also be used with the forms of plant hitherto generally used. In this case, as soon as the bulk of the nitro-glycerine has been separated from the waste acid in the "separator", the water can be slowly added at once, and as the rise of temperature is only slight, the presence of cooling coils is not essential, although desirable, during this operation. When the last of the nitro-glycerine already formed has been skimmed off, there is no danger of further formation or separation of nitro-glycerine, so that the acids can be dealt with without further precaution.

Dated this 7th day of February, 1903.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.
13, Temple Street, Birmingham, and
30, Cross Street, Manchester.
Agents.

COMPLETE SPECIFICATION.

"Improvements in and relating to the Manufacture of Nitro-glycerine."

We, FREDERIC LEWIS NATHAN, Major of the Royal Artillery, JAMES MILN THOMSON, Manager, and WILLIAM RINTOUL, Chemist, all of the Royal Gunpowder Factory, Waltham Abbey, in the County of Essex, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

This invention relates to improvements in the manufacture of nitro-glycerine, and its object is to prevent the formation and separation of nitro-glycerine in the waste acids after the nitro-glycerine initially formed in the nitrating vessel has been separated and removed.

We have found that if, after the nitration of the usual proportion of glycerine in the charge of nitrating acids, and after the separation and removal of the nitro-glycerine formed, a relatively small quantity of water be added to the resultant waste acid, all further formation and separation of nitro-glycerine is thereby practically prevented, even although the mixture be subjected to a considerable degree of cold for a protracted period. The strength of the waste acids is only very slightly reduced, so that their separation and reconcentration are not affected.

The discovery of this fact enables us to modify the present process of manufacturing nitro-glycerine so as to entirely dispense with the tedious and expensive operation of "after-separation", and to simplify the plant required for the manufacture.

The invention consists in the addition of a relatively small quantity of water to the waste acids resulting from the formation of nitro-glycerine, so that further formation of nitro-glycerine in these waste acids is prevented.

By this invention the process of "after-separation" is dispensed with, and

the acids may be safely stored in tanks or the like without requiring the usual continuous watching and care.

The invention may be conveniently carried out in the apparatus described in the Specification of our Patent No. 15,983 of 1901. With such an apparatus, we prefer to operate as follows:—After the required amount of nitro-glycerine has been nitrated, the separation is started at such a temperature that when all the displacing acid has been added, and the separation of the nitro-glycerine is complete, the temperature of the contents of the nitrator shall not be lower than 15° C. When the separation has been completed, a sufficient quantity of clear displacing acid lying in the lower part of the apparatus is run off through the waste acid cock, to allow of the remaining acids being air-stirred, without splashing over the top. A small quantity of water is now slowly added through the separation cylinder. If the nitrating acids are approximately of the following composition:—

Sulphuric acid (monohydrate) - - - - -	62 *per cent*
Nitric acid (anhydrous) - - - - - -	33 „ „
Water - - - - - - - - -	5 „ „
	100 „ „

and the temperature of the waste acids at the time of its addition be not below 15° C., a quantity of water, equal to about 2 *per cent*, by weight of the waste acids formed, will be sufficient. If the nitrating acids contain less than 4 *per cent.* of water, or if the temperature be lower than 15° C., from three to five *per cent.* of water may have to be added.

While adding the water the contents of the nitrator are air-stirred, but not cooled, the temperature being allowed to rise slowly and regularly as the water is added. Usually it will rise about three degrees Centigrade for every *per cent* of water added.

The air stirring is continued for a short time after all the water has been added, in order to ensure a uniform mixture. The agitation is then stopped, and a further quantity of displacing acid is admitted, in order to remove by displacement any small quantity of initially formed nitro-glycerine which may have been adhering to the coils and sides of the vessel, and which would be disturbed by the agitation with compressed air. The acids are kept at rest for a short time to allow of this floating to the top.

When this has been effected, the whole of the acids are ready for de-nitration, or can be safely stored, until required, in any ordinary storage tanks without further precaution such as continuous watching as is now required.

By this means the operation known as "after-separation" is eliminated, and the combined nitrator and separator described in Patent No. 15,983 of 1901, is rendered at once available for the nitration of another charge of glycerine

While this invention is particularly suitable for use in conjunction with the apparatus of our former patent hereinbefore referred to, it can also be used with the forms of plant hitherto generally used. In this case, as soon as the bulk of the nitro-glycerine has been separated from the waste acid in the "separator", the required proportion of water is added slowly, and as the rise of temperature is only slight, the presence of cooling coils is not essential during this operation. When the last of the nitro-glycerine already formed has been skimmed off, there is no danger of further formation or separation of nitro-glycerine, so that the acids can be dealt with without further precaution. When the usual process of "after-separation" is carried out in the nitrator-separator described in Patent No. 15,983 of 1901, the rate of production of nitro-glycerine with a given plant is limited by the time required for "after-separation", and our improved process, therefore, enables the rate of production with a given plant to be greatly increased.

Improvements in and relating to the Manufacture of Nitro-glycerine.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1.—In the manufacture of nitro-glycerine, adding to the residual acids, a small proportion of water, as and for the purpose described.

2.—A process for the manufacture of nitro-glycerine, which consists in adding glycerine to nitrating acid, allowing the formed nitro-glycerine to settle at the surface of the acids, displacing the nitro-glycerine through an opening in the upper part of the nitrating vessel by the admission of inert liquid from below, adding to the acids a relatively small quantity of water whereby further formation of nitro-glycerine in these acids is prevented, and the process of "after-separation" is eliminated, substantially as described.

3.—The hereinbefore described process for the manufacture of nitro-glycerine whereby the processes of nitration and separation are effected in one vessel, further formation of nitro-glycerine is prevented, and the process of "after-separation" is rendered unnecessary.

Dated this 8th. day of December, 1903.

MARKS & CLERK,
18, Southampton Buildings, London, W.C.
13, Temple Street, Birmingham, and
30, Cross Street, Manchester.
Agents.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.
[G 7831—125—3/1904.

[Second Edition.]

N° 2489 A.D. 1896

Date of Application, 4th Feb., 1896

Complete Specification Left, 4th Nov., 1896—Accepted, 23rd Jan., 1897

PROVISIONAL SPECIFICATION.

Improvements in the Manufacture of Silicates of Sodium and Potassium, of Nitric and Sulphuric Acids, and of Caustic Soda and Potash.

I, WILLIAM GARROWAY, of Netherfield Chemical Works, Duke Street, in the City of the County of Glasgow, North Britain, Manufacturing Chemist, do hereby declare the nature of this invention to be as follows :—

This invention relates to improvements in the manufacture of sodium and potassium silicates and of nitric and sulphuric acids, and has for its object also the manufacture of caustic soda and potash in a cheap and efficient manner without the use of any expensive reagent, and at the same time to obtain nitric and nitrous acids. For this purpose I take nitrate of soda or potash and ground sand or flint and heat them in a suitable furnace or retort to redness (if necessary over or through which superheated steam is passed). Nitric acid is evolved and may be condensed by any known means or sent direct from the retort in which it is evolved, to the chambers for the manufacture of vitriol.

The retort or vessel, when the process is employed in connection with the production of vitriol may be advantageously placed on the pyrites burners in order to utilize their heat.

The mixture of silicate of soda or potash that remains in the retorts is withdrawn when the action has ceased, and treated with water and steam : while some sand remains insoluble, the silicate of soda or potash dissolves and forms a solution and may be either disposed of directly as silicate of soda after boiling down or concentrating to the desired strength,—or the silicate of soda may be treated with lime to precipitate the silica, while the caustic soda or potash remains in solution and may be treated by known means. The insoluble silicate can be dried and treated for cement manufacture.

In carrying out my invention I proceed as follows :—

I mix together two hundred to three hundred parts by weight or thereby of silica or sand (ground) to one hundred parts by weight or thereby of nitrate of soda and place this mixture in a retort or vessel preferably of cast iron, which in the case of the manufacture of vitriol is placed or built in the kiln and heated by the flame of burning pyrites or sulphur passing over and around it. I then pass superheated steam through the hot charge (and a little hot air when required), which effects the decomposition, nitric acid being evolved, which is conducted directly into the vitriol chambers or Glover towers, or it is condensed for sale or treated in any other known way. The mixture of silicate of soda and sand remaining in the retort is now withdrawn, treated with water and steam if necessary by which silicate of soda is obtained in solution.

Dated this 3rd day of February 1896.

JOHNSONS,
115 St. Vincent Street, Glasgow, Petitioner's Agents.

[*Price* 8*d.*]

COMPLETE SPECIFICATION.

Improvements in the Manufacture of Silicates of Sodium and Potassium, of Nitric and Sulphuric Acids, and of Caustic Soda and Potash.

I WILLIAM GARROWAY, Manufacturing Chemist of Netherfield Chemical Works, Duke Street, Glasgow, in the County of Lanark, Scotland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to improvements in the manufacture of silicates of sodium and potassium and of nitric and sulphuric acids, and it has also for its object the manufacture of caustic soda and caustic potash, in a cheap and efficient manner, and without the use of any expensive reagent or material.

For this purpose I take nitrate of soda or of potash with ground sand or flint and heat them in a suitable furnace or retort, (over which or through which I pass superheated steam and hot air) silicate of the alkaline base is formed, while nitric acid is evolved and may be condensed by any known means, or sent direct, from the vessel in which it is evolved, to the chamber for the manufacture of vitriol. The retort or vessel may be heated by any ordinary means, but when the process is employed in connection with the production of vitriol, it may be advantageously placed on the pyrites burners in order to utilise the heat.

When the action has ceased the silicate of soda or of potash that remains in the retort is withdrawn and is treated with water and steam. Some sand or silica remains insoluble, but the silicate of soda or potash dissolves and forms a solution, which may either be disposed of directly or, after being boiled down or concentrated to the desired strength, be employed for the manufacture of soap powders, or in the process of rectifying mineral oil. Or the silicate of soda or potash may be treated with lime, to precipitate the silica, while the caustic soda or potash remains in solution, and may be treated by any known means ; and the insoluble silicate may be dried and treated for the manufacture of cement.

In carrying out my invention I proceed as follows :—

I mix together from one hundred to two hundred parts by weight of sand or ground flint with one hundred parts by weight, or thereby, of nitrate of soda, or its equivalent of nitrate of potash, and place this mixture in a retort or vessel, preferably of cast iron, which, in the case of the manufacture of vitriol, is built in the kiln, and is heated by the flames or heat of the burning pyrites or sulphur passing over or around it. I then pass superheated steam through the hot charge (and a little hot air when required) which effects the decomposition, nitric acid being evolved, which is conducted directly into the vitriol chambers or the Glover towers, or it is condensed for sale or treated in any known way. The mixture of silicate of soda or of potash and sand, remaining in the retort, is now withdrawn, treated with water and steam, by which the silicate is obtained in solution.

In carrying out my process, when it is employed in connection with the manufacture of vitriol or sulphuric acid, the apparatus and plant I employ will be readily understood from the accompanying drawings and the following description :—

Figure 1 is an elevation shewn partly in section.

Figure 2 is a cross section.

A is the retort, of which there may be any number, B the charging door by which the materials are introduced into the retort, C a steam pipe, D and D^1 pipes

leading to sulphuric acid chambers or Glover tower for conveying the evolved nitric acid thereto, E E drawing off or discharging doors. F is the superheated steam supply pipe, G, G are the pyrites or sulphur burners. H is the Glover tower.

Two retorts may be used for a set of six chambers, but that will of course depend on the capacity of both the retorts and the chambers. The one retort may be opened and be charged or discharged without in the least interfering with the process going on in the other.

When the process is not intended to be applied in connection with the manufacture of sulphuric acid, the retorts may be heated by the combustion of ordinary fuel, in any suitable furnace, or in any well known manner.

Having now particularly described and ascertained the nature of my said invention and the means by which I carry it out, I declare that what I claim is :—

1st. The production of silicate of soda and of potash and of nitric acid by heating a mixture of silica, in the form of ground sand or flint, with nitrate of soda or of potash, with superheated steam, as hereinbefore described.

2nd. The employment in the vitriol chamber or Glover tower, of nitric acid prepared by heating a mixture of silica, in the form of sand or flint, with nitrate of soda or of potash, as hereinbefore described.

3rd. The production of caustic soda or caustic potash by treating the silicate of soda or of potash obtained in the aforesaid processes, with lime, as hereinbefore described.

Dated this 3rd day of November 1896.

JOHNSONS,
115 St. Vincent Street, Glasgow, Applicant's Agents.

Redhill : Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.
[G. 4351—50—11/98.]

A.D. 1896. Feb. 4. Nº 2,489.
GARROWAY'S Complete Specification.

(1 SHEET)

(2nd Edition)

Fig 2.

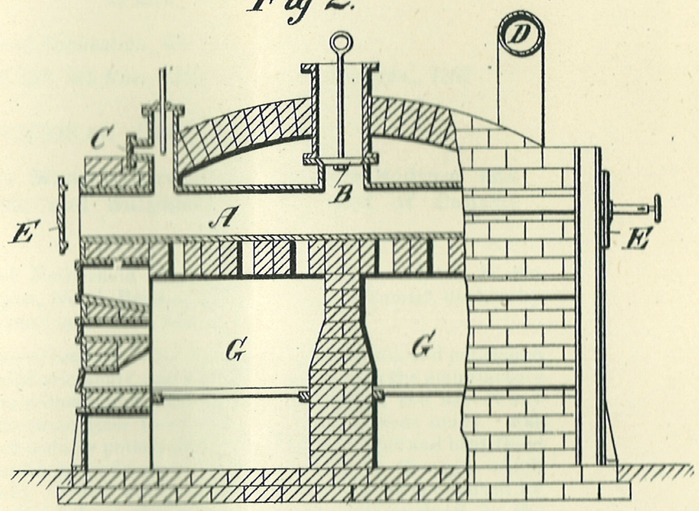
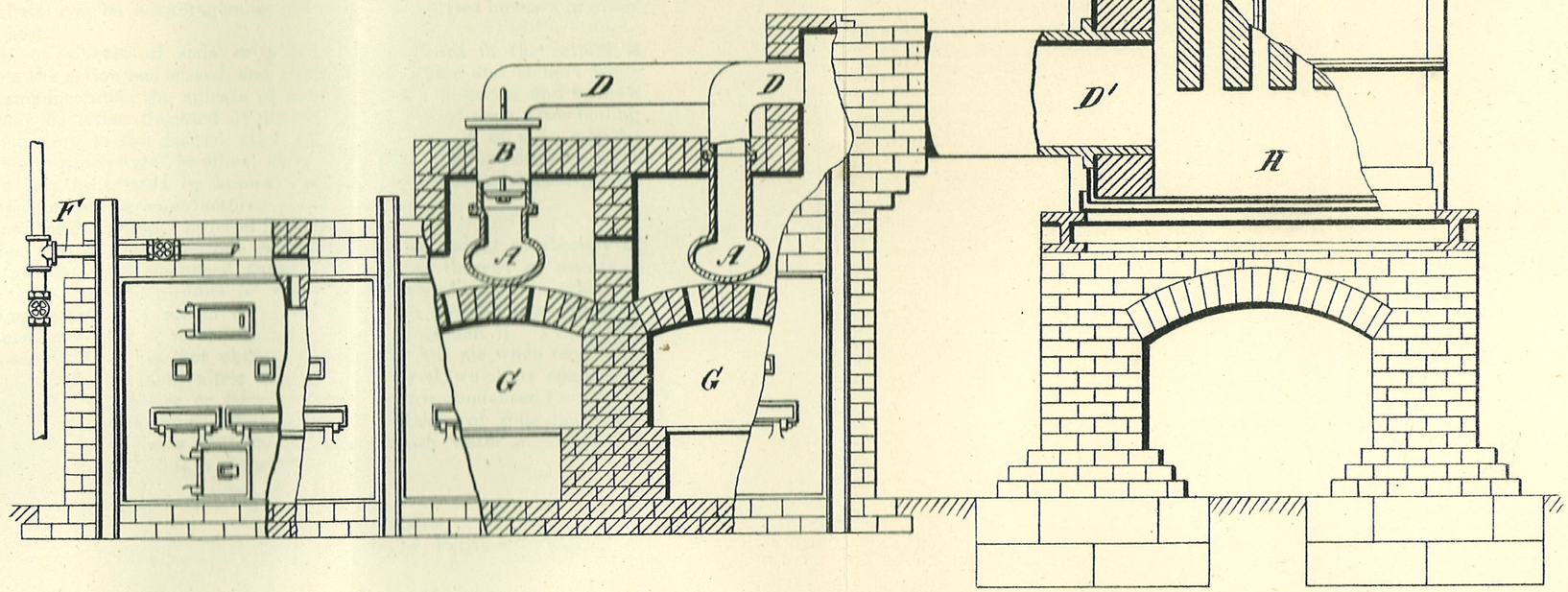


Fig 1.



[This Drawing is a full-size reproduction of the Original.]

Malby & Sons, Photo-Litho.

N° 2466 A.D. 1895

Date of Application, 5th Feb., 1895

Complete Specification Left, 4th May, 1895—Accepted, 8th June, 1895

PROVISIONAL SPECIFICATION.

Improvements in the Manufacture of Sulphuric, Nitric, and Nitrous Acid, and of Sulphate of Soda, Oxide of Iron, and Alumina.

I, WILLIAM GARROWAY, of Netherfield Chemical Works, Duke Street, in the City of the County of Glasgow, North Britain, Manufacturing Chemist, do hereby declare the nature of this invention to be as follows :—

This invention relates to improvements in the manufacture of sulphuric, nitric and nitrous acid, and of sulphate of soda, oxide of iron and alumina.

In accordance with my said invention I mix together proto-sulphate of iron (copperas) and nitrate of soda, and subject this mixture to a moderate temperature, by which I obtain nitric acid, with some nitrous acid, which pass off, and may be employed in the manufacture of sulphuric acid or recovered by any well-known means, while sulphate of soda associated with peroxide of iron remains behind as a residue. This residue I treat with water, in which the sulphate of soda dissolves, while the oxide of iron remains insoluble and constitutes a fine red pigment of considerable commercial value.

In carrying out my invention or improved process I either grind separately and mix together, or grind together the protosulphate of iron and the nitrate of soda, and heat the mixture in the ordinary way. I can use the protosulphate of iron either with the whole of its contained water of crystallization, or after a portion of that has been removed by previous heating. During the process the sulphuric acid acts upon the nitrate of soda, producing sulphate of soda, which remains as a residue, mixed with the peroxide of iron, while the nitric acid accompanied by some nitrous acid is volatilised. I can then separate the sulphate of soda by treating the residue with water, which dissolves it, settling or filtering the solution, and concentrating it to obtain Glauber's salts in the usual way, while the oxide of iron requires only to be washed and dried in order to bring it into a marketable condition.

I have also found that sulphate of alumina or alum treated in the same way yields nitric and nitrous acids, as well as sulphate of soda which remains associated in this case with pure alumina, which like the oxide of iron, may be separated by treatment with water, and is then left in a marketable condition.

In heating my retorts containing the said mixtures I may either employ heat specially generated for the purpose, or in the application of the resulting nitric acids for the sulphuric acid manufacture the heat of the pyrites or sulphur kilns or burners.

Dated this Fourth day of February 1895.

JOHNSONS,
115, St. Vincent Street, Glasgow, Petitioner's Agents.

[*Price* 8*d.*]

COMPLETE SPECIFICATION.

Improvements in the Manufacture of Sulphuric, Nitric, and Nitrous Acid, and of Sulphate of Soda, Oxide of Iron, and Alumina.

I, WILLIAM GARROWAY of Netherfield Chemical Works, Duke Street, Glasgow, North Britain, Manufacturing Chemist, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

My invention relates to an improved process by which I obtain nitric and nitrous acid which may be advantageously employed in the manufacture of sulphuric acid, and to the production at the same time of sulphate of soda, oxide of iron and alumina.

In carrying out my invention I mix together proto-sulphate of iron (copperas) and nitrate of soda and subject this mixture to a moderate temperature, by which I obtain nitric acid and nitrous acid, which pass off, and may be employed in the manufacture of sulphuric acid, or they may be recovered by any well known means, while sulphate of soda associated with peroxide of iron remains behind as a residue. This residue I treat with water, in which the sulphate of soda dissolves, while the oxide of iron remains insoluble and constitutes a fine red pigment of considerable commercial value.

In practically working or carrying out my invention I grind separately and mix together, or grind together, 556 parts of the proto-sulphate of iron and 340 parts nitrate of soda, both by weight. These are chemically equivalent proportions, but as neither of these substances are known commercially in a pure state, the proper allowance must be made for such impurities as may be present. In any case I do not confine myself strictly to these proportions as I find in practice that they may vary without detriment to the process. Thus, I can use for example 2 parts of commercial proto-sulphate of iron to 1 part of commercial nitrate of soda, both by weight. I can also use the proto-sulphate of iron either with the whole of its contained water of crystallization or after a portion of that has been removed by previous heating. The mixture so produced I place in pots or retorts made of cast iron or other suitable material, in which I then heat the mixture, preferably up to a dull red heat. During the process of heating the sulphuric acid combines with the soda, producing sulphate of soda which remains as a residue mixed with the peroxide of iron, while the nitric acid accompanied by nitrous acid is volatilized. These acids may be either led directly into the sulphuric acid chamber for use there, or they may be recovered by condensation or by other well-known means. I then treat the residue in the retorts with water, hot or cold, by which I dissolve out the sulphate of soda from the oxide of iron. The former I can recover as Glauber's salts by evaporation and crystallization in the usual way: the latter I wash with water and dry it, after which it is ready for the market. I find that the oxide of iron prepared in this way is of superior quality in respect that it is free from all acidity which is so objectionable in the oxide of iron made by roasting copperas in the ordinary way.

I have also found that sulphate of alumina or alum treated in the same way yields nitric and nitrous acids as well as sulphate of soda, which remains associated in this case with pure alumina, which like oxide of iron may be separated by treatment with water and is then left in a marketable condition.

In heating my pots or retorts containing the said mixtures I may either employ heat specially generated for the purpose, or, in the application of the resulting nitric acids for the sulphuric acid manufacture, the heat of the pyrites or sulphur kilns or burners.

I do not consider it necessary to give any drawing of the plant or apparatus, as

I find that the "nitre pot" usually employed in the manufacture of vitriol serves the purpose very well, as far as that manufacture is concerned. Where the nitric acids are to be condensed or otherwise employed, however, it will be necessary to use such retort or vessel as is commonly in use for the manufacture of nitric acid.

Having now particularly described my invention and the manner of carrying it out, I now declare that what I hereby claim is :—

First. The preparation of nitric and nitrous acids by heating a mixture of protosulphate of iron and nitrate of soda, in the manner substantially as hereinbefore described.

Second. The preparation of sulphate of soda by heating a mixture of protosulphate of iron and nitrate of soda, in the manner substantially as hereinbefore described.

Third. The preparation of oxide of iron by heating a mixture of protosulphate of iron and nitrate of soda, in the manner substantially as hereinbefore described.

Fourth. The preparation of alumina by heating a mixture of sulphate of alumina or alum with nitrate of soda, in the manner substantially as hereinbefore described.

Fifth. The preparation of nitric and nitrous acids by heating a mixture of sulphate of alumina or alum with nitrate of soda, in the manner substantially as hereinbefore described.

Sixth. The preparation of sulphate of soda by heating a mixture of sulphate of alumina or alum with nitrate of soda, in the manner substantially as hereinbefore described.

Dated this 3rd day of May 1895.

JOHNSONS,
115, St. Vincent Street, Glasgow, Applicant's Agents.

London : Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1895

[Second Edition.]

N° 6777 A.D. 1899

Date of Application, 29th Mar., 1899
Complete Specification Left, 28th Dec, 1899—Accepted, 3rd Mar., 1900

PROVISIONAL SPECIFICATION.

Improvements in the Manufacture of Nitric Acid, Neutral Sulphate of Soda, Ammonium Nitrate, and Carbonate of Lead.

I, WILLIAM GARROWAY, Netherfield Chemical Works, Duke Street, Glasgow, Chemical Manufacturer, do hereby declare the nature of this invention to be as follows :—

This invention relates to a continuous and improved process and apparatus for the manufacture of nitric acid, and neutral sulphate of soda; it has also for its object the manufacture of ammonium nitrate, and carbonate of lead.

For this purpose I take nitre cake (acid sulphate of soda) occurring as a waste product in the manufacture of sulphuric, or nitric acids, and heat it in a suitable furnace or retort with about half its weight or thereby of nitrate of soda. I then pass steam and air over or through the heated mixture, which effects the decomposition of the nitrate of soda. Nitric acid is evolved and may be condensed by known means or employed for the manufacture of ammonium nitrate, and carbonate of lead, as described in the Specifications of my Patents No. 7066/97 and No. 22,395/97.

The neutral sulphate of soda remaining in the furnace is withdrawn when the action has ceased, and can be disposed of directly for glass making and such like.

Dated this 28th day of March 1899.

JOHNSONS,
Petitioner's Agents, 115, St. Vincent Street, Glasgow.

COMPLETE SPECIFICATION.

Improvements in the Manufacture of Nitric Acid, Neutral Sulphate of Soda, Ammonium Nitrate, and Carbonate of Lead.

I, WILLIAM GARROWAY, Netherfield Chemical Works, Duke Street, Glasgow, Chemical Manufacturer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to a continuous and improved process and apparatus for the manufacture of nitric acid, and neutral sulphate of soda, from the acid sulphate of soda (or the waste material " nitre cake ").

In carrying out my invention I proceed as follows, I take nitre cake (acid sulphate of soda) occurring as a waste product in the manufacture of sulphuric

acid or nitric acid, I mix together two hundred parts by weight or thereby of the nitre cake, (in small pieces) with one hundred parts by weight or thereby of nitrate of soda, and heat the mixture in a suitable furnace or oven, I then pass steam and air through the heated mixture, which effects the decomposition of the nitrate of soda, nitric acid is evolved and may be condensed by known means, or employed for the manufacture of ammonium nitrate, carbonate of lead, or sulphuric acid, as described in the Specifications of my Patents No. 7066/97 No. 22395/97 and No. 2489/96.

The neutral sulphate of soda remaining in the furnace is withdrawn when the action has ceased, and can be disposed of directly for glass making and such like.

The method and plant employed when my process is connected with the manufacture of vitriol will be readily understood from the accompanying drawing in which Fig. 1 is an elevation and Fig. 2 a section.

In the said drawings

A, is the muffle furnace on top of pyrites burners say about 10 feet × 3 feet × 6″.

D, the door by which the charges can be raked and shifted.

E, the discharging door.

C, the pipe leading the nitric acid to chambers.

P, the steam and air supply pipe to oven.

The improved apparatus is designed for the purpose of passing the nitric acid vapours direct from the furnace or oven to the lead chambers, thereby effecting a considerable economy and improvement in the working, a considerable part of which hitherto has been lost by passing them through the "Glover's tower" when some of the nitrous gases coming into contact with sulphurous gases at a high temperature are thereby decomposed, but this new and improved process works so easily and regularly that the nitric acid can be sent in a continuous stream direct into the lead chambers instead of into the "Glover tower" with the result that practically no nitric acid is left in the sulphuric acid from the "Glover tower" and less nitre is required to produce a given quantity of vitriol.

The advantage of this process on the score of economy will be manifest to vitriol and nitric acid makers, when the waste product nitre cake has to be dealt with.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. The preparation of neutral sulphate of soda, by passing steam and air through a heated mixture of the waste product nitre cake, and nitrate of soda in a manner substantially as hereinbefore described.

2. The preparation of nitric acid by passing steam through a heated mixture of nitrate of soda, and of the waste product nitre cake in a manner substantially as hereinbefore described.

3. The simultaneous preparation of neutral sulphate of soda and nitric acid by passing steam through a heated mixture of the waste product nitre cake and nitrate of soda, in a manner substantially as hereinbefore described.

4. The use, in the vitriol chamber or in the process in the manufacture of vitriol of the nitric acid produced by my improved process, in a manner substantially as hereinbefore described.

Dated this 27th day of December 1899.

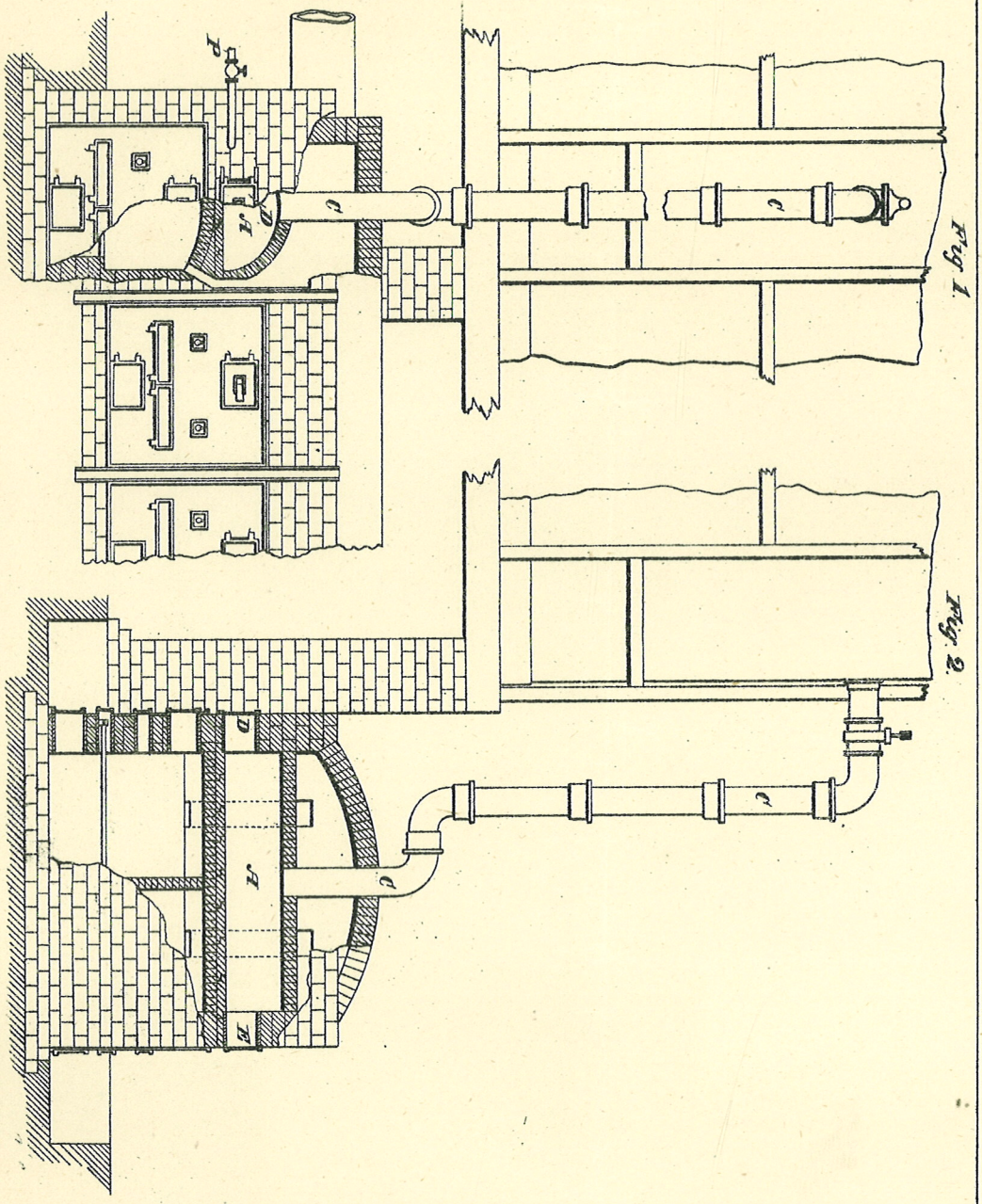
JOHNSONS,
Applicant's Agents, 115, St. Vincent Street, Glasgow.

Redhill: Printed for Her Majesty's Stationery Office, by Malcomson & Co., Ltd.
[C. 5448–125–9 1900.]

A.D. 1899. March 29. N° 6777.

GARROWAY'S Complete Specification. (1 SHEET)

(2nd Edition)



[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Litho.

N° 10,171 A.D. 1893

Date of Application, 23rd May, 1893
Complete Specification Left, 22nd Feb., 1894—Accepted, 23rd May, 1894

PROVISIONAL SPECIFICATION.

Improved Still and Apparatus for the Distillation of Ammoniacal Liquor and other Fluids.

GEORGE PETTIGREW 58 St. Paul's Road Middlesbrough Gas Engineer do hereby declare the nature of this invention to be as follows :—

The still is made columnar or vertical and is divided into two compartments, about two thirds of its height. Both compartments are connected by a syphon or syphons. The still may be heated by steam let into the bottom in the usual manner, or it may be heated by gas or by direct firing, and when it is heated by direct firing the fire bars may be made hollow, and the ammoniacal liquor or other fluid to be distilled may be passed through them to ensure its being sufficiently heated before entering the still.

In the upper part of the still is placed any number of shallow trays, helical in form. The fluid to be distilled enters into the center circumvolution of the first tray (and there being any number of circumvolutions in each tray) flows round each successive circumvolution from the center to the circumference, then flows from the first tray to the outer circumvolution of the second tray, and round each successive circumvolution from the circumference to the center, then to the third tray and so on to any number. When the fluid leaves the last tray it passes into a pipe which conveys it nearly to the bottom of the first compartment of the still, then by a syphon it is conveyed to the second compartment, where it comes into contact with "milk of lime," which is caused to flow by a syphon arrangement into the second compartment of the still, at stated intervals, and in specified quantity. Small spaces are left between the circumvolutions of the trays, to allow the steam and heated gases to pass up between them.

The ammoniacal liquor or other fluid to be distilled runs in at the top of the still continuously, but, owing to the arrangement of the syphons, the "spent liquor" only runs from the still intermittently.

Dated this 20th day of May 1893.

GEO. PETTIGREW.

COMPLETE SPECIFICATION.

Improved Still and Apparatus for the Distillation of Ammoniacal Liquor and other Fluids.

GEORGE PETTIGREW 58 St. Paul's Road Middlesbrough Gas Engineer do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention has more particular reference to the distillation of ammoniacal liquor for the manufacture of sulphate of ammonia. The still is made round in form and vertical, and is made of cast iron or other suitable material. In the upper part of the still Fig. 1 is placed a number of shallow trays helical in form shewn in Fig. 2.

The liquor to be distilled flows in at the top of the still by the pipe C. to the centre of the first tray A. It then flows round each circumvolution into which the tray may be divided, in the direction shewn by the arrow head Fig. 2 from the centre to the overflow pipe D. at the circumference. The liquor flows down

this overflow pipe to the circumference of the second tray E. Fig. 1 its direction of flow is here reversed, the liquor now flows round each circumvolution from the circumference to the overflow pipe F. in the centre of the tray flowing down this overflow to the centre of the third tray A_2. The liquor now flows from the centre round each circumvolution to the circumference, as in the first tray, and so on to any number of trays. The liquor having passed through all the trays composing the still, flows down the overflow pipe D_2 the end of which is sealed in liquor contained in the sealing box S. The bottom part of the still is divided into two compartments, the liquor overflows from the box S. down the pipe L. to nearly the bottom of the first compartment where it is mixed with "milk of lime."

The liquor rises in this compartment to nearly the top of the division plate, it then flows through a pipe which conveys it to nearly the bottom of the second compartment, it then rises to the height of the overflow from the still. The steam to heat the liquor is let into the still at the bottom in the usual manner, and with the heated gases passes up through the holes O. (made in the trays for the purpose in the positions shewn) in the direction of the arrow heads Fig. 1 into "hoods" H. made to cover each circumvolution of the trays, the bottom edges of the hoods resting on the inside bottom of the trays as shewn. The bottom edges of the hoods are serrated to a depth less than the height of the top of the overflow pipes from the inside bottom of the trays, thus ensuring that the serrations in the bottom edges of the hoods, are always covered with liquor when the still is in action. The steam and heated gases depress the liquor under the hoods, passing out through the serrations in the bottom edges of the hoods, and up through the liquor flowing between each circumvolution of the trays, and out at the top of the still through suitable outlet pipe to the saturator. The trays may be made so as to fit into the body of the still Fig. 1 and be lifted in and out for cleaning purposes, or they may be made with flanges and be bolted together.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is;

1. The helical form of tray composing the still, as substantially described in my Specification and shewn on the drawings herewith.

Dated this 21st day of February 1894.

GEO. PETTIGREW.

London: Printed for Her Majesty's Stationery Office. by Darling & Son, Ltd.—1894

A.D. 1893. May 23. No. 10,171.

PETTIGREW'S Complete Specification.

(1 SHEET)

FIG. 1.

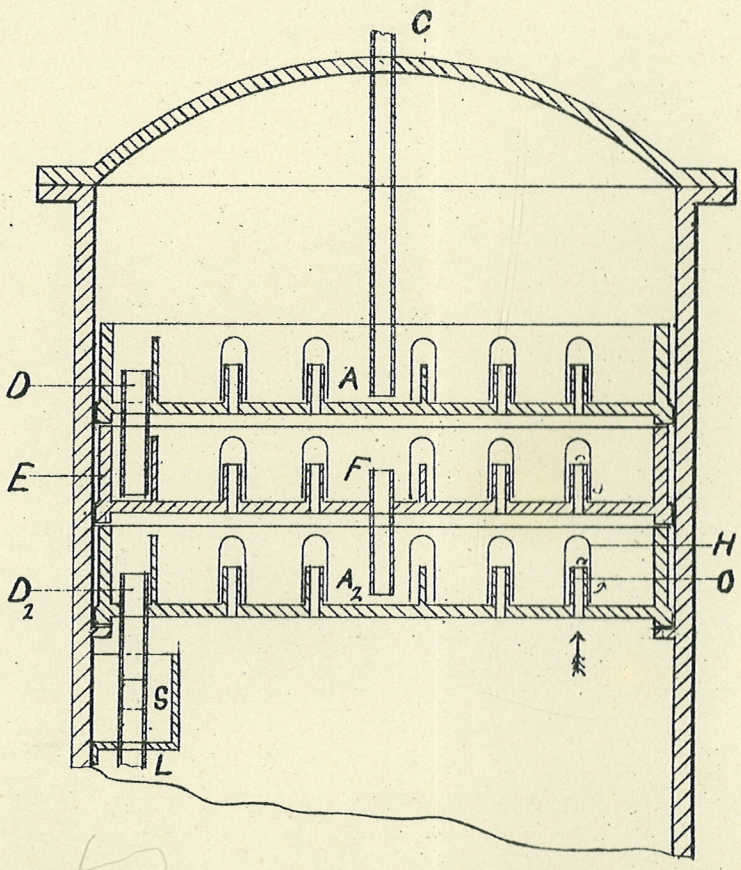
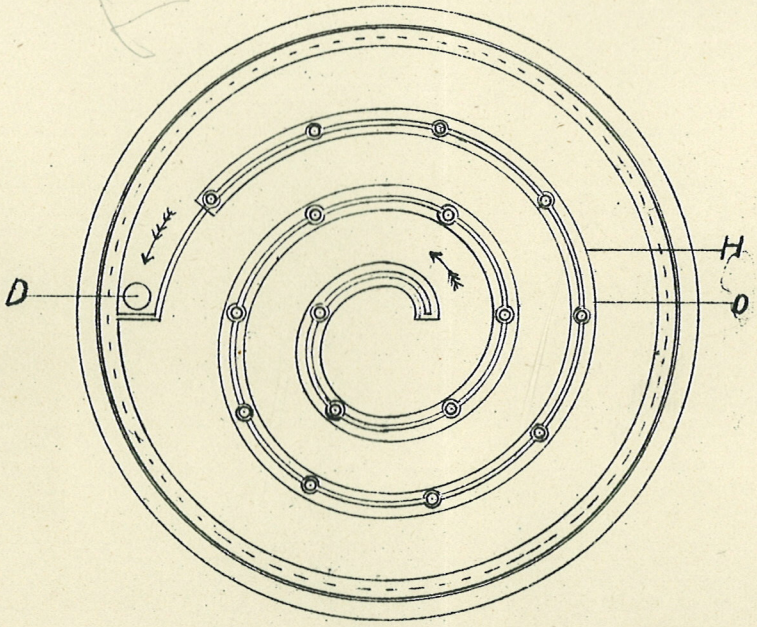


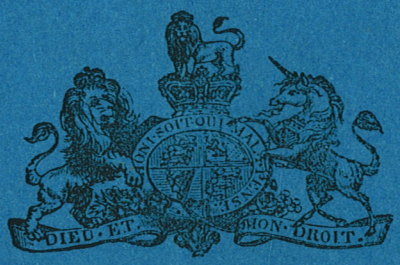
FIG. 2.



[This Drawing is a full-size reproduction of the Original.]

London: Printed by Darling and Son Ld.
for Her Majesty's Stationery Office. 1894.

Malby & Sons, Photo-Litho.



A.D. 1877, 25th JANUARY. N° 328.

SPECIFICATION

OF

ALEXANDER MELVILLE CLARK.

EVAPORATING SACCHARINE JUICES.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:
PUBLISHED AT THE GREAT SEAL PATENT OFFICE,
25, SOUTHAMPTON BUILDINGS, HOLBORN.
1877.

Price 8d.
Price 4d.

A.D. 1877, 25th JANUARY. N° 328.

Evaporating Saccharine Juices.

LETTERS PATENT to Alexander Melville Clark, of 53, Chancery Lane, in the County of Middlesex, Patent Agent, for the Invention of "IMPROVED APPARATUS FOR EVAPORATING SACCHARINE JUICES." A communication from abroad by José Guardiola, of Chocolá, in the Republic of Guatemala, Central America.

Sealed the 16th March 1877, and dated the 25th January 1877.

COMPLETE SPECIFICATION filed by the said Alexander Melville Clark at the Office of the Commissioners of Patents on the 25th January 1877.

ALEXANDER MELVILLE CLARK, of 53, Chancery Lane, in the County of Middlesex, Patent Agent. "IMPROVED APPARATUS FOR EVAPORATING SACCHARINE JUICES." A communication from abroad by José Guardiola, of Chocolá, in the Republic of Guatemala, Central America.

This Invention relates to a new sugar evaporating apparatus, and to new means for rapidly and effectually evaporating sugar juice. It consists more particularly in a novel construction of a series of connected oblong channels, arranged in successive steps one above the other, in which the syrup or juice is gradually evaporated and conveyed to tanks for further treatment, and wherein it is also skimmed by overflowing from one channel of the evaporator to another.

The Invention also consists in a novel combination of one or more such series of channels with a series of tanks for the further effectual treatment of the saccharine matter.

Figure 1 of the accompanying Drawings is a plan view of the improved evaporator; and Figure 2 is a transverse section of the same taken on the line x, x, Figure 1.

Similar letters of reference indicate corresponding parts in the two Figures.

A is an oblong evaporator consisting of a series of connected channels or a continuous channel B^1 arranged in successive steps a^1, a^1, the central one being the highest, and each successive step being inclined downwards towards the next below, and the last in the series being inclined toward the discharge spout c^1. The channel B^1 throughout its entire length is made in shape of a vertical ledge d^1, which has the outwardly projecting horizontal flange e^1 and an upwardly inclined lip f^1. If any of the juice that flows downward along the channel B^1 boils over

[Price 4d.]

Price 4d.

it is thrown on the flange e^1 which is perforated, and is thereby skimmed so that the impure parts will remain on the surface of the said perforated flange. Along the lower portions of the channel B^1 the flange is not perforated, so that the juice cannot be laterally discharged from the lower parts of the said channel. This oblong evaporator is set in brickwork and is provided with a furnace suitably arranged for evaporating purposes.

The discharge spout c^1 of the oblong evaporator is arranged to discharge into either compartment of a vat g^1, which is divided longitudinally through its centre and provided with gates or cocks h^1. The vat is placed at the front or rear of the fire arch, so that a portion of its under surface is acted upon by the fire.

Defecating tanks are placed upon the arch remote from the fire, and at such a level as will permit of running their contents into the evaporator A through a suitably arranged pipe.

The operation is substantially as follows:—The cane, beet, or sorghum juice passes from a mill to the defecating vats when it is treated by the usual known processes for defecating saccharine juices, the process being carried on in alternation in the vats, and as soon as the juice arrives at the proper state it is permitted to flow through a pipe into the central and highest part of the evaporator, when it flows through the channels of the evaporator until discharged through the spout c^1 into one of the compartments of the vat g^1 where it is subjected to a further heating, and is finally drawn off through one of the gates h^1 while the spout is changed so as to direct the juice into the empty compartment of the said vat g^1.

If an oblong evaporator having a channel of considerable length is used the inclination of the channel should be increased, say, every fifty feet, as the liquid gradually becomes thicker and requires more pitch to flow without burning.

A great amount of water contained in the juice is driven off in going through the evaporator, and the stream of juice or syrup coming out of it is comparatively pure. A boy with a rag or brush can clean the strainer or skimmer flange, no other attendance being requisite. It will take but a few minutes for the juice to pass through a channel and be properly evaporated. The yield will therefore be greater and the quality of produce better than in any other apparatus for the same purpose.

Having described the nature of the said Invention and the manner of performing the same, I declare that what I claim as new and desire to secure by Letters Patent is,—

First. The oblong evaporator containing the channel B^1 and the perforated skimming flanges e^1 along the said channel, substantially as herein shown and described.

Second. The combination of an oblong evaporator with the comparted vat g^1, substantially as herein shown and described.

Third. The comparted vat g^1 for receiving the liquid from the evaporator, substantially as herein shown and described.

Fourth. The movable spout c^1 for discharging the juice from the evaporator into either of the compartments of the vat g^1, substantially as herein shown and described.

In witness whereof, I, the said Alexander Melville Clark, have hereunto set my hand and seal, this Twenty-fifth day of January, in the year of our Lord One thousand eight hundred and seventy-seven.

A. M. CLARK. (L.S.)

LONDON: Printed by George Edward Eyre and William Spottiswoode
Printers to the Queen's most Excellent Majesty. 1877.

A.D. 1877. JAN. 25. № 328.
CLARK'S COMPLETE SPECIFICATION.

(1 SHEET)

fig 1.

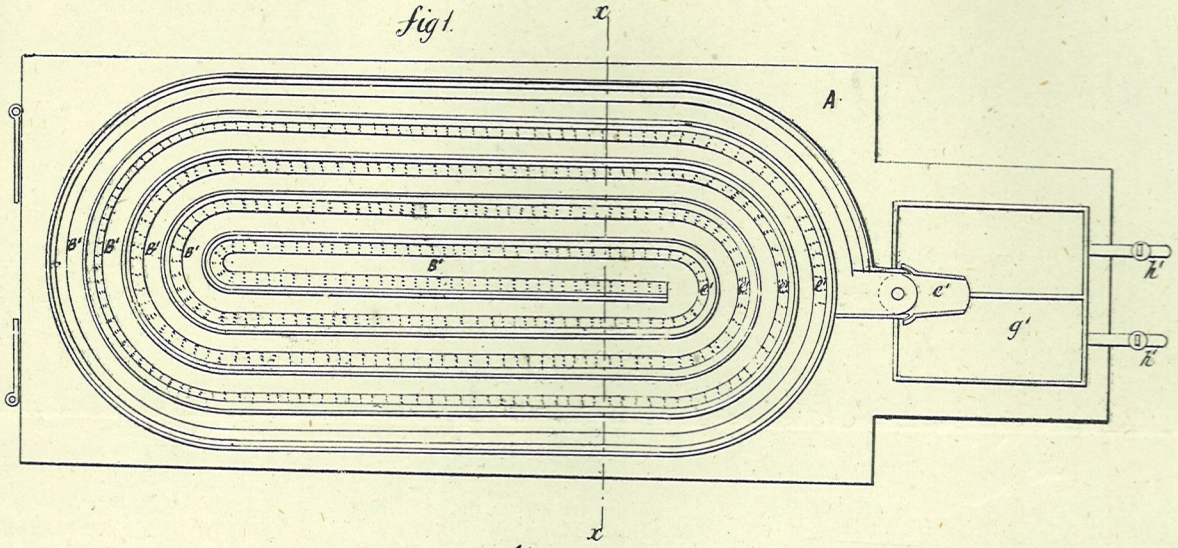
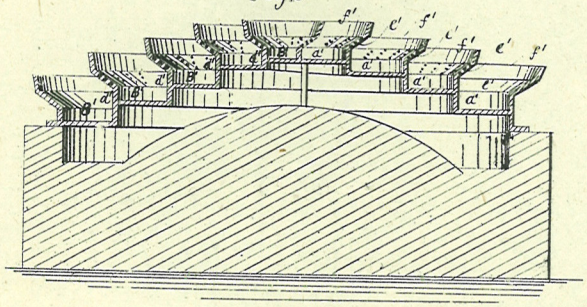


fig 2.



The filed drawing is not coloured.

Maiby & Sons, Photo-Litho.

LONDON: Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE.
Printers to the Queen's most Excellent Majesty. 1876.

MEMORANDUM.

From the **SUPERINTENDENT,**
Patent Office, Sale Branch,
25, Southampton Buildings,
LONDON, W.C.

Any further communication on this subject should be addressed as above.

Dr R Robertson

6/10/03

With reference to your Letter received this day.

The Specification you require, No. 3155 of 1882

cannot be supplied as it is out of print

	s.	d.
Amount remitted by you	2 :	0
Publications sent, with Postage	1 :	4
Balance returned herewith ...	:	8

A Lovell *Superintendent.*

W B & L (x)—6741—3000-4-3

PATENT OFFICE, SALE BRANCH,

25, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON, W.C.

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Searches cannot be undertaken by the Patent Office, but must be made by the person requiring information, or by his solicitor or agent.

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W B & L (240J)—60992--5000-9-02

A.D. 1887, 6th DECEMBER. N° 16,805.

SPECIFICATION

OF

WILLIAM THOMAS WALKER.

IMPROVEMENTS IN DISTILLATORY APPARATUS FOR USE IN CHEMICAL OPERATIONS.

LONDON:
PUBLISHED AND SOLD AT THE PATENT OFFICE SALE BRANCH,
[38], CURSITOR STREET, CHANCERY LANE, E.C.

Price 8*d*. 1888.

Date of Application, 6th Dec., 1887
Complete Specification Left, 6th Sept., 1888
Complete Specification Accepted, 12th Oct., 1888

A.D. 1887, *6th* DECEMBER. N° 16,805.

PROVISIONAL SPECIFICATION.

Improvements in Distillatory Apparatus for Use in Chemical Operations.

I, WILLIAM THOMAS WALKER, of Bishopswood Road Highgate in the County of Middlesex, Esquire, do hereby declare the nature of this Invention to be as follows :—

My Invention relates to distillatory apparatus in which liquors are subjected to the action of steam heat whilst the said liquors are flowing from chamber to chamber of a superposed series arranged in the form of a column. Hitherto such chambers have consisted of shallow compartments provided with partitions affording openings or passages for the liquor alternately at opposite ends and provided with overflow pipes or passages for the passage of the liquor from vessel to vessel the liquor taking a backward and forward course through the apparatus between the said partitions. Under each of the shallow compartments are steam casings for heating the liquors and driving off their volatile matters such for example as in treating ammoniacal gas liquors in what is known as the closed vessel process of purifying coal gas. This apparatus so constructed is expensive to make and inconvenient in use and it is the object of my Invention to provide an apparatus cheap to make and very efficient in operation.

According to my Invention I provide the chambers through which the liquors pass each with a raised partition giving a course or channel in the form of a volute or spiral so that the liquors fed in (say at the side) will take a spiral course continuously in the same direction. The outlets for the liquor from chamber to chamber may be made so that the liquors pass in alternately opposite directions in adjacent chambers or so that the liquors are led out of the centre of one chamber into the outward part of the volute or spiral of the chamber next below it.

In order to economize heat the column of chambers may be surrounded by a casing with felt or other non-conductor of heat between its interior and the exterior of the column. The said outer casing may be hinged (preferably by a vertical hinge) or arranged so that it can be readily opened out completely to get at any of the chambers.

Dated this 6th day of December 1887.

J. H. JOHNSON & Co.,
47, Lincoln's Inn Fields, London, W.C.,
Agents for the said William Thomas Walker

[*Price* 8*d*.]

COMPLETE SPECIFICATION.

Improvements in Distillatory Apparatus for Use in Chemical Operations.

I WILLIAM THOMAS WALKER of Bishopswood Road Highgate in the County of Middlesex Esquire do hereby declare the nature of this Invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement:—

My Invention relates to distillatory apparatus in which liquors are subjected to the action of steam heat whilst the said liquors are flowing from chamber to chamber of a superposed series arranged in the form of a column. Hitherto such chambers have consisted of shallow compartments provided with partitions affording openings or passages for the liquor alternately at opposite ends and provided with overflow pipes or passages for the passage of the liquor from vessel to vessel the liquor taking a backward and forward course through the apparatus between the said partitions. Under each of the shallow compartments is a steam casing for heating the liquors and driving off their volatile matters such for example as in treating ammoniacal gas liquors in what is known as the closed vessel process of purifying coal gas. This apparatus so constructed is expensive to make and inconvenient in use and it is the object of my Invention to provide an apparatus cheap to make and very efficient in operation.

According to my Invention I provide the chambers through which the liquors pass each with a raised partition giving a course or channel in the form of a volute or spiral so that the liquors will in each chamber take a spiral course continuously in the same direction. The outlets for the liquor from chamber to chamber may be made so that the liquors pass in alternately opposite directions in adjacent chambers or so that the liquors are led out of the centre of one chamber into the outward part of the volute or spiral of the chamber next below it.

The accompanying drawing shows an arrangement according to my Invention. Figure 1 being a vertical section of part of a column. Figure 2 a plan of one chamber and Figure 3 a plan of that next below it. A, B, are the compound chambers forming the sections of which the column is built up. A are the chambers through which the liquors pass the floor of each such chambers being provided with a raised partition *a* in the form of a volute or spiral and B are the spaces beneath the floors of the chambers into which steam is admitted from the steam pipe C by branches *c* the water of condensation being drawn off by the pipes *d* communicating with the main pipe D.—E are the passages through the centre of the apparatus by which the gases pass from each chamber A to the next above it and to the outlet.—*f* are the tubes by which the liquor descends from each chamber A to the next chamber A below it and to the discharge from the lowest chamber A. The floors of the chambers A are shown as being alternately somewhat inclined inwards and outwards for the flow of the liquid although this may be provided for by the level

to which the tubes *f* open into the chambers A. The tubes *f* are alternately at the inward and outward ends of the spiral passages so that the liquor flows outward and inwards alternately.

In order to economize heat the column of chambers may be surrounded by a casing *g* with felt or other non-conductor of heat *h* between its interior and the exterior of the column. The said outer casing may be hinged (preferably by a vertical hinge) or arranged so that it can be readily opened out completely to get at any of the chambers.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is :—

1. In distillatory apparatus of the kind described chambers through which the liquors pass with a course or channel in the form of a volute or spiral substantially as herein before described.

2. The distillatory apparatus arranged or constructed as illustrated in the accompanying drawings.

Dated this 6th day of September 1888.

J. H. JOHNSON & Co.,
Agents.

LONDON : Printed for Her Majesty's Stationery Office,
By DARLING AND SON, LTD.

1888.

Fig. 1.

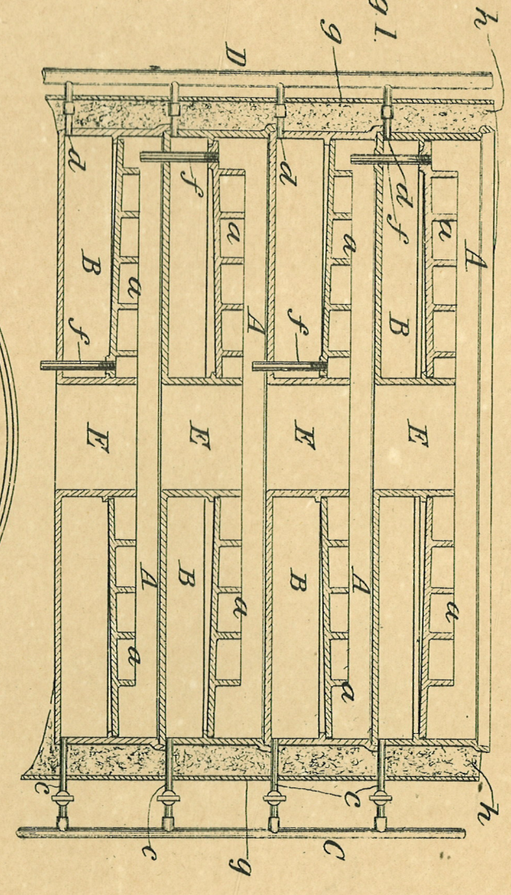


Fig. 2.

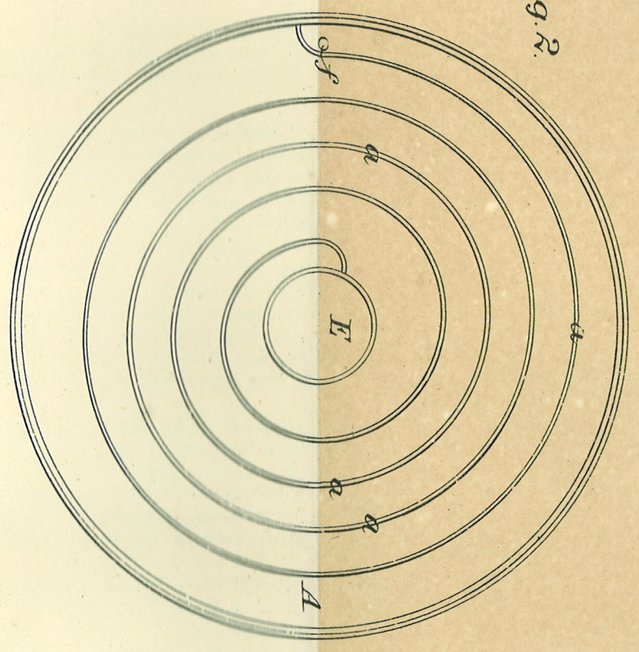
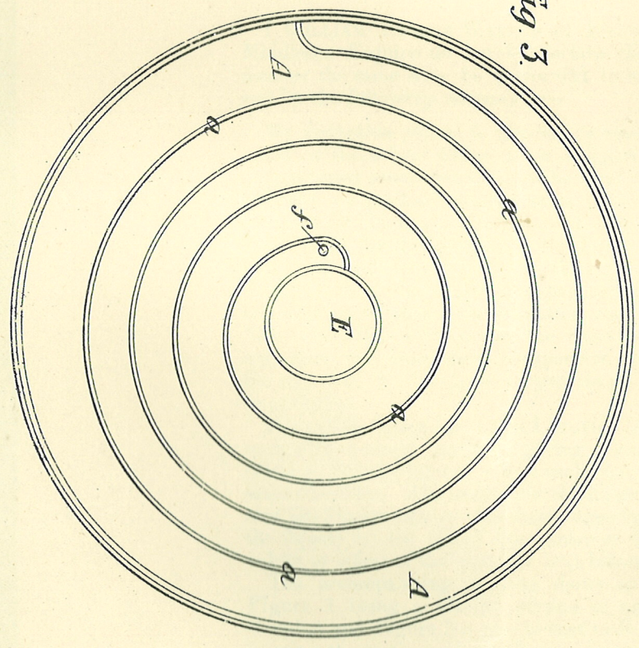


Fig. 3.



[This Drawing is a full-size reproduction of the Original.]

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for Her Majesty's Stationery Office. 1888.

Malby & Sons, Photo-Litho.

~~Na Cl Liquides 156~~

·156 Kg/ha deposited by one chevaline hour (with hail ·152 Kg/ha)

Force motrice nécessaire pour décomposer 1 Kg de l'électrolyte

Kilogrammètres	Chevaux-heures
~~1555~~ 558,400	2·07
[with hail 697,300	2·58]

Electrolyse, Fontaine

p. 25. Calc: of work reqd/pr electrolysis

Harpers Bird

Lo: Cl 3d 2/12/95

Peters: Angewandte Electrochemie

Band II 1898.

Ul Kali & chlorine water

H_2O_2 na

O_3 hals

S nasse 80 pays.

Haro.

Desbiez (E. P. 1855), kassel of hart Log in outer rolls of a row of 5 hard wd. bars in middle. Logs 4 grooved.

J. S. C. I. /95 p. 804

Mäusermann

Cost of working an electric plant for Cl manuf.

1 electrical horse power = 1·1 mechanical h.p.

A steam engine of modern type requires 0·8 Kg per horse power hour. The expense of converting mechanical into electrical energy is equal to the cost of the coal consumed. = 1·6 Kg

[= ·37d for h.p. per hour converted into electrical energy (coal 15/- per ton Rd.)]

J. C. S. I. /95 Harpreans p. 1073

Cl per ampère hour	1·31 grams
Electricity for 1 I.H.P.	600 watts
Current duty	~~0·8~~ 0·8
1 in Kg of bleach	350 grams ~~3·4 volts~~ 3·4 volts
E.M.F.	

$\frac{350 \times 3.4}{1{\cdot}31 \times 600 \times 8}$ = 1·89 I.H.P.

-an amount of power wh. can be produced by very much less than 1 Kilo of coal

Hunt: Efficiency of an electr: cell

J. I. E. 9/98 p. 97

Ch. Zeit 27/mar/95 – comparison of process, cost, energy for KOH & Cl

Towers. glass tube, cut off U

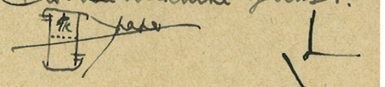
~~Rubber~~ tubing from Phillips instrument

~~2 oz/ft new plan of cuts W 24/5~~

~~plan of bridge W 24/5~~

~~Records for draught-cords back~~

~~Each end of machine to have~~



Williams: outlet for air p. 5 W 24/5

from stone. Keyed.

Gunter ants catalogue

~~Termites~~ Termites like.

Values Wh. and Jos bight 6" to 12" pipes. W 24/5

Catalogue small air compressor. – reservoir.

Towers – reed savings &. Keeping mind gap between fibres not too great. Each deal size & plane down to fit.

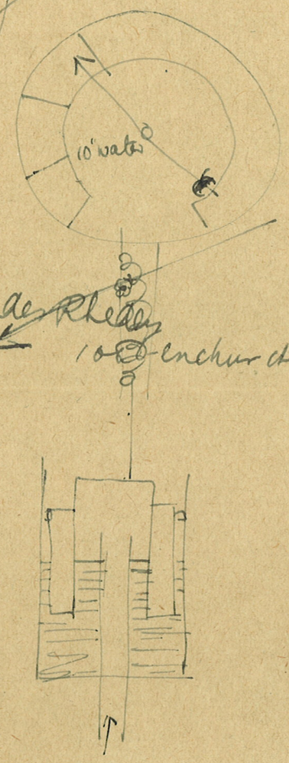
Iron bars at ends.

Strands – samples from Austen.

Catalogues – paper machés

= 4 12" pipes.

Phoenix Draught Guage –



Lander Rhead

10" enclosed.

Mr Clemson

Proportion of different orders for 1/04 – 5

		Dimi shots
387,000	Size 16/26	~~46~~ 34
360 000	37	160
412,000	41	120
787,000	37/33	96
350,000	26	~~34~~ 58
35,000	11	·25
29,000	4½/12	16

(Russian)



Printing tester in connection with limit of running & electric clocks plant –

Size	55/22
Ships	15
Wh. hr.	5.20%

Jobs 55 & 37 at 1 week & 26 at 1 week.

Printing

Size	Ships	Wh. hr.
55	64	1·84
[160		1·29]
45	·60	1·92
[120		1·4]
37	50	1·66
[96		1·2]
26	34	1·7
	34	1·9
[96		1·2]
16	16	1·8
	[34	1·4
		1·1]

Patent B.

Processes for the Absorption & Recovery of Acetone Vapour from Air.

1. Whereas the formation of a compound of acetone with bisulphites such as bisulphite of sodium, potassium, magnesium, calcium etc is well known to occur on mixing the acetone with solutions of the salts, the present process is based on the fact which we have discovered, that such solutions of bisulphites under suitable conditions such for example as a gas scrubbing process, are capable of extracting to a large extent acetone vapour from an oxidising medium such as air, even when in a state of great attenuation.

A solution that we have found very suitable is that of 30 parts by weight of Sodium Bisulphite in 100 parts by volume of solution, water but we do not exclude the use of other strengths of solution although it is evident that with weaker solutions there is an increase in bulk of liquid to be handled.

The solution after being used for the absorption of acetone vapour may be distilled with sufficient alkali to form sulphite and the acetone condensed and rectified in

Patent B. contd.

the usual way, or it may be treated as under (4).

(2) We find very suitable for the absorption of attenuated acetone vapour in air, the apparatus which forms the subject of Patent A. The solution of bisulphite is allowed to flow as syphon down the strands of wool or cotton of a tower, constructed preferably of lead, during which descent it repeatedly meets the ascending air current and extracts from it the greater portion of its acetone.

To prevent undue evaporation of the bisulphite liquor by warm air currents, a preliminary treatment of the latter by passing it through a similar tower down which water flows, may be adopted.

Present to great Con centration

Two or more towers using bisulphite solution may be coupled together, and the solution from the last passed on to the second last, and so on till sufficiently saturated.

(3). We also find that a considerable portion of the acetone present in an attenuated condition in air can be extracted by the use of bisulphite solution injected into the air containing acetone in the state of a fine spray. The spray may be condensed

Patent B. cont.

by baffling it against the strands of such a tower as described in Patent A, or by passing it through a coil or by other suitable means.

This process for the absorption of acetone vapour by means of a spray may be used by itself, or as an adjunct to the process described in paragraph (2).

(4) We have found that for the recovery of acetone from bisulphite solution, a suitable method which does not involve the conversion of the bisulphite into sulphite by the addition of alkali, is to distil the said solution directly. The bisulphite present is by no means all decomposed by the time all the acetone has distilled over, and the small amount of sulphurous acid which is driven over can be recovered as sulphite by the addition of an equivalent quantity of alkali to the liquid before the final rectification of the acetone.

(5) During the time the bisulphite solution is exposed to the oxidising action of the air, a certain amount of oxidation to sulphate takes place. If this sulphate were allowed to accumulate it might interfere with the action of the absorbent. We find, however, that the sulphate formed in the case of the sodium salt

X "A"

Patent B. cont.

is only slightly soluble at moderately low temperatures in a solution of bisulphite containing a small quantity of acetone. If therefore, after being sufficiently saturated with acetone vapour in the towers, the solution is cooled down somewhat, the excess of sulphate crystallises out, leaving the solution sufficiently free for further use in the towers after the acetone has been distilled off.

We claim –

Bisulphite absorption

I. The process of absorption of acetone vapour from air containing it, by scrubbing the mixture with solution of a bisulphite in water, and the recovery of the acetone from the resulting solution by direct distillation.

~~II. I + direct distillation~~

I + Apparatus

II. The process of absorption of acetone vapour from its mixture with air, by scrubbing the latter with solution of a bisulphite in water, using a tower such as described in Patent A.

I + Spraying

III. The process of absorption of acetone vapour from its mixture with air, by injecting into the latter solution of a bisulphite in water, in the form of a fine spray.

Patent - B cont^d..

IV. The process for the recovery of acetone from solution of bisulphite containing it, by directly distilling the solution and subsequently rectifying the dilute acetone in presence of alkali.

Recovery from Sulphite Soln

V. The method of removing the greater part of the sulphate formed when sodium salts are used, by cooling the solution of bisulphite containing it, while the acetone is still present.

A. Absorption of acetone vapours from air.

(a) By aspiration through (1) water, 1a, 3a
(2) bisulphite, 1, 2, 3

(b) By meeting sprays of (1) water 4, 5 6, 10
(2) bisulphite, 12–14, 18

(α) Calculation for co-current flow of acetone & bisulphite, 11
(β) Expt. on aspiration of air thro water sols of acet., 7.
(γ) Expts. on app. of (2) vacuo in apph of (b), 15.
(δ) Expt. on reduction of hatHSO3 mist., 19.

(c) By use of cross acting towers using atomisers
(1) water, 30, 32, 35 35 36, 38
(2) hatHSO3 30%, 26, 31, 34, 37, 55
(3) hatHSO3 powder 20%, 50
(4) hatHSO3 sol 10%, 44
(5) MgHxSyOz – 80%, 56
(6) KHSO3 powder 30%, 57

B (α) Calculations for towers, 22
(β) Expt. on flow down towers 23, 24
(γ) – – aspirating tank. 25
(δ) description of apparatus for tower expts, 27, 54

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C Oxidation of bisulphite solutions

(a) By aspiration of air through $NaHCO_3$ solution, 20

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Resumé of Contents of Workbook on Absorption and Recovery of Acetone Vapours from air

A

A Absorption of acetone vapours from air

(α) By aspiration through { (1) water Ia, IIIa / (2) $NaHSO_3$ solution, I, II, III.

(β) By use of sprays of { (1) water, IV — VI, X / (2) $NaHSO_3$ sol^n XII — XIV, XVIII.

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(3) 20% " L

(4) 10% " XLIV

(5) 30% $MgSiF_6$ LXI

(6) 30% $KHSO_3$ LVII

(α) Calculations for towers, XXII.

(β) Expts. on flow down towers, XXIII, XXIV.

(γ) " " aspirating tank XXV.

(β) Description of apparatus for tower experiments

(Table here)

(a) In the preliminary experiments under this section, air containing acetone vapour was pulled through water on the one hand and ~~ha~~ 1 bisulphite solutions on the other. In the case of water the absorption was good & became nearly complete with a large excess of the liquid; with the stronger bisulphite solutions containing about 2½ times the theoretical quantity of the salt for the compound $NaHSO_3.C_3H_6O$, the absorption was practically complete.

~~See Table~~

These experiments, although showing the possibility of acetone vapour mixed with air being absorbed by solutions, have not a practical bearing on the absorption of acetone vapour from the air of a drying stove for example, as in this case it is inadvisable to baffle the outgoing air current by a column of liquid.

Table

A (cont.) (7) In the experiments under this section which had for their object the absorption of acetone vapour from air by the expedient of bringing it into intimate contact with absorbent converted into a condition of fine spray or mist the apparatus described in IV was used certain variations being introduced from time to time with the object of condensing the spray produced in the course of the experiment.

Generally the results of these experiments are as follows:— with water the absorption is slight, this being in accordance with the experiment VII in which it is shown that all acetone can be eliminated from its aqueous solution by a sufficiently long sustained air current: with 30% sodium bisulphite solution absorption to the extent of from 54-88% of acetone were obtained, the concentration of acetone vapour being in all cases low, viz. from 0·18 to 0·74%.

As this method of bringing the absorbent into intimate contact with the acetone vapour in air is one which does not involve any heating back of the air current emerging from a cordite store for example it is evident that this method of absorption is suitable either by itself or as an auxiliary for the recovery of at least part of the volatile vapour.

(C) A consideration of the best means of condensing the mist produced in the spraying experiments by means of some substance which would at the same time offer a large surface to the emerging air current & at the same time present little or no resistance to it, led at first step from the use of heads of cotton wool plugs to the idea of strings containing the absorbent suspended in a closed box. Ultimately towers were constructed in which their vertical threads, parallel to each other, of a very hairy texture, were led downwards in a zigzag manner, the threads carrying the absorbing solution in a direction inclines to that of the upgoing gas current containing the vapour to be absorbed. These towers of which 3 were used, S, a single string wooden towers, D a doubly string wooden towers and L, a lead towers doubly strung, were employed for the absorption of vapours directly, without the preliminary treatment with a spray.

(discussed XXVII & LIV)

to produce the necessary air current through the towers

A (contd) (C) (contd) As an aspirator a large ~~tank~~ ^ metal tank of a capacity of 66 cubic feet was obtained and made air tight by a soldered zinc roof. By running water from this tank air was pulled through the towers connected to it at a fixed rate, and by means of a suitable vaporiser ~~the~~ any required concentration of acetone vapour was obtained. As far as possible the calculations for volume of air treated & ~~capacity~~ of apparatus used were ~~about~~ on the basis of one hundredth of what would probably be suitable on the large scale. dispensed by a large cordite drying store. In the towers themselves the conditions were fulfilled of large absorbent surface with no lapping of the gas current & the results show that a very high percentage of recovery of acetone from air containing that vapour in a state of small concentration is possible by this means, by the use of suitable absorbents.

(1) Absorbent – water. With air containing 1% of its volume of acetone vapour, acetone to the extent of 20 to 73% was absorbed, but to obtain the higher absorption the volume of water employed had to be increased to a very large extent. With air containing only half this amount of acetone ~~only 20%~~ 50 to 64% was recovered, also with a large expenditure of the liquid & consequent extreme dilution of the solution.

(2) Absorbent – 30% hatt CO_3. This was the solution most frequently used. With 1% concentration of acetone ~~vapour~~ in air, taking the results of one tower only it will be seen (XXXI & XXXIV), that ~~with air containing 1% of its volume of acetone~~ about 70% of the acetone is recovered by the single tower S with an expenditure of evaporation ~~of 1 (acetone) : 3.15 and 2.7 (hatt CO_3), the theoretical being 1 : 1.79~~ of 1 : 2.8 and 3.15 and 2.84 to 1 of acetone, the theoretical ratio for the compound being 1.79 : 1. With the same concentration, the doubly strong towers L recovered over 80% with the personal expenditure of $\frac{1.9}{2}$: 1. This strength of solution was also found very efficient for a small concentration of acetone (XXXVII), over 70% being recovered by the towers S with the low ratio of hatt CO_3 to acetone of 2.4 : 1. With the concentration of acetone diminished ~~to the~~ by absorption

of the major part in the first tower, the experiments in which a second tower was ~~completed~~ interposed show that thus produced even at the great attenuation of acetone in air, the former can be to a large extent recovered,

absorbent (3) 20% bisulphite solution. In this case, with air containing .5% acetone (T.) the ratio of bisulphite to acetone was 2·4 : 1 in the first tower (D - double strength) & over 50% was recovered, the single tower S which follows recovering 50% of the remaining acetone which has thus reached the great attenuation of 0·28%.

(4) absorbent 5% bisulphite solution (~~V~~ to IV). Here again the concentration was ·5% & the ratio 2·4 : 1, but the amount of acetone recovered has is decreased while the total bulk of absorbent solution used increased on account of its dilution.

(5) absorbent - 2·4% magnesium bisulphite. In this experiment (to VI) the fibres were not completely saturated with the magnesium bisulphite solution, with the result that the ratio of salt to acetone was only 1 : 1 instead of the theoretical being 1·6 : 1. A certain amount was recovered which when calculated to the ~~W~~ with the amount of salt used which would have been equal ? 5% about 62% under normal conditions. Other considerations to be mentioned below however went against magnesium bisulphite as an absorbent.

As absorbent - 27% potassium bisulphite, (to VII) with 1% of acetone in the air, the ratio of salt to acetone of 2·3 : 1 (theoretical 2·07 : 1), the high recovery of nearly 83% with one tower (T - double strength) was effected. This result which was obtained under conditions similar in all respects to those of to V is directly comparable to the latter figures VI to VII, & the of practically the same value from the point of view of absorptive power.

To sum up the results obtained with the towers it has been found that by their use acetone in a condition of great attenuation in air can be recovered; that water can be used as an absorbent but is only effective when the amount of water used is very very large in proportion to recovering a large percentage

thus ~~works out~~ causing great dilution in the residual liquor as well as ~~some~~ difficulty in handling it on account of bulk; ~~that~~ on the whole the most suitable solution from most points of view has been 30% $NaHSO_3$, the results as given above being very favourable even at great attenuation of acetone in air ~~& on~~ also there being on account of the strength of the solution ~~there is~~ ~~plenty~~ less ~~in dealing~~ with; that weaker solutions of sodium bisulphite, give fair results at low attenuation of acetone, but on account of the increased volume ~~to be handled~~ ~~present~~ no advantage over 30% solution; and ~~that~~ of the other ~~bisulphites~~ tried ~~that~~ ~~potassium~~ salt from the point of view of absorption is similar ~~to that~~ of sodium of 30% strength.

B

B Recovery of acetone from solution

(a) from water solution by distillation, ~~IV V~~ &c ~~4, 5, 6, 10, 30, 32~~ &c.

(b) from bisulphite solutions by addition of alkali & distillation, ~~XII - XIV~~ &c.

(c) from — — — direct distillation ~~XLI, XLII, XLVII~~

(a) This method which consists of distilling off all the acetone & subsequently rectifying calls for no explanation.

(b) The same remark applies to the distillation of the sodium bisulphite liquor which has been converted into a solution of sodium sulphite by addition of alkali, the process of boiling eliminating the acetone without decomposing the sulphite.

~~(c)~~ This was the method employed in estimating the amount of acetone recovered in the experiments, the gravity of the distillate being the measure of acetone present in the liquors from the apparatus, ~~used~~.

(c) An observation on the behaviour on boiling a ~~solution~~ water solution of the sodium-bisulphite ~~compound with~~ acetone compound when acetone was observed to be liberated, led to ~~the~~ performance of some experiments (XLI, XLII & XLVII(a), (b)) to determine whether the acetone in an excess of bisulphite solution could be eliminated by boiling without decomposition of all the bisulphite present or of that part of it

combined with the acetone. The results, with 30% solutions of NaHSO$_3$, are tabulated thus:-

No. of Expt	Acetone used	Ratio of acetone : NaHSO$_3$ (solid)	Vol. of residual solution	Loss of SO$_2$ in grams per gram acetone recovered
	cc		cc	
I & II	17·4	1 : 4·5	90	0·18
III & IV	17·4	1 : 4·7	80 (weighings entailed)	0·48
V & VI (a)	33·0	1 : 2·4	87	0·08
VII & VIII (b)	15·0	1 : 4·3	70	0·53.

The loss in grams of SO$_2$ was determined by analyses of the original solution & of the residual solution after all the acetone had been distilled over. The losses in the case of the 2nd & 4th experiments are needlessly high, as in the case of the former the unnecessary adjunct of a fractionating column was used & in the case of the latter the distillation was pushed much farther than was necessary to expel the acetone.

The first and third experiments agree with each other & as the third represents the excess of bisulphite frequently employed in the former experiments, it may be taken that for 1 part by weight of acetone recovered 0·1 parts by weight of SO$_2$ leaves the solution along with it. Now as the theoretical amount of SO$_2$ in the NaHSO$_3$ for 1 part of acetone by weight is 1·1, it is evident that boiling is sufficient to break up the acetone-bisulphite compound & that this operation decomposes only a small fraction of the bisulphite present. It should also be understood that this so called loss of SO$_2$ is only temporarily so, as on the subsequent distillation of the aqueous acetone the SO$_2$ present would be fixed by means of a small quantity of alkali.

C

Oxidation of Bisulphite Solutions

(a) Effect of aspiration pair through $NaHSO_3$ solutions ~~&~~ XX

(b) Effect of converting into spray by air solutions of { (1) $NaHSO_3$: 52, 53, 58 ; (2) $KHSO_3$ 58 ; (3) $Mg(HSO_3)_2$ 58.

(c) Effect of passing down fibres of towers solutions of { (1) $NaHSO_3$, 52, 53, 55 ; (2) $KHSO_3$ 57. ; (3) $Mg(HSO_3)_2$ 56.

(d) Effect of cooling solutions of $NaHSO_3$ containing $NaSO_4$ with and without acetone XLIII.

(a) Early in the work the possibility was recognised of ~~the~~ interference with the reaction by reason of the partial oxidation of ~~sodium~~ sodium bisulphite, especially as it is necessarily exposed ~~in a state of fine division~~ to large volumes of an oxidising medium, & preliminary experiments (XX) were made on the point, with the result that under the conditions employed, which ~~were~~ differed indeed from ~~practice~~, the practical use of the absorbent, only small oxidation was observed. The large percentage of acetone recovered by the towers proved that under practical conditions oxidation did not go on to a sufficiently large extent to ~~prevent~~ interfere with the process.

However, as oxidation of the bisulphite to sulphate ~~must~~ is to be expected in some degree, it was necessary to investigate the point, & to determine on the one hand the actual amount of bisulphite which ~~was to be expected to~~ oxidise ~~in a~~ under working conditions for the recovery of acetone ~~in the towers~~ by means of spray and by means of towers, and on the other hand to see if other easily obtainable bisulphites were superior to that of sodium in the matter of oxidisability.

See table (6) In experiments L.II & L.III, which are comparable, the somewhat severe treatment was adopted of converting the solution into spray 10 times, & it will be seen from the results that less oxidation goes on in the stronger solution than in the weaker. While the experiments on this point are perhaps not sufficiently numerous, & there seems to be a probability that an indication in favour of the ~~above~~ again in the preliminary experiments of L.VIII in which the solution was converted into spray 5 times

use of the strong solution ~~from the spraying of the~~ of sodium bisulphite
~~30 to 20% solution of sodium bisulphite stores in L VIII.~~

As regards the use of bisulphite of potassium magnesium as compared with sodium, the spraying experiments did not bring out any superiority in the potash salt and showed that the use of magnesium salt was impossible.

(C.) As the result obtained for sulphate formed by oxidation in that L II was in all probability initiated by the presence of Na_2SO_4 in the wood work of the towers, a tower composed of lead glass LIV was constructed for the double purpose of determining more accurately the amount of oxidation that goes on during the operation of the recovery of acetone and for the purpose of comparing the oxidation of different bisulphites used in recovery. Three comparable experiments on these lines were made, viz., L V, L VI & L VII. Of the three the potassium bisulphite shows the least oxidation, the sodium salt slightly more & highest is again the magnesium salt. The advantage of the slightly less oxidisable potassium salt is so small as to be of little consequence compared with other considerations affecting its use, while the considerably greater tendency to oxidation of the magnesium bisulphite confirms the conclusion from the spraying experiment in regard to its unsuitability.

The amount of sodium sulphate formed L V – 13% of the total solids – is certainly a factor to be reckoned with, & accordingly in the following paragraph will be found an indication of one means at least of eliminating it from solutions.

Effect of Exhibit L III interfered with by evaporation of the solution

C (contd) (c) Keeping in view the possibility that the towers worked by might be exposed in the open for the recovery of acetone, a number of experiments was made to get an estimate of the liability of sodium bisulphite to crystallise out from solutions of bisulphite. As it was observed that crystallisation took place more readily in bisulphite solutions containing acetone, the effect of lowering the temperature of solutions containing bisulphite & acetone in ratios such as would occur in practice was noted. The results may be tabulated thus.

	Acetone - sodium bisulphite solutions containing on solution H_2SO_3				
	3.64% Na_2SO_4		11.5 Na_2SO_4	16.06 Na_2SO_4.	
	@ 9°C.	@ 0°C.	@ 0°C	@ 9°C.	@ 0°C.
30%	No crystals	Trace of crystals	Crystals	Small quantity crystals	Crystals
25%	No crystals	" " "		" "	"
20%	" "	" " "		No crystals	"
15%	" "	No crystals		No crystals	Small quantity
10%	" "	" "		No crystals	No crystals.

It will be seen from these results that the tendency of sodium sulphate to crystallise out increases directly with its concentration in the solution & with reduction of temperature.

It is also obvious that a method has been here obtained of eliminating large quantities of sodium sulphate from similar solutions charged with it, thus rendering them by a means which does not involve any chemical treatment of the solution, fit for further use.

D Absorption of the Volatile Vapours.

(a) Ex alcohol 29
By ether .40.

(a) An experiment on the absorption of alcohol by the towers gave a ~~[illegible]~~ good percentage of volatile ~~[illegible]~~ vapour recovered. The concentration of alcohol vapour in air was low — 0.5% — & the total amount recovered by ~~the~~ towers was 87% ~~of~~ the theory. Water was used as the absorbent but however due used in large quantity to obtain the otherwise promising result.

(b)

Miscellaneous Experiments

(a) Sp. gr. of acetone solutions. ~~XVI~~

(b) action of sodium bisulphite on metals. XVI

(c) analysis of bisulphites. XIV, I.

(a) This table (see beginning of book) was compiled for the purpose of determining the amount of acetone ~~in~~ present in a solution by ~~the~~ an estimation of the sp. gr. & was used ~~throughout the~~ experiments chiefly in connection with the distillates obtained from liquors which has been used as absorbents.

(b) The general result of exposure of certain metals to contact with 20% sodium bisulphite solution were as follows:—

Unattacked, lead, antimonial lead;

Slightly attacked, copper, brass, iron;

Attacked, aluminium, tin & zinc.

(c) The great variations in the composition of mattes, as found in the trade point to the necessity of careful examination of ~~samples~~ the materials before use especially in the matter of sodium bisulphate present.

Patent-A

Apparatus for Scrubbing Gases, & Recovery of Vapours

The object of this Patent is to provide an apparatus for the scrubbing of gases & for the recovery of vapours present in different degrees of concentration in gaseous mixtures. The apparatus by means of which this is attained is by the following specially constructed towers.

A tall shell or box of suitable material is provided at top & bottom with a lid through which an exit for the gases and a supply pipe for the absorbent liquid, and which is closed at the bottom with the exception of an inlet pipe for the gases & a means of running off the absorbent liquid. Near the top of the tower is a dish immediately under the supply pipe for absorbent & into this dish dip the ends of strands of wool, cotton, asbestos, glass-wool or other suitable substance. These strands after passing over the side of the dish are carried at an angle of 75° to the side of the tower, parallel to each other and at such a distance apart that the small fibrils in adjacent strands somewhat interlace. The strands are now turned downwards at an angle of 30° to their former course until they reach the opposite side of the tower, when they are again turned downwards at the same angle to their former direction. So the parallel strands extend from side to side of the tower a screen is thus formed which is continually being deflected on meeting the walls of the tower.

The method of using the tower is to allow an absorbent solution to flow or syphon from the reservoir near the top of the tower down the strands & this solution being distributed in its course over a multitude of interlacing fibres presents a very large surface of active liquid to the ascending gas driven or aspirated through the apparatus, without causing any appreciable leading back of the gas current. A second set of strands starting from the opposite side of the dish may be arranged in such a manner that this with the first set cross in the centre of the tower, & in this way an increased efficiency is obtained with the same tower space.

Patent B. Process for the ~~Recovery~~ absorption & Recovery of Acetone vapour from air.

(1) Whereas the ~~existence~~ formation of a compound ~~of~~ acetone ~~and~~ with bisulphites such as bisulphite of sodium, potassium, magnesium, calcium &c is well known & occurs on mixing ~~the~~ acetone with ~~strong~~ solutions of the salts, the present process is based on the fact which we have discovered, that such solutions of bisulphites under suitable conditions, such as for example in a gas scrubbing process, are capable of extracting a large extent acetone vapour ~~even when great~~ from air even when in a state of great attenuation in that medium.

A ~~strength~~ solution that we have found very suitable is that of 30 to 40% Calcium bisulphite in 100 parts by volume of water, but we do not exclude the use of other strengths of solution although it is evident that with weaker solutions there is an increase in bulk of liquid to be handled.

The solutions after being used for the absorption of acetone vapour may be distilled with ~~an alkali~~ sufficient alkali to form sulphite & the acetone condensed & rectified in the usual way, or it may be treated as under (4)

(2) We find very suitable for the absorption of ~~attenuated~~ acetone vapour in air the apparatus which form the subject of Patent A. The solution of bisulphite is allowed to flow or trickle down the strands of ~~the~~ gunny or coke a tower during which descent it repeatedly meets the ascending ~~gas~~ air current & extracts from it the greater portion of its acetone.

To prevent undue evaporation of the bisulphite liquor in the tower ~~a portion~~ by warm air currents, a preliminary treatment of the air by ~~injecting~~ passing it through a similar tower down which water flows, may be adopted.

Two or more towers using bisulphite solution may be coupled together & the solution from the last passed on to the second last & so on till ~~enough~~ sufficiently saturated.

3 (3) We also find that a considerable portion of the acetone present in an attenuated condition in air can be extracted by the use of bisulphite solution which has been converted into a state of fine spray by suitable means & in this state ~~caused to~~ injected into the air containing acetone.

Patent B (contd)

The ~~air~~ may be condensed by ~~means of~~ baffling it against the strands of such a tower as described in Patent A, or by passing it through a coil or by other suitable means.

This process of ~~recovery~~ absorption of acetone by means of air may be used by itself or as an adjunct to the process (b).

(c) We have found that ~~a suitable means~~ for the recovery of acetone from bisulphite solutions a suitable method which does not involve the conversion of all the bisulphite into sulphite by means of alkali, is to ~~distil~~ heat the solution containing acetone directly. The bisulphite present is by no means all decomposed by the time all the acetone has distilled off & the small amount of sulphurous acid which distils over with the acetone may be recovered by ~~absorbing~~ passing the vapours into an alkaline solution ~~which last~~ is. Pure acetone is then obtained by distilling the latter.

The claims are therefore as follows:-

(1) The use of solutions of bisulphites for scrubbing ~~gases~~ air containing ~~the~~ vapour of acetone in an attenuated form for the purpose of absorbing the acetone & the recovery of the acetone from such solutions by ~~suitable~~ means.

(2) The use of solutions of bisulphites for scrubbing ~~gases~~ air containing acetone vapour in an attenuated form in the towers described in Patent A above mentioned for the purpose of effecting recovery.

(3) The use of solutions of . . . by the use of bisulphites, ~~&~~ converted into the form of fine spray & injected into air containing acetone vapour, for the purpose of absorbing the acetone.

(4) A process of recovery of acetone from bisulphite solutions containing acetone by directly distilling the solution & collecting the vapours in an alkaline solution which is subsequently dried & the acetone

Abstract of Book

Expt.	Method & Object	Result.
I	A nasp. aspirator thro' bulbs containing 10% $NaHSO_3$ (1:4·3)	76·6 % recd.
Ia	" " " " " " water (1: 47·4)	94·8 % -
II	" " " " " " 2·5% $NaHSO_3$ (1: 4·3)	99·6 % -
III	" " " " " " 5·0% $NaHSO_3$ (1:4·6)	93·8 % -
IIIa	" " " " " " water (1:8·6)	61·4 -
IV	A nasp. meeting water spray (1:8·3), seal and dry cotton wool to catch spray conc. ·5	11·3 -
V	" " " " - (1:12·5), do. (seal at constant level) ·7	16·5 -
VI	" " " " - (1:12·5) do. (do.) cotton wool damped ·7	11·6 -
VII	Aspiration of air through acetone & water solution ·7	Acetone gradually eliminated from water
~~VIII~~	A nasp. meeting water spray (1:9·4), place head as spray trap.	3·9 % recovered
IX	Calculations.	
XII	A nasp. meeting 3% $NaHSO_3$ spray, 1:4·02 ~~trap~~ section conc. ·6 wool damped ·7	85·8 % recovered
XIII	" " " " " " " 1:6·24 $NaHSO_3$, seal with $NaHSO_3$ conc. running down head as trap ·7	65·6 %
XIV	" " " " " " " 1:4·86 " " " " " on trap " ·7	68·7 %
XVIII	" " " " " " " 1:7·50 (do.) low conc. of acetone ·2	54·1 %
XV	Expts. on vacua in app. of XII ~~to XIV~~	most efficient position of jet altered. Effect of water seal determined. Amount of air drawn in " Effect of slightly constricting outer tube of jet "
XVI	Action of $NaHSO_3$ on metals	Lead heavily attacked.
XIX	Expts. on reduction of $NaHSO_3$ mist	mist condensed by passing thro' coil, much particles sealing of gas current.
XX	Action of air aspirated thro' ~~air~~ $NaHSO_3$ conc. & $NaHCO_3$. C_5H_6O conc.	Slight oxidation.
XVI	Sample of $NaHSO_3$ from B.T.T.	
XXII	Calculations for Towers.	
XVIII	Expts. with 3% $NaHSO_3$ in Tower S	By capillarity, rate of draining feeding box shortly
XXIV	" " ~~water in Tower D~~	after start becomes fairly uniform.
XXIV	" " water in Tower D	Do. if fibres initially wetted at start.
XXV	" " aspirating tank (3'5" x 4'6" x 3'10")	Rate of discharge determined.
XXVI		

Expt	Method			Ratio		Recovd.
XXVI	Toner S	1%	$NaHSO_3$	30%	1:8·2	89·2 / Recovered
XXX	D	1%	water		1:38·7	47·2
XXXI	S+D	1%	$NaHSO_3$	30%	1:3 1:12	From here a shallow tray instead of deep dish for fixing fibre. 68·9 19·5 } 88·4
XXXII	S+D	1%	water		1:9 1:15	8·2 12·2 } 20·4
XXXIII	S+D	1%	water		1:9 1:15	7·8 16·6 } 24·4
XXXIV	S+D	1%	$NaHSO_3$	30%	1:2·7 1:14·6	68·8 12·9 } 81·7
XXXV	S+D	1%	water		1:28 1:56	45·8 27·3 } 73·1
XXXVI	S+D	0·5%	water		1:72 1:206	41·1 23·1 } 64·2
XXXVII	S+D	0·5	$NaHSO_3$	30%	1:2·4 1:17·6	76 [illegible] 9·2
XXXVIII	D+S	0·5	water		1:32 1:32	[illegible] 3
XXXIX	D+S	0·5	$NaHSO_3$	10%	1:2·4 1:1·72	44·0 17·3 } 61·1
L	D+S	0·5	$NaHSO_3$	20%	1:3·0 1:6·8	54·5 23·7 } 78·2
LI	L	as 1·0	$NaHSO_3$	28%	1:20	81·3
LII	L	as 1·0	$Na_2H_2S_2O_5$	27%	1:1·0	36·6
LIII	L	as 1·0	$NaHSO_3$	27%	1:2·3	84·5
XXXIX	electros. D+S	0·5	water		1:40	77·7 3·3 } 81·0
XL	electros					

XXVII. Description of apparatus for Toner experiments.

XLI Recovery of acetone by direct distn in $NaHSO_3$ soln: — All acetone recovered: small amount $NaHSO_3$ decomposed.

XLII Do. — do.

~~XLIII Effect of cooling on $NaHSO_3$ soln: with & without acetone~~

XLVII Do. with & without excess of $NaHSO_3$ — do.

XLIII Effect of cooling on $NaHSO_3$ soln: with & without acetone. — $NaHSO_3$ separates out & this is facilitated by presence of acetone.

48; 49. XLV Analyses of Leuco naphthols.

XLVI " of $NaHSO_3$ compd: with acetone.

XLI " of Leuco naphthols.

see ~~XXX~~ XX

LII Expts. on oxidation of $NaHSO_3$ soln:, spraying Stones & Spraying & frame

LIII see L. in Toner L

LIV ? LVIII? observations, in Toner L

LVI $Na_2H_2S_2O_5$ - - -

LVIII $NaHSO_3$ - - -

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TELEPHONE Nº 836, HOLBORN.

Marks & Clerk,
Consulting Engineers &
Chartered Patent Agents.

G. CROYDON MARKS, A.M.I.C.E., M.I.M.E.
DUGALD CLERK, M.I.C.E., F.C.S.
EDWARD C. R. MARKS, A.M.I.C.E., M.I.M.E.
M. ATKINSON ADAM, B.Sc., A.M.I.C.E.

BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

CODES USED,
A1, A.B.C. WESTERN UNION
& PRIVATE.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

7th. July 1904.

Messrs Robertson & Rintoul.,
4, Sewardstone Road.
Waltham Abbey...Essex.

Dear Sirs,

Re German Application No. R.12814 filed 18-2-03.
"Improvements relating to the manufacture of
"explosives, celluloid and the like".

We have pleasure in advising you that on the 28th. June, the above application was definitly allowed, and the Patent will bear No.154124.

We hope to receive the Letters Patent document in about three months time.

The 2nd. annuity, amounting to £3:10:0, now becomes due for payment hereon, and we shall be glad to have your cheque for this amount, as soon as possible, in order that we may attend to the payment.

Awaiting you favour, We are,

Dear Sirs,

Yours faithfully.

Marks & Clerk

Acknowledged & Reminder sent
7/7/04.

Acids to be { 64 = 70·8 / 20 = 28·4 / 16 leave 1·8 } from { 65 = 72·2 / 18·1 = 21·9 / 16·9 = 1·9 left }

x = lbs of H_2SO_4 & threads (1·8)
4 - - - Hno$_3$ - - - (1·42)

$$\frac{65+\frac{9x}{10}}{18\cdot1+\frac{74}{10}}=\frac{64}{20}=\frac{32}{10}$$

$$\frac{650+9x}{181+74}=\frac{32}{10}$$

$$6500+90x=5792+2244$$
$$90x-2244=-708$$
$$90x-2164=468$$
$$84=1176$$
$$4=147$$

$$\frac{65+\frac{9x}{10}}{16\cdot9+\frac{x}{10}+\frac{34}{10}}=\frac{64}{16}=\frac{4}{1}$$

$$\frac{650+9x}{169+x+34}=\frac{4}{1}$$

$$9x+650=676+4x+124$$
$$5x-124=26$$

$$\frac{18\cdot1+\frac{74}{10}}{16\cdot9+\frac{x}{10}+\frac{34}{10}}=\frac{20}{16}=\frac{10}{8}$$

$$\frac{181+74}{169+x+34}=\frac{10}{8}$$

$$10x+304+1690=74+1448$$
$$10x+234=252$$
$$10x-244=52$$
$$474=2000$$
$$4=4\cdot25$$

$$5x-27=26$$
$$5x=51$$
$$x=10\cdot2$$

H_2SO_4	65	9·2	74·2
Hno$_3$	18·1	2·9	21·1
H_2O	16·9	1	19·2

$$\frac{65+\frac{9x}{10}}{16\cdot9+\frac{x}{10}+\frac{34}{10}}=\frac{64}{16}$$

$$\frac{650+9x}{169+x+34}=\frac{4}{1}$$

$$9x+650=676+4x+124$$
$$5x-124=26$$
$$90x-2164=468$$
$$90x-2244=-708$$
$$84=1196$$
$$4=149\cdot5 \text{ Hno}_3$$

$$5x-1764=26$$
$$5x=1738$$
$$x=347\cdot6$$
$$5x=1790$$
$$x=358$$

$$5x-1770=26$$
$$5x=1796$$
$$x=359\cdot2 \text{ } H_2SO_4$$

H_2SO_4	65 + 312	=	377
Hno$_3$	18·1	104·6	= 122·7
H_2O	16·9	35	44·9 = 96

H_2SO_4	65 + 312·8	=	377·8
Hno$_3$	18·1	104·6	= 122·7
H_2O	16·9	34·8	44·9 = 96·6

H_2SO_4	65 + 322·2	=	387·2
Hno$_3$	18·1	104·6	= 122·7
H_2O	16·9	35·8	44·9 = 97·6

H_2SO_4	65 + 323·3	=	388·3
Hno$_3$	18·1	104·6	= 122·7
H_2O	16·9 + 35·9		44·9 = 97·7

• x = lbs of H_2SO_4 (96%) the added
y = " " HNO_3 (92%) " "

$$\frac{65+\frac{96x}{100}}{18.1+\frac{92y}{100}} = \frac{64}{20}$$

$$\frac{6500+96x}{1810+92y} = \frac{32}{10}$$

$65{,}000 + 960x = 57{,}920 + 2944y$

$960x - 2944y = -7{,}080$
$240x - 736y = -1770$
$120x - 368y = -885$
$120x - 48y = -810$

$-320y = -75$
$y = 23.4$

$120x - 368y = -885$
$120x - 48y = 390$

$-320y = -1275$
$y = 4$ lbs.

H_2SO_4	$6x$	+ 4.8	$= 69.8$
HNO_3	18.1	3.7	$= 21.8$
H_2O	16.9	$.2$ $.3$	$= 17.2$
			108.8

$108.8)\overline{69.80}(64$
$652\,8$
4520
4528

$109)\overline{6880}(63$
6588
2920

$109)\overline{2180}(20$
2088
172

$1088)\overline{2180}(20$
2176
400

$65 + \frac{96x}{100} = \frac{4}{1}$

$16.9 + \frac{4x}{100} + \frac{84}{100}$

$\frac{6500+96x}{1690+4x+84} = \frac{4}{1}$

$96x + 6500 = 6760 + 16x + 324$
$80x - 324 = 260$
$20x - 84 = 65$
$20x = 149$
$x = 7$

16.92 260 18 $184\,2280$ $276\,260$ $2944\,4880$ 1.1

92 5 4.6

8.4 9 21.6

$1088)\overline{17.20}(1.5$
1088
6320

Using H_2SO_4 of 1.84 (90%) HNO_3 of 92% to rejuvenate

$$\frac{65+\frac{90x}{10}}{18.1+\frac{92y}{100}} = \frac{64}{20} = \frac{32}{10}$$

$$\frac{6500+90x}{1810+92y} = \frac{32}{10}$$

$65{,}000 + 900x = 57{,}920 + 2944y$
$900x - 2944y = -7080$
$900x - 576y = 4880$
$2368y = 11960$
$y = 5$ ✓

H_2SO_4	65	2.5	$= 72.5$
HNO_3	18.1	4.6	$= 22.7$
H_2O	16.9	$.9$ $.4$	$= 18.2$
			113.4

$113.4)\overline{72.50}(64$
6824
4260

$$\frac{65+\frac{90x}{100}}{16.9+\frac{10x}{100}+\frac{84}{100}} = \frac{4}{1}$$

$$\frac{6500+90x}{1690+10x+84} = \frac{4}{1}$$

$6500 + 90x = 6760 + 40x + 324$
$50x - 324 = 260$
$50x - 1604 = 260$
$50x = 420$
$x = 8.4$ ✓

$113.4)\overline{18.20}(.05$
1134
6860
6804
560

Cost of Recovery of 1 Ton of Acetone by 30% $NaHSO_3$ Method

Prices of Materials (from current trade reports):-

	£	S.	D	
Sodium Bisulphite	7	10	0	per ton.
Sodium Carbonate	4	17	6	" "
Sodium Sulphate	1	10	0	" "
Sulphur	6	5	0	" "
Coal	1	0	0	" "
Sodium Sulphite	5	15	0	" "

Assumed - that the ratio by weight of Acetone : Bisulphite is 1:2; & that 75% of the Acetone vapour is absorbed; that 13% of Sodium Sulphate & 12% of Sodium Sulphite are formed; and that 1 lb of coal raises 5.7 lbs of Water from 15° to 100° C or evaporates 9 lbs of water at 100° C.

Methods of Recovering Acetone from $NaHSO_3$ Soln,

A. Distillation with Sodium Carbonate & Rectification.

B. Direct Distillation & Rectification.

A. 1 Ton of acetone recovered requires 2.7 tons $NaHSO_3$ 2 Tons of this remains undecomposed after the acetone has been absorbed and this requires 1 Ton of Na_2CO_3 to convert it into Sulphite. After distillation 1.8 Tons of the 2.4 Tons of Sulphite produced is converted into 2.7 Tons of Bisulphite using .5 Tons of Sulphur, leaving .6 Tons of Sulphite as a bye-product (in solution). The cost of Rectification of the dilute acetone may be

B. Direct distillation of the Acetone-bisulphite liquor produces 2 tons of Bisulphite, ·3 tons of Sulphite and ·35 tons of Sulphate. The ·3 tons of Na_2SO_3 formed require ·1 ton of Sulphur to convert it into $NaHSO_3$, the total amount of $NaHSO_3$ then being 2·45 tons or ·25 tons short of the 2·7 tons required for the next operation. To produce ·25 tons of $NaHSO_3$, are required ·12 tons Na_2CO_3 and ·1 Ton. of Sulphur.

The other calculations are as in A

Table of Costs for 1 ton of Acetone Recovered by Method B.

Materials	amount required	Cost per ton	Total Cost
Sodium Carbonate	·3 tons	£4·17·6	£0·11·8
Sulphur	·2 tons	£6·5·0	£1·5·0
Coal	·26 tons	£1·0·0	£0·5·3
			£2·1·11

Bye-product

Na_2SO_4 (as $Na_2SO_4, 10H_2O$)	·35 tons	£1·10·0	£0·10·6	£0·10·6
				£1·11·5
Rectification of acetone, wages included				£1·10·0
Total Cost of 1 Ton Recovered Acetone				£3·1·5

To which must be added as in A, the share of Capital Cost and Wages.

taken at £1·10/- per ton wages included.

No estimates for freezing out Sodium Sulphate, wages, or cost of plant, have been made.

The amount of coal given is that required to raise 9 tons of solution from 15° to 100°C and to distil off 1/10th of the volume, the specific heats of the solution and acetone being taken as equal to water.

Table of costs for 1 tone of Acetone Recovered

Materials	amount required	Cost per ton	Total Cost
Sodium Carbonate	1 Ton	£4·17·6	£4·17·6
Sulphur	·5 Tons.	£6·5·0	£3·2·6
Coal	·3 Tons	£1·0·0	£0·6·0
			£8·6·0

By Products,-

Sodium Sulphite (in Solu).	·6 Tons	£5·15·0	£3·9·0
Sodium Sulphate (Na_2SO_4 as $Na_2SO_4,10H_2O$)	·35 Tons.	£1·10·0	£0·10·6
			£3·19·6
			£4·6·6
Rectification of Acetone, wages included			£1·10·0
Total Cost of 1 Ton of Recovered Acetone			£5·16·6

To this must be added -

Share of capital cost of 2·7 Tons Bisulphite of Soda at £7·10 per ton = £20·5·0

Share of Capital Cost of Plant.

Wages.

Apparatus for Scrubbing Gases and Recovery of Vapours from Gaseous Mixtures.

The object of this patent is to provide an apparatus for the scrubbing of gases and for the recovery of vapours present in gaseous mixtures especially when the former are present in a state of great attenuation.

The apparatus by which this end is attained, is the following specially constructed tower.

"B" A tall oblong shell or box of suitable material is provided with a lid through which are an exit for the gases and supply pipe for the absorbent liquid, and is closed at the bottom, with the exception of an inlet pipe for the gases and a means of running off the absorbent liquid. Near the top of the tower and immediately under the supply pipe for the absorbent is a dish into which dip the ends of loosely spun strands of wool, cotton, asbestos, glass wool or other suitable material. These strands may be allowed to hang vertically inside the tower but are preferably arranged as follows. After passing over the side of the dish they are carried at an angle of about 75° to the side of the tower, parallel to each other, and at such a distance apart, that the small

fibres in adjacent strands somewhat interlace. The strands are now carried downwards at an angle ~~of about~~ 30° to their former course until they reach the opposite side of the tower when they are again turned downwards at the same angle to their former direction, and so on to the bottom of the tower. As each layer makes an angle of about 60° with the parallel strands extend from side to side of the tower, a series of screens is thus formed, through which the gases to be treated are made to pass.

A second set of strands starting from the opposite side of the dish, may be arranged in such a manner as to interlace with the first set in the centre of the tower, and in this way an increased efficiency is obtained with the same tower space.

The angle of inclination of the fibres may be varied according to the nature of the absorbent and the desired rate of flow.

The method of using the tower is to allow an absorbent solution to flow or syphon from the reservoir near the top of the tower, down the strands, and this solution, being distributed in its course over a multitude of interlacing fibres, presents a very large surface of active liquid to the ascending gas driven or aspirated

through the apparatus, without causing any appreciable heading back of the gas current.

Objects & description of Towers

In the absorption of acetone vapour contained in the air of a coal gas purifying stove it is necessary to take into account in the first place the very great absorption of the volatile solvent. & in the second place the. To draw the air as it leaves the stove through any appreciable depth of solution being impracticable ~~although with water, which is used as absorbent, is effected~~ (see) it is necessary to find an apparatus in which there should be no heading back of the air current by liquid, in which the amount of power required to pull the air through the apparatus is reduced to a minimum & in which the active ~~surface~~ absorbent surface is as great as possible & is arranged in the best possible manner to oppose the current of vapour-laden air.

These three objects are attained in the present towers, in which the gas in its upward passage ~~passes~~ is made to pass through an array of fibres containing an absorbent for the vapour contained in the gas. these fibres ~~conducting~~ forming a counter current system opposite to the flow of gas. ~~In the case of acetone vapour in air the solution of both, the latter element~~ is sent down. The arrangement of fibres is as follows:- Dipping into a reservoir situated at the ~~in~~ top of the towers are the ~~fibres~~ ends of the fibres which after passing over the side of the dish are carried ~~down~~ to the side of the towers, parallel to each other & at such a distance apart that the smaller fibres in adjacent fibres somewhat interlace. The fibres are then turned downward at an angle of 30° to their former direction each in the same plane until they reach the opposite side of the tower when they are again turned downward. It is found that the solution flows or ~~effluxes~~ from the reservoir down the strands & being distributed in its course over a multitude of fibres a very large surface of active liquid is exposed to the ascending gas. Starting from opposite sides of the dish another set of fibres may be arranged in such a manner that the two sets interlace in the centre of the tower, & in this way an increased efficiency is obtained with the same tower space.

It will be seen that there is here no ~~obstruction~~ heading back of the

gas current that the gas can be drawn freely through the apparatus with little expenditure of power & that the active absorbent surface is very great. Experience in working the towers has shown that these claims can be made good, for, with a normal rate of flow of gas the back pressure is only = $\frac{1}{16}$" of water while the numerous results quoted show the capabilities of the towers as regards absorbing vapours in a state of great attenuation in air.

Dated ..... 189 .

The Clayton Aniline Company Ltd.

TO

License.

DIGGLES & OGDEN,

MANCHESTER.

CHORLTON & KNOWLES, Printers, Manchester.

This Indenture made the day of 189 **between** THE CLAYTON ANILINE COMPANY LIMITED of Clayton in the City of Manchester hereinafter called the Licensors (which expression shall include the said Company and their Successors and Assigns where the context so requires or admits) of the one part and hereinafter called the Licensees (which expression shall include where the context so requires or admits) of the other part **Whereas** by letters patent under the seal of the Patent Office numbered 610 of 1892 the sole and exclusive license and authority of making using exercising and vending in the United Kingdom and the Isle of Man certain inventions for a process and apparatus for the manufacture of concentrated nitric acid were granted to Frederick Valentiner his executors administrators and assigns for the respective terms of fourteen years from the date thereof subject to the payment of the fees and the conditions for making void the same as therein provided **And whereas** the Licensors are entitled under and by virtue of an Indenture of Assignment dated the 26th of June 1896 and made between the said Frederick Valentiner of the first part the said Frederick Valentiner on behalf of himself and his co-partners of the second part and the Licensors of the third part to the said invention and letters patent and the excluse benefit thereof respectively **And whereas** by letters patent under the seal of the Patent Office and numbered 13826 of 1895 the sole and exclusive license and authority of making using exercising and vending in the United Kingdom and the Isle of Man a certain invention for improvement in the manufacture or production of nitric acid and apparatus therefor were granted to Charles Dreyfus his executors administrators and assigns for the term of fourteen years from the date thereof subject to the payment of the fees and the conditions for making void the same as therein provided **And whereas** the said patent numbered 13826 of 1895 has been vested in the Licensors absolutely by virtue of an Indenture of Assignment dated the day of 1896 **And whereas** the Licensors have agreed with the Licensees to grant to them a license to use the said inventions to the extent and subject to the restrictions covenants and agreements upon the terms hereinafter expressed and contained **Now this Indenture witnesseth** that in pursuance of the said Agreement and in consideration of the royalties herein reserved to the Licensors and of the covenants and agreements on the part of the Licensees hereinafter contained the Licensors hereby grant unto the Licensees and their limited assigns full liberty license power and authority to make use and exercise the said inventions for the purpose of carrying out the process in the production of nitric acid within the United Kingdom of Great Britain and Ireland To have hold exercise and enjoy the said license and premises unto the Licensees and their limited assigns for and during all the respective residues now to come and unexpired of the said respective terms of fourteen years **And it is hereby agreed** between the said respective parties hereto as follows namely:—

1. The Licensees shall pay all and every the expense for the erection construction and management of the apparatus necessary for carrying out the process shown by the said patents or either of them The Licensees shall pay to the Licensors the sum of four shillings for every ton of nitrate of soda or saltpetre operated upon by the above patents or either of them as royalty Such royalty to

become due and be paid half-yearly on the 30th day of June and the 31st day of December in every year.

2. The Licensees shall at all times during the continuance of the license keep accurate and regular accounts in separate books containing full entries and particulars of all nitrate of soda or saltpetre used in the production of nitric acid or made by them under this license and of all particulars in relation thereto which may be material for the purpose of showing the amount payable to the Licensors by way of royalty as aforesaid And the said books of accounts and all other documents in the possession of the Licensees relating to the said invention manufacture and premises shall be kept at the place of business of the Licensees and shall at any time if required be produced for the inspection of the Licensors or any person appointed by them who shall be at liberty to make copies of or extracts from any of the accounts or matters therein contained. The Licensees shall report in writing to the Licensors every addition or enlargement of the plant used in connection with the said patents.

3. The Licensees shall within one calendar month after every 30th of June and the 31st of December furnish to the Licensors or their agents a full account and statement in writing to be made in the form required by the Licensors at the expense of the Licensees of any nitrate of soda or saltpetre used in connection with the said patents during the preceding six months and every such statement and also any of the entries in the books of account to be kept as aforesaid shall if required by the Licensors or their agents be verified by the statutory declaration of the Licensees or some person or persons in their employment who shall be approved of for that purpose by the Licensors and be in the form required by the Licensors.

4. The Licensees shall not either directly or indirectly either by themselves or any agent or agents use or exercise the said inventions otherwise than in accordance with those presents.

5. The Licensees will not without the written consent of the Licensors first had and obtained assign or mortgage charge or grant sub-licenses in respect of or otherwise deal or part with the possession or control of this license or attempt so to do.

6. If the royalties hereby made payable or any part thereof shall at any time be in arrear or unpaid for twenty-one days after the same shall have become due (whether demanded or not) or if the Licensees being a Company shall excepting for the purpose of reconstruction commence to be wound up on account of their inability as defined by Section 80 of the Companies Act 1862 or any statutory modification thereof for the time being to pay their debts or being a Company or individuals or an individual shall not commence their or his business in relation to this license within four calendar months from the date hereof or shall not commence their or his business within the like period from the date of the assignment to them or him of this license or being a Company or individuals or an individual having commenced their or his business shall for any period of six calendar months consecutively cease practically to carry on the same or being individuals or an individual shall become bankrupt or commit any act of bankruptcy whether available for adjudication or not or if the Licensees shall make default in any obligation hereunder other than in respect of the payment of moneys and (in the case of a breach capable of being made good) shall for the space of twenty-one days after they shall have been served with a notice in writing by the Licensors to make good the said breach neglect or omit so to do then and in any such case it shall be lawful for the Licensors by notice in writing given to the Licensees or left for them at their registered office or principal place of business in case of an individual being an assign to revoke this license which shall thereupon become void without prejudice to any right of action or remedy of the Licensors for the recovery of any moneys then due to them hereunder or in respect of any antecedent breach of any of the covenants and agreements of the Licensees hereinbefore contained.

7. Nothing herein contained shall except as herein expressly provided affect the right of the Licensors to grant licenses to any other Company person or persons to use or exercise the said inventions **Provided** that if such licenses shall as to royalties be granted on terms more favourable or advantageous to the Licensee or Licensees than the terms contained in these presents then the Licensees parties hereto shall as to such royalties be subject to such new or more favourable terms in lieu of the terms herein contained **Provided always** and it is hereby agreed that these presents shall not be construed as a warranty by the Licensors of the novelty or utility of the said inventions or either of them the original validity of the complete specifications or either of them or the sufficiency of the said specifications or either of them or the filing thereof **Provided always** that if the said patents be found by a Court of competent jurisdiction in the United Kingdom to be held invalid or infringements of pre-existing patents the said royalties shall cease to be payable by the Licensees to the Licensors from the date that the said patents have been declared invalid.

8. The Licensees shall not at any time or times hereafter dispute the validity of the said patents.

9. The Licensees shall forthwith and at all times give to the Licensors all information which may come into their possession relating to the users of the said inventions or infringement of the said letters patent by persons other than those who shall have taken the licenses from the said Licensors to use the same and shall do all such things and give all such assistance other than pecuniary assistance as they may be reasonably called upon to do or to give for the purpose of upholding the said letters patent and keeping the same on foot.

10. The license shall be deemed to commence from the date of the erection and completion of the plant on order from which day the royalties hereinbefore mentioned shall become payable and shall be paid at the dates hereinbefore mentioned on all nitrate of soda saltpetre or other nitrates used in connection with the said inventions and the covenants agreements and provisions contained herein shall be deemed to apply as from the said erection and completion of the said plant **Provided always** and it is hereby further agreed and declared by and between the parties hereto that the Licensors or other the person or persons in whom the said patents shall for the time being be vested shall be at liberty from time to time during the continuance of this license to disclaim any part of the said letters patent as they shall think proper to do or to file a memorandum of alteration in relation to the specification thereof without prejudice to the continuance of this license so far as the same shall be applicable (if at all) to the parts remaining undisclaimed and the Licensees shall not directly or indirectly oppose such disclaimer or memorandum or alteration.

In witness whereof the said Licensors and Licensees have hereunto

The Common Seal of THE CLAYTON ANILINE COMPANY LIMITED was hereunto affixed by order of the Board of Directors in the presence of

Director.

Secretary.

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836, HOLBORN.

Marks & Clerk,
Consulting Engineers &
Chartered Patent Agents.

G. CROYDON MARKS, A.M.I.C.E., M.I.M.E.
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CODES USED,
A1, A.B.C. WESTERN UNION
& PRIVATE.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

8th May 1906

Messrs. Robertson & Rintoul,

WALTHAM ABBEY.

Dear Sirs,

As requested in your letter of the 6th inst. we have pleasure in enclosing herewith three copies of the agreement with Messrs. Fraser & Co. as per your draft returned herewith.

Yours faithfully,

Marks & Clerk

Encls. 0.

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& PRIVATE.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

May 7th, 1906.

Messrs. Robertson & Rintoul,
4, Sewardstone Road,
Waltham Abbey.

Dear Sirs,

We are obliged for your letter of yesterday's date enclosing settled Agreement between Messrs. Fraser & Co. and the War Office, and have duly put in hand the engross of same.

We are, Dear Sirs,

Yours faithfully,

Marks & Clerk

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836, HOLBORN.

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Consulting Engineers & Chartered Patent Agents.

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CODES USED,
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& PRIVATE.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

February, 22nd. 1906

Messrs. Robertson & Rintoul,
Waltham Abbey.,

Dear Sirs,

re Working of Italian Patents

We beg to advise you that a Royal Decree has been issued notifying that the Milan Exhibition of 1906 is an Exhibition admitted to the benefits of the Italian law of the 16th. July, 1905, which contains important clauses in favour of exhibitors of new inventions. One of these clauses which is important to foreigners reads as follows:-

"Inventions, as well as models and drawings, relating to "any exhibited object, having already formed the subject matter "of a patent, will be considered as HAVING BEEN WORKED for "all the duration of the exhibition in accordance with the 58th. "art. Nos. 2 and 3 of the Italian Patent Law and to the 15th. "art. of the law of August 3rd. 1868, No. 4578."

If therefore you are exhibiting at the Milan Exhibition this year in accordance with any of your patents now in force it

would be well that some certification of the exhibiting be made which you could file as evidence in case it becomes necessary to produce this in support of the validity of the patent should the same be attacked on the ground of non-working.

We shall be glad to hear whether you desire us to take any steps with a view to securing such certification of any exhibits you are making at Milan at your early convenience.

We are,

Yours faithfully,

Marks & Clerk

TELEGRAPHIC ADDRESS: "ABECEDARY, LONDON."
TELEPHONE Nº 836, HOLBORN.

Marks & Clerk,
Consulting Engineers &
Chartered Patent Agents.

G. CROYDON MARKS, A.M.I.C.E., M.I.M.E.
DUGALD CLERK, M.I.C.E., F.C.S.
EDWARD C.R. MARKS, A.M.I.C.E., M.I.M.E.
M. ATKINSON ADAM, B.Sc., A.M.I.C.E.

BIRMINGHAM: 13, TEMPLE ST.

MANCHESTER: 30, CROSS STREET.

CODES USED,
A1, A.B.C. WESTERN UNION
& PRIVATE.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

29th. March, 190 6.

Messrs. Robertson & Rintoul.

Dear Sirs,

re Italian Patents -- Workings

We have had no reply from you to our letter of the 22nd. February with regard to the working of your Italian patents by exhibiting at the Milan Exposition of 1906. Since writing you our associates have put a question before Professor Amar, who is a well known authority on industrial property in Italy, as to whether the exhibiting of drawings or models of an invention at the Milan Exhibition would be considered equivalent to the exhibiting of the object it-self so far as the working of patents is concerned. Professor Amar is of opinion that the showing of drawings or models of an invention would be equivalent to the exhibiting of the patented object itself, and as this course offers a very simple and effective method of working patents in Italy this year we would advise that steps be taken to exhibit either the invention itself or drawings or models of same. We could have certification of your

exhibits made, as it is necessary to secure proof of the exhibits for use in any proceedings which might be instituted under the patent, and if desired we could probably arrange to exhibit your inventions or drawings at the stand of other clients of ours who are exhibiting.

The Exhibition officially opens on the 18th. April next.

Yours faithfully,

Marks & Clerk

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& PRIVATE.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

7 MAY 1906 190

Messrs. Robertson & Rintoul.

Dear Sirs,

re Italian Patent No. 155/207 of 30.6.05.
"Manufacture of explosives, celluloid and the like".

We beg to formally advise you that in order to conform with the provisions of the law in relation to the above patent it is necessary that the reneval fee should now be paid thereon, if the validity of the patent is to be maintained.

Kindly therefore instruct us hereon, remitting at the same time cheque value £2.11.-, if you wish payment to be made. Instructions and cheque should be received by us not later than the 31st. instant, if we are to take the responsibility for due payment of the fee.

Yours faithfully,

Marks & Clerk

CofM

17 th. May, 6.

Messrs. Marks & Clerk,

18 Southampton Bldgs.

Chancery Lane, W.C.

Dear Sirs,

re- Italian Patent 155/207 of 1896.

Replying to your favour of the 11th. Inst. we have not been successful in getting this patent taken up, and do not propose to incur further expense in the matter.

Yours truly,

(Sd) R Robertson & W. Rintoul..

Any *further* communication respecting this matter should be addressed to—

THE PRINCIPAL,
COMMERCIAL DEPARTMENT,
(INTELLIGENCE BRANCH),
BOARD OF TRADE,
73, BASINGHALL STREET,
LONDON, E.C.

And the following number should be quoted :—

C.I.B. 2345.

Telegraphic Address.
ADVANTAGE, LONDON.

BOARD OF TRADE,
COMMERCIAL DEPARTMENT,
(INTELLIGENCE BRANCH),
73, BASINGHALL STREET,
LONDON, E.C.

22nd June, 1904.

Sir,

With reference to previous correspondence and particularly to the letter of the 21st ulto., in which you were informed that enquiries on the subject of Acetone would be made through the Foreign Office, in the United States, Germany and France, I now beg to state that so far as the two latter Countries are concerned replies to the enquiries have now been received.

H. M. Chargè d'Affairs at Berlin, writing under date of the 17th instant, states that the Pro-Consul at Berlin, to whom the matter was referred, has instituted exhaustive enquiries with regard to the quantity of Acetone annually made in Germany and to the quantity used as a solvent in the manufacture of explosives and of celluloid. He states, however, that no statistics are available thereon. Experts are of opinion that neither the total production nor the use as a solvent in the manufacture of explosives and of celluloid can approximately be estimated. The production of Acetone has considerably increased since the outbreak of the Russo-Japamese War. Acetone is only used for the manufacture of explosives in Germany in time of war. The excess of production is used in the manufacture of vinegar.

About a year ago a large factory for Acetone was erected in Austria, but the company had to be wound up as the kinds of

R. Robertson, Esq.,
4, Sewardstone Road,
Waltham Abbey, Essex.

wood required for the purpose could only be obtained with great difficulty and its delivery (carriage, freight, etc.,) became too expensive.

For this latter reason and because Acetone as a solvent can only find a ready market in Germany during times of war, the many branch establishments founded by the discredited "Treber Gesellschaft", formerly of Cassel, have proved to be most unsuccessful.

In the case of France, H. M. Ambassador at Paris reports that he has caused enquiries to be made on the subject in which you are interested, but he understands there are no means of obtaining information with regard to the quantity of Acetone used in various manufactures in France.

I may add that when the reply is received to the enquiry which has been made in the United States, the same will be duly communicated to you.

I am, Sir,

Your obedient Servant,

Thos Worthington

Any *further* communication respecting this matter should be addressed to—

THE PRINCIPAL,
COMMERCIAL DEPARTMENT,
(INTELLIGENCE BRANCH),
BOARD OF TRADE,
73, BASINGHALL STREET,
LONDON, E.C.

And the following number should be quoted:—

C. I. B. 2383.

BOARD OF TRADE,

COMMERCIAL DEPARTMENT,

(INTELLIGENCE BRANCH),

73, BASINGHALL STREET,

LONDON, E.C.

25th June, 1904.

Sir,

I beg to acknowledge receipt of your letter of the 23rd instant, and in reply to state that further enquiries upon the subject of the use of Acetone in Germany are being made, the result of which will be communicated to you in due course.

I am, Sir,

Your obedient Servant,

Thos. Worthington

Robert Robertson, Esq.,
4, Sewardstone Road,
Waltham Abbey.

4 & R.
W.T.
23/6/02

Sir, I have to thank you for the yours of 22nd June (C.B. 2345) & for the manner in which your correspondents have investigated the matter.

Since writing you, in fact only a few days ago, I met a man who had just returned from a visit to a German acetone factory where he was assured that 80% of that article was used for ammunition by the German Government. It is therefore difficult to reconcile this with the your statement that acetone is only used in Germany in time of war.

I am not so much concerned with but I have definite information that this acetone is used for the manufacture of explosives.

I do not know whether your correspondent is in a position to verify this statement of my friend's.

We note the result of the French inquiries & await with interest those you are kindly making in U.S.A.

Yours R & T W

4, Sewardstone Road,
Waltham Abbey,
Essex.

R. Robertson, D.Sc., F.I.C.
W. Rintoul, F.I.C., F.C.S.

8th. August. 1906.

Superintendent, R.G.P.F.

Acetone Recovery, Pats.25993 & 4 of 1901.

With reference to Messrs. Curtis's & Harvey's application for details as to present arrangements" re above, we would suggest that they be informed of the conditions under which a license to work these patents can be issued to them.

With regard to the royalty to be charged on acetone from Non-Govt material, we would propose £3.10 per ton of acetone recovered from this source. We are not aware of the present-War Office view regarding Royalties on Govt Material. (Irony intentional)

A As to the details of the plant and process, the course hitherto pursued in such cases is applicable, namely, that Messrs. C. & H. be informed that all particulars of construction and working, with designs of plant, are to be obtained from the patentees. This is in accordance with the procedure laid down and followed in the cases of Messrs. Nobel's and the Cotton Powder CO's inquiries.

R. Robertson & W. Rintoul.

Dear Bl,
Saw Capt Hope about this today. He suggests writing C & H as at (A) & then telling Dr/A he has done so and asking him to notify them as to terms of license. I put the letter back & stuck in a bit to make Non-Gov. part clear.
Just finished packing & ready to clear out tomorrow.
W.R. 9/8/06.

E.I. DU PONT DE NEMOURS POWDER CO.,
WILMINGTON, DELAWARE, U.S.A.

T. J. WRAMPELMEIER,
EUROPEAN REPRESENTATIVE.

CABLE ADDRESS: WRAMPELMEIER, LONDON.
CODES: WESTERN UNION AND LIEBER'S.
Telegrams: "Wrampelite, London."

39, Victoria Street, S.W.

June 25th 1904.

IN YOUR REPLY PLEASE REFER TO FILE 45.

Robert Robertson Esq.,
Royal Gunpowder Factory,
Waltham Abbey.

My dear Mr. Robertson:-

About a month ago, when I was travelling on the Continent, I received an acknowledgement from my company of the receipt of my report on your process of Acetone Recovery, with the statement that the same had been passed on to Mr. Francis I. du Pont, and I now have a letter in which after apologizing for the delay Mr. du Pont says that, owing to the fact that the amount of powder in the manufacture of which they use Acetone is so very small, it would not be worth their while to put in a plant for its recovery. Our company is not at all interested in the manufacture of celluloid. I think the address of the principal manufacture of this article is the American Celluloid Company, Newark, New-Jersey.

Regretting that we cannot make use of your process,

I remain,

Yours faithfully,

T. J. Wrampelmeier.

Telegraph "Fraser Engineer London"
(National) Telephone No. 4413 Avenue.
Post. Please address all communications to
W. J. Fraser & Co. Ltd

98 Commercial Road East
London

August 10th, 1906.

Contractors to Admiralty, War Office, Public Authorities, &c.

Specialities.

Heating and Ventilating.

Chemical Plants.

Lead Burners.

Tanks.

Extraction Apparatus.

Stills.

Boilers.

Vacuum Pans.

Drying Apparatus, &c.

Messrs Robertson & Rintoul,
4, Sewardstone Road,
Waltham Abbey.

Dear Sirs,

Agreement under Patents No.25993 & 4.1901.

We are in receipt of your letter of yesterday's date enclosing us signed agreement for which accept our thanks.

Yours truly,

For W. J. FRASER & Co., LIMITED.

T. C. Palmer ..... Director.

T.C.P.

TELEGRAPHIC ADDRESS:
"ABECEDARY, LONDON"
TELEPHONE Nº 836, HOLBORN.

BIRMINGHAM:
13, TEMPLE STREET.

MANCHESTER:
30, CROSS STREET.

18, Southampton Buildings,
Chancery Lane,
London, W.C.

April 29th 1905

Drs Messrs Robertson Rintoul

To Marks & Clerk,

CHARTERED PATENT AGENTS & CONSULTING ENGINEERS.

April	14	To drafting Spcn preparing drawings & filg Appln for Italian Patent of Importation of your invention "Impts relating to manufacture of explosives celluloid & the like" (Brit. Equiv. No 25994/01) inclusive of 1st Govt Fee & translation	15	15 ·
		" Notary's fees for attesting the execution of the power of attorney in this matter & obtaining legalisation of same by Italian Consul	1	4 ·
		" certified & legalised copy of British printed Spcn. for use with this case inclusive of Official fees & Consul's charges		17 6
			£ 17	19 6

With Compliments

In the Privy Council.

TO THE QUEEN'S MOST EXCELLENT MAJESTY IN COUNCIL.

In the Matter of

Letters Patent granted to HENRY EDWARD NEWTON, formerly of 66, Chancery Lane, in the County of Middlesex, but now of 6, Bream's Buildings, Chancery Lane, aforesaid, for an Invention of "Improvements in Explosive Compounds," dated the 2nd day of December, A.D. 1875, No. 4,179, communicated to him by ALFRED NOBEL, of Paris, in the Republic of France.

The humble Petition of NOBEL'S EXPLOSIVES COMPANY, LIMITED, whose registered office is at No. 149, West George Street, Glasgow, as assignees and registered owners of the said Letters Patent.

SHEWETH AS FOLLOWS:—

1. That the said Henry Edward Newton obtained the grant of Your Majesty's Royal Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date the 2nd day of December, 1875, for an Invention of "Improvements in Explosive Compounds," whereby Your Majesty did give and grant unto the said Henry Edward Newton his executors, administrators and assigns the sole privilege to make, use, exercise and vend the said invention within the United Kingdom of Great Britain and Ireland, the Channel Islands and the Isle of Man, for the term of 14 years from the date of the said Letters Patent.

2. That in pursuance of the conditions and provisions in the said Letters Patent contained, the said Henry Edward Newton duly filed in the Great Seal Patent Office on the 2nd day of June, 1876, a proper and sufficient specification of the said invention, whereby he duly described and ascertained the nature of the said invention and the manner in which the same was to be performed; and all

other conditions contained in the said Letters Patent, or upon which the said Letters Patent were granted, including those relating to the payment of stamp duties, have been duly observed.

3. That the said invention was at the date of the said Letters Patent a new invention within Your Majesty's realm and the said Henry Edward Newton was the true and first inventor within this realm, and the said invention was the discovery of the said Alfred Nobel, who communicated the same to the said Henry Edward Newton, from without Your Majesty's realm, viz., from Paris, in the Republic of France, as above set forth.

4. The said invention relates to the manufacture of a class of highly explosive substances, of which the best known is a substance to which the name "blasting gelatine," has been generally applied. Blasting gelatine is made, as fully set out in the said specification, by dissolving nitrated cellulose in nitro-glycerine, the result of the process being the production of a new type of explosive substances of great value and utility. Blasting gelatine thus prepared is a body of gelatinous consistency and of an entirely novel character, and the properties which it possesses render it perfectly unique and greatly superior to all other explosives for a large number of purposes.

Such properties are as follows :—

(1.) It possesses exceptionally great explosive power.

(2.) It is not a liquid and is very insensible to shock—so that its storage and transport are easy and safe.

(3.) It is plastic and gelatinous in character—enabling it to be readily handled and adapted to inequalities in boreholes or other cavities.

(4.) It is unaffected by water—even though continuously immersed therein for a very long period—so that it can be stored unprotected under water with perfect safety and without loss of explosive power.

(5.) Its chemical composition is such as to cause very complete combustion on explosion.

(6.) It is less liable to freeze than ordinary nitro-glycerine explosives, and the risk of accidents is thereby greatly diminished.

5. The said specification also describes the manufacture of explosive compounds more or less similar to blasting gelatine, in the manufacture of which other bodies are added, modifying or varying the explosive power of the completed substance. Explosives can thus be manufactured according to the said invention specially suitable to special conditions of user, rendering them at once exceptionally useful and safe. All these possess to a greater or less extent the above-mentioned properties.

6. By reason of the above, the said invention was, and is, of exceedingly great public utility, and has placed the public in possession of a variety of explosives superior to any others then or now made, and it has been and is of great service to Her Majesty's subjects for mining purposes and otherwise.

7. The whole beneficial property in the said Letters Patent is and has been, from the date of the grant thereof by Your Majesty, in your petitioners, Nobel's Explosives Company, Limited, or in the British Dynamite Company, Limited, of which they are the successors. Such latter Company was reconstituted in January, 1877, pursuant to the Companies Act of 1862, under the title or name of "Nobel's Explosives Company, Limited," your petitioners, who thereby acquired the beneficial interest in the said Letters Patent and subsequently became and have ever since remained the registered legal owners thereof.

8. The history of explosives of this class begins with the discovery of nitro-glycerine, which is a powerful explosive, but which, although of great value as such, possesses some serious drawbacks, and among others, that of being a liquid and exceedingly sensitive to shock. It is, therefore, both inconvenient and dangerous to handle, store or transport.

9. In order to overcome these objections to the use of nitro-glycerine, the said Alfred Nobel, in the year 1867, invented a method of mixing a certain proportion of an inert absorbent substance with nitro-glycerine so as to get a solid body (now known as dynamite), which could be transported without danger of leakage or exudation, for which invention the said Alfred Nobel obtained Letters Patent within this realm, No. 1,345, and dated the 9th day of May, 1867.

10. On the 7th day of June, 1871, the Company above referred to (your petitioners' predecessors) was registered as the British Dynamite Company, Limited, with the object of acquiring the said last-mentioned Letters Patent of Alfred Nobel and of manufacturing dynamite and for other purposes.

11. By an Indenture dated the 6th and 12th days of April, 1871, the said Alfred Nobel, in consideration of an undertaking to allot to him three-eighths of the entire share capital of the said British Dynamite Company, Limited, to be held and deemed as fully paid up, and of the sum of £300 credited as cash paid by him in respect of certain other shares of the said Company for which he undertook to subscribe, assigned his last-mentioned Letters Patent to the said Company, and covenanted to assign to them any Letters Patent which he might subsequently obtain in this Realm in respect of any further inventions or improvements in the manufacture of explosives like dynamite which he might discover. In pursuance of this covenant your petitioners, as successors of the British Dynamite Company, Limited, became beneficially entitled to the Letters Patent, the subject of this petition, and the same were formally assigned to them by the said Alfred Nobel, under an Indenture dated the 8th and 17th days of January, 1877.

12. In the 38th year of Your Majesty's reign, an Act, 38 Vic. c. 17, was passed entitled the "Explosives Act, 1875," which came into operation on the 1st

of January, 1876, for the purpose of regulating the manufacture and sale of explosives. The leading object of the Act was to ensure that explosives should not be manufactured imperfectly or without due care, or put upon the market in a dangerous state. This was effected by giving to the Secretary of State the power to control and even prohibit the manufacture of any explosives deemed to be specially dangerous, and provisions were made for the regulation and licensing of the manufacture, storage, transport and sale of explosives, and for requiring the manufactured explosives to fulfil such tests as the Secretary of State should think fit to impose.

13. Within a few months of the granting of said Letters Patent, the subject of this petition, your petitioners' said predecessors and afterwards your petitioners put themselves in communication with the Secretary of State regarding the various arrangements necessary for the manufacture of blasting gelatine at their works at Ardeer, which required the approval of the Secretary of State in accordance with the provisions of the said Act, and the Secretary of State proceeded under the powers given to him by the said Act to make regulations relative thereto.

14. Owing to the great novelty of the said invention and to the high explosive power of the substance there was much discussion about the said matters, and great delay arose in connection therewith, and when at length the Secretary of State came to a decision as to the definition of the exact character and composition of the blasting gelatine to be licensed for manufacture, and the tests which it must satisfy in respect of stability and chemical purity, it was found by your petitioners that the said definition and tests which the Secretary of State had in the interests of the public deemed it necessary to impose were so stringent that they were unable to work to them in manufacturing operations.

15. By reason of the stringency of the definition and tests so adopted by the Secretary of State, your petitioners, notwithstanding their utmost efforts to improve the manufacture, were unable to make blasting gelatine which would satisfactorily stand those tests. The years 1877, 1878, 1879 and 1880, were practically consumed in repeated attempts to alter the manufacture in such a way as to produce blasting gelatine which should be to the satisfaction of the Secretary of State, and only very small quantities were sold to the public. In 1881 and 1882 your petitioners thought that they had overcome these difficulties and a considerable quantity was made. It was soon found, however, that the manufactured product failed to meet the requirements of the Secretary of State, and your petitioners, therefore, feeling that they would be unable successfully to manufacture blasting gelatine so long as such tests were deemed to be necessary were reluctantly obliged to abandon the manufacture altogether, and it was accordingly given up and remained entirely suspended during part of 1882, the whole of 1883, and part of 1884.

16. During the period above referred to, your petitioners continued to make representations to the Secretary of State with a view to induce him to alter the

tests which in the interest of the public, he felt it necessary to impose. As experience was gathered, they were able to show to him good grounds for believing that these tests might be reconsidered with a view to modification. Accordingly by order of the Secretary of State, a further and prolonged series of experiments were carried out by the eminent chemists with the view to re-investigating the tests which should be applied to blasting gelatine in order to ensure the safety of the public and at the same time place no unnecessary obstacles in the path of the manufacture of an explosive the value of which had now become universally recognised, and which in other countries was being manufactured and sold in large quantities owing to the absence of any prescribed tests as to quality or condition.

17. The result of such series of experiments was to show that it was possible to modify the tests without injury to public safety, and accordingly in 1884 such modifications were adopted by the Secretary of State. Although these tests were still strict, necessitating the use of specially purified ingredients and the greatest precaution in the manufacture of the blasting gelatine, they were not of a character to render such manufacture commercially impracticable, and accordingly your petitioners at once recommenced the manufacture, and from that time to the present they have continued to manufacture large and increasing quantities of such explosive.

18. The tests adopted by the Secretary of State in 1884 under the circumstances above referred to have been in force ever since that date and have been found to be sufficient for the public safety, and the blasting gelatine manufactured by your petitioners during that period has proved itself to be an explosive of a specially safe and reliable character, and by reason of its great explosive power and its freedom from accidents it has come into very extensive use and such use is still rapidly extending.

19. That your petitioners have, since the adoption by the Secretary of State of the present tests, made every exertion in their power to bring blasting gelatine to the notice of the public, and to induce persons engaged in blasting operations to adopt that explosive. They have advertised it largely in this realm and elsewhere; and in order that the properties of such a novel and efficient explosive and the best methods of using it might become known without danger to the public, your petitioners have at their own cost sent persons previously instructed in its use to many places all over the world where blasting with blasting gelatine was about to be commenced, to assist in and direct experimental trials.

20. Your petitioners have always since within a few months of the date of the said Letters Patent, been willing to supply blasting gelatine to persons requiring the same at reasonable prices, excepting at those times when they were unable to manufacture and sell it by reason of the matters hereinbefore stated.

21. The rapidity with which the use of this explosive has increased from the time that your petitioners commenced to put it into the market in 1884 shows that had they been under the present tests as to manufacture, the blasting gelatine would have come into general use many years before it actually did and your petitioners would have made very large sales during the whole of the term of the Letters Patent. Your petitioners have thus through no fault of their own but by reason of the above-mentioned difficulty of meeting the regulations imposed in the interest of the public, consequent upon the novel character of the explosive, lost by far the most profitable portion of the term granted to them by Your Majesty, for in such a case as the sale of explosives the chief profits are made by manufacturers during the years that elapse after the article has become well known in the market and persons have become accustomed to use it and see it used, while the profits in the earlier years are comparatively small.

22. That neither the validity of the said Letters Patent nor the utility of the said invention has ever been called in question.

23. That the said Alfred Nobel has obtained Letters Patent in respect of the said invention in the foreign countries hereinafter named, on the dates respectively mentioned, but your petitioners have not, nor have they ever had any right or interest whatever in these Letters Patent or any of them.

In France, No. 110,549, on 30th November, 1875.
In Belgium, No. 38,901, on 18th February, 1876.
In Italy, No. 81, on 21st February, 1876.
In United States of America, No. 175,735, on 15th March, 1876.
In Portugal, No. 376, on 11th April, 1876.
In Saxony, No. 4,465, on 8th June, 1876.
In Wurtemburg, No. 95, on 9th June, 1876.
In Bavaria, No. 98, on 24th June, 1876.
In Grand Duchy of Baden, No. 76, on 27th June, 1876.
In Sweden, No. 131, on 8th July, 1876.
In Norway, No. 43, on 3rd October, 1876.
In Austria, No. 58, on 17th January, 1877.
In Germany, No. 4,829, on 27th February, 1878.
In Mexico, on 21st November, 1881.

24. The said Alfred Nobel also obtained Letters Patent for the said invention in the British Colonies and Dependencies hereinafter named, and by an agreement dated the 8th and 17th days of January, 1877, the Letters Patent for the following British Colonies and dependencies were assigned by the said Alfred Nobel to your petitioners, in consideration of your petitioners paying to the said Alfred Nobel a sum equal to 5 per cent. on the price of all blasting gelatine sold by them both at home and abroad. The said Colonies and Dependencies are :—

Country.	Date.	Term.	Expires.
Newfoundland - -	2nd Dec., 1875,	14 years,	1889.
Cape of Good Hope -	26th Sept., 1876,	14 years,	1890.

Victoria - - -	13th Oct., 1876,	14 years, 1890.
Queensland - -	23rd Nov., 1876,	14 years, 1890.
South Australia - -	14th Dec., 1876,	14 years, 1890.
New South Wales -	14th Dec., 1876,	14 years, 1890.
India - - -	23rd Dec., 1876,	14 years, 1890.
Tasmania - - -	29th June, 1877,	14 years, 1891.
New Zealand - -	10th Dec., 1877,	14 years, 1891.
Natal - - -	11th Jany., 1878,	14 years, 1892.
Ceylon - - -	6th Sept., 1878,	14 years, 1892.
Canada - - -	12th Dec., 1876,	15 years, 1891.

No profits had been made by the said Alfred Nobel or any other person by reason of the manufacture of the said explosive under the said Letters Patent for British Colonies and Dependencies prior to such assignment, inasmuch as there had been no time or opportunity to commence to manufacture thereunder.

25. Neither the said Alfred Nobel nor the said Henry Edward Newton have ever had any beneficial interest in the said Letters Patent, No. 4,179 of 1875, other than so far as the said Alfred Nobel has participated in the profits made by your petitioners in respect of the invention patented therein by reason of his being a shareholder in the Company, and under the arrangement referred to in clause 24 hereof, but the whole beneficial interest in the said Letters Patent has always been in your petitioners and their said predecessors, who themselves have had to overcome all the aforesaid difficulties and to bear all the expense connected with manufacture under the said Letters Patent. Your petitioners have not and never have had any interest whatever in any profits derived by the said Alfred Nobel from any of the said foreign patents, but, as has already been set forth, they and their said predecessors have always been the sole owners of the patent granted by your Majesty within this realm, and are the owners of those granted as above mentioned in the British Colonies and Dependencies.

26. Your petitioners, in the year 1886, granted licenses to the following companies to import blasting gelatine, made according to this invention, into this realm, viz., The Dynamit Actien, Gesellschaft, Hamburg; The Deutsche Sprengstoff Actien Gesellschaft, Hamburg; and the Rhenische Dynamit Fabrik, Opladen, Cologne.

27. That, having regard to the great cost incurred in experimenting upon blasting gelatine, both for the purpose of making the process of manufacture a commercial one and for the purpose of instructing the public in the use of it and otherwise, and more especially having regard to the loss, expense and delays occasioned by the matters hereinbefore mentioned, and having regard to the very great benefit conferred on the public by the introduction by your petitioners of an explosive of such value and utility, and to the difficulties of introducing such a novel form of explosive, and to the long period during which your petitioners were from no fault of their own deprived of the benefit of their

21. The rapidity with which the use of this explosive has increased from the time that your petitioners commenced to put it into the market in 1884 shows that had they been under the present tests as to manufacture, the blasting gelatine would have come into general use many years before it actually did and your petitioners would have made very large sales during the whole of the term of the Letters Patent. Your petitioners have thus through no fault of their own but by reason of the above-mentioned difficulty of meeting the regulations imposed in the interest of the public, consequent upon the novel character of the explosive, lost by far the most profitable portion of the term granted to them by Your Majesty, for in such a case as the sale of explosives the chief profits are made by manufacturers during the years that elapse after the article has become well known in the market and persons have become accustomed to use it and see it used, while the profits in the earlier years are comparatively small.

22. That neither the validity of the said Letters Patent nor the utility of the said invention has ever been called in question.

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In Grand Duchy of Baden, No. 76, on 27th June, 1876.
In Sweden, No. 131, on 8th July, 1876.
In Norway, No. 43, on 3rd October, 1876.
In Austria, No. 58, on 17th January, 1877.
In Germany, No. 4,829, on 27th February, 1878.
In Mexico, on 21st November, 1881.

24. The said Alfred Nobel also obtained Letters Patent for the said invention in the British Colonies and Dependencies hereinafter named, and by an agreement dated the 8th and 17th days of January, 1877, the Letters Patent for the following British Colonies and dependencies were assigned by the said Alfred Nobel to your petitioners, in consideration of your petitioners paying to the said Alfred Nobel a sum equal to 5 per cent. on the price of all blasting gelatine sold by them both at home and abroad. The said Colonies and Dependencies are :—

Country.	Date.	Term.	Expires.
Newfoundland - -	2nd Dec., 1875,	14 years,	1889.
Cape of Good Hope -	26th Sept., 1876,	14 years,	1890.

invention, and of the privileges granted to them by Your Majesty, your petitioners submit that they have not had a fair opportunity of enjoying or utilising their said Letters Patent, and, in consequence, have not been able to derive an adequate amount of remuneration therefrom.

28. That your petitioners humbly submit that, in the very special circumstances of this case, and in view of the serious contraction of the life of the said Letters Patent from the causes above narrated, an exclusive right of using the said invention for a further term of seven years in addition to the term granted by the said Letters Patent will not be more than sufficient to enable your petitioners to obtain a fair remuneration and reward for their exertions.

29. That your Petitioners have caused the necessary and proper advertisements to be inserted in the "London Gazette" and in the Metropolitan and Provincial newspapers, pursuant to the statutes in that case made and provided and the rules and regulations made in that behalf, notifying that it is the intention of your Petitioners to apply to Your Most Excellent Majesty in Council for the grant of New Letters Patent or for a prolongation of the said Letters Patent.

Your petitioners therefore humbly pray that Your Majesty will be graciously pleased to take the case of your Petitioners into your royal consideration, and to refer the same to the Judicial Committee of your Majesty's most Honourable Privy Council, and that your Petitioners may be heard before such Committee by their counsel and witnesses. And that Your Majesty will be pleased to grant to your Petitioners new Letters Patent, or a prolongation of the term of the said Letters Patent, for a further and additional term of seven years, or for such other term as to your Majesty shall seem fit.

And your Petitioners will ever pray.

21. The rapidity with which the use of this explosive has increased from the time that your petitioners commenced to put it into the market in 1884 shows that had they been under the present tests as to manufacture, the blasting gelatine would have come into general use many years before it actually did and your petitioners would have made very large sales during the whole of the term of the Letters Patent. Your petitioners have thus through no fault of their own but by reason of the above-mentioned difficulty of meeting the regulations imposed in the interest of the public, consequent upon the novel character of the explosive, lost by far the most profitable portion of the term granted to them by Your Majesty, for in such a case as the sale of explosives the chief profits are made by manufacturers during the years that elapse after the article has become well known in the market and persons have become accustomed to use it and see it used, while the profits in the earlier years are comparatively small.

22. That neither the validity of the said Letters Patent nor the utility of the said invention has ever been called in question.

23. That the said Alfred Nobel has obtained Letters Patent in respect of the said invention in the foreign countries hereinafter named, on the dates respectively mentioned, but your petitioners have not, nor have they ever had any right or interest whatever in these Letters Patent or any of them.

In France, No. 110,549, on 30th November, 1875.
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South Australia - -	14th Dec., 1876,	14 years,	1890.
New South Wales -	14th Dec., 1876,	14 years,	1890.
India - - -	23rd Dec., 1876,	14 years,	1890.
Tasmania - - -	29th June, 1877,	14 years,	1891.
New Zealand - -	10th Dec., 1877,	14 years,	1891.
Natal - - -	11th Jany., 1878,	14 years,	1892.
Ceylon - - -	6th Sept., 1878,	14 years,	1892.
Canada - - -	12th Dec., 1876,	15 years,	1891.

No profits had been made by the said Alfred Nobel or any other person by reason of the manufacture of the said explosive under the said Letters Patent for British Colonies and Dependencies prior to such assignment, inasmuch as there had been no time or opportunity to commence to manufacture thereunder.

25. Neither the said Alfred Nobel nor the said Henry Edward Newton have ever had any beneficial interest in the said Letters Patent, No. 4,179 of 1875, other than so far as the said Alfred Nobel has participated in the profits made by your petitioners in respect of the invention patented therein by reason of his being a shareholder in the Company, and under the arrangement referred to in clause 24 hereof, but the whole beneficial interest in the said Letters Patent has always been in your petitioners and their said predecessors, who themselves have had to overcome all the aforesaid difficulties and to bear all the expense connected with manufacture under the said Letters Patent. Your petitioners have not and never have had any interest whatever in any profits derived by the said Alfred Nobel from any of the said foreign patents, but, as has already been set forth, they and their said predecessors have always been the sole owners of the patent granted by your Majesty within this realm, and are the owners of those granted as above mentioned in the British Colonies and Dependencies.

26. Your petitioners, in the year 1886, granted licenses to the following companies to import blasting gelatine, made according to this invention, into this realm, viz., The Dynamit Actien, Gesellschaft, Hamburg; The Deutsche Sprengstoff Actien Gesellschaft, Hamburg; and the Rhenische Dynamit Fabrik, Opladen, Cologne.

27. That, having regard to the great cost incurred in experimenting upon blasting gelatine, both for the purpose of making the process of manufacture a commercial one and for the purpose of instructing the public in the use of it and otherwise, and more especially having regard to the loss, expense and delays occasioned by the matters hereinbefore mentioned, and having regard to the very great benefit conferred on the public by the introduction by your petitioners of an explosive of such value and utility, and to the difficulties of introducing such a novel form of explosive, and to the long period during which your petitioners were from no fault of their own deprived of the benefit of their

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And your Petitioners will ever pray.

INSTITUTE OF TECHNOGRAPHY

50 CHURCH STREET

NEW YORK CITY

Institute of Technography,
50 Church Street,
New York City.

Gentlemen:-

What do you estimate would be the maximum

cost of making { a bibliography / an abstract } of the { patents / literature } of

the following countries

and pertaining to the following { subject / improvement / patent }:-

It is understood that this inquiry is absolutely confidential and involves no obligation.

Yours truly,

Address:

RATIO BALLANTYNE, F.I.C., F.C.S.,
Member of the Society of
Public Analysts,
Consulting and Analytical Chemist.

Telegraphic Address :—
"XENOTIME, LONDON."

TELEPHONE No. 1152, CENTRAL.

Chemical Laboratory,
75, Chancery Lane,
London, W. C. 6th Jany., 1904.

Dear Bob,

I have had a call from Mr. Baird with reference (I may say in confidence) to raising more capital for extension of his business. I am inclined to assist him, but should first like to hear from yourself, since his scheme embraces the manufacture of pure chemicals. Is your project definitely "off" now? If not, I should want to consider the matter before acting; and in any case, in view of our recent conversations, I should like you to know of what is going on.

Assuming that you do not yourselves intend to manufacture, would you care for an investment of this sort? Baird offers 6% Debentures and I can send you all particulars if you would like me to.

~~Yours ever~~

Ihnen zum Jahreswechsel herzlichst Glück wünschend, verbleibe ich,

Hochachtungsvoll,

Horace Ballantyne.

ARMY BOOK 136.

Books.

136

82

5 June '05

SN

Mineral oil → 720 cc°
Used for articulation → 620 cc°

Sp. Gr. before capsumens. .8831
" after " .8766

620 c.c. heated to 150°C in oil distn flask — no distillate
above quantity distilled in current of steam
Distillate 37 c.c.
Sp. Gr. of Dist. — .8667
[Sp. Gr. of Liq. volatilized .8675]
600 c.c. oil before use distilled with steam gave 4 c.c. of CS_2 from a former capt.
Sp. Gr. of oil after steaming .8781

6th June '05 1 Cyl.

Cascade oil 595 cc°

Used for distillation 490 cc°

Sp. Gr. before Experiment 1.0520

" after " 1.0388

490 c.c. heated to 750°C in oil distn flask gave no distillate.

Same quantity distilled in current of steam gave "

Distillate — 12 c.c.

700 c.c. oil before use distd. as above gave 4·25 c.c. Distt.

Sp. Gr. of oil after steaming — 1.0456

∴ contd 2/3 liquid & 1/3rd anthracene

13 June '05

Anthracene oil.

Blank for Exp 2 S.N. 1/6 200 cc°

Sp. Gr. → 1.0568

200 cc° for steam distillation

Dist — 2·4 c.c. mostly solid (contd abt 1·7 c.c. solid) re-distd. dried - gave 5 c.c. clear slightly yellow distillate @ 140°C - 195°C. Distt. solid above this temp. = 2 c.c. distt. fr 1200 c.c. oil.

Anthracene oil after Exp 2. S.N

1170 cc° Sp. Gr. 1.0571

Dist — 5·0 c.c. partly solid (contd 1·7 c.c. solid) re-distd. as above gave 1·5 c.c. clear distillate @ 140-195°C.

∴ ~~No S.N. absd. by this oil in 2nd Tower.~~

~~Distt. with cold steam.~~

Min. Oil for 2 S.N. – after –

Total Vol 4010 c.c. Sp. Gr. .8788

1500 c.c. Steam distd. gave 7.2 c.c. Distt.

1000 c.c. of same quantity of oil after cooling distd. with superheated steam gave 27 c.c. of distt. which was directly distilled over bunsen without condenser gave

2.5 c.c.	–	130–135°C	∴ 1000 c.c. gave 19 c.c.
5"	–	139	+ 4.8 (⅔ of 7.2)
7.5"	–	140	23.8
10	–	142	+ 3.6 (allowance of 15% for expt'l losses not expt'n estim.)
12.5"	–	145"	27.4 c.c. S.N.
15"	–	150	∴ The 4500 c.c. oil used contd 123.3 c.c. S.N.
17.5"	–	158	150 c.c. evaped
			∴ Result 82.2% Abs.

clear

19 – Temp. fell, raised flame

1 c.c.	–	185"	yellow
2	–	240	
3	–	260	
4	–	266	began to crack

Blank of Min. for 2 S.N. – before.

Sp. Gr. . — .8793

800 c.c. distd. with superheated steam. Distt. meas'd every 15" min.

¼ hr.	Temperatures Steam	oil	Glyc. Bath.	Vol. of Distt.
1st	180	130	140	.8
2	188	139	142	1.3
3	187	137	145"	1.7
4	187	143	141	1.3
5"	184	143	149	1.9
6	188	145"	151	1.8
7	187	142	148	1.4
8	190	143	152	1.6
[air blown till cold				.5"]
9	185"	143	140	.8
10	180	137	143	.7
11	140	140	140	.4
12	140	140	140	.4
12.5 c.c. above dist'd distt. over bunsen,				14.6

1 c.c — 200–215°C
2 " — 240
3 " — 245"
4 " — 255"
5" " — 260
6 " — 265
7 " — 285 (cracking)

∴ no S.N. present.

Expt. on Estn of Ether in oil.

1000cc of steamed mineral oil.

20cc of ether 0.730 - methylated

Distilled with steam. The oil & ether were heated to 100°C. when steam was blown in. Ether & water condensed & ejected.

With steam at 110°C; oil at 105°C rising to 125°C. 13.5 cc were obtained as a top layer. The rate & temp. of steam were raised to 120°. When the apb. bumped over much oil being ejected thro' the condenser.

On steaming no more ether came over. On cooling out the water layer with CaCl₂

Yield 13.5

+ ——

= %

Expt. on Estn of S.N. in oil

800 cc steamed min. oil.

20 cc S.N. added & mixed.

Distilled with steam superheated.

Apbs as described —

Cc.	Hours	Steam	Temp. Glycerine bath	Oil	Vol. of distillate per quarter	% recovered
1		124°C.	114°	112°	4·7 cc	23·5%
2		118°	114°	108°	4·2	45·5
3		118°	113°	107°	2·3	56·0
4		130°	125°	110°	1·6	64·0
5		125°	135°	116°	2·5	76·5
6		127°	135°	119°	2·1	87·0 (yellowish & slight bumping)
7		130°	140°	125°	1·5	94·5
8		132°	135°	127°	1·6	102·5
9		134°	138°	125°	0·8	106·5
10		132°	138°	127°	1·3	118%
					22·1	

22 c.c. distd. over naked bunsen, with condenser, no column

Distillate — 126–165°C — 16·3 c.c. colourless

over 200°C — 5·3 " yellow

21·6 ~~= 84·5% of possible~~.

16·3 c.c. recovd. out of 20 cc. = 81·5% of possible

Dictée

In ne
ouat en
Fin
10
20
30
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70
80
90
92

1000 c.c. Min. oil after 2 SV distilled with Superheated steam

½ hrs	Temperatures Steam	Oil	Slyc.	Distillate
1st	131	120	135°	7.7
2nd	128	120	135°	4.5
3rd	130	127	132	4.3
4th	129	125°	131	2.5
5th	130	124	130	1.9
6th	130	127	131	2.1
7th	129	125°	133	1.6 (yellow)
				24.6

24.0 c.c. distd. over bunsen with condenser.

1st drop 122°c — Total distt. collected 19.4 c.c.

19.4
+ 2.9 (15% for expt'l losses)
22.3 in 1000 c.c. = 100.35 c.c. in 4500 c.c. oil
= 66.8 % on 150 c.c. evapd.

1st portion

1900 c.c. Nim Oil after 3 S.N. distl. with superheated steam

Hrs	Steam Temps.	Oil	Glyc.	Distt.
1st	125°	130	145°	17.5
2nd	132	140	150	17.3
3d	125°	146	150	12.5
4th	132	138	135°	6.2
5th	135°	132	137	4.2
6th	130	130	130	3.0
7th	138°	132	130	2.8
8th	130	130	130	1.7 (10 min)
9th	138	132	133	2.2
10th	120	133	125°	2.2

2nd Portion 2680 c.c. Min. oil from SN_3

Distilled with superheated steam

¼ hrs	Temperatures			Distillate c.c.
	Steam	Oil	Glycerine	
1st	129	132	125	11·0
2nd	134	139	133	12·0
3rd	126	148	140	11·7
4th	130	142	135	11·7
5th	130	136	125	6·5
6th	130	138	131	5·0
7th	128	142	135	5·3
8th	128	142	136	5·1
9th	128	142	130	4·3
10th	124	142	132	3·5
11th	135	141	135	2·5

Distillates from 1st & 2nd portions of Min Oil from N_3

Redistilled over bunsen with condenser.

From 1st portion 66 c.c.
" 2nd " 77 c.c.
} Total 143 c.c.

1st drop at 130°C

10 c.c.	—	135°C
20	—	136½
30	—	138
40	—	140
50	—	142½
60	—	145
70	—	147
80	—	149½
90	—	154
100	—	167

Distt. — 113 cc.
Residue in flask — 27
140

at 106 c.c. temp. fell from 171°C, heat increased

110	—	200

at 113 c.c. temp fell from 218°C with full size bunsen.

Total Vol. of distillate — 113 c.c.

Cresols oil from SN_3, Total after draining.
Distilled with superheated steam

¼ hrs	Temperatures Steam	oil	Glycerine	Distillate cc's	
1st	133	126	122	3.9	
2nd	124	127	122	6.7	
3rd	112	125	119	3.3	
4th	119	120	115	1.8	Some crystals
5th	105	118	112	.8	Semi solid
6th	118	115	111	1.7	Semi solid, last portion solid

Total vol. of distillates 19 c.c. on standing all night deposited about 1 c.c. of crystals. Clear liquid poured off & distilled over bunsen with condenser

HORATIO BALLANTYNE, F.I.C., F.C.S.,
Member of the Society of
Public Analysts,
Consulting and Analytical Chemist.

Telegraphic Address :—
"XENOTIME, LONDON."

TELEPHONE No. 1152, CENTRAL.

Chemical Laboratory,
75, Chancery Lane,
London, W. C. 6th Janr., 1904.

Dear Bob,

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Assuming that you do not yourselves intend to manufacture, would you care for an investment of this sort? Baird offers 6% Debentures and I can send you all particulars if you would like me to.

~~Yours ever~~

Ihnen zum Jahreswechsel herzlichst Glück wünschend, verbleibe ich,

Hochachtungsvoll.

Horatio Ballantyne.

B It was found by experiment that the bisulphite compound in solution could be distilled directly with the loss of only a portion of the CO_2 which came over with the distillate. The heat used was obtained without the use of a deflegmator.

On assumption that the CO_2 which distilled over is not recovered this loss which equals 10% of the bisulphite = 0·06 ton Sulphur [£6·5 ton] = 7/6

The acetone containing CO_2 would be distilled & the CO_2 might be retained by using an alkali such as soda.

To obviate the removal of the boiled solution for revivifying, CO_2 water (0·143 tons of 10% strength) might be conveyed to the spot & this amount almost exactly equals the volume of water CO_2 lost in distillation.

Cost of Sulphur	£	0	7 · 6
Heating solution			10 · 0
Revivification with soda		1 ·	10 · 0

C Calculations on basis of Experiment XXXVI.

Ratio $\frac{\text{water by weight}}{\text{acetone by weight}} = \frac{200}{1}$, + 64·2% recovered.

∴ for 1 ton acetone ultimately gained are required 3·10 tons of water.

To raise this 15°–100° requires 5·4 tons of coal

To evaporate of $\frac{1}{10}$ (containing the acetone) 3·4 " " "

Total 8·8 tons of coal = £8·17·6.

This amount of hot water is excessive but might be to some extent employed in heating the stove.

D. Calculations on basis of Experiment XXXIX.

Ratio, $\frac{\text{water by weight}}{\text{alcohol by weight}} = \frac{40}{1}$ & 80% recovered.

For 1 ton alcohol ultimately recovered are required 50 tons water.

To raise this 15°–100°C requires 0·9 tons coal

To evaporate $\frac{1}{10}$ including the alcohol 0·6 " "

To take 1·5 tons coal = £1·10/.

The warm water produced might be used for heating purposes.

Summary of prices:—

	A(1)	(2)	(3)	(4)	B	C	D
Materials	£42·19	£4·2·6	Free	£3·15·0	£0·7·6	-	-
Heating	·11	-	£1·0·0	·7·0	·10·0	£8·17·6	£1·10·0
Value of by-products	-	15·0·0	9·0·0	4·8·0	-	-	-
Rectification of acetone with ways 1 in 10	-	-	-		1·10·0	-	-

Comparison of Cost of recovering Acetone & Alcohol from Solutions.

A (1) Treatment of bisulphite solution containing acetone with Na_2CO_3 & distillation of acetone from sol^n.
(2) Treatment of half Na_2SO_3 " with SO_2; disposal of half Na_2CO_3
(3) Treatment of half Na_2SO_3 " with $NaHSO_4$; " " " "
(4) Treatment of half Na_2CO_3 " with H_2SO_4; " " " "

B. Treatment of bisulphite solution containing acetone by boiling.

C. Treatment of water solution acetone by boiling.

D. Treatment of water solution alcohol by boiling.

A (1) Calculations made on a basis of ratio, weight of acetone : weight of $NaHSO_3$ :: 1 : 3 and 70% of acetone evaporated in drying stoves recovered.

∴ 1 ton acetone ultimately recovered requires 4·3 tons $NaHSO_3$ [@ £7·10 per ton] = £32·5
4·3 tons $NaHSO_3$ require 2·2 tons Na_2CO_3 [@ £4·17·6 per ton] = 10·14
∴ for 1 ton acetone recovered are formed 5·2 tons Na_2SO_3 costing £42·19
This may be considered as capital.

(2) Half the Na_2SO_3 (2·6 tons) require 0·66 tons Shephelm [@ £6·5 a ton] as SO_2 = £4·2·6
Half the Na_2CO_3 can be saved [£5·15 a ton] = 15·0·0
Gain on treatment (not counting price of caps to claim Na_2SO_3) £10·17·6

(3) From (1) are obtained 15·2 tons solution containing 5·2 tons Na_2CO_3. This is treated as follows:
(a) 4·6 tons solution containing 2·6 tons Na_2CO_3 are treated with 6 tons nitre-cake (33% H_2SO_4) producing 6 tons $NaHSO_4$ [@ £1·11·0 a ton = £9] or 13·6 tons Na_2SO_4. 10 H_2O which requires for solution 32 tons water. The total solution ∴ weighs 45·6 tons. Assuming sp. heat of salts as = that of water & that 1 lb coal evaporates 9 lbs of water and raises 57 lbs water from 15° to 100°C:–
∴ to raise 45·6 tons 15°–100°C requires 0·51 ton coal
to evaporate 1/7 of bulk " 0·48 " " ——— 0·99 ton coal.

~~To evaporate the acetone are required 0·02 tons coal [lbs water to 1 lb acetone × 6·36/140]~~

∴ To tal coal required = 0·99 ton + ~~0·02~~ = 0·99 ton = £1·0·0.

& there are produced 6 tons Na_2CO_4 = 9·0·0

∴ Gain on process (not counting preparation of anhydrous Na_2SO_4) = £8·0·0

(b) Into this half of the Na_2CO_3 solution the CO_2 developed by the action of the nitric acid on the Na_2CO_3 δ_β(a) is led.

(4) From (1) are obtained 15·2 tons of solution containing 5·2 tons Na_2SO_3. 2 this was halved into (a) & (b)

(a) 2·6 tons Na_2CO_3 require 2·5 tons of H_2CO_4 of 24 gr 1·75 [£1·10 a ton] & produce 2·9 ton Na_2SO_4

∴ cost of acid = £3·15

and cost of heating sol^n = evaporating $\frac{6}{7}$ [·34 ton coal] = ·7

while there are produced 2·9 tons Na_2CO_4 [£1·10 a ton] = 4·8

∴ Gain (not counting cost of obtaining anhydrous Na_2CO_4 = 0·6.

(b) Into this half of the Na_2CO_3 solution is led the CO_2 developed in (1).

⊕ To evaporate the acetone from the Na_2CO_3 solution on assumption of sp. heat of salts equalling that of water + 1 lb coal evaporating 9 lbs of water + 1 lb of coal raising 5·7 lbs of water from 15° to 100° C + 1 lb of coal evaporating 4 lbs of acetone (0° to vapour),

15·2 tons solution raised to boiling	= 0·27 tons coal
$\frac{1}{7}$ evaporated off	= 0·24 tons coal
1 ton acetone evaporated	= 0·02 tons coal
To tal	= 0·53 tons coal = £0·10·0

Fuel would be saved in (3) and (4) by using this warm Na_2CO_3 solution.

WR. 23/3/04.

N° 17,289 A.D. 1894

Date of Application, 11th Sept., 1894—Accepted, 20th Oct., 1894

COMPLETE SPECIFICATION.

[Communicated from abroad by EDWARD HART, Professor of Chemistry, of Easton, in the State of Pennsylvania, United States of America.]

Improved Apparatus for the Condensation of Nitric Acid and other Vapours.

I HENRY EDWARD NEWTON of The Office for Patents, 6 Bream's Buildings, Chancery Lane, in the County of London, Patent Agent, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to an improved apparatus for the concentration of vapours, and especially for the condensation of nitric and similar acids from gaseous into liquid form. The improved apparatus depends upon the principle of the division of the current of vapour, so as to secure a large cooling surface, and diminish the friction of the gases, and that of the high degree of refrigeration secured by the evaporation of liquid from the surface of pipes, or equivalent conveyors, through which the gases are passed.

For a full understanding of the invention, a detailed description of an apparatus for condensing nitric acid, embodying the invention in the preferred form, will now be given in connection with the accompanying drawing, showing the apparatus in diagrammatic side elevation, and the features forming the invention then specifically pointed out in the claims.

In the drawing, A is the retort, which may be of any suitable form, and from which the vapour passes through the pipe B into the vessel C, with the top of which connects a vertical pipe D which communicates by a series of pipes, E, with a second vertical pipe, F, which is open at the top, so as to form an escape pipe for non-condensable gases. The pipes E may be exactly horizontal, or inclined in either direction, but for the best results, they are preferably inclined slightly, as shown, towards the pipe D, at their inlet ends, so that the acid will flow back through the pipes E and pipe D into the vessel C, from which it is syphoned off by the syphon H, into the bottle or other receiver I, while the uncondensed vapours pass onward through the pipes E into the pipe F, and are thus discharged at the top, where they may be condensed by any suitable means. By this method of returning the acid to the vessel C, the acid is boiling hot as it is syphoned off into the receiver, so that in the case of nitric acid, no red oxides of nitrogen or chlorine shall be dissolved in it, but it is delivered in a very pure condition. While, however, this construction is preferable, and in itself forms a part of the invention, it will be understood that the receiver may be connected with the pipe F, and the pipes E be horizontal, or inclined towards the pipe F. The pipes E, however, should be approximately horizontal, so as to expose the pipes throughout their length, to the action of a sprinkler placed above them, and to secure the prolonged cooling action which results from a slow current of the condensed or partially condensed liquid. Above the pipes E is the water supply pipe G, perforated or slotted in any suitable manner, to supply the amount of cold water required by sprinkling the same over the pipes E.

As the pipes E are quite hot, the water is evaporated therefrom, and by constructing the pipe G so as to properly regulate the water supply, all, or substantially all, of the water may be evaporated from the pipes, so as not to necessitate provision for carrying off the surplus water. It will be understood, however, that it is not essential that all the water should be evaporated, and a

trough K, with drain pipe *k*, may be used below the pipes E, as shown, to carry off any surplus water, or other suitable provision be made for this purpose.

The vessel C and vertical pipes D, F are preferably made of stoneware, glass, or other similar material, suitable to resist the attack of the acid, and the pipes E are preferably made of glass or other material suitable to resist the attack of the acid, and, at the same time, conduct the heat from the gas quickly, so as to secure the proper cooling action.

The number, size, and length of the pipes D, E, F, and other parts of the apparatus, will be varied as is necessary, in order to secure perfect condensation of the gas, it being obvious that this will depend somewhat upon the size of the retort and other circumstances, and such variation being within the knowledge of those skilled in the art.

A construction which has been found efficient is produced by making the vertical pipe D about three inches in diameter, and the pipes E about one inch in diameter, and six feet or more in length, the inclination of the pipes E being about one inch in six feet.

It will be seen that by thus dividing the current of vapor, large cooling surfaces are secured, and the friction of the gas is diminished, and that by the evaporation of the water a large and rapid absorption of heat is secured.

While the invention has been described in connection with water as the cooling medium, as this is the liquid commonly used, it will be understood that any other suitable liquid may be used for this purpose. The apparatus has been described in connection with the preparation of nitric acid, but it will be understood that the apparatus is applicable also to the condensation of other similar gases.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, as communicated to me from abroad, I declare that what I claim is :—

1. The combination with a retort and receiver, of a series of pipes between which the vapor is divided on its path from the retort to the receiver, and means for sprinkling liquid upon said pipes, substantially as described.

2. The combination with a retort and receiver, of horizontal or inclined pipes arranged one above the other, between which the vapor is divided on its path from the retort to the receiver, and a perforated liquid supply pipe above said pipes, substantially as described.

3. The combination with a retort, of pipes arranged one above the other between which the vapor is divided on its path from the retort, said pipes being inclined slightly towards the inlet end for the vapor, a perforated liquid supply pipe above said pipes, and a receiver for the condensed liquid connected with the inlet ends of said pipes, substantially as described.

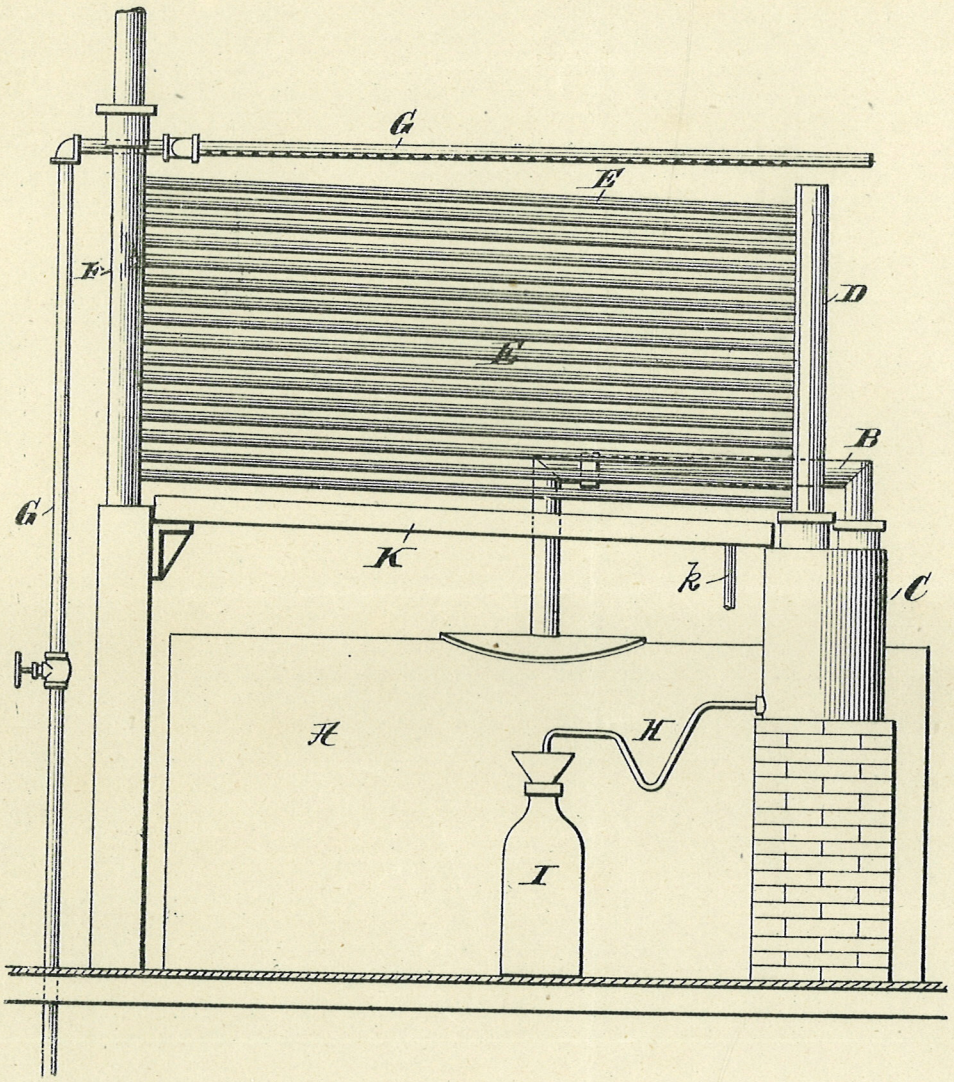
4. The combination with a retort and receiver, of a vessel receiving the vapor from the retort, a vertical pipe from said vessel, a series of pipes connecting with said vertical pipe at one end, and arranged one above the other, and inclined slightly towards said vertical pipe, a vertical gas escape pipe connecting with the other ends of said inclined pipes, and a syphon between said vessel and receiver, substantially as described.

5. The combination with retort A, of the vessel C, connected with said retort, pipe B connecting said retort and vessel, vertical pipe D connected at its base with said vessel C, vertical pipe F, pipes E connecting said vertical pipes D, F, and arranged one above the other, perforated liquid supply pipe G above said pipes E, and a syphon for conducting the condensed acid from the vessel C to a receiver, substantially as described.

Dated this 1st day of September 1894.

NEWTON & SON,
Agents for the Applicant.

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[This Drawing is a reproduction of the Original on a reduced scale.]

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R Robertson
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With Compliments

Table A (c).

Absorption of Acetone Vapour by Towers.

No. of Expt.	Date of Expt.	No. of Runs.	Acetone per Run C.C.	Concentration of Acetone Vapour in Air. % by Vol.		Solution of Bisulphite					Ratio (by weight) Acetone : {Bisulphite / Water}			Acetone Recovered. %				Remarks.
				1st Tower	2nd Tower	Strength & Nature.	Amount Used 1st Tower.	Amount Used 2nd Tower.			1st Tower	2nd Tower	Total	1st Tower	2nd Tower	Total	% of Possible Recovered in 2nd Tower	
							c.c.	c.c.										
XXVI	10/5/00.	1	41	1·00	–	30% $NaHSO_3$	900	–										
XXX																		
XXXI	19/5/00	3	41	1·00	0·31	30% $NaHSO_3$	1000	1300										
XXXII																		
XXXIII																		
XXXIV	–	2	41	1·00	0·31	30% $NaHSO_3$	600	900										
XXXV																		
XXXVI																		
XXXVII	–	3	20·5	0·50	0·13	30% $NaHSO_3$	400	750										
XXXVIII																		
XXXIV	21/4/01	3	20·5	0·50	0·28	10% $NaHSO_3$	1200	450										
L.		3	20·5	0·50	0·22	20% $NaHSO_3$	750	400										
LV	22/9/01	3	41	1·00	–	26% $NaHSO_3$	680	–										
LVI	30/9/01	3	41	1·00	–	27·4% $MgH_2S_2O_6$	350	–										
LVII	6/10/01	3	41	1·00	–	27% $KHSO_3$	850	–										

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OLD BROAD ST. LEADENHALL ST. FENCHURCH ST. LIMEHOUSE. GREAT TOWER ST. FINSBURY. WOOD STREET. CHARTERHOUSE ST. CHANCERY LANE. RUSSELL SQUARE. OXFORD STREET. REGENT STREET. PALL MALL. WESTMINSTER. VICTORIA. CNSLOW SQUARE. SOUTH KENSINGTON. PADDINGTON. MARYLEBONE. SOUTHWARK. PECKHAM. TOOTING. WALTHAM ABBEY. WOODFORD. MUSWELL HILL.
SUB BRANCHES,
EAST DULWICH. CHESHUNT. WALTHAM CROSS. ENFIELD HIGHWAY. LOWER EDMONTON. WINCHMORE HILL. PALMERS GREEN. LOUGHTON. BUCKHURST HILL.
CHAMBERS & SONS "PROTECTIVE" FINSBURY, LONDON.

No A A 077852

Waltham Abbey Branch,

19 SEP 1905

London, 13th Sept. 1905

The London Joint Stock Bank Limited

WALTHAM ABBEY.

Pay Dr. R. Robertson or Order

Forty Pounds Stg.

£ 40-0-0

R. Robertson & W. Rintoul

THIS CHEQUE REQUIRES ENDORSEMENT.

HEAD OFFICE, PRINCES ST
LOTHBURY OFFICE, 6, LOTHBURY.
BRANCHES
OLD BROAD ST. LEADENHALL ST. FENCHURCH ST. LIMEHOUSE. GREAT TOWER ST. FINSBURY. WOOD STREET. CHARTERHOUSE ST. CHANCERY LANE. RUSSELL SQUARE. OXFORD STREET. REGENT STREET. PALL MALL. WESTMINSTER. VICTORIA. CNSLOW SQUARE. SOUTH KENSINGTON. PADDINGTON. MARYLEBONE. SOUTHWARK. PECKHAM. TOOTING. WALTHAM ABBEY. WOODFORD. MUSWELL HILL.
SUB BRANCHES,
EAST DULWICH. CHESHUNT. WALTHAM CROSS. ENFIELD HIGHWAY. LOWER EDMONTON. WINCHMORE HILL. PALMERS GREEN. LOUGHTON. BUCKHURST HILL.
CHAMBERS & SONS "PROTECTIVE" FINSBURY, LONDON.

No A A 077854

Waltham Abbey Branch,

21 DEC 1905

London, 20th Dec 1905

The London Joint Stock Bank Limited

WALTHAM ABBEY.

Pay Dr. R. Robertson or Order

Fifteen Pounds Stg.

£ 15 " 0 " 0

R. Robertson & W. Rintoul

THIS CHEQUE REQUIRES ENDORSEMENT.

HEAD OFFICE, PRINCES ST
LOTHBURY OFFICE, 6, LOTHBURY.
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OLD BROAD ST. LEADENHALL ST. FENCHURCH ST. LIMEHOUSE. GREAT TOWER ST. FINSBURY. WOOD STREET. CHARTERHOUSE ST. CHANCERY LANE. RUSSELL SQUARE. OXFORD STREET. REGENT STREET. PALL MALL. WESTMINSTER. VICTORIA. CNSLOW SQUARE. SOUTH KENSINGTON. PADDINGTON. MARYLEBONE. SOUTHWARK. PECKHAM. TOOTING. WALTHAM ABBEY. WOODFORD. MUSWELL HILL.
SUB BRANCHES,
EAST DULWICH. CHESHUNT. WALTHAM CROSS. ENFIELD HIGHWAY. LOWER EDMONTON. WINCHMORE HILL. PALMERS GREEN. LOUGHTON. BUCKHURST HILL.
CHAMBERS & SONS "PROTECTIVE" FINSBURY, LONDON.

No A A 077853

Waltham Abbey Branch,

6 OCT 1905

London, 28th Sept 1905

The London Joint Stock Bank Limited

WALTHAM ABBEY.

Pay Mr. W. Rintoul or Order

Forty Pounds Stg

£ 40-0-0

R. Robertson & W. Rintoul

THIS CHEQUE REQUIRES ENDORSEMENT.

HEAD OFFICE, PRINCES ST
LOTHBURY OFFICE, 6, LOTHBURY.
BRANCHES
OLD BROAD ST. LEADENHALL ST. FENCHURCH ST. LIMEHOUSE. GREAT TOWER ST. FINSBURY. WOOD STREET. CHARTERHOUSE ST. CHANCERY LANE. RUSSELL SQUARE. OXFORD STREET. REGENT STREET. PALL MALL. WESTMINSTER. VICTORIA. CNSLOW SQUARE. SOUTH KENSINGTON. PADDINGTON. MARYLEBONE. SOUTHWARK. PECKHAM. TOOTING. WALTHAM ABBEY. WOODFORD. MUSWELL HILL.
SUB BRANCHES,
EAST DULWICH. CHESHUNT. WALTHAM CROSS. ENFIELD HIGHWAY. LOWER EDMONTON. WINCHMORE HILL. PALMERS GREEN. LOUGHTON. BUCKHURST HILL.
CHAMBERS & SONS "PROTECTIVE" FINSBURY, LONDON.

No A A 077855

Waltham Abbey Branch,

5 JAN 1906

London, 3rd Jany 1906

The London Joint Stock Bank Limited

WALTHAM ABBEY.

Pay Mr. E. Phillips or Order

Six Pounds ten Shillings Stg

£ 6-10-0

R. Robertson & W. Rintoul.

THIS CHEQUE REQUIRES ENDORSEMENT.

R. & R.

No. OF CHEQUES.	SERIES.	NUMBERED.
25	a/a	077851 — 077875

THE LONDON JOINT STOCK BANK LIMITED respectfully requests that this book be kept locked up. *Additional security* will be gained if the Cheques are filled up by the Drawer, or by some person with whose writing the Bank may be acquainted.

It is desirable that the sum should be commenced as near the left-hand margin as possible.

No. AA 077857

26th January 1906

Messrs Marks & Clerk

Fees re- Frasers licence

£ 11-16-0

No. AA 077856

22/11 1906

RR

£ 10.0.0

No. AA 077855

3rd January 1906

E. Phillips

Asst. Plant draughtsman

Messrs Fraser & Co

£ 6-10-0

No. AA 077854

20/12/ 1905

RR

£ 15.0.0

No. AA 077852

13/9/ 1905

R.R.

£ 40.0.0

No. AA 077851

13th Sept. 1905

M & C

£ 1-4-0

No. AA 077863

16/6 1906

M. & C.

Frost's further fees (Fraser) 2.12

Expenses sundries appearance (Frost) 1.5

£ 3.17.

No. AA 077862

11/7 1906

~~W. J. Fraser & Co.~~

entered in error

counterfoil destroyed

RR

£

No. AA 077861

17th April 1906

W.R.

£ 50-0-0

No. AA 077860

17-Apr. 1906

R.R.

£ 20.0.0

No. AA 077859

8-3-1906

D. Miller Esq

re. Nobel negotiations

£ 2-2-0

No. AA 077858

29th January 1906

Marks & Clerk

German Pat. fee £8.0

French " " £5.10

£ 13.10.0

No. AA 077869

19/1 1910

Messrs Marks & Clerk

[advising re remuneration for Roberts (abandt.)]

£ 4.4

No. AA 077868

19/1 1910

W. J. Fraser & Co Ltd.

Completing Pat 10261 Appg

- our share

£ 2.16.

No. AA 077867

6.8.1909

W. J. Fraser & Co

½ cost of fees on application for Pat: 10261/09

£ 1.8.0

No. AA 077866

25-7-1907

WR

£ 15.0.0

No. AA 077865

25/9/ 1906

RR

£ 5.0.0

No. AA 077864

26/7 1906

RR

£ 15.0.0

No AA 077872

14th Nov 1910

Messrs B & T.

£ 1.7.10

No AA 077871

10/10 1910

E R Deacon
(for back work)

£ 3.10/-

No AA 077870

18/8 1910

W J Fraser
(air Filter + 7 Plays ales)
Lens for Aurora 1.1.4
10.2
1.11.7

£ 13.5/5

No AA 077875

4/4 1911

D. R. R.

£ 2.15.3

No AA 077874

28/3/1911

E R Deacon

£ 7.6

No AA 077873

28/3/1911

B & T.

£ 4.7.6



No. OF CHEQUES.	SERIES.	NUMBERED.
25	A.	009226—009250

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No A 009231
23/8 1911
Dr. R.R.
(see small book)
Cheques at Fraser's + re Guttmann
£ 11.15.7

No A 009230
21/8 1911
Messrs Baird & Haldane
(Solrs. at Fraser)
£ 6.12.1

No A 009229
18/8 1911
E. J. Williams
(for drawings)
£ 20.0.0

No A 009228
1st Aug 1911
E. S. Skinner Ltd.
(for Bi. - cards used by Guttmann)
£ 5.7.8

No A 009227
6/6 1911
E R Deacon
(for search)
£ 1.18.0

No A 009226
6th May 1911
Messrs E. S. Skinner Ltd
£ 0.10.0

No A 009238
27/12 1911
Dr. R.R.
(For small Cx Cheques)
£ 3.10.9

No A 009237
20/12 1911
E R Deacon
£ 2.13.

No A 009236
12/12/1911
E J Williams
(a/c C+H)
£ 7.9.6

No A 009235
25/11 1911
Wm Rankine
making all square on out-drawings
£ 300.0.0

No A 009234
22/11 1911
Messrs W.T. Fraser
For Cocheres re tickets with GR on dil. con. agmt 3, 8-9 and 10 to 11th June
£ 16.19.6

No A 009233
1/11 1911
D.R.R.
£ 300.0.0

No A 009244
6th Jan 1913
Cashier of the Bank of England
Receipt order No. 1728
(11th Rec'd)
84/R/3111 (M.O.F.)
£ 24.0.0

No A 009243
10th Oct 1912
Cashier of the Bank of England
Receipt order No. 846
84/R/3111 (M.O.F.)
£ 22.0.0

No A 009242
1st Aug 1912
D.R.R.
£ 30.0.0

No A 009241
23/7/1912
D.R.R.
(small expenses)
£ 2.7.-

No A 009240
31st Jan 1912
R R
£ 40.0.0

No A 009239
2/1 1912
O. Guttmann Esq
Gibbs at Holmwood
£ 20.3.9

No A 009250

22nd Jan 1914

Chief Cashier of the Bank of England

£ 5.7.3

No A 009249

28/3 1913

Dr RR

£ 10

No A 009248

28/4 1913

Dr RR

£ 20.0.0

No A 009247

23/1/ 1913

Dr RR

£ ~~21.6.7~~ 17.13.9

No A 009246

23/1/ 1913

Wm Rintoul

£ 60.0.0

No A 009245

22/1/ 1913

RR

(Final expenses

£ 2.0.0

A009226 19

TO

THE LONDON JOINT STOCK BANK LIMITED,

WALTHAM ABBEY BRANCH:—WALTHAM ABBEY.

Please deliver to the Bearer a Book containing ..... *stamped*

Cheques payable to ..... *and debit* ..... *Account.*

Address .....

118.16.2
22.16.9
95.19.5

20.3.9
2.13
22.16.9



21·5885
16·4445
5·1440 Ri.

5·1440
~~—~~
Capsule 18·0508
2·1948

Heated to fusion & incipient evolution of acid fume –

Cap. + subs. 22·901

Loss = water + ~~Ri~~ H_2SO_4 = 5·7%

Heated over bunsen: fuses, boils. Crust forms with spitting, gradually solidifying.

Full burner heat 5 mins. – very partial fusion of Na_2SO_4 – only small quantity of fume rising

weight ——— 21·751

Total Loss 1·4438 = 28·09% ~~W~~

Heated to white heat over blowpipe fused to transparent liquid

weight — 21·6445

Total Loss — 1·55-03 = 30·13%

$MgSO_4$
5H

~~20·104~~

18·0425

Heated over bunsen, fused, water gradually expelled till white crust remained, no signs of decomp.

Wt. – 20·476

Loss – 2·5765 = 57·57%

(Theo of Cryst. calcd = 57·2%)

Heated at white heat over blowpipe no signs of decomp. – no fusion.

Weight – 20·421 =

Loss – 2·6215 = 52·43%.

ON HER MAJESTY'S SERVICE.

Decomposition of Sulphates

D.R.P. 126,601 of 1900

Z. für an. ch.

Darstellung von Schwefeltrioxyd unter gleichzeitiger Gewinnung von Portlandzement. R. Haack.

Bisulphate from Hms, manufr. is heated with kaol + coal :–

$KAlSO_4 + NaCl + 2C = KAlS + HCl + 2CO_2$.

MgO ? M. P. Na_2SO_4 & MgO. " a Behaviour of $MgSO_4$

? $FeCO_3 + NaHSO_4$ into

FeO $FeO, Na_2SO_4 + H_2O$

? Solv. of FeO in $NaHSO_4$

CuO. ? Solv. CuO in $NaHSO_4$

? Cu + $NaHSO_4$ giving SO_2

? Decomposg temp. – Cu salts

ZnO. ? as above.

MnO ? " "

? Behaviour of $NaHSO_4$ on heating :– M. Pt. of Na_2SO_4 900°C

? $Na_2SO_4 + 13C = 3Na_2S + 2Na_2S_2 + 2Na_2CO_3 + 11CO_2$ (Lunge)

? Decomps of $NaHSO_4$ with SiO_2 at – high temp.

Utilisation of free acid directly such as use of Ether on evolution of gases.

S. M. 9./92

Ketones 12,660, Lowe, Crden

L.M.9./91

none

L.M.9./90

Ketone 9793

L.M.9./89

none

L.M.9/88

Ketones 6869 – Alcohol,

Aldehydes Ketones – Purification of alcohol & obtaining aldehydes & ketones therefrom. The crude alcohol is first distilled. 2o distillate & ades mixed & re-distilled. Distillate then distilled with about ½ pint of 50% H2SO4. The aldehydes & ketones may be separated by any suitable process.

L.M.9/87

Ketones 1694 Ozs
5257 Crown

L.M.9/86

Ketones 12,052 Ozs

?

~~5407/98~~
~~11676/ "~~
~~17538/ "~~
~~23866/ "~~
~~25502/99~~
~~2832/ "~~
~~2506/99~~
~~4495/ "~~
~~5923/ "~~
~~8239/ "~~
~~12139/ "~~
~~17053/ "~~
23724/ "
~~11868/ "~~
~~17083/ "~~
~~24056/ "~~
7474/ "
~~16735/ "~~
~~17620/ "~~
~~20501/~~
~~24383/~~



canvas in layers in intermediate places

0	.9995		
1	.9986		
2	.9976		
3	.9966		
4	.9955		
5	.9945		
6	.9935		
7	.9925		
8	.9916		
9	.9906		
10	.9896		
11	.9886		
12	.9876		
13	.9868		
14	.9858		
15	.9848		
16	.9838		
17	.9827		
18	.9816	31	.9686
19	.9806	32	.9676
20	.9796	33	.9666
21	.9786	34	.9656
22	.9776	35	.9646
23	.9766	36	.9636
24	.9756	37	.9626
25	.9746	38	.9616
26	.9736	39	.9606
27	.9726	40	.9596
28	.9716	41	.9585
29	.9706	42	.9575
30	.9696	43	.9565
		44	.9555
		45	.9545
		46	.9535
		47	.9525
49	.9484	48	.9514
50	.9394		

'79

~~1410~~
~~1733~~
~~3068~~
~~4029~~
~~4117~~
~~4233~~
~~4770~~
~~5102~~

'80

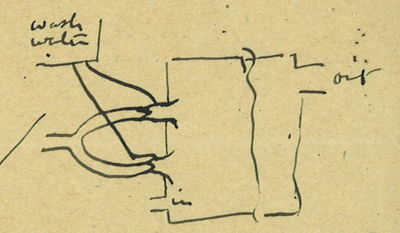
~~624~~
~~728~~
~~1119~~ Fossils. (Prov. only)
~~1481~~
~~1478~~
~~3323~~
~~3579~~
3678 " "
~~4443~~
~~4467~~
~~4723~~
~~4998~~

'77

~~272~~
~~422~~
~~705~~
~~1644~~
~~1668~~
~~1814~~
~~2476~~
3791 Sheets of canvas in Dyed-Lyed
~~3817~~
~~4071~~
~~4333~~
~~4666~~
~~4926~~

'78

~~443~~
~~522~~
~~640~~
~~725~~
~~1260~~
~~1306~~
~~1881~~
2231
~~2376~~
~~2526~~
~~2833~~
~~4515~~



Previous Patents
in Ketones

1893.



20578.
Water air & steam jet.

20808
Improvement on 5255/87.
air jet



– 21181 finished

Washing gas by spraying
2231/78

Ketones

'82 — nil
'87 — nil
'88 — nil
'89 — nil
'90 — nil
'92 — nil
'93 — nil
'94 — nil
'95 — nil
'96 — nil.
'97 — nil
'98 — to hand 16 ~~2971~~ ~~9165~~ near — nil.
'99 — nil
'00 ? 16292 not known

S. M. 9. '97

Spirit producers & spreaders.

537, Light forced blast nozzle by air pr.
590, Ball on jet over hole atomizer.
696 — coil of wire.
1498 — no air.
1843 — ~~air~~ atomizer & flue &c
2423 no air
6466 — Paint sprayer — mechanical spraying atomizer
8099 — no air.
8258 — Rotating cylinder which strains to centre &c
8630 — humidifying air, jet on a conical shoulder
8713 no air.
8789 — sprays for toilet or medical work.
8902 — moistening air in mills — see Patents
9306
10,477
13,541
13,934
15,526

S. M. 9. 1898

Ketones /97 13,214, 23,719 Colour Sonora
" /97 14613, Perfume
/98 15,210 Perfume
/98 2816 Hunter. Use less oil pumice & alkaline carbon.

S. M. 9. 1899

Ketones /98, 9165 Sonora
" /99 6141 Sonora
" /98 15,907 Acetone direct from dilute formol.
/98 23,254 Sonora
/98 25,634 Colour
/99 1034 Dimethyl methyl Ketone (Colour)
/99 1944 Sonora (a

Recovery of Solvents in Explosives.

In the manufacture of smokeless powder certain solvents are used for bringing the nitrocotton which is an essential constituent of modern powders into gelatinous form. The solvent after having done its work must be eliminated from the powder & for this purpose the explosive is heated in a drying stove. The usual practice for example in the case of cordite in this country is to allow the solvent to escape into the air, as the methods for its recovery have not been deemed adequate.

The methods usually employed consist of processes in which the gases leaving the explosive are compressed & cooled in a vacuum and then compressed & recovered. This method however is unsatisfactory in result and demands, where there is a large output, an enormous outlay in vacuum drying stoves & exhausting plant.

The difficulty in the recovery of the solvent in the case of smokeless powders lies in the fact that the powder from its gelatinous nature dries slowly, producing only a small concentration of acetone vapour in the drying stove to begin with, and as the drying proceeds the concentration of acetone vapour in the air of the stove becomes very low. The concentration of acetone vapour in a stove has been calculated & found to be about 1% by volume on the assumption that the air is changed every hour in the stove. Experience also has shown that the actual amount of acetone present in a stove during drying is from 0.35 to 0.95% of acetone vapour by volume.

This great attenuation of acetone vapour in the stoves has previously rendered it impossible to recover much in the way of commercial methods of recovery. But the present experiments have shown that it is possible to recover this acetone without resorting to expensive plant.

2 — 130–145
3 — 168
4 — 187
5 — 195 yellow
5½ — 200
6 — 205
Campbell rosaniline flavine
6½ — 212
7 — 213
7½ — 214
8 — 216.

WASC 16472

2 mm. 700 Cms pure acetone
230 gms cordite dr. 96 % S.
Small stick. 8 hrs each room @ 18° C. 28 % vol.
(Exp. 460 gms.)

Nobels Explos. Co. Ltd.
149 West George St
Glasgow

The Chilworth Gunp. Co.
57 Parliament St.
S.W.

Messrs. Kynoch Ltd
Kynochtown - Essex

The New Explo Co. Ltd.
Stowmarket

The National Explo. Co. Ltd
11 Austins Friars
E.C.

The Cotton Pde Co. Ltd.
Faversham
Kent

Messrs Curtiss' Harvey Ltd
3 Gracechurch St
E.C.

The Schultze Gunp. Co. Ltd.
28 Gresham St
E.C.

E.C. Pde Co. Ltd
40 New Broad St
E.C.

Smokeless Pde & Ammn. Co.
28 Gresham St E.C.

Law Offices
of
E. G. Siggers,
Patents & Patent Laws,
National Union Insurance Building,
918 F Street N.W.,
Washington, D.C.

Mar. 25, 1903.

Mr. R. Robertson,
Waltham Abbey, England.

Dear Sir:-

Having seen the illustration of your invention and the claims of your patent in the U. S. Patent Office Gazette, and not knowing if you have as yet applied for a Canadian patent. I take the opportunity to enclose a circular letter, which will give you information as to my charges for procuring a patent in the Dominion of Canada. The issuance of the U. S. patent will not debar you from procuring a valid Canadian patent, but it is important, for the reasons stated in the circular, that the application for patent be made as soon as possible.

As you are likely to have further U. S. patent business, I invite your attention to the accompanying pamphlet entitled "How to Obtain Patent, Caveat, Trade-Mark and Copyright Protection with Decisions in Leading Patent Cases," a careful reading of which will make clear to you my terms for securing a patent in the United States. Please read the introduction, pages 2 and 3, and consult the references on the last few pages of the pamphlet, that you may ascertain my past experience in the patent business, and my qualifications for giving competent attention to the interests of my clients.

For a simple invention, the total cost of procuring a U. S. patent is $65--see section 10, page 8. Of this amount, $20 is payable in advance--section 5, page 5; the attorneys fee is $25, section 12, page 9; while the final government fee, due any time within six months after the allowance of the patent, is $20--section 16, page 11.

Under the present law, all applications for U. S. patents must be made within seven months of the date of filing of the earliest application for foreign patent. By proclamation of the President, all U. S. patents may, at a slight additional expense, be made to apply to Porto Rico and the Philippine Islands--section 41, page 25. Your U. S. patent just issued may be extended to the Colonies for $10. A patent in the States is therefore of greater pecuniary value to the inventor than formerly.

You will see from the inside page of the front cover of the pamphlet that I occupy the same building with the Washington agency of The Bradstreet Company, and beg leave to refer to them as well as to Dun's reports. You will find me rated in both, as I own the Inventive Age, a journal devoted to inventions and scientific progress, and now in its fourteenth year. My foreign references are Ed Bennis & Company, Bolton, England; and Donald B. Morrison, Hartlepool, England.

Hoping you will command my services whenever I can be of any assistance to you, I am,

Yours truly,

E. G. Siggers

CANADIAN PATENT $30.

PROVISIONAL PROTECTION $4.

OFFICE OF

E. G. SIGGERS,

PATENT SOLICITOR AND LAWYER,

National Union Building, 918 F Street, N. W.,

WASHINGTON, D. C.

Dear Sir:

Your U. S. Patent, with drawings, claims and address, has been published in the "Patent Office Gazette," which has a large circulation in Canada, and it will be to your interest to secure protection in that country without delay, for "if any person has commenced to manufacture in Canada the invention for which a patent is afterwards obtained, such person shall continue to have the right to manufacture and sell such article notwithstanding such patent." (Quoted from Section 8, Chapter 61, of Canadian Patent Laws.)

I procure a Canadian Patent for a simple invention, i. e., one having only a single sheet of U. S. drawings, for six years for $30, and, at the end of that time, you can have it continued for twelve years longer by paying a Government tax of $40.

If the invention patented in the U. S. has more than one sheet of official drawings, the extra cost will be $5 for each additional sheet.

On receipt of $2, with the date or number of your U. S. Patent, I will prepare your papers for a Canadian Patent application and send them to you for signature. After you have signed the papers, they should be returned to me with the Canadian Government fee, $20, and the balance of the fee, $8; total $28; thus making the entire cost of a Canadian Patent for six years, **for an ordinary case,** *$30. If you prefer, you can send the full amount at one remittance. This course should be followed when the time is short, and it is desired to expedite the application.*

If you are unable now to make application for a complete patent in Canada, you can, within three months from the date of your U. S. Patent, file an application for **provisional protection** in Canada, for $4, and when the proper certificate is issued from the Canadian Patent Office, "then no other person having commenced to manufacture the invention in Canada, during the period of one year, shall be entitled to continue the manufacture of the same, after the inventor has obtained a patent therefor, in Canada." (Quoted from Section 8, Chapter 24, Canadian Patent Laws.)

☞ *The money expended for provisional protection cannot be subsequently applied to cover the cost of a complete patent.*

You can assign in Canada, either before or after the grant of the patent, but no assignment or partnership pertaining to your United States Patent can apply to or affect your Canadian Patent, which will give you the exclusive right in the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, Manitoba, British Columbia, and Prince Edward's Island—**no matter what interests you may have sold in the United States.**

I guarantee to secure the grant of a Canadian Patent in every case where I have prepared the papers.

Please compare my prices for Foreign Patents at the back of enclosed pamphlet with those of other attorneys, and **SEE REFERENCES ON LAST PAGES.**

Yours truly,

E. G. Siggers

P. S. A model is not required in an application for Canadian Patent.

From the Office of
E. G. SIGGERS,
Patent Lawyer,
NATIONAL UNION BUILDING,
918 F. STREET,
Washington, D. C.

Mr. Robert Bryant
Mountnessing
Brentwood
England

WASHINGTON D.C.
MAR 25
8 30 PM
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E. G. SIGGERS,

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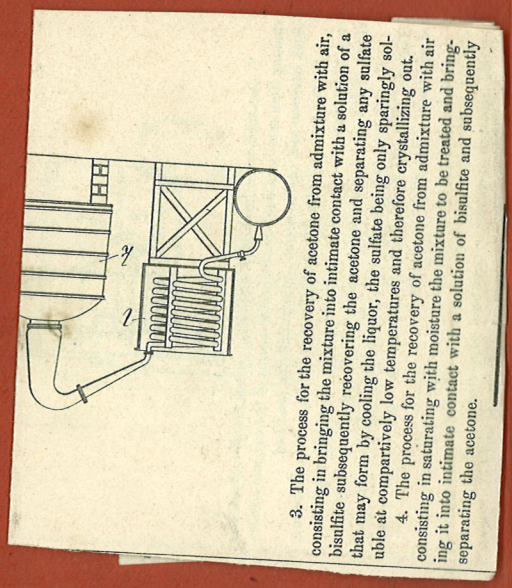
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3. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulfite subsequently recovering the acetone and separating any sulfate that may form by cooling the liquor, the sulfate being only sparingly soluble at compartively low temperatures and therefore crystallizing out.

4. The process for the recovery of acetone from admixture with air consisting in saturating with moisture the mixture to be treated and bringing it into intimate contact with a solution of bisulfite and subsequently separating the acetone.

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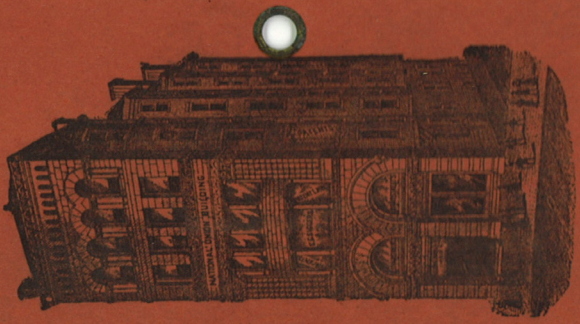
Claim.—1. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulfite and subsequently separating the acetone.

2. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulfite and subsequently separating the acetone by distilling the compound directly, practically all the acetone coming over before any substantial decomposition of the bisulfite has taken place and recovering the small amount of sulfurous acid which does come over by the addition of an alkali, before final rectification of the acetone.

3. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulfite subsequently recovering the acetone and separating any sulfate that may form by cooling the liquor, the sulfate being only sparingly soluble at compartively low temperatures and therefore crystallizing out.

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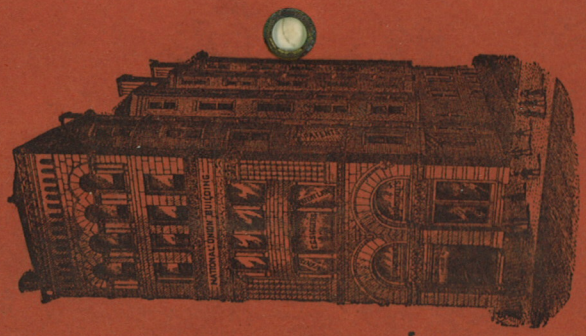
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Mr. Robt. Robertson
Walthamstow
England

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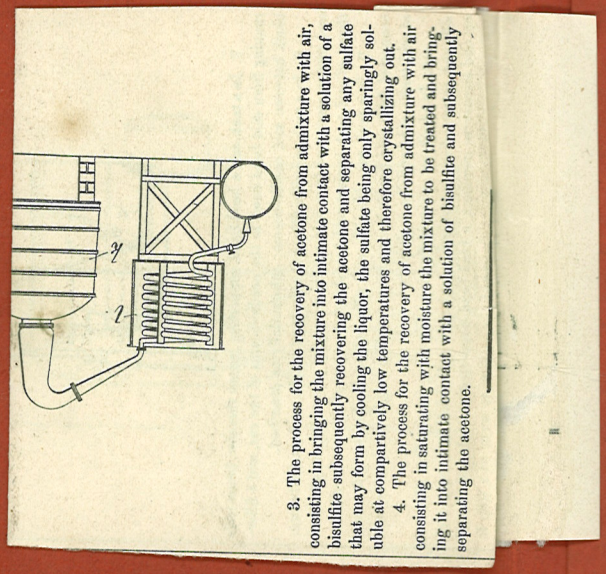
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Mr. Ralph Robertson

Walthamabbey

England

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3. The process for the recovery of acetone from admixture with air, consisting in bringing the mixture into intimate contact with a solution of a bisulfite subsequently recovering the acetone and separating any sulfate that may form by cooling the liquor, the sulfate being only sparingly soluble at compartively low temperatures and therefore crystallizing out.

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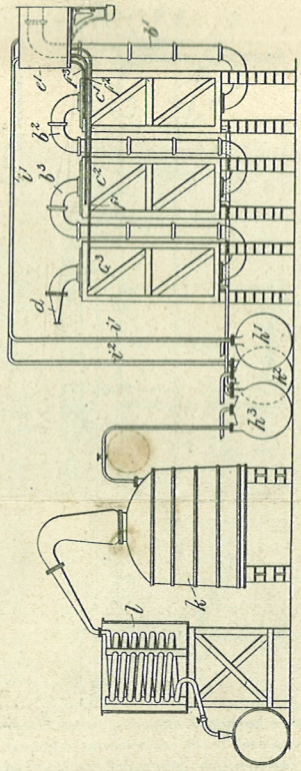
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7. In a tank-car, a head-band, supporting means therefor, brace-rods running from said head-band to the needle-beams of the car, and a filler-block between said needle-beams; substantially as described.

8. In a tank-car, side sills, end sills, head-blocks, and needle-beams, and means connected from said needle-beams for preventing longitudinal thrust of said tank against said head-blocks; substantially as described.

9. In a tank-car, side sills, end sills and needle-beams, and means connected from said needle-beams for preventing longitudinal movement of said tank; substantially as described.

10. In a tank-car, an underframing comprising longitudinal sills, end sills and intermediate transverse members, a cylindrical tank supported on said transverse members, a head-band supported at each end of said [illegible]ially in contact therewith in position to serve as a stop to

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E. G. SIGGERS,

PATENT SOLICITOR AND LAWYER,

National Union Building, 918 F Street, N. W.,

WASHINGTON, D. C.

Dear Sir:

Your U. S. Patent, with drawings, claims and address, has been published in the "Patent Office Gazette," which has a large circulation in Canada, and it will be to your interest to secure protection in that country without delay, for "if any person has commenced to manufacture in Canada the invention for which a patent is afterwards obtained, such person shall continue to have the right to manufacture and sell such article notwithstanding such patent." (Quoted from Section 8, Chapter 61, of Canadian Patent Laws.)

I procure a Canadian Patent for a simple invention, i. e., one having only a single sheet of U. S. drawings, for six years for $30, and, at the end of that time, you can have it continued for twelve years longer by paying a Government tax of $40.

If the invention patented in the U. S. has more than one sheet of official drawings, the extra cost will be $5 for each additional sheet.

On receipt of $2, with the date or number of your U. S. Patent, I will prepare your papers for a Canadian Patent application and send them to you for signature. After you have signed the papers, they should be returned to me with the Canadian Government fee, $20, and the balance of the fee, $8; total $28; thus making the entire cost of a Canadian Patent for six years, **for an ordinary case,** *$30. If you prefer, you can send the full amount at one remittance. This course should be followed when the time is short, and it is desired to expedite the application.*

If you are unable now to make application for a complete patent in Canada, you can, within three months from the date of your U. S. Patent, file an application for **provisional protection** in Canada, for $4, and when the proper certificate is issued from the Canadian Patent Office, "then no other person having commenced to manufacture the invention in Canada, during the period of one year, shall be entitled to continue the manufacture of the same, after the inventor has obtained a patent therefor, in Canada." (Quoted from Section 8, Chapter 24, Canadian Patent Laws.)

☞ *The money expended for provisional protection cannot be subsequently applied to cover the cost of a complete patent.*

You can assign in Canada, either before or after the grant of the patent, but no assignment or partnership pertaining to your United States Patent can apply to or affect your Canadian Patent, which will give you the exclusive right in the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, Manitoba, British Columbia, and Prince Edward's Island—**no matter what interests you may have sold in the United States.**

I guarantee to secure the grant of a Canadian Patent in every case where I have prepared the papers.

Please compare my prices for Foreign Patents at the back of enclosed pamphlet with those of other attorneys, and **SEE REFERENCES ON LAST PAGES.**

Yours truly,

E. G. Siggers

P. S. A model is not required in an application for Canadian Patent.

Law Offices
of
E. G. Siggers,
Patents & Patent Law,
National Union Insurance Building,
918 F Street N.W.,
Washington, D.C.

Mar. 25, 1903.

Mr. R. Robertson,
Waltham Abbey, England.

Dear Sir:-

Having seen the illustration of your invention and the claims of your patent in the U. S. Patent Office Gazette, and not knowing if you have as yet applied for a Canadian patent. I take the opportunity to enclose a circular letter, which will give you information as to my charges for procuring a patent in the Dominion of Canada. The issuance of the U. S. patent will not debar you from procuring a valid Canadian patent, but it is important, for the reasons stated in the circular, that the application for patent be made as soon as possible.

As you are likely to have further U. S. patent business, I invite your attention to the accompanying pamphlet entitled "How to Obtain Patent, Caveat, Trade-Mark and Copyright Protection with Decisions in Leading Patent Cases," a careful reading of which will make clear to you my terms for securing a patent in the United States. Please read the introduction, pages 2 and 3, and consult the references on the last few pages of the pamphlet, that you may ascertain my past experience in the patent business, and my qualifications for giving competent attention to the interests of my clients.

For a simple invention, the total cost of procuring a U. S. patent is $65--see section 10, page 8. Of this amount, $20 is payable in advance--section 5, page 5; the attorneys fee is $25, section 12, page 9; while the final government fee, due any time within six months after the allowance of the patent, is $20--section 16, page 11.

Under the present law, all applications for U. S. patents must be made within seven months of the date of filing of the earliest application for foreign patent. By proclamation of the President, all U. S. patents may, at a slight additional expense, be made to apply to Porto Rico and the Philippine Islands--section 41, page 25. Your U. S. patent just issued may be extended to the Colonies for $10. A patent in the States is therefore of greater pecuniary value to the inventor than formerly.

You will see from the inside page of the front cover of the pamphlet that I occupy the same building with the Washington agency of The Bradstreet Company, and beg leave to refer to them as well as to Dun's reports. You will find me rated in both, as I own the Inventive Age, a journal devoted to inventions and scientific progress, and now in its fourteenth year. My foreign references are Ed Bennis & Company, Bolton, England; and Donald B. Morrison, Hartlepool, England.

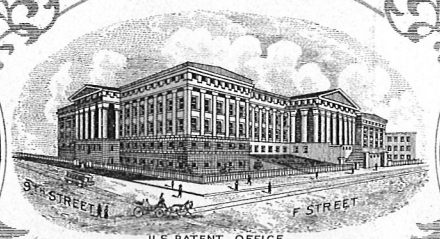
Hoping you will command my services whenever I can be of any assistance to you, I am,

Yours truly,

E. G. Siggers

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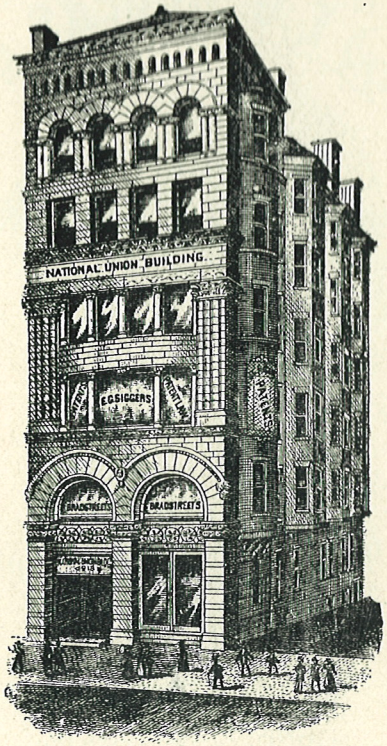
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AND
COUNSELLOR IN PATENT CAUSES

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TRADE-MARK AND COPYRIGHT
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(1) INTRODUCTION.

To Inventors, Patentees and Manufacturers.

It is the purpose of this introduction to state clearly and concisely the grounds on which we rely for your patronage and support. It is, perhaps, desirable at the outset to emphasize that the data, figures, decisions and statements of law and practice herein submitted have been carefully collated and verified. No pains have been spared to insure accuracy, and this pamphlet may be safely relied upon as an up-to-date compendium of matter and information, useful to every inventor and owner of a patent.

Every client has a personal interest in the professional standing and personal character of his attorney; it is a matter of paramount importance to him. Too much care in the selection of an attorney cannot be exercised, for the United States Supreme Court has said: "The growth of the patent system in this country has reached a stage in its progress where the variety and magnitude of the interests involved require accuracy, precision and care in the preparation of all the papers on which the patent is founded."

Edward G. Siggers entered the patent soliciting business in May, 1880, since which date he has devoted his entire time and attention to the diligent practice of his profession. For a period of twenty-one years, therefore, Mr. Siggers has had personal experience in all branches of the patent business. During much of this time he was engaged in the active management of a business of great magnitude. **The conduct of interference and infringement cases has received his especial attention.** With good reason, Mr. Siggers feels himself competent to successfully handle cases of the most intricate and technical nature. He pledges to his clients in the future, the same unremitting care and attention which has marked his conduct of business in the past.

Connected with Mr. Siggers are Mr. J. H. Siggers, his brother, for many years associated with him in the patent business, and a corps of competent assistants, all trained under the supervision of Mr. Siggers.

Every inventor who comes to Washington leaves here convinced that the only place for a patent solicitor is in this city. Easy access to drawings, models and other records of the Patent Office, as well as the facilities afforded by personal interviews with the Government officials, are a sufficient guarantee of greater expedition and a higher degree of accuracy in the prosecution of applications, than is possible where the business is entrusted to attorneys outside of Washington, who must transact it through the mails or Washington correspondents.

It must be apparent that the contingent-fee system, which we have adopted, offers fair inducements to inventors. It requires no argument to show that if an attorney's compensation is dependent upon his ability to secure a patent, and not merely upon his report that the invention is patentable, he will be more careful in his preliminary examination, and make fewer mistakes in recommending the filing of applications. About forty per cent of the applications filed in the U. S. Patent Office each year never eventuate in patents. The proportion of applications, filed through our office, which are not allowed, is less than four per cent.

See references on last pages.

No attorney solicitous for his professional honor will, knowingly, take any action in an application for a patent prejudicial to his standing before the Patent Office; and this is, after all, one of the best guarantees an inventor can have that his interests will be carefully protected, and his work attended to with reasonable dispatch. Our reputation, we believe, is firmly established, and we submit for your careful consideration, the commendatory letters from an ex-Commissioner of Patents, U. S. Senator, professional men generally, inventors, and manufacturers, given in the last pages of this pamphlet.

As to our financial responsibility, we cheerfully invite inquiry through your Congressman, local banker or the Bradstreet Co., to whose reports we subscribe. By reference to the inside page of the front cover, it will be seen that our office is in the same building with the Bradstreet Co., and they will willingly give information to any subscriber of their reports as to our financial standing and general reputation for fair dealing. If you are not a subscriber, then have your bank look us up.

We deposit in the Columbia National Bank, and the Washington Loan and Trust Co., of this city, to which we are at liberty to refer.

The instructions and suggestions in this pamphlet are given to enable inventors to secure patents in the quickest and most economical way. We retain no attorney's fee for prosecuting an application for a patent, unless we secure the official allowance of the application. **In the event, however, of the rejection of the application by the Patent Office, the inventor loses the amount of the first government fee and the necessary charge for the drawings—in all, usually $20.** The necessity, therefore, of exercising care and discrimination in reporting upon the patentability of an invention, is important alike to our clients and ourselves. In order to reduce to a minimum mutual losses, this work and all other business shall always have our personal attention.

E. G. SIGGERS,
Patent Lawyer, Register No. 2098.

See references on last pages.

(2) SUBJECTS FOR PATENT AND THE PREREQUISITES THEREOF.

Under Section 4886 of the Revised Statutes, amended March 3, 1897, patents are granted in the United States to "any person who has invented or discovered any new and useful art, machine, manufacture, or composition of matter, **or any new and useful improvement thereof,** not known or used by others in this country before his invention or discovery thereof, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, or more than two years prior to his application, and not in public use or on sale in this country for more than two years prior to his application."

The same Act of Congress changed the law relative to the effect of an invention having been first patented by the inventor or his legal representatives or assigns in a foreign country, so that, as it now stands, a prior foreign patent will not debar an inventor from receiving a patent for his invention or discovery, **unless the application for the foreign patent was filed more than seven months prior to the application for a patent in this country,** in which case no patent will be granted in this country.

All patents issued under this provision of the law grant to the patentee, his heirs, or assigns, for the term of seventeen years, the exclusive right to make, use and sell the invention or discovery throughout the United States and the territories thereof. Also, by virtue of law, every patent, or any interests therein, shall be assignable in writing, thus conferring upon the patentee the right to sell the invention in whole, or in part, or by territory, or to lease the same by license.

As a patent secures to the owner the exclusive right to make, use and sell the invention, these rights are each divisible and independent rights, and may be separately sold by the patentee; consequently, **a patent may be infringed by one who makes, or sells, or uses anything covered by a patent.** The maker, seller, and user are therefore severally and jointly liable to the owner of the patent.

(3) HOW TO APPLY FOR A PATENT.

If you have an invention and want a patent, send us a model of any size and material, except paper or pasteboard. Send by mail or express (charges prepaid), with a careful description of its construction, operation and advantages. Write the description in your own way, and explain the same by the use of your own terms and mode of expression. Do not attempt to follow set forms, but give us your explanation briefly and to the point. Mark the principal parts of the model with letters or

See references on last pages.

numbers, and describe by referring to these. The model need not be fine or expensive, and it need not always be a working model; but it should fully show your invention. The model can be returned to you after we are through with it, or after issue of patent. If you cannot send a model, a plain pencil or ink sketch or photographs will, in many cases, answer. These should be marked by letters, and explained by referring to these letters. **We can never make examination of the records of the Patent Office until we receive a model, drawing or photographic representation of the invention. We never examine from a written description alone.**

(4) COMING TO WASHINGTON.

If the invention is complicated in construction and intricate in its operation, and a working model cannot be made, or the securing of good drawings is impracticable, **the inventor is advised to come to Washington.** We have competent draftsmen in our office who are capable of preparing the drawings for an application for patent merely from the verbal explanation of the inventor, assisted by his rough sketches. The trip to Washington will save the cost of a model, and we are prepared to give immediate attention to clients who call in person. The application papers can be prepared and executed while the inventor is in Washington.

We will, for a reasonable fee paid in advance, go to the home or factory of the inventor and prepare his application for patent. This practice is sometimes followed when the machinery is too heavy to send as a model.

(5) WHEN TO SEND MONEY.

The inventor should remit the amount for first Government fee and for one sheet of official drawings, $20, when he sends the model, drawing or photo of his invention for examination. By such remittance we will know positively that he intends to apply for a patent, provided his invention is patentable, and in such case we will prepare his application papers promptly and without loss of time by further correspondence, but if we find his invention not patentable, because it is anticipated by other patents, **we will use one dollar of this money** to buy the printed drawings and specifications of such anticipating patents and send to the inventor, as the best way of showing him why he cannot get a patent. The balance, $19, of the remittance, $20, will be held to the credit of the inventor, and may be applied to other business, or will be returned to him as he may direct.

☞**The Patent Office never returns the Government fee** when an application has been formally filed and is rejected, nor do we.

See references on last pages.

(6) HOW TO SEND MONEY.

To avoid delay, remit by bank draft, post-office or express money order, express or registered package, or certified check. Do not inclose money with the model, either by express or mail. If not convenient to remit $20, remit $5, and we will proceed with the examination and report as explained, retaining the balance, $4, instead of $19, to the credit of the inventor, if our preliminary examination shows the invention to be old.

(7) FREE PRELIMINARY EXAMINATION.

Upon receipt of model, sketch or photograph, we will make a careful free preliminary examination in the Patent Office, in order to see if the invention is probably patentable. If we decide it cannot be patented, we will write you with explanation, but if we are of the opinion that your invention is patentable, **and you have previously sent $20,** we will, without loss of time in further correspondence, prepare application papers for patent and send to you with directions how to sign. If sufficient money has not been sent, we will report and call for first fee, and at the same time state the entire cost of procuring a patent on the invention. Upon receipt of the first payment required, we will send proper papers for signature.

(8) THE EXTENT OF OUR FREE EXAMINATIONS.

Considering the fact that we charge nothing for this service, and that we take as much pains with this branch of our business, and make as thorough examinations as those attorneys who charge $5 for the same work, it is not strange that these examinations are appreciated by our clients. However we have sometimes been imposed upon by triflers, who begin and end their business with us in availing themselves of our free preliminary examinations. Of course no honest inventor will ask us to waste our time in making examinations to satisfy a mere whim or fancy on his part to find out if his invention is patentable. He should not ask us to make such an examination unless he is prepared and willing to proceed with the application for patent, if the invention appears to be patentable. And we reserve the right at any time to refuse to make free preliminary examinations, whenever we suspect that an inventor is trying to take advantage of us. **After we have made a preliminary examination and reported favorably, it is but just and right to charge the usual fee, $5, for the examination, if the inventor refuses or fails to proceed with the business through our office.**

When the inventor has remitted from $5 to $20 for an application for patent, we of course have positive proof

See references on last pages.

that he is in earnest, and the inventor should, in all cases when he is in haste to receive an early report as to the patentability of his invention, remit either $5 or $20 in advance (see Section 5), for we, of course, must give preference to the business of those clients who show, by remittance, that they are not seeking to obtain the benefit of our free preliminary examination.

We wish our clients to understand that the free preliminary examination comprehends searching through the records of United States patents, and does not include an examination of foreign patents, scientific publications, manufacturers' catalogues, pending applications and caveats, all of which sources of information are almost exclusively under the control of the Examiners of the Patent Office.

Therefore, we do not wish it understood that our report as to patentability is conclusive on this subject. It is, however, as exhaustive and as reliable as the examination of any attorney, and special care will always be taken to guard against erroneous reports, for our protection, as well as to protect our clients.

(9) SPECIAL EXAMINATIONS.

It is our aim to encourage inventors to fully acquaint themselves with what has already been patented in the same line of inventions as their own before presenting an application for patent. This advice should commend itself to those desirous of avoiding an infringement of existing prior patents. Also, by having before them copies of patents showing what has been previously patented, inventors may not only be able to judge of the propriety of filing an application for patent, but may also frequently be enabled to improve their invention so as to place the same in a more practical shape.

To give full information as to the prior art in any particular line of inventions, we make a special examination of the records of the Patent Office, and send copies of patents with our report. In this report we advise specially with reference to the bearing of any conflicting patents, and also concerning such objections as may lie in the way of securing a patent.

While in no sense an infringement report, such as is contemplated by Section 33 of this pamphlet, an inventor will obtain through this special examination a clear idea of what patents, if any, his invention is likely to infringe.

The cost of this special examination and report varies from $5 up, and, whenever the same is desired, a special request should be made and $5 remitted.

The service furnished in this special examination and report should not be confused with the service referred to in Section 20, under the title, "No Catalogues."

See references on last pages.

(10) THE COST OF A PATENT.

Our charges for securing patents will always be as low as is consistent with a careful and expert preparation of the application, and a painstaking prosecution of the same before the Patent Office. The minimum cost of obtaining a patent through us is $65, which is summarized as follows:—

First Government fee	$15
Final Government fee	20
Official Drawings (1 sheet)	5
Our fee, due on allowance of patent	25
Total	$65

A patent for $65 may be obtained on a majority of devices invented, which involve few parts and no special complication, such, for instance, as hand tools of all sorts, nut-locks, hardware articles, household utensils, clasps, buckles, packing and storing vessels, toys, improvements in harness, shop implements, and hundreds of other articles too numerous to mention.

The cost of the patent necessarily increases in proportion to the number of sheets of drawings required (see Section 11). We always **increase** the attorney's fee due on allowance of patent in all complex mechanical, and the greater number of electrical inventions. This class includes such inventions as agricultural machines, metal and wood-working machines, milling machinery, looms, harvesters, thrashers, air brakes and similar railway apparatus, weighing and measuring machines, electrical generators, telephonic and telegraphic systems, and many other intricate inventions which require the most careful and expert attention. Applications in these classes are never taken for the minimum fee.

While we always make our charges as moderate as possible, we make it a point to advise an inventor as to the total cost of procuring his patent at the time of reporting favorably on the patentability of his invention, which estimate we will adhere to throughout the prosecution of the application for patent, unless an interference is instituted (see Section 19), or an appeal is required (see Section 18).

(11) EXTRA DRAWINGS.

If, in accordance with the rules of the Patent Office, it is necessary to submit more than one sheet of drawings to properly illustrate the invention, a charge of $5 is made for each additional sheet. The inventor is always informed of this additional expense when we submit our report.

Our practice has taught us the importance of showing every detail of the invention by large, plain drawings, in order to facilitate examination by the Patent Office and secure the best results.

See references on last pages.

Whenever there are a number of ways of accomplishing the same result, it is desirable, though not absolutely necessary, to incorporate in the Patent Office drawings, figures illustrating the various modifications. This can in most cases be done. A patent is often strengthened by pursuing this course.

(12) OUR FEE CONTINGENT ON ALLOWANCE OF PATENT.

While we make no charge for prosecuting an application unless we obtain the allowance of patent, we require, after we prepare and send the application papers for a patent, that they be returned to us with a certificate of deposit for the amount of the attorney's fee, signed by the cashier of any bank in good financial standing. We furnish the inventor with a form of certificate for use in making the deposit, which certificate stipulates that the money is to be returned to the inventor, should we fail to obtain the allowance of the patent. In many instances, inventors prefer to send the attorney's fee direct to us, to save the trouble of making the bank deposit, and we, on receipt of the attorney's fee, deposit it in one of our banks (the Washington Loan and Trust Co.), where the money bears interest at 2 per cent (per year), and we are willing to allow the inventor the interest we get from the bank **on such deposits**, the interest to be computed from the date of filing of the application until the application is allowed or rejected. This arrangement does not apply to anything but the attorney's fee, which, when paid in advance, we furnish the inventor with a receipt promising to return it if we fail to obtain the allowance of patent.

(13) ASSIGNMENTS.

Every patent, or any interest therein, is assignable by an instrument in writing, and such interests may be vested in assignees, in grantees of exclusive sectional or territorial rights, in mortgagees and in licensees.

Oftentimes it is advantageous to an inventor to associate with himself one who will be of financial assistance in obtaining the patent and handling the invention, and frequently, upon the strength of our report as to the patentability of his invention, he is able to find a partner or partners who will purchase an interest in his invention, either for a pecuniary consideration or the cost of procuring the patent, or both. The interests of such partner or partners can be secured by a formal assignment, signed by the inventor and recorded in the United States Patent

See references on last pages.

Office. The cost of preparing, filing and recording an assignment of ordinary length is $3.

It must be borne in mind that the legal right to sell territorial privileges does not begin until the patent is issued. Any sales of territory made while application for patent is pending, can only be considered in the light of executory contracts—that is to say, a covenant or contract which a court of equity may carry into full effect when the patent issues.

Every assignment affecting the title to a patent must be recorded in the United States Patent Office. It is a waste of money to enter them for record in the office of the county clerk.

In litigated cases it is sometimes difficult to prove the execution of an assignment, grant or conveyance of a patent, and this has been facilitated by a recent Act of Congress providing that

"If any assignment, grant, or conveyance of any patent shall be acknowledged before any notary public of the several States or Territories or the District of Columbia, or any commissioner of the United States Circuit Court, or before any secretary of legation or consular officer authorized to administer oaths or perform notarial acts, the certificate of such acknowledgment, under the hand and official seal of such notary or other officer, shall be **prima facie** evidence of the execution of such assignment, grant or conveyance."

The recording of an assignment, acknowledged in the manner contemplated by the statute, usually requires an additional recording fee of $1, making the total cost of preparing, filing and recording an acknowledged assignment of ordinary length, $4.

(14) IN THE PATENT OFFICE.

In the Patent Office your case will be assigned to its special class. In some classes the work is about one month in arrears. Other classes are so much behind with their work that sometimes two or three months must elapse before a case can reach its turn for examination. Few applications are allowed as soon as reached, for most of them require amendment and argument to pass the criticisms or objections of the Patent Office Examiners. The work of attending to a case in the Patent Office is laborious, consumes time, and cannot be hurried. **Applications cannot be railroaded through the Patent Office without doing violence to the inventor's true interest.** Therefore the

(15) TIME REQUIRED TO OBTAIN PATENT

cannot be definitely foretold. We have sometimes secured patents in four or five weeks, but have frequently

See references on last pages.

been as many months; though we wish it distinctly understood that we cannot, under our contract, **limit ourselves as to time.** Perhaps the larger number of patents are allowed in from eight to twelve weeks after application. There are over thirty different divisions in the Patent Office, and each division is presided over by an Examiner, with a number of assistants. Each Examiner has a different practice. Some are liberal, while others are technical and illiberal. **We endeavor to do thorough rather than hasty work,** and would always prefer to work for inventors who know what this means. In trusting your business to us, your best security that we will prosecute your case with energy and diligence is the fact that we will get no fee until we have secured the allowance of your patent.

(16) WHEN YOUR PATENT HAS BEEN ALLOWED.

When your patent has been allowed, we will send you the notice of allowance, and the final Government fee of $20 may be remitted at once; or, if you prefer, you may wait six months from the date of the notice of allowance. The six months will give you ample time to make preparation for the introduction or exploitation of your invention in the United States, before the issuance of the patent, also to apply for patents in foreign countries.

(17) MANUFACTURING UNDER PATENT APPLIED FOR.

It is better not to exploit your invention until your patent issues. We have known of instances where the manufacture of the invention, during the pendency of the application, has brought about an interference in the Patent Office, causing delay in the prosecution of the application, and frequently resulting in the loss of the patent. By no means write to manufacturers, or send samples of the invention to manufacturing concerns, until after you have obtained patent protection.

Furthermore, the extensive manufacture and disclosure of your invention, while the application is pending, is likely to cause you to lose the right of obtaining foreign patents thereon, as someone seeing your invention on the market in the United States, may proceed to patent it in foreign countries; for, under the practice of some of the countries of Europe, the first applicant, whether the inventor or not, obtains the patent. You will have plenty of time, after the patent is formally issued, in which to have samples of the invention made and the invention introduced, and you can do so then with perfect safety, because after a patent has been issued, there is no power in the Patent Office to take it away from you.

See references on last pages.

(18) APPEALS.

If the Patent Office Examiner refuses to allow a patent, three distinct appeals are made available to the applicant, namely:—

First.—An appeal from the Primary Examiner to the Board of Examiners-in-Chief, which is a tribunal composed of three experienced examiners. This tribunal carefully reviews the record of the application, and either affirms or reverses the decision of the Primary Examiner. The Government fee for this appeal is $10.

Second.—In the event of an adverse decision by the Board of Examiners-in-Chief, appeal may be taken to the Commissioner of Patents in person, and the Government fee required for this appeal is $20.

Third.—From the adverse decision of the Commissioner of Patents, an appeal may be taken to the Court of Appeals of the District of Columbia. The expense of this last appeal is considerable.

(19) INTERFERENCES.

It sometimes happens that parties make fraudulent claims to inventorship, and file applications for patents on inventions that belong to others, and as all applications are held by the Patent Office as secret communications, the true inventor does not become aware of the attempted theft until the patent to the fraudulent inventor has issued.

While the Patent Office cannot annul the fraudulent patent, it can issue a patent to the one entitled to it, when proper application is made and proof filed to show priority. After the second patent has been issued, both parties will be placed on an equal footing, and the successful one in the interference proceeding at the Patent Office, can then file a bill in equity in any of the Federal Courts, and pray that the patent first granted be declared null and void under Section 4918 of the Revised Statutes.

The majority of interferences are declared by the Commissioner of Patents between two or more contesting applicants for the same invention. These contests are conducted through the U. S. Patent Office, and a patent is granted to the one who is able to prove priority of conception or reduction to practice. The Patent Office charges no fees for hearing these contested cases, except when appeals are taken; but the expense to the contesting parties is necessarily considerable. Our charges are $25 to $40 a day when engaged in preparing papers or taking testimony in interference proceedings. When it is necessary for us to leave Washington to take depositions at the home of our client, or to cross-question the witnesses of his opponent, hotel and traveling expenses are also charged. After testimony has

See references on last pages.

been printed and presented in due form, the Examiner of Interferences in the Patent Office decides the question of priority from the evidence submitted. Proper appeals can be taken from his decision. See section 18.

Interference proceedings are not often declared, and we always endeavor, if possible, to save our clients the expense of the same. **The exact cost can never be definitely determined,** as the cost will depend largely on the nature of the case, and upon the opposition of the other party.

Mr. Siggers has had extensive experience in interference work, many important interference controversies having been successfully handled by him. We feel especially well qualified for this service, and are prepared to give it **personal** attention.

(20) NO CATALOGUES.

We are repeatedly requested by correspondents to send them catalogues in different lines of inventions, as though the Patent Office printed books of this character for distribution. There are no such pamphlets or catalogues published by the Patent Office. The Patent Office "Gazette," a weekly publication, contains the drawings and claims of every patent issued. It is not limited to any particular class of inventions. The only way for an inventor to inform himself, as to what has been done in any specific line, is to purchase copies of patents in that class. We are always prepared to furnish these copies of patents, but invariably charge a fee for the search. The cost necessarily varies with the number of copies of patents wanted and the nature of the search. The charge is usually $3, and should be sent in advance.

(21) ATTITUDE OF PATENT OFFICE TOWARD PERPETUAL MOTION AND KINDRED SUBJECTS.

On machines which involve the perpetual-motion fallacy, the Patent Office has for a number of years consistently refused to grant patents. We are in thorough accord with this practice, as neither we nor the Patent Office can be convinced, from a drawing or non-working machine, that perpetual motion is anything but a theory.

All machines or apparatus purporting to create their own energy from the power expended, whereby the same will run "until stopped or broken," as some inventors express it, are classed as perpetual-motion inventions, and the Patent Office Examiners will not even consider an application for patent based on such a theory without a full-sized working machine. Consequently, we strenuously advise inventors of such machines not to file applications for patents until they have first demonstrated the invention by a full-sized

See references on last pages.

working machine. Either abandon the matter or file a caveat in order to afford time to test and perfect the invention before applying for a patent. See Section 39, under title of "Caveats."

The Patent Office entertains these views in the case of air ships or flying machines of the type which have no balloon or similar attachments, and contemplate creating power to provide for their own buoyancy.

Patents will also not be granted on hog-cholera compounds, and rarely on any medical compound, as explained in Section 29.

(22) DESIGN PATENTS.

The statute authorizing the grant of a design patent applies to any person, whether a citizen or alien, thereby making it possible for foreign designers and manufacturers to secure design patents on their productions, and thereby preventing other parties from making, selling, or using similar productions in the markets of this country.

The statute deals with two distinct types of designs, the first of which includes such productions as are originated solely with reference to artistic ornament. This type can only be protected by a design patent, and embraces any ornamental or decorative design, superficial ornamentation for such articles as knives, forks, spoons, as well as patterns or designs for wall paper, carpets, fabrics and the like.

The second and very important type of designs consists of new shapes or forms of manufactured articles, which are made by hand, machinery or otherwise, the only condition precedent to the grant of the design patent being that the same must have a new, useful and original shape or configuration. In short, the statute authorizes **the grant of design patents on mechanical inventions,** or devices having mechanical functions, where such invention or device presents a new and original shape or appearance.

The value of design patents on mechanical inventions should not be underestimated, as by giving a new and original appearance to a manufactured article, the salable value thereof may be greatly enhanced.

There are three distinct classes of mechanical inventions under the second head upon which we advise applying for a design patent. The first includes such mechanical inventions which, though patentable from a mechanical standpoint, at the same time have a distinctively new shape. **This does not interfere with the right of the inventor to also secure a mechanical patent on the invention.**

The second class includes such articles as have a distinctively new shape, but present only a slight mechanical improvement over prior patented constructions, and consequently could only be protected by a restricted mechanical patent. In such cases the inventor **should apply for a design patent alone,** as the same would afford equally as much protection as the mechanical patent.

See references on last pages.

The third class includes such articles as do not possess sufficient mechanical novelty to entitle the inventor to a mechanical patent, but which have a distinctively new shape. In such cases, a design patent covering the exterior shape of the article **will afford the only protection procurable.**

There are several advantages incident to applying for a design patent. First, a design patent is less expensive than a mechanical patent; and second, the same can generally be more easily and quickly procured: also, the courts are very liberal in the construction of design patents. In addition to these advantages, the privileges of manufacturing, selling and using the invention, and of licensing the same rights to others, are equally applicable to design patents.

Design patents are granted for either of three terms, and the applicant must select in advance the term for which he wishes to apply, as this term when once chosen, cannot be changed or the patent renewed. The entire cost of securing design patents is as follows:—

Patent for 3½ years, **whole expense**.....$30
Patent for 7 years, **whole expense**..... 35
Patent for 14 years, **whole expense**..... 50

There is no final Government fee in applications for design patents, and as soon as the application is allowed, the patent is sent to issue.

If you want a design patent send us your name in full, together with a model or drawing of the design. Also remit fees as above indicated, which are payable in advance, but the attorney's fee, $15, is held on the same conditions as explained in Section 12. We will then proceed with the business.

(23) WHEN YOUR PATENT ISSUES.

When your patent issues, your name and address, with one of the figures of the drawing and the claims of your patent will be published *once* in the United States Patent Office "Gazette," a magazine having a large circulation in this country, Canada and Europe among manufacturers, agents, patentees, investors and others interested in patents. **No advertisement, or any unusual notice of an invention, is permitted in the "Gazette."** You will receive propositions from many patent brokers, sale agencies, investment companies, associations and swindlers of every stripe. Some will pretend to be able to sell

See references on last pages.

your patent, and fix a fancy price thereon, and even claim that they have an offer for it, and seek to obtain a remittance on various pretentious claims. There are concerns which will try to make you believe that a working drawing is the touchstone of success in the sale of the patent. We advise you to pay no attention to sale agencies or any of these concerns.

A single copy of the "Gazette" can be sent to any address for 15 cents; subscription by the year, $5; payable always in advance. If an inventor desires to keep himself informed as to improvements in his line of invention, he should subscribe for the "Gazette."

(24) FREE ADVERTISEMENT IN THE "INVENTIVE AGE."

Every patent procured by E. G. Siggers is given a free advertisement in the "Inventive Age," a scientific paper, replete with information pertaining to the Patent Office and technical matter interesting to every inventor, patentee, scientist and manufacturer. The paper is now in its fourteenth year, and is recognized as the only scientific journal published at the National Capital dealing **exclusively** in matters of interest to inventors. Sample copy free.

(25) COPIES OF PATENTS.

Upon the issuance of every patent, the drawing is photo-lithographed and the specification printed, and copies of the drawing and specification can be sent at the rate of 10 cents each, **when the number of the patent is given.** Such copies are uncertified. A certified copy of the patent can be sent for $1.50. No orders for copies of patents are accepted by the Patent Office unless the numbers are given.

If the patentee's name, the date of the patent, or its number are unknown, we will, if desired, carefully search for the patent described in the order, but we must have before us, in making such a search, a print or illustration of the invention. For the time occupied in making this search we charge $1.

All payments for copies of patents must be made in advance, as we cannot send them C. O. D. Much time will be saved if these instructions are carefully followed.

(26) CUTS AND ENGRAVINGS.

We are prepared to execute photo-engravings on metal, attached to wood bases, at the uniform rate of $1.50 for cuts **not exceeding six square inches (3x2).** Twenty cents per square inch for cuts of larger size. These charges are based on making the engraving from any one of the figures of the drawing of your patent, and do not include any change therefrom, as this would

See references on last pages.

necessitate first making a new drawing at the usual rates. We will quote exact figures on application.

ELECTROTYPES made from photo-engravings, not exceeding six square inches, 70 cents each. All over that size at the rate of 10 cents per square inch. As many electrotypes as desired can be made from a photo-engraving, and it is always well to order one or more electrotypes when presenting your order for the photo-engraving, for you can then use your electro to print from and save the photo-engraving from wear.

Photo-engravings must be made from pen and ink or the Patent-Office drawings to secure the best results. **They cannot be taken direct from photographs** sent us by clients. "Half-tone" engravings can be made from photographs at 40 cents per square inch. None made for less than $3.50.

The money must, in all cases, accompany the order.

(27) BLANK DEEDS.

We are also prepared to supply blank deeds for disposing of state, county, town or shop rights (the same deed will answer for either) in quantities to suit, 25 cents per dozen, or 100 for $1.50.

(28) PATENTS FOR COMPOUNDS.

Patents are granted on any new and useful composition of matter, but the only kind of compositions on which an inventor can expect the Patent Office to issue a patent, are paint compositions, fuel compounds, plastic compounds, paving compounds, and, in fact, any new and useful composition of matter, **other than a medical compound.**

In such compositions we make a free preliminary examination through prior United States patents granted in the same line of inventions. The search does not include the examination of patents of foreign countries, nor the consultation of books, trade magazines and scientific publications upon the same subject. Such search would consume an excessive amount of time and involve considerable expense, but in most cases we think an inventor will be willing to rely upon our careful expert examination of prior United States patents, and take what risk there may be of the Patent Office finding anticipating citations in publications and the like.

If you have a composition of matter of this class, and desire to secure a patent, send us the name of each ingredient, the proportions used, as well as how and for what purpose the composition is employed. We will then make the examination and report as to the probable patentability of the composition. The total cost of securing a patent for a compound is $65, and the first payment required in advance on every application is

See references on last pages.

$25. If the application for patent is allowed, the balance of our fee—$20, and the final Government fee of $20, total $40—should be sent, and the patent will then issue.

(29) MEDICAL COMPOUNDS.

Our charges are the same as above indicated, but we do not advise the filing of an application for a patent on a medical compound. The Patent Office has practically ceased granting patents in this class, for the reason that medical compounds are considered to amount to nothing more than a physician's prescription.

In view of the above, we do not undertake to make a search and report as to patentability, but if an inventor insists upon filing an application, we will attend to the business.

In the case of medical compounds, we uniformly advise our clients to put their medicines upon the market, adopt a good, attractive trade-mark, and register the same in the Patent Office.

(30) REGISTRATION OF TRADE-MARKS.

A trade-mark may be registered by any person, firm or corporation domiciled in the United States, or in any foreign country which, by treaty, affords similar privileges to the citizens of the United States, and which person, firm or corporation is entitled to the exclusive use of any trade-mark and uses the same in commerce with foreign nations or with Indian tribes.

The fact that the registration of a trade-mark is **prima facie** evidence of ownership, and that registration confers privileges in the Federal courts which the owner otherwise would not possess, are ample reasons why a trade-mark should always be registered in the Patent Office.

Generally speaking, any words, marks or symbols may be adopted as a trade-mark which are indicative of the origin or ownership of the manufactured article, so that a trade-mark may properly consist of the autograph of the proprietor, his portrait, a monogram, or, in fact, any device, design, non-descriptive word or expression that will serve to distinguish the goods of one man from those of another.

A proprietor contemplating the adoption of a trade-mark should carefully select a mark or symbol that conforms with the statutory requirements, and then have the same registered through a skillful and reliable attorney.

The present practice of the Patent Office with respect to the registration of trade-marks is exceedingly technical, and requires the most skillful preparation and prosecution of an application to secure favorable action thereon.

See references on last pages.

As a guide to proprietors of medicines, food products and manufacturers, to enable them to intelligently adopt a legal trade-mark, and comply with the requirements precedent to registration, it may be explained, first, that if the device, mark or symbol is adopted for the purpose of describing the class, grade, style or quality of the merchandise upon which it is placed, the same cannot be registered in the Patent Office. Second, that the exclusive right to the use of a trade-mark is founded upon the actual adoption thereof, **prior to application for registration,** and its use in connection with a particular class of merchandise.

No trade-mark will be registered unless the same has been used by the applicant in commerce with some foreign nation or an Indian tribe, but this statutory requirement can be satisfied by sending a few samples of the goods, with the trade-mark affixed, to any merchant in Canada or any other foreign country.

In view of the great number of trade-marks that have already been registered, it is desirable, before making application for registration, that the owner should have an examination made to determine the registerability of the mark. Our charge for such service is $5, and in the event of reporting favorably, this amount will be applied on the cost of registration.

The whole expense of securing registration of a trade-mark through us will be:—$25 Government fee and $20 attorney's fee, in all $45, which amount should be sent us with a copy of your trade mark and a statement of the class of goods to which it is applied.

The certificate of registration remains in force for thirty years, and may be renewed for thirty years longer.

☞When the foreign trade in the goods covered by the mark is considerable, precaution should be taken to register the mark in foreign countries, in order to avoid the counterfeiting of it by foreign merchants. The cost of registration is given on pages 39, 40 and 41 of this pamphlet.

(31) PRINTS AND LABELS.

The authority to register prints and labels is conferred upon the Commissioner of Patents by a section of the copyright statute. Hence the protection afforded is similar in all respects to the protection given by copyrights, but the distinction resides in the fact that the print or label must be associated with an article of manufacture, **not connected with the fine arts.**

The real difference between a print and label is that a print is not applied to the article manufactured, while a label is applied direct to the article. Therefore, a print may be defined as a picture similar in kind to an engraving, cut or photograph, or any artistic representation or intellectual production, not borne by an article

See references on last pages.

of manufacture, such, for instance, as an advertisement thereof.

A label may be defined as an artistic representation or the like, impressed or stamped directly upon the article of manufacture, or upon a slip or piece of paper or other material, to be attached in any manner to manufactured articles, or to bottles, boxes and packages containing them, to indicate the contents of the package, the name of the manufacturer, the quality of goods, etc.

A print, not being applied to an article of manufacture, is not in any sense a trade-mark, nor can it become one, but a label may have trade-mark matter thereon, which, however, would not prevent its registration.

The whole expense of obtaining registration of a print or label through us is $20, which amount includes the Government fee, and, in the event of registration being refused by the Patent Office, we will return a part of the fee. Five printed copies of the print or label are required to be filed with the application.

The registration of a print or label continues in force for twenty-eight years, and may be renewed for fourteen additional years, if the renewal application is filed within six months before the expiration of the first term.

(32) THE VALUE OF YOUR PATENT

will depend much upon the skill and care with which your papers are prepared, and the faithfulness with which your case is prosecuted in the United States Patent Office. This work will receive the benefit of skill and experience acquired by a long and successful practice. We will spare neither time nor pains to secure a patent as broad as your invention, and one that will protect you against infringement. But to do this in some cases requires time and much labor, and we ask you to remember that while you will sometimes have to wait, we will have both to wait and work. Remember, also, that we have an interest in the successful outcome of every case intrusted to us, namely, the amount of our fee, which is due only when patent is allowed. Our reputation also is strengthened and increased by every case successfully managed.

(33) LEGAL OPINIONS AS TO INFRINGEMENT, SCOPE AND VALIDITY OF PATENTS.

A patent for a machine or manufacture is infringed by one who, without ownership or license, makes, uses or sells any specimen of the thing covered by any claim of the patent. Though only one claim of a patent is infringed, the infringer is liable.

While it often happens that a person actually infringes the claims of a patent, and is thereby liable in an action

See references on last pages.

for damages, yet it is more frequently a fact that a party claiming infringement of his patent does so either as an intimidation of a competitor, or in ignorance of what is actually covered by the patent. In the case of both the alleged infringer and the party ignorant of the scope of the patent, they should each seek the opinion of a competent patent lawyer with reference to the existence or non-existence of the infringement, either before entering suit against an alleged infringer, or before giving any consideration to a notice of infringement, or threat of a suit.

To determine whether a device or machine is an infringement of a patent, or whether infringement exists between two or more patents, always calls for the exercise of the closest scrutiny and judgment, both with respect to matters of law and mechanics. It requires the most skillful treatment of a thoroughly equipped patent lawyer, and a careful and extended expert examination of prior patents and records, involving the expenditure of much time and labor. The only definite information we can give in reference to charges is that the cost of an examination with a written opinion on the question of infringement, will vary from $25 up. We will always advise a client about the fee before undertaking the work.

It is our practice to encourage persons contemplating the purchase of a patent to first ascertain if the same is free from infringement, and whether or not the same is valid and properly covers an invention. The reason for such advice is obvious. Patents involve property rights just as much as real estate, and the same care and caution that is usually exercised in the purchase of such property should also prevail in purchasing patents. An intending purchaser of real estate never purchases until the title thereto has been thoroughly investigated, and business caution dictates that the same practice should be followed by purchasers of patents. It is, therefore, our advice that before a patent is bought, intending purchasers should procure an

(34) ABSTRACT OF TITLE

from the Patent Office, or have the title examined by an expert. The cost of such an examination is usually $5; and we can in most instances send an abstract of title, certified by the Commissioner of Patents, for this amount, but where a large number of assignments have been filed, the charge must be increased.

(35) LEGAL SERVICE.

Legal advice will at all times be furnished by us for reasonable fees, and whenever it does not involve too much investigation, we are prepared to give our clients special service in this direction at a nominal cost.

See references on last pages.

While we cannot submit opinions as to infringement and the scope of patents without the usual fee (see Section 33), we will always show special favors to our own clients, and make charges to them to cover only the actual cost of the work. We draw up licenses, contracts and agreements, and all papers connected with the sale of patents. Our practice, while confined to patents exclusively, includes every branch of the business, and we are always ready to defend the patents we procure, in the courts, or prosecute suits for infringement, at the usual rates.

We are also prepared to furnish expert testimony in litigated cases.

(36) INFRINGEMENT NOT CONSIDERED BY THE PATENT OFFICE.

The courts alone have jurisdiction over the question of infringement, and the Patent Office never attempts to decide it. The Patent Office decides which of two or more inventors claiming the same device is the prior inventor, by means of what is known as an interference proceeding (see Section 19), but the Patent Office has no jurisdiction over infringements.

(37) REISSUES.

The practice of the Patent Office has been so molded by decisions of the Supreme Court of the United States that it is now very difficult to procure a reissue of a patent. The purpose of a reissue is to amend a patent to cure some defect therein. It can never cover a different invention from that embraced in the original patent. It can never enlarge the claim or make a new claim, unless the reissue is applied for promptly after the issue of the original patent. To restrict a claim or cure any other defect than those already enumerated, it may be applied for at any time during the term of the original patent. The cost of procuring a reissue of a patent is $75. The grant of the reissue does not extend the term of the original patent.

(38) REJECTED CASES.

A patent is frequently refused by the Patent Office when, by proper management, it might have been allowed. This is especially the case when the papers have been prepared by an unskilled person, or when the attorney is incapable or has been negligent. We frequently succeed in obtaining patents after others have failed. Our fee for attending to such cases is usually from $25 to $50, according to the amount of labor involved, and this fee is contingent upon success. But we always charge a small fee of $5 to $10 in advance for examining and amending the papers. The same requirement concerning the security for the attorney's fee applies to rejected cases. (See Section 12.)

See references on last pages.

Write us about your rejected case, inclosing any Patent Office letters you may have received, and at the same time remit $5. It is more than possible that we may be able to secure the allowance of the patent. At any rate, the fact that our fee is payable only on allowance of patent, will insure for you correct advice as to the desirability of proceeding further with the application, because we never take a case to prosecute on our usual terms unless there is a fair chance of success.

(39) CAVEATS.

The object of a caveat is to give the inventor time to test and perfect his invention. Should another apply for a patent on the same invention while the caveat is in force, the caveator is officially notified and called upon to file his application for patent. The existence of a caveat is accepted as evidence of priority of invention. A caveat holds good for one year, and can be renewed from year to year indefinitely. Caveats can only be filed by citizens of the United States and aliens who have resided here one year and declared their intention to become citizens. All caveats are deposited in the secret archives of the Patent Office, and no one can see or obtain a copy of the caveat without the order of the caveator or his attorney.

An inventor does not learn, by the filing of a caveat, whether his invention is patentable or not. A caveat does not prevent another than the inventor from making, using or selling the caveated article. Only a patent can do that. It does not secure an exclusive right of sale. The Government makes no search to determine the novelty of an invention when a caveat is filed, and we never make a preliminary examination to ascertain if the invention on which a caveat is desired to be filed contains patentable novelty, unless the inventor is willing to advance the usual fee, $5, for such examination, which amount would be subsequently applied by us on the cost of filing the caveat. **No portion of the money paid for filing a caveat can be applied subsequently to secure a patent on the invention.**

A caveat consists of a petition, specification, drawing and affidavit of invention. To be of any value these papers should be carefully prepared and the invention explained as fully as possible. No model is required.

The whole expense to file a caveat is, for a simple invention, $25. On filing the caveat, the Patent Office issues an official receipt, which we send to the inventor. To prepare caveat papers, all that we need is a sketch or photograph, and description of the invention, with which remit $25.

(40) COPYRIGHTS.

Any citizen or resident of the United States may obtain a copyright who is the author, designer or

See references on last pages.

proprietor of any book, map, chart, dramatic or musical composition, engraving, cut, print or photograph, or negative thereof, or of a painting, drawing, chromo, statue, and of models and designs intended to be perfected **as works of the fine arts.**

A copyright is not valid unless the title or description is recorded in the Library of Congress **before the publication of the work.**

If you desire to obtain a copyright, send us the **intended title** of the book, print or photograph (not the work itself) with $5, and we will have it recorded by the Librarian of Congress. The official certificate of copyright will be sent to you as soon as received.

If a copyright is desired for a painting, drawing, chromo, statue, model or design for a work of art, send us the **intended title,** and also a brief description thereof, with $5.

Copyrights are granted for the term of twenty-eight years, and may be renewed for fourteen additional years, if the renewal is filed within six months before the expiration of the first term.

Copyrights may be assigned. The assignment must be recorded by the Librarian of Congress; charge, $3.

In the case of a periodical or newspaper a separate entry of each number or issue is required, and the fee for every entry is the same.

Not later than the day of publication in this country, two complete copies of the best edition of each book, or other article copyrighted, must be delivered or deposited in the mail within the United States, addressed to the Librarian of Congress, Washington, D. C., to perfect the copyright. Without the deposit of copies above required, the copyright is void, and a penalty of $25 is incurred.

The copyright law secures to authors and their assigns the exclusive right to translate or to dramatize their works. No notice is required to enforce this right.

The time of publication is not limited by any law or regulation, but the Courts have held that it should take place within a reasonable time.

Copyrights cannot be granted upon trade-marks, nor upon names of companies, libraries or articles, nor upon an idea or device, nor upon prints or labels intended to be used for an article of manufacture. (See Section 31.)

The fine arts for copyright purposes, include only painting and sculpture; and articles merely of ornamental and decorative art should be protected under the design patent law. (See Section 22.)

The right of citizens or subjects of foreign nations to copyright in the United States extends by Presidential proclamation to Great Britain, France, Germany, Italy,

See references on last pages.

Spain, Portugal, Belgium and Switzerland; and Americans can also secure copyrights in those countries. For this, direct application must be made abroad.

It is impossible to make an examination of the records of the Library of Congress, to determine if a given title has ever been entered for copyright.

The duty of the Librarian of Congress is to record all claims to copyright in the order of their receipt, and to furnish certificates of such records, without regard to the ultimate validity of such claims. No question as to the originality or priority of a copyright can, under our laws, be determined by any authority, except a Federal Court, on a suit for infringement.

(41) PATENT AND TRADE-MARK PROTECTION IN THE COLONIAL POSSESSIONS OF THE UNITED STATES.

Uncertainty as to the status of patent and trade-mark owners in the territory recently acquired by the United States in the war with Spain, has been relieved by an order which directs that in territory subject to government by the military forces of the United States, owners of patents, including design patents, which have been issued, or which may hereafter be issued, and owners of trade-marks, prints or labels duly registered in the United States Patent Office, shall receive the same protection as is accorded them in the United States under the laws pertaining thereto. The order is applicable to Cuba, as well as to the ceded territory of Porto Rico and the Philippine Islands.

In view of the revival and encouragement of the arts and industries following the advent of the United States into the territories of Cuba, Porto Rico and the Philippine Islands, a large field is opened up to patent owners and proprietors of trade-marks and similar properties, and the opportunity to secure protection in the said territories should not be neglected.

Our charge for the service necessary to secure the protection in **each** of the above specified territories will be $5.

(42) STATE LAWS CONCERNING PATENTS.

The power of a State or municipality to place restrictions upon the manner in which patents should be assigned and sold has never been squarely brought before the United States Supreme Court, with the result that much conflicting legislation has been enacted by different States.

The first legislation attempting to place restriction upon the handling of patent rights, was an act passed by the State Legislature of Ohio in 1868 requiring any

See references on last pages.

person, before offering for sale a patent right in any county, to submit the patent to the Probate Judge of the county and make affidavit before him that the patent was in force and that the applicant had the right to sell, and also requiring that any written obligation taken on the sale of such right should bear on its face the words "Given for a Patent Right." The portion of the Ohio statute relating to the making and filing of proofs was subsequently made the law in Indiana, Illinois, Minnesota, Nebraska and Kansas, while the requirement that written obligations given for a patent right should bear such statement written on its face was made the law in Vermont, Michigan, Pennsylvania, Wisconsin, New York, Connecticut and Arkansas. Following the enactment of these State laws, the subject was indirectly brought before the Supreme Court of the United States, in the cases of *ex parte* Robinson, 2 Bissel, 309, and Webber *vs.* Virginia, 20 O. G., 136, in which it was clearly indicated that property in inventions existed by virtue of the laws of Congress, and that no State had any right to interfere with its enjoyment or annex conditions to the grant; also, that a patentee had a right to go into the open market anywhere in the United States and sell his property. Yet the Court did not decide the constitutionality of the State statutes, although it established the proposition that a State under its police authority **may regulate the sale of the manufactured article covered by a patent.**

In view of these Supreme Court decisions, some of the States repealed their statutes **relating to the filing of proofs** of the grant of patent, while others did not, but it may be regarded as settled on the point in question that the statute remains in force in Indiana and Kansas, but has been declared invalid by the Supreme Courts of Illinois, Minnesota and Nebraska. **The weight of reason and of authority are decidedly against the validity of the statutes.**

There is also a division between the States as to the law requiring the insertion in written obligations of the words "Given for a Patent Right." It has been declared unconstitutional by the higher State Courts in Illinois, Michigan, Minnesota and Nebraska, and by the United States Circuit Courts in the southern district of Ohio and in the district of Indiana; while its validity has been sustained by the courts of last resort in New York, Pennsylvania, Ohio, Indiana and Kansas. Therefore, the validity of the State statutes on the point referred to may be regarded as finally established in New York, Pennsylvania, Ohio, Indiana and Kansas, until brought before the Supreme Court of the United States, which will undoubtedly declare the statutes unconstitutional.

See references on last pages.

(43) WE DO NOT BUY OR SELL PATENTS,

but confine our business strictly to the subjects mentioned in this pamphlet. Neither can we procure partners for inventors. The most we can do is to secure patents for them according to the terms explained in this pamphlet. By giving our time exclusively to procuring patents, and to causes in court involving patent law, we can reasonably claim to do better work than if we had side speculation in selling, buying or promoting patents.

(44) ABOUT SELLING PATENTS.

For the benefit of many inquirers we submit below a few hints which we hope may be useful:—

First.—Have a substantial model made, one that will show your invention in its best light. Do not employ a stranger, or a firm in a distant city, to make your model, but have it constructed under your supervision.

Second.—In all cases where an invention can be advantageously represented by engravings, the patentee should have them made, to be used on bill-heads, letters, pamphlets and circulars. We can have the work done for you at the rates published herein. (See Section 26.)

Third.—If you have a chance to sell a town right or shop right, do so, no matter if you get little or nothing for it. The purchaser of this town or shop right may, by his industry and good judgment, pave the way for your future success.

Fourth.—We know of many inventors who have made money by peddling farm, county, State and shop rights, and if an inventor does not wish to undertake the manufacture of his invention, this is a very desirable course to pursue.

The license and royalty plan is often the most profitable method of selling patents. This, in effect, involves a contract between a patentee and a manufacturer by which the latter, in consideration of a license to manufacture the article, agrees to pay the patentee a specified sum for each article made or sold, and warrants to sell a certain number each year.

We give to our clients a sample of the license deed and a list of manufacturers in any line of industry, and you can use this list either to correspond with them, or, what is a preferable course, visit them personally with a model of your invention and a copy of your patent.

Do not make the mistake to suppose that a patent is a fortune in itself. Success with a patent will, like success with a farm, a factory or gold mine, depend on management and good judgment.

See references on last pages.

45) HINTS TO CORRESPONDENTS

1. Whenever you write, no matter how often, please give your address. Always write your name plainly, and give your first name in full.

2. Whenever you write, refer to your former business or correspondence with us, and if you are writing in the interest of some inventor, give his name and furnish proper authority from him. Generally we would remember you, but such a reminder will help us in the identification.

3. Remember that all business is strictly confidential, and that we cannot tell one client about another client's business without written authority from the latter.

4. As soon as the case is filed in the Patent Office, the applicant is protected against the grant, without his knowledge, of a patent for the same thing to another person.

5. Citizens, foreigners, women, minors and the administrators of estates of deceased inventors may obtain patents. There is no distinction in charges as to nativity or persons.

6. It is not necessary to work a United States patent, within any specified period, in order to maintain its validity. The patent is granted for seventeen years, and remains valid for that period, whether it is worked or allowed to sleep. The seventeen years' term of a patent cannot be extended, except by special act of Congress.

7. Two or more persons may apply jointly for a patent if they are joint inventors. Where one person is the inventor and the other only a partner, the patent must be applied for in the name of the inventor; but he may secure his partner in advance by executing a deed of conveyance, so drawn that the patent will be issued in both names. See Section 13.

8. Remember to always put your name and address on your model. We very frequently receive models, which we are unable to identify, because of this negligence.

9. Postage and expressage must be prepaid, unless the inventor is unable to get the exact rate from his express agent, and in such case, he should always send us a remittance to cover any possible charge.

10. Inventors should never destroy models and sketches made during the development of their inventions. They become of prime importance in case interference controversies should arise. Fix the date on them. It is always well to have evidence to establish the date of conception of invention. See Section 19.

11. POSITIVELY NO NEW MATTER CAN BE INTRODUCED INTO AN APPLICATION AFTER IT IS ONCE REGULARLY FILED. THE PATENT OFFICE WILL NOT PERMIT AMENDMENTS OF THIS

See references on last pages.

CHARACTER TO BE INCORPORATED AT ANY STAGE OF THE PROCEEDINGS.

12. If our clients will carefully read this pamphlet they will not have to take the time to write us for information, and we will not have to repeat in a letter what is set forth plainly in the pamphlet. The inclosure of this pamphlet, with a paragraph marked, may be considered a respectful answer to such letters.

(46) DECISIONS IN LEADING PATENT CASES.

In the following digest we present a carefully selected and verified list of decisions, including those rendered by the Supreme Court of the United States, the Circuit Courts of Appeal, the Circuit Courts, of some State Courts, and of various Commissioners of Patents, all of which decisions enunciate well-settled and controlling principles of patent law. To make the digest useful as a ready reference, we have classified the decisions according to their respective subjects:—

Relating to the Patent Grant.

Letters patent are *prima facie* evidence of the validity of the patent.—Carty *vs.* Kellogg, C. D., 1895; Cushman *vs.* Parham, C. D., 1876, p. 130.

Patent rights are coextensive with the United States, and are not subject to seizure and sale on execution. —Stevens *vs.* Gladding, 17 How., 447.

In construing a patent, it is, first, pertinent to ascertain what, in view of the prior state of the art, the inventor has actually accomplished, and, this having been found, such a construction should be given as will secure the actual invention to the patentee, so far as this can be done consistently with giving due effect to the language of the specification and claim.—Van Marter *vs.* Miller, 15 Blatch., 562.

An invention disclosed, but not claimed in a patent, cannot be covered by a new application for an original patent or for a reissue, filed long after the issue of the patent which thus discloses without claiming. "Where a patent fully describes an invention which could be claimed therein, and makes no reservation, and gives no warning to the public, a second patent, granted upon an application filed months afterwards, which claims simply and solely the invention thus made public, is invalid."—Holmes Electric Co. *vs.* Burglar Alarm Co., 33 F. R., 254; Miller *et al. vs.* Eagle Mfg. Co., C. D., 1894, p. 147.

Patentability of Inventions.

Systems of book-keeping, tabulating, and the like, are not patentable.—Berolsheimer, M. E., *ex parte*, C. D., 1870, p. 33; *ex parte* Pierce, C. D., 1877, p. 46.

See references on last pages.

Systems of keeping accounts, etc., are not patentable.—Dick's (R.) Ext., C. D., 1872, p. 166.

The application of an old device to a new purpose simply analagous to its old purpose, is mere double use.—*Ex parte* Schoenberg, C. D., 1870, p. 36; Solvay Process Co. *vs.* Michigan Alkali Co., 90 F. R., 818 (1899); Adams Elec. Ry Co. *vs.* Lindell Ry Co., 77 F. R., 432.

An old construction in a windmill is not patentable in a paddle wheel.—*Ex parte* Glasgow, C. D., 1870, p. 40.

Curvatures and angles become of importance in plowshares, water wheels, rotary pumps, engines and blowers, and generally in all cases when, by a change of form, a new and useful result is produced.—Wagner, *ex parte*, C. D., 1869, p. 41.

An article of manufacture, old as to form and general appearance, may have intrinsic qualities due to the process of its manufacture which make it a new and patentable product.—*Ex parte* Hopson & Brooks, C. D., 1871, p. 153.

Adulterations of food are not patentable.—Weida, P. W., *ex parte*, C. D., 1874, p. 118.

It is not the result, effect, or purpose to be accomplished which constitutes invention or entitles a party to a patent, but the mechanical means or instrumentalities by which the object sought is obtained.—Miller *et al. vs.* Eagle Mfg. Co., C. D., 1894, 147; U. S. Supreme Court.

Where the novelty of an invention resides in the particular form adopted, it is not negatived by prior structures in another art not capable of doing its work nor designed nor adapted to do the same work.—U. S. Supreme Court, Topliff *vs.* Topliff *et al.*, 1892, C. D., 402, and the Knickerbocker Co. *vs.* Rogers *et al.*, 1894, C. D., 337.

A combination of old elements producing a new and useful result is patentable.—1895, U. S. Printing Co. *vs.* American Playing Card Co., 72 O. G., 1499; Webster Loom Co. *vs.* Higgins, 105 U. S., 580; American Tobacco Co. *vs.* Streat, 83 F. R., 700; Clisby *vs.* Reese, 88 F. R., 645; Wood *vs.* Packer, 17 F. R., 650.

An assemblage of old elements conserving no new and useful result is not a patentable combination.—U. S. Supreme Court, 1895, Palmer *vs.* Corning, 70 O. G., 1497.

Mere change of form and proportion where no new result or advantage is produced is not patentable.—1895. Taws & Hartman *vs.* Laughlins & Co., 73 O. G., 287.

Simplicity in change of construction does not negative patentability where a new and beneficial result is involved.—American Cable Railway Co. *vs.* Mayor of City of New York, 1893, C. D., 468.

The mere substitution of one material for another is not invention.—Grayson & Crecelius, 1894, C. D. 100; Hicks *vs.* Kelsey, 18 Wall., 670.

The making of a structure in a solid casting instead of attached parts does not involve invention. Consolidated Electric Mfg. Co. *et al. vs.* Holtzer, 72 O. G., 415.

See references on last pages.

While it is true that the utility of a machine, instrument, or contrivance, as shown by the general public's demand for it when made known, is not conclusive evidence of novelty and invention, it is nevertheless highly persuasive in that direction, and, in the absence of pretty conclusive evidence to the contrary, will generally exercise controlling influence.—Hicks *vs.* Kelsey, 18 Wall., 670.

It was never the object of the patent laws to grant a monopoly for every trifling device, every shadow or shade of an idea which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufacture. Any adaptation to a special emergency which a competent person can make, by the aid of accumulated knowledge and past experience, is an excercise of mere mechanical skill not amounting to the dignity of invention.—Atlantic Works *vs.* Brady, 107 U. S., 192.

Discoveries and Theoretical Inventions.

A mere discovery of a new principle, force or law, operating, or which can be made to operate, on matter, will not entitle the discoverer to a patent. It is only where the explorer has gone beyond the mere domain of discovery, and has laid hold on the new principle, force or law, and connected it with some particular medium, or mechanical contrivance, by which, or through which, it acts on the material world, that he can secure the exclusive control of it under the Patent Act. It is then an invention, although it embraces a discovery.—Morton *vs.* Infirmary, 5 Blach., 116.

Perpetual motion devices will not be patented.—Smith, W. L., *ex parte*, C. D., 1873, p. 139.

Patents will not be granted on air ships which create their own buoyant force, without practical demonstration.—*Ex parte* DeBausset, 43 O. G., 1583, and 50 O. G., 1766.

Design Patents.

All the regulations and provisions which apply to obtaining or protecting patents for inventions or discoveries, not inconsistent with the provisions of the statute relating to designs, shall apply to patents for designs. (Section 4933, Revised Statutes.)—Northrup *vs.* Adams, C. D., 1877, 322, cited with approval by the United States Supreme Court, in Smith *et al. vs.* Whitman Saddle Co., C. D., 1893, 324.

Design patents are granted for articles of manufacture which are given new and original appearances that may enhance their salable value and may enlarge the demand.—Gorham Mfg. Co. *vs.* White, 14 Wall., 511, 524, approved and cited by United States Supreme Court, in Smith *et al vs.* Whitman Saddle Co., C. D., 1893, 324.

See references on last pages.

The adaptation of an old form for a design is patentable if such adaptation is not mere imitation, and the result is in effect a new creation.—Untermeyer *vs.* Freund, C. D., 1893, 661.

It is immaterial to the patentability of a design whether it is more graceful or more beautiful than older designs; it is sufficient if it is new and useful.—U. S. Supreme Court in Lehnbeuter *vs.* Holthaus, 105 U. S., 94.

In determining whether a design patent is infringed, the test is whether there is a substantial similarity in appearance, not to the eye of an expert, but to that of the ordinary observer, giving such attention as would ordinarily be given by a purchaser of the article bearing the design.—Ripley *vs.* Elson Glass Co., C. D., 1892, 467; Byram *vs.* Friedberger, 87 F. R., 559; Smith *et al. vs.* Whitman Saddle Co., C. D. 1893, 324.

Trade-Marks.

Generally, any words, marks, or symbols indicative of the origin or ownership of the manufactured article, may be adopted as a trade-mark, but those used simply to describe the quality, kind or nature of the article cannot be so appropriated.—Improved Fig Syrup Co. *vs.* California Fig Syrup Co., 7 U. S. App., 588; Bennet *vs.* McKinley, 26 U. S. App., 496; Columbia Mill Co. *vs.* Alcorn, 150 U. S., 460.

The exclusive right to the use of a mark or device claimed as a trade-mark is found on priority of appropriation, and it must appear that the claimant was the first to use or employ it on like articles of production.—Columbia Mill Co. *vs.* Alcorn (United States Supreme Court), 159 U. S., 460.

The fact that a trade-mark bears its owner's own name andportrait does not render it unassignable to another.—Dr. S. A. Richmond Nervine Co. *vs.* Richmond (United States Supreme Court), 159 U. S., 293.

In the case of an alleged violation of a valid trade-mark, the similarity of brands must be such as to mislead ordinary observers, in order to justify a restraining injunction.—Improved Fig Syrup Co. *vs.* California Fig Syrup Co., 1893, C. D., 416.

Trade-marks based on misrepresentation and deceit, and especially such as are intended to deceive and defraud the public into the purchase of articles for what they are not, in the belief that they are valuable when they are deleterious, will not be protected by the Courts.—7 U. S. App. 588 (9th Cir.).

The Patent Title, Including Assignments and Licenses.

A patent to a dead man at the time of the grant is not void for the want of a grantee, but vests in his heirs or assigns.—United States Supreme Court, De La Vergne

See references on last pages.

Refrigerating Machine Co. *vs.* Featherstone, 1893, C. D., 181.

A patent right, like any other personal property, is understood by Congress to vest in the executors and administrators of the patentee, if he dies without having assigned it.—Shaw Relief Valve Co. *vs.* City of New Bedford, 19th Fed. Rep., 758.

A patentee who assigns his patent cannot, when sued for infringement, contest the validity thereof.—Babcock *et al. vs.* Clarkson *et al.*, 1894, C. D., 689; Martin & Hill Cash Carrier Co. *vs.* Martin, 1895, C. D., 503; Griffith *vs.* Shaw, 89 Fed. Rep., 313.

An oral agreement for the sale and assignment of the right to obtain a patent may be specifically enforced in equity upon sufficient proof thereof.—United States Supreme Court, Dalzell *et al. vs.* Dueber Watch Case Mfg. Co., 1893, C. D., 357.

A verbal license or interest in an invention has no effect as against a subsequent assignee without notice of such verbal license or interest.—United States Supreme Court, Gates Iron Works *vs.* Fraser *et al.*, 1894, C. D., 304.

Although an assignment of patent is not recorded within three months it is binding on the assignor, and he cannot sell the patent again.—*Ex parte* Waters, Com. Dec., 1869, p. 42.

One who buys patented articles of manufacture from an assignee for a specified territory becomes possessed of an absolute property in such articles unrestricted in time or place.—United States Supreme Court, Keller *et al. vs.* Standard Folding Bed Co., 71 O. G., 451.

Every person who pays the patentee for a license to use his process becomes the owner of the product, and may sell it to whom he pleases, or apply it to any purpose, unless he binds himself by covenants to restrict his right of making and vending certain articles that may interfere with the special business of some other licensee. Met. Washing Machine Co. *vs.* Earle, 2 Fish., 203; 2 Wall., Jr., 230.

A territorial grantee cannot be restrained from advertising and selling within his territory, even though the purchasers may take the patented article outside of the vendor's territory.—Hatch *vs.* Hall, 22 Fed. Rep., 438.

A "shop right" is a personal license and is not assignable.—Gibbs *vs.* Hoefner, 19 Fed. Rep., 523; 22 Blatch., 36.

The United States have no more right than a private person to use a patented invention without license or making due compensation.—1896. United States Supreme Court, Belknap *et al. vs.* Schild, 74 O. G., 1121; 161 United States, 10.

A license merely to make, and not to sell, does not impair the patent owner's right to sue for infringement outside the license; and the purchase of the licensee's tools and materials would not carry the right to sell the

See references on last pages.

product made therefrom.—American Graphophone Co. *vs.* Walcut, 87 Fed. Rep., 556. (1898.)

An implied license to use a patented improvement without payment of any royalties during the continuance of employment of the inventor, and thereafter on the same terms and royalties fixed for other parties, is shown where the inventor applies the patent to his employer's work, without any agreement for compensation for its use, further than a notice that he would require pay after his employment terminated.—Keyes *vs.* Eureka Consol. Min. Co. (United States Supreme Court), 158 United States, 150.

An agreement to assign future patents, in consideration of the assignee's paying the expenses of taking them out, is broken by his refusal to pay for and take out a particular patent when requested, and a subsequent assignment to another conveys a perfect title.—Buck *vs.* Timony, 78 Fed. Rep., 487.

Where a party does license, grant and convey any invention which he may hereafter make, this gives only an equitable right to have an assignment made, and this right may be defeated by assignment of the patent to a purchaser for value, without notice of this equity.—Regan Vapor Engine Co. *vs.* Pacific Gas Engine Co. (Ninth Cir.), 7 U. S., App. 73.

A contract assigning a patent and all future improvements thereon is enforceable against assignees of such improvements who take with notice of the contract.—Westinghouse Air Brake Co. *vs.* Chicago Brake and Mfg. Co., 85 F. R., 786.

The sale of a patented machine by one authorized to sell conveys the whole ownership to the purchaser, who may sell it again to another.—Morgan Envelope Co. *vs.* Albany Perforated Wrapping Paper Co., 152 U. S., 425.

A license is not forfeitable for non-payment of royalties in the absence of express provision to that effect.—Wagner Typewriter Co. *vs.* Watkins, 84 Fed. Rep., 57. (1898.)

Inventorship and Ownership.

To constitute two persons joint inventors it is not necessary that exactly the same idea should have occurred to each at the same time, and that they should work out together the embodiment of this idea in a perfected machine. Such a coincidence of ideas would scarcely ever occur to two persons at the same time. If an idea is suggested to one, and he even goes so far as to construct a machine embodying this idea, but it is not a complete working machine, and another person takes hold of it, and by their joint labors, one suggesting one thing and the other another, a perfect machine is made, a joint patent may properly issue to them. If, upon the other hand, one person invents a distinct part of a machine, and another person invents another

See references on last pages.

distinct and independent part of the same machine, then each should obtain a patent for his own invention.—Worden *vs.* Fisher, 11 Fed. Rep., 505.

Owners of a patent are tenants in common, and each, as an incident of his ownership, has the right to use the patent or to manufacture under it. But neither can be compelled by his co-owner to join in such use or work, or be liable for the losses which may occur, or to account for the profits which may arise from such use.—DeWitt *vs.* Elmira Nobles Mfg. Co., 12 N. Y. Supr., 301; Rose *vs.* Singer, 4 Allen (Mass.), 226 *vide* Pitt B. Hall, 3 Blatch., 201.

Where A suggests the idea of an invention to B, but gives no explanation as to how such idea is to be carried into effect, B is the lawful inventor if he embodies the idea into practical shape.—Forgie *vs.* Oil Well Supply Co., 1894, C. D., 352.

Where an inventor had forgotten an invention, or has laid it aside as worthless, he has the right to take it up again and proceed as if he had then first made the discovery, so long as its abandonment was unknown to the public.—Western Electric Co. *vs.* Sperry Electric Co., 1893, C. D., 573.

To make experiments, then drop them and only recur to them when another and later inventor has made a success of the idea, makes them "abandoned experiments."—Chipman *vs.* Fales, C. D. 1869, p. 44.

Abandonment of an invention once put in public use inures to the public; a subsequent inventor cannot take a patent therefor.—Young *vs.* Van Duzen, 16 O. G., 95.

The patent of an originator of a complete and successful invention cannot be avoided by proof of any number of incomplete and imperfect experiments made by others at an earlier date. This is true, though the experimentors may have had the idea of the invention, and may have made partially successful efforts to embody it in a practical form.—Am. Wood Paper Co. *vs.* Fibre Disintegrating Co., 23 Wall., 566.

The making of an invention is complete when all that remains to be done is the work of the mere mechanic.—Morse *vs.* Clark, C. D. 1872, p. 58.

Status of Employer and Employee.

When a man has conceived the main idea of an invention, and employs another to embody it, the product will be the invention of the former, though the latter may furnish hints, suggestions and decided improvements, unless the changes made by the latter amount to a new and complete invention.—Hayes *vs.* Hopkins, C. D., 1892, p. 75; Jordan *vs.* Agawan Co., 7 Wall., 583.

An inventor may avail himself of the services of skilled laborers, and suggestions and improvements coming from them are to be considered part and parcel

See references on last pages.

of the original invention.—Spofford *et al. vs.* Moore *et al.*, C. D., 1870, p. 6; Yost *et al. vs.* Powell, 13 O. G., 122.

As between an employer and employee, not specially employed to embody the invention of the former, there is no presumption of originality in favor of the employer.—Solomon *vs.* United States, 137 U. S., 342; Johnston *vs.* Pimlott, C. D., 1870, p. 44; Mallet *vs.* Crosby, C. D., 1870, p. 56.

A contract between an employer and employee, wherein the employee obtains service with the employer on condition that any improvement he may make on the machines of the employer shall be for the exclusive use of his employer, held valid.—Hulse & Wright *vs.* Bonsack Machine Co., C. C. A., C. D., 1895, p. 225.

An employer has an equitable license to use and sell in the line of his business the invention of an employee who, during the course of his employment, uses the tools and workshop of his employer to experiment with and perfect his invention.—United States Supreme Court, Lane & Bodley Co. *vs.* Locke, 1893, C. D., 639.

If an employee makes an invention and permits his employer to use it before making application for a patent without demanding any compensation, a license to continue the use may be implied.—McClurg *vs.* Kingsland, 1 How., 202; 2 Robb, 105; Slemmer's Appeal, 58 Penn. St., 155; Chabot *vs.* Buttonhole Co., 6 Fish., 71.

In the absence of an express agreement, a company or manufacturing corporation is not entitled to the conveyance of patents obtained by a skilled employee, even though such employee is employed for a stated compensation to take charge of the works and devote his time and services to devising and improving the manufactured articles.—United States Supreme Court, Dalzell *et al. vs.* Dueber Watch Case Mfg. Co., 1893, C. D., 357.

An employee who uses property or labor of his employer to put an invention into practical form, and assents to the latter's use of it, cannot recover from him a royalty or other compensation therefor on taking out a patent on the invention.—Gill *vs.* United States (United States Supreme Court), 160 United States, 426; Blauvelt *vs.* Interior Conduit and Insulation Co., 80 Fed. Rep., 906.

Infringement.

Anything infringes a patent if it infringes any claim of a patent, and patents sometimes have many claims, so that each claim is to be considered by itself on this question of infringement. And each claim stands by itself on this question; it receives no help or assistance from any other claim, except that sometimes it is to be inferred that a claim should not have a certain meaning (*i. e.*, construction) given to it because some other claim

See references on last pages.

in the same patent has that meaning, or because such a meaning is inconsistent with the clearly expressed meaning of some other claim. A claim is always to be understood in connection with and to be explained by what the descriptive part of the specification (in connection with the drawings, if any) says about the parts, steps or ingredients that are specified in the claim.—Fuller *vs.* Yentzer, 94 United States, 288.

A device is none the less an infringement because it contains an improvement upon the patented invention.—Robbins *et al. vs.* Dueber Watch Case Mfg. Co., 1896, C. D., 2 2.

It is an infringement of a patent to either make or use or sell a patented thing without legal permit.—Whittemore *vs.* Cutter, 1 Wall., 429.

Making for one's own use is as wrongful as making for sale, and making without either using or selling is infringement.—Bloomer *vs.* Gilpin, 4 Fish., P. C., 50.

A preliminary injunction will ordinarily be granted to restrain the infringement of a patent, when the validity of a patent has been previously affirmed by a court, or is to be presumed by a long-continued public acquiescence, and when the title and infringement are clear.—Standard Elevator Co. *vs.* Crane Elevator Co., 1893, C. D., 432, and S. S. White Dental Mfg. Co. *vs.* Johnson *et al.*, 1893, C. D., 430.

State Courts have no jurisdiction of suits for infringement, but are not barred out when patents come in collaterally.—Goodyear *vs.* The Union Rubber Co., 4 Blatch., 63.

One who makes and sells one element of a patented combination with intent to bring about its use in that combination, is guilty of contributory infringement, and is equally liable with him who in fact organizes the complete combination.—Thomson-Houston Electric Co. *vs.* Ohio Brass Co. (C. C. A.), 80 Fed. Rep., 712, Wallace *vs.* Holmes, 9 Blatch. 65.

The absence from an alleged infringing device of a single essential element of the combination claimed, prevents infringement.—Adams Electric Ry. Co. *vs.* Lindell Ry. Co., 77 Fed. Rep., 432; P. H. Murphy Mfg. Co. *vs.* Excelsior Car-Roof Co., 76 Fed. Rep., 227.

One purchasing in a foreign country an article protected by a United States patent from persons other than the owner of such patent or his vendees, cannot sell them here without infringing the patent.—Dickerson *vs.* Finling, 84 Fed. Rep., 192.

Officers or agents of the United States, although acting under orders of the United States, are personally liable for their own infringement of a patent.—Belknap *vs.* Schild (United States Supreme Court), 161 U. S., 10.

A purchaser of a patented machine consisting of several distinct parts may repair a part broken or worn out

See references on last pages.

if the machine as a whole retains its identity, and what is done does not amount to reconstruction, but he has no right under the guise of repairs to make a new machine. —Shickle, Harrison & Howard Iron Co. *vs.* St. Louis Car Coupler Co., 77 Fed. Rep., 739.

Reissue Patents.

A reissue patent on broadened claims may be obtained if applied for without delay after the discovery that a mistake has been made and before the rights of third parties have intervened, but such a patent will not be granted to broaden claims of the original patent, unless it appears that such claims are indicated in the original application, that they constituted a part of the original invention, and were sought and intended to be covered by the original patent.—Supreme Court of United States, in Corbin Cabinet Lock Co. *vs.* Eagle Lock Co., 1893, C. D., 612, and in Topliff *vs.* Topliff *et al.*, 1892, C. D., 402.

Marking Patented Articles.

The manufacturer of a patented article can continue to affix to it the word "Patented" and the date, even after the patent has expired, without liability, under Section 4901.—Wilson *vs.* Singer Mfg. Co., 9 Biss, 172.

Marking unpatented articles "Patented" with intention to deceive the public, renders the party liable to a penalty under Section 4901 of the Revised Statutes.—Hotchkiss *vs.* Samuel Cupples Woodenware Co., 1893, C. D., 386.

Copyrights.

A copyright gives the author or the publisher the exclusive right of multiplying copies of what he has written or printed. To infringe this right, a substantial copy of the whole, or of a material part, must be produced.—Perris *vs.* Hexamer (United States Supreme Court), 99 U. S., 674.

Those printing and those publishing and selling infringing books are equally liable to the owner of the copyright, and if only portions of a copyrighted book are so intermingled with the rest of the piratical work that they cannot be well distinguished from it, the entire profits realized must be accounted for.—Belford *vs.* Scribner, 144 U. S., 488.

Miscellaneous.

Alterations cannot be made in pending applications which go outside the original record and model.—Gray *vs.* Hale, C. D., 1871, p. 129.

Prior use or knowledge abroad cannot affect the United States patent.—Grell *vs.* Kuhnert, C. D., 1869, p. 5.

If the foreign invention had been printed or patented, it was already given to the world and open to the people

See references on last pages.

of this country, as well as to others upon reasonable inquiry. They would, therefore, derive no advantage from the invention here. It would confer no benefit upon the community, and the inventor is therefore not considered to be entitled to the reward.—Gaylor *vs.* Wilder, 10 How., 477.

(47) FOREIGN PATENTS AND TRADE-MARKS.

Inventors can now obtain foreign patents without impairing the validity or shortening the term of their United States patents. **The inventor may proceed at once to secure patents in foreign countries and need not wait for his United States patent.** The prior issue of the foreign patents cannot now, as before January 1, 1893, affect the United States patent. As a rule, foreign patents are granted without limitation as to claims. The question of validity, when raised, is determined by the courts. If an invention is patentable in the United States, it is presumably patentable in most countries.

As to the registration of trade-marks in foreign countries, it may be said that the terms and requirements are more liberal than for the grant of patents. In but three countries—Russia, Bolivia and Servia—are annual taxes required to keep the registration of trade marks in force.

General Instructions.

Select the country or countries in which you want a patent, or desire to register your mark, and remit $5 for each country named. We will then send you papers in the language of each country, with directions for signing the same. You will then return the papers and remit the balance for each country, according to the schedule of prices following; or, if you prefer, send the full amount in the first remittance.

The prices hereinafter given for foreign patents **relate to a simple invention,** usually one, which in the United States patent is illustrated by a single sheet of drawings. If two sheets are required, there will be an additional charge of $5 for each country. If three sheets, $10, etc. **The figures given for trade-marks cover all cases.**

In some foreign countries, it is necessary to work the patent. The working is usually nominal, to comply with the law, and we will attend to it at moderate cost. We can also attend to the payment of the taxes as they fall due.

CANADA—Patents, $30. Includes the Provinces of Ontario, Quebec, Nova Scotia, New Brunswick, British Columbia, Manitoba, Northwest Territory and Prince Edward's Island. Term, six years, extensible to eighteen years by payment of $40 before expiration of sixth year. If United States patent has been granted

See references on last pages.

for more than a year, a Canadian patent cannot be obtained. **Trade-Marks**, General—term perpetual—**$50.** Specific—term twenty-five years—renewable, **$45**.

GREAT BRITAIN—Patents, $50. Covers England, Ireland, Scotland, Wales and the Channel Islands. Term, fourteen years. Taxes after fourth year. No working. If desired, provisional protection may be taken out at a cost of **$20** in advance, and the payment of **$40** within nine months thereafter, completes the patent. **Trade-Marks, $45**—term, fourteen years—renewable.

FRANCE AND COLONIES—Patents, $60. Term, fifteen years. Yearly tax. Patent must be worked within two years. **Trade-Marks, $45**—term, fifteen years—renewable.

GERMANY—Patents, $65. Term, fifteen years. Yearly tax. Patent must be worked within three years from date of patent. **Trade-Marks, $45**—term, ten years—renewable. **GEBRAUCHSMUSTER, $35** for three years, and extensible for three years longer for $30.

BELGIUM—Patents, $35. Term, twenty years. Invention must be worked in Belgium within a year of its working in any foreign country. Yearly tax. **Trade-Marks, $40**—term, perpetual.

SPAIN—Patents, $60. Term, twenty years, Patent must be worked within two years. Annual tax. **Trade-Marks, $50**—term, perpetual.

AUSTRIA—Patents, $65. Term, fifteen years. Patent must be worked within one year, and working must not afterwards cease for two consecutive years. Yearly tax. **Trade-Marks, $45**—term, ten years—renewable.

HUNGARY—(Same as Austria).

RUSSIA—Patents, $140. Term, fifteen years. To be worked within five years. Annual tax. **Trade-Marks, $65**—term, one to ten years—renewable.

SWITZERLAND—Patents, $75. Term, fourteen years. Working before third year. Yearly taxes. **Trade-Marks, $40**—term fifteen years—renewable.

ITALY—Patents, $60. Term, fifteen years. Must be worked within two years. Yearly tax. **Trade-Marks, $50**—term, perpetual.

DENMARK—Patents, $65. Term, fifteen years. Patent must be worked within three years. Annual tax, **Trade-Marks, $45**—term, ten years—renewable.

See references on last pages.

NORWAY—Patents, $65. Term, fifteen years. Patented device must be placed on sale within three years. Annual tax. **Trade-Marks, $50**—term, ten years—renewable.

SWEDEN Patents, $70. Term, fifteen years. Annual tax. Patent must be worked within three years. **Trade-Marks, $55**—term, ten years—renewable.

BRAZIL—Patents, $150. Term, fifteen years. Patent must be worked within two years. Annual tax. **Trade-Marks, $65**—term, fifteen years—renewable.

MEXICO—Patents, $140. Term, twenty years. Taxes and working after fifth year. **Trade-Marks, $75**—term, perpetual.

CHILE—Patents, $300. Term not to exceed ten years. No taxes. **Trade-Marks, $90**—term, ten years—renewable.

ARGENTINE REPUBLIC—**Patents** are granted for three, ten and fifteen years, at a cost respectively of **$140, $200** and **$300. Trade-Marks, $90**—term, ten years—renewable.

CAPE COLONY (Cape of Good Hope)—**Patents, $150.** Term, fourteen years. Taxes, **$60** before expiration of the third year, and $110 before expiration of seventh year. **Trade-Marks, $95**—term, fourteen years—renewable.

NEW SOUTH WALES—Patents, $75. Term, fourteen years. No taxes. Provisional protection, nine months, **$40. Trade-Marks, $55**—term, perpetual.

QUEENSLAND—Patents, $65. Term, fourteen years. Taxes before fifth and ninth years. Provisional protection, nine months, **$40. Trade-Marks, $50** term, fourteen years—renewable.

VICTORIA—Patents, $65. Term, fourteen years. Taxes before fourth and eighth years. Provisional protection, nine months, **$35. Trade-Marks, $45**—term, fourteen years—renewable.

WESTERN AUSTRALIA—Patents, $70. Term, fourteen years. Taxes before fifth and ninth years. Provisional protection, nine months, **$40. Trade-Marks, $45**—term, fourteen years—renewable.

SOUTH AUSTRALIA—Patents, $75. Term, fourteen years. Taxes before fourth and eighth years. Provisional protection, twelve months, **$35. Trade-Marks, $55**—term, fourteen years—renewable.

JAPAN—Patents. Terms, five, ten or fifteen years. Five-year patent, **$110**; ten-year patent, **$120**; fifteen-year-patent, **$140. Trade-Marks, $75**—term, twenty years—renewable.

See references on last pages.

(48) REFERENCES.

The long-continued practice of his profession has brought Mr. Siggers into intimate relation with many prominent inventors, who have shown their appreciation of his services by recommending him to their friends. It is not too much to say that the bulk of our business comes from this source.

Since starting in business in his own name in May, 1899, Mr. Siggers has transacted patent and other business for nearly 1000 clients scattered throughout the United States. As it was impossible to print all their names, without extending the limits of the pamphlet, he has arranged their names in separate lists, according to States, copies of which will be mailed, when requested by correspondents, should the references given herein be not considered sufficient for an intelligent inquiry as to his competency and general reputation for the fair treatment of his clients.

We append letters from an EX-COMMISSIONER OF PATENTS, clients and others:—

From Ex-Commissioner of Patents Seymour.
Seymour, Seymour & Harmon.
40 Wall Street, New York.

E. G. Siggers, Esq. April 24, 1899.

My Dear Sir:—I take pleasure in saying that I have marked your professional advance with interest, and have been impressed with your capability and efficiency in contested cases, as well as the equally intricate matters that you have presented in ex parte hearings. I take equal pleasure in commending you as a capable and efficient attorney in patent causes.

With best wishes for your continued success, believe me. Very sincerely yours, John S. Seymour.

From Senator Warren of Wyoming.
United States Senate, Committee on Claims.
Francis E. Warren, Chairman.
Washington, D. C., March 10, 1900.

I am pleased to state that Mr. E. G. Siggers, one of the leading patent attorneys of Washington, is eminently qualified by experience and training to successfully conduct all patent business entrusted to him. He has been personally employed in the work of obtaining patents for nearly twenty years, and has, at the present time, a well-equipped and effective office organization capable of prosecuting all patent business placed in his charge to a speedy conclusion. I recommend Mr. Siggers to those having business before the United States Patent Office as a reliable and energetic attorney.

Very respectfully, Francis E. Warren.

OFFICE OF
COUNSEL FOR TREASURY DEPARTMENT.
Before Board of U. S. General Appraisers,
641 Washington Street.
New York, N. Y., October 18, 1901.

I have known Edward G. Siggers somewhat intimately now for a good many years, and entertain a very high opinion of his character and ability. His professional and personal standards are of the highest. His industry, his mastery of detail and his conscientious devotion to his work have brought him rare success, and coupled with his wide experience, make him a most efficient solicitor and attorney in patent causes. I commend him unreservedly.

Albert H. Washburn,
Counsel for the Treasury Department.

OFFICE OF J. J. DARLINGTON,
410 5th Street, N. W.
Washington, D. C., April 20, 1899.

I take pleasure in stating that I have been associated with E. G. Siggers, Esq., in patent causes in interference, closely contested, and requiring unusual professional diligence and labor, and that I have found him on all occasions vigorous, energetic, and in a marked degree devoted to the interests of his clients and efficient in their representation. I have no hesitation in recommending him as a capable and efficient attorney in patent causes. J. J. Darlington.

This is to certify that I have been well acquainted with Mr. E. G. Siggers, patent attorney, of this city, for many years, and esteem him as an honorable Christian gentleman, a thoroughly reliable business man and skillful attorney. I commend him in all confidence to those having business with the United States Patent Office, and am satisfied their interests will be faithfully and efficiently cared for.

F. D. Power,
Pastor Vermont Avenue Christian Church.
Ex-Chaplain of the House of Representatives.
Washington, D. C., April 25, 1899.

J. N. Thomas, Pres. A. L. LeGrand, Sec.
THE EXETER MACHINE WORKS,
Pittston, Pa., September 16, 1901.

E. G. Siggers, Esq., Washington, D. C.

Dear Sir:—Replying to your favor of the 4th inst. I am pleased to say that the patent business that you have transacted for me during a period of fifteen years, and for our company during the past six years, has been entirely satisfactory, and I have always and will continue to refer inquiring inventors to you with assurance that their business will be looked after with fidelity and skill.

Yours very truly, A. L. LeGrand.

James C. Haydon, President. Vernon H. Rood, Vice-President and Manager.
A. Bartholomew, Treasurer.
JEANESVILLE IRON WORKS COMPANY.
Jeanesville, Luzerne Co., Pa., April 20, 1899.

Mr. E. G. Siggers.

Dear Sir:—Replying to your esteemed favor of the 18th inst., it is with pleasure that the writer testifies to the unfailing tact and ability shown by you personally in prosecuting the several claims which I have entrusted to the care of your firm, and beg to assure you that should I have any further business in your line, shall not hesitate to turn it over to you.

Yours very truly, V. H. Rood.

Thos. J. Moore, Pres. T. C. Snover, Vice-Pres.
Richard R. Weisenflue, Sec. Ezra H. Ripple, Treas.
L. E. Stone, Genl. Sales Agent.
THE SCRANTON AXLE WORKS.
Scranton, Pa., April 17, 1899.

E. G. Siggers, Esq.

Dear Sir:—I have your favor of the 13th inst., advising that you will on May 1st open an office of your own. I will at any time be very glad indeed to testify to the good work you have done for the Scranton Axle Works. Yours very truly,

The Scranton Axle Works,
R. R. Weisenflue, Secy.

A. L. Kitselman. D. M. Kitselman.
KITSELMAN BROS.
(Established 1883.)
Woven Wire Fence Machines.
Muncie, Ind., U. S. A., 4-22-99.

Mr. E. G. Siggers.

Dear Sir:—It is now about twelve years since you commenced looking after our business in the Patent Office at Washington, during which time we have taken out several patents. The business done for us has been entirely satisfactory in every respect, and we take pleasure in recommending you to any one in need of such services.

Wishing you the best of success in your new undertaking, we are, Yours truly,

Kitselman Bros.

Lawrence Foot, Pres. W. H. Powell, Vice-Pres.
B. L. Roberts, Cashier.
MISSISSIPPI STATE BANK.
Canton, Miss., April 9, 1900.

E. G. Siggers, Esq., Washington, D. C.

Dear Sir:—Yours of April 1st is received, and it affords me pleasure to state that I employed you to give me your opinion in regard to two patents. You did so, and I will state that the opinion showed great research, ability and skill on your part. Your charge

was reasonable, and your advice good, as it kept me out of an expensive law suit.

Yours respectfully, L. Foot.

FROM THE INVENTOR OF THE FISHER BOOK TYPEWRITER.
Athens, Tenn., April 17, 1899.

Mr. E. G. Siggers.

Dear Sir:—I desire to say that my patent business, which you have personally looked after for the past six years, which business involved the prosecution of quite a number of domestic and foreign applications, has been very satisfactory to me.

I am pleased with both the ability and interest you have manifested in connection with my business with you. Yours truly, Robert J. Fisher.

THE KEARNS-GORSUCH BOTTLE CO.
Zanesville, O., August 31, 1901.

E. G. Siggers, Esq., Washington, D. C.

Dear Sir:—We desire to compliment you for the dispatch you have made in procuring our last two patents. Also the elaborate opinion you have just given us on the subjects desired is eminently satisfactory, and shows your large resources of legal knowledge as well as mechanical genius. Hoping to favor you with further business soon, we remain,

Yours truly, The Kearns-Gorsuch Bottle Co.
J. T. Gorsuch, Pres.

Chas. Austin Bates, President. Jos. Hamlin Phinney, Jr., General Manager.
THE LAXAKOLA COMPANY,
45 Vesey Street, New York.
New York, August 27, 1901.

Mr. E. G. Siggers, 918 F St., N. W.,
Washington, D. C.

Dear Sir:—Replying to your favor of August 24th, it affords us pleasure to say that such trade-mark business as this company has had to have done at your hands, has been performed to its entire satisfaction.

Very truly yours, The Laxakola Company,
Joseph Hamlin Phinney, Jr.

R. F. Sprague, Pres. L. W. Sprague, Vice-Pres.
Paul Van Deinse, Sec.
THE GORDON HOLLOW BLAST GRATE CO.
Greenville, Mich., August 28, 1901.

E. G. Siggers, Esq., Washington, D. C.

Dear Sir:—Thirteen years' experience has given me an exceedingly high opinion of your ability as a patent attorney. I know of none in whom I have greater confidence. Very truly yours, R. F. Sprague.

THE HALL & MUNSON COMPANY.

Bay Mills, Mich., Sept. 9, 1901.

E. G. Siggers, Esq., Washington, D. C.

Dear Sir:—We have found your work thorough in searches, getting out applications, prosecuting applications, etc., etc., for U. S. and foreign countries. Also the exhaustive and able opinions you have given us on patents offered, which we contemplated buying, have been very valuable.

You have our entire confidence in patent matters.

Yours truly,

The Hall & Munson Co.,

by Jas. M. Leaver.

We have at our offices commendatory letters from hundreds of other parties, and we shall be pleased at any time to send to inquiring correspondents copies of such letters, which, owing to the restricted limits of this pamphlet, have not been given. In each instance the client, whose name appears below, has authorized us to refer to him, and inventors who are seeking a reliable attorney are invited to correspond with any of these parties. The suggestion is made that they enclose a postage stamp for reply.

Philip A. Jackson, Attorney-at-Law, Goodwater, Ala.
Theo. C. Eberhardt, Prattville, Ala.
Turner H. Nance, Talladega, Ala.
Gilbert L. Baker, P. O. Box No. 136, Waterford, Cal.
Adam Bergman, 1720 L St., Sacramento, Cal.
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Charles R. Harper, Marshalltown, Iowa.
Charles F. Snider, Mt. Pleasant, Iowa.
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Chambers, Bering & Quinlan Co., Decatur, Ill.

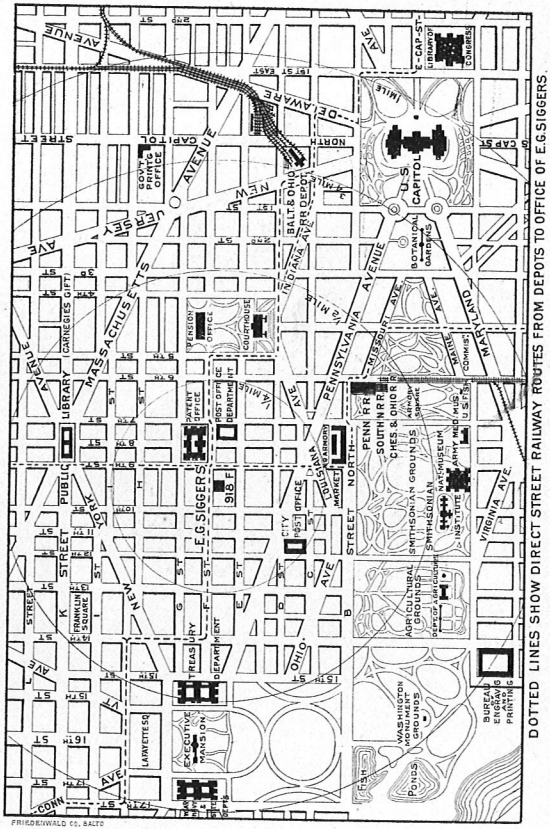
Victor W. Clough, Geneseo, Ill.
Henry McMackin, Saybrook, Ill.
William B. Sturgis, Shelbyville, Ill.
R. C. Willis, Toledo, Ill.
George P. Heilman, 1100 Upper 2d St., Evansville, Ind.
Hartig-Becker Plow Company, Evansville, Ind.
Glascock Bros. Mfg. Company, Muncie, Ind.
Rev. G. W. W. Amick, Peabody, Kans.
Finis E. Lack, 1200 S. 3d St., Paducah, Ky.
Alexander B. Kokernot, 1521 S. Liberty St., New Orleans, La.
W. J. Phelps (Phelps & Co.), 702 Covington St., Baltimore, Md.
James W. Brown, Brockton, Mass.
James M. Moody, Harwich, Mass.
John F. Murphy, Adrian, Mich.
Dr. George B. M. Seager, Adrian, Mich.
Hiram R. Lamb, 53 S. Main St., Adrian, Mich.
Daniel Warner, Bronson, Mich.
John N. Neal, Coldwater, Mich.
H. S. Lee, Tecumseh, Mich.
Mayer Brothers, Mankato, Minn.
John E. Caps (Caps Bros. & Co.), 317 S. W. Boulevard, Kansas City, Mo.
C. E. Granniss, Missouri, Kansas & Texas Trust Co., Kansas City, Mo.
Alderman & Cummins, Maryville, Mo.
Lambert Pharmacal Company, St. Louis, Mo.
Albertus H. Kidd, Beatrice, Neb.
Albert A. Armitage, Kenesaw, Neb.
G. S. Adams, 216 Erie St., Camden, N. J.
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Joseph C. Hoshor, Paterson, N. J.
Alvin F. Florey (Cornish & Co.), Washington, N. J.
Dr. William S. Rice, Adams, N. Y.
Benjamin B. McFadden (Commercial Envelope Co.), Binghamton, N. Y.
William Robertson, 247 Grant St., Buffalo, N. Y.
Truman Noble, Ithaca, N. Y.
Ornamite Veneer Co., 69 Frankfort St., New York, N. Y.
R. W. Parramore, 401 W. 124th St., New York, N. Y.
Robert H. Hutchinson, 151 Maiden Lane, New York, N. Y.
R. E. Conlin, Poughkeepsie, N. Y.
William H. Ramseur, Charlotte, N. C.
William Sullivan (Sullivan Printing Works), Broadway and Court St., Cincinnati, O.
Meek & Beach Company, Coshocton, O.
Albert A. Suber, Deshler, O.
J. M. Gale (Eaton Banking Co.), Eaton, O.
Samuel W. Dixon, 517½ N. Main St., Findlay, O.
William H. Etter (Buckeye Novelty Company), Marietta, O.

Wm. Fetzer, Sec. McSherry Mfg. Co., Middletown, O.
Col. J. H. Sprague (Sprague Umbrella Co.), Norwalk, O.
Henry Klein (Cardington Novelty Co.), Cardington, O.
Arthur R. Gordon, 1462 Milburn Ave., Toledo, O.
Melvin Barber, 410 First St., Oklahoma City, O. Ter.
Joseph H. Miller, Box 481, Oklahoma City, O. Ter.
William T. Hatten, Heppner, Or.
Terrell & Terrell, Grants Pass, Or.
R. M. Downie (Keystone Driller Co.), Beaver Falls, Pa.
James L. Kerstetter, Bradford, Pa.
Dr. S. L. Diven, 453 N. Hanover St., Carlisle, Pa.
Samuel Butz, Easton, Pa.
A. W. Drake, Lattimer Mines, Pa.
Horace F. Neumeyer, Macungie, Pa.
James A. Horton, New Castle, Pa.
Henry Riedel, care W. H. Holmes Co., 333 Water St., Pittsburg, Pa.
Orville L. Leach, Emery House, Providence, R. I.
John T. Roddy, Rock Hill, S. C.
Carl Jackson, Clark, S. Dakota.
F. B. Grimshaw, Clark, S. Dakota.
Ross B. Kirkwood, 415 Walnut St., Chattanooga, Tenn.
L. O. Read, 406 W. Seventh St., Chattanooga, Tenn.
Henry W. Maxwell, Knoxville, Tenn.
George R. Scates, 403 N. Eighth St., Knoxville, Tenn.
James D. Canale, Memphis, Tenn.
W. W. Brooks, 314 Main St., Memphis, Tenn.
Jesse W. Pierce, Belton, Tex.
Sinclair Taliaferro, Attorney, Houston, Tex.
Douglas M. Campbell, Houston, Texas.
G. A. Kelly Plow Co., Longview, Tex.
Callison & Bing, 63½ W. Second South St., Salt Lake City, Utah.
Samuel J. Johnston, Leesburg, Va.
Edgar C. Wiley, Lynchburg, Va.
H. E. McWane (The Glamorgan Pipe & Foundry Company, Manufacturers), Lynchburg, Va.
James R. McWane (Lynchburg Plow Works), Lynchburg, Va.
John R. Gould, 2237 Venable St., Richmond, Va.
Dr. T. W. Crozier, 202½ Commerce St., Roanoke, Va.
Ralph R. Spears (Spears & Riddle), Wheeling, W. Va.
Randolph Stalnaker, Wheeling, W. Va.
Jesse E. Phoebus (Wheeling Register), Box 143, Wheeling, W. Va.
Joseph F. Paull, Wheeling, W. Va.
Robert F. A. Mackinnon, Centralia, Wis.
Frank McDonough, 1500 Galloway St., Eau Claire, Wis.
Noah Shaw, 533 Water St., Eau Claire, Wis.
Jennings Comrie, 524 Van Buren St., Milwaukee, Wis.
George Kelly, Mineral Point, Wis.
John F. White, 205 Sixth St., Racine, Wis.
Charley McDonner, Wausaukee, Wis.
Dr. H. J. O'Brien, 620 Tower Ave., West Superior, Wis.
P. Emerson Glafcke, Cheyenne, Wyoming.



E. G. SIGGERS.

MAP OF THE BUSINESS SECTION OF WASHINGTON SHOWING THE PRINCIPAL PLACES OF INTEREST.



DOTTED LINES SHOW DIRECT STREET RAILWAY ROUTES FROM DEPOTS TO OFFICE OF E.G.SIGGERS.

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WHERE IS IT.

American Powder Manufacturers see P.

British Xylonite Co.

Managing Dir. Chas. P. Isaacs.

Hale End N.E.

Show Room, 3 Fore St. Avenue E.C.

Works. Manningtree.

Celluloid

Scottish Vulcanite Co.
Newfoorth
J.D. Sargent Edinburgh
manager.

British Xylonite Co. See B.

Cotton Spinner — Sandeman — see S

Compressed gases, Lennox — see L.

also from Linsa Directory :—

Bayerische celluloidwaaren-Fabrik U. A
Meyer 13 Paper St. E.C.

Blumel, C.W. 40500 Rose Place
Globe Road E.

Celluloid Novelty Co. 56 Basinghall St. E.C.

Compagnie française du celluloid. Paris.
(C. Enhanot & Co., Agents), 38 Brook St. E.C.

Converse Manuf^g Co. Ltd. (makers of celluloid
horses & all varieties), Garratt Works, Summers Town
SW

Dalee manufg Co. 68 St Paul's Churchyard E.C.
and 25 Soho Sq. W.
English & French manufactory - 38 Monkwell St E.C.
Greenberg & Sons, 3 Manchester Avenue E.C.
Guterman S & Co. Ltd. (sole agents for the
Celluloid Co) 35 & 36 Aldermanbury E.C.
Dr. P. Hunaeus: Works - Linden Hanover
London: 16 Farringdon Avenue E.C.
C. John Oscar (agent) 13 Paper St. E.C.
The Rhenish Rubber & Celluloid Co. Ltd.
(W. Klauchin, agent) 38 Basinghall St. E.C.
Pelletcollin (M & G)
(M. Mohr & Co. agents) Paris & Monville.
c/o Fore St. E.C.
Lemann & Marx Orgonneaux. France.
Factory, Rue St. Martin 326 Paris.

La fabrication des dynamites est localisé en France dans quatres usines appartenantes à trois sociétés.
Celle de Paulilles, près Port-Vendres, Soc. générale
Celle d'Ablon, près Honfleur, même société
Celle de Cugnu, près Fontainebleau, Socé. française
Celle de Saint martin-de-Crau, près Arles, Société anonyme des explosives et produits chimiques.

Dunn, H. J.
The "Kamois" Laboratories
Caterham Surrey

(4) 8 Tremadoc Rd.
Clapham ~~Park~~ Road, S. W.

Explosive factories French see D.
German see G
American see P

French dynamite Factories. See D.

German explosive factories — contributing to the upkeep of the Centralstelle.

Vereinigte Köln-Rottweiler Pulverfabriken, Cologne
Deutsche Waffen- und Munitionsfabriken, Berlin
Waffenfabrik Mauser at Oberndorf on the Neckar
Rheinisch-Westfälische Sprengstoff-Aktien-gesellschaft, Cologne.
Pulverfabrik Wolff & Co. at Walsrode.
Pulverfabrik Crania & Buchholz at Roensahl and
Dynamit-Aktien-Gesellschaft, vormals A. Nobel & Co. at Hamburg.
Rheinische Dynamitfabrik at Opladen.
Deutsche Sprengstoff Aktien-Gesellschaft at Hamburg
Dresdner Dynamitfabrik at Dresden.

Not in Krupp-Colonia-Rottweil Trust:-
Westfälisch-anhaltische Sprengstoff-Aktien Gesellschaft. (Pr. Govt contractors)

Lennox, Reynolds & Fyfe
Rosebank works
Fulham (for compressed gases)

Wm Macnab, F.I.C.
10 Cromwell Crescent. S.W.
(nearest Sta. Earl's Court).
Telegrams. Picryl London
Telephone No. 3526 Kensington

Powder manufactures - American.

E. I. Du Pont de Nemours & Co.
Wilmington Del. U.S.A.

The Hazard Powder Co. New York.

The American "E.C." Powder Co.
Oakland, Bergen Co. N.J. U.S.A.

The Laflin & Rand Powder Co.
New York.

The Oriental Powder Co.
Portland, Maine. U.S.A.

The King Powder Co.
Kings Mills.
Ohio, U.S.A.

Powder manufactures - French see D.

Scottish Vulcanite Co. – see Cellulonde.

Spinners (~~Cotton~~)

F. S. Sandeman & Sons

Stanley

Perthshire.

SO_2 (compressed) – Leamox – see L.

W. G. Tarrett
c/o Messrs Maclaren & Sons
37 & 38 Shoe Lane
E. C.
Telegraphic address: Runs.

Vulcanite Co. Leeds, Eng. celluloid

Klondike to British see B.

E. I. Du Pont de Nemours & Co.
Wilmington Del. U.S.A.

—

The Hazard Powder Co. New York

—

The American "E. C." Powder Co
Oakland, Bergen Co. N.J.

—

The Laflin & Rand Powder Co
New York

—

The Oriental Powder Co.
Portland
Maine U.S.A

—

The King Powder Co.
King's Mills
Ohio U.S.A

—

