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QUIEST SPOT NEAR LONDON"

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Penny Pictorial



# THE PENNY PICTORIAL MAGAZINE.

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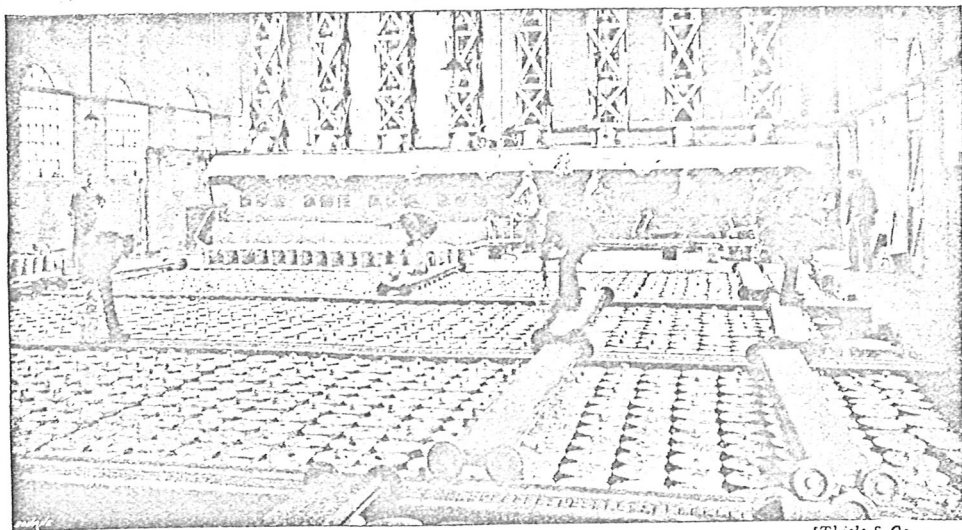


Photo by

[Thiele &amp; Co.]

THE GUN-COTTON DIPPING HOUSE FULL OF COOLING JARS.  
Here harmless cotton waste is converted into a powerful explosive.

## THE DEADLIEST SPOT NEAR LONDON.

### WHERE AND HOW CORDITE, GUN-COTTON, AND NITRO-GLYCERINE ARE MADE.

By Alfred Arkas. Illustrated by Photographs.

**A** VISIT to a cordite factory is very much like a balloon ascent, inasmuch as you cannot be quite certain that you will return alive.

However, if you have fears for your safety before embarking on a tour through a Government powder factory, you won't find much consolation or guarantee of personal safety when you actually arrive on the spot.

The cordite factory at Waltham Abbey, recently visited by the writer for the purposes of this article, is situated in an open tract of country about a mile from the station, and within view of the Government Small Arms Factory at Enfield Lock.

It is a weird, uncanny place. With its high brick wall, slate-coloured notice-boards, and severely official-looking entrances, it suggests a sort of cross between a barracks, a workhouse, and a convict prison.

"Abandon hope, all ye who enter here" is not painted on the gateway, but from its forbidding appearance and the numberless official precautions taken in the endeavour to ensure your safety once you have entered, it certainly seems that the famous motto would be most appropriate.

Inside the gate is an overgrown sentry-house, occupied by the policeman in charge

of the entrance. Now begin the precautions. In the first place, no word-of-mouth statement will induce him to let you pass. Produce a properly signed permit and, unlike Niobe, he is all smiles. The permit proving satisfactory, you sign, in a book kept for the purpose, your name, address, occupation, and the number of your party. Then follows the order to disgorge pipe, tobacco, and matches, loose and in bulk. If a loose vesta should be pulled out with your handkerchief in one of the factories, it is more than likely you will never need pipe, or tobacco again; so it is just as well to pull out the linings of your pockets and make assurance doubly sure.

This done, you may pass on to the manager's office, where you will be required to show your permit once more, when, if all is satisfactory, an escort is detailed to show you round.

The factories are concerned in the making of cordite, gun-cotton, and nitro-glycerine—probably the three most explosive substances the world has ever seen. Each explosive has a separate block of buildings devoted to its manufacture. In all these departments the buildings are of small size, and in the case of those engaged in the more

dangerous processes they are sunk in the ground and surrounded by a massive buttress of grass-grown earth or brickwork, so that, should a building "go up," as the workpeople term it, the damage may be localised as far as possible, and adjoining factories protected from injury.

In other large factories each special class of work is performed under one roof. At Waltham Abbey several houses are devoted to each process. By this system only three or four men work in each house, so that if an explosion occurs the loss of life is reduced to a minimum. This system also enables the authorities to divide the necessary raw material into comparatively small quantities, a certain proportion only being allowed in each house. Thus the force of an accidental explosion is greatly reduced.

In cases where the shops are surrounded by buttresses, the workpeople enter through a tunnel in the bank or brickwork.

A continuous system of tram lines runs round and across the whole place. Curious-looking trucks, about one quarter the size of those used for goods on the railways, but very much like them in other respects, convey the raw and finished material from one factory to another. They are pushed by boys, and so stringent are the precautions, that each loaded truck must be kept a certain distance from the others.

When the workpeople enter in the morning they, like the visitors, are searched at the entrance, and must give up all pipes, tobacco, and matches. Perhaps a hundred yards from the gateway, is a long, low building, some distance from the nearest factory. Here the workmen are required to change their clothes, substituting a plain blue serge uniform, by no means unbecoming. In the factories they put on carpet slippers with very thick felt soles. The floors of



Photo by]

A TEDIOUS OCCUPATION.  
Women picking the cotton waste used for gun cotton.

[Thiele & Co.



the houses are covered with thick brown linoleum, very like leather. This material is kept spotlessly clean, so much so that it is almost as slippery and shiny as polished oak.

Grit is fatal, hence the precautions. It may seem incredible, but it is none the less a fact that the smallest particle of grit in the machines used in the manufacture of cordite may set up friction and blow the place into a thousand fragments.

In some of the larger rooms the machinery runs the whole length of the building on either side. Down the middle is a concrete alley-way through which runs the tram, so that it may be unloaded at the very spot required. You may walk in this alley-way in ordinary walking boots, but should you desire to step to the sides, or visit a room in which there is no such alley-way, you must exercise the greatest precaution lest you introduce dust or grit from the road.

In the case of shops in which there is no alley-way, a wooden barrier some six inches high separates the room from the concrete floor of the entrance chamber. You may come thus far but no farther without special boots. These are immense leathern affairs that go right over your ordinary boots. They stand on a small board of deal, kept scrupulously clean, and in donning them you must stand on this board and nowhere else.

In spite of every care, accidents will

happen, as the occasional blowing up of a factory proves. Yet no forbidden article has ever been discovered on any of the workmen. Not a single breach of the stringent regulations governing the factory has ever been known. Then to what are these accidents due? It is impossible to say. The visitor who possesses an imagination makes the round in the utmost trepidation. Every step is fearfully made. Every sound startles him. Yet the workmen, though more silent

and reserved than their brothers in other departments of life, work day in and day out without apparent realisation of danger.

Yet not one man who enters the place in the morning has any certainty of ever leaving it alive.

The last serious explosion occurred in 1894, when the nitro-glycerine house went up. It is a curious building surrounded by a brick wall of abnormal thickness. It reminds one

more of a gateway in the Great Wall of China than anything else. Some idea of its exterior may be gathered from the photograph on page 420.

An eye-witness described this awful occurrence to me most graphically. He was in another factory at the time of the disaster. Suddenly a loud, grinding, rumbling noise reached his ears. It did not occur to him that an explosion was the cause, but the instinct of self-preservation becomes sharpened in such dangerous places, and, together with others, he rushed for the

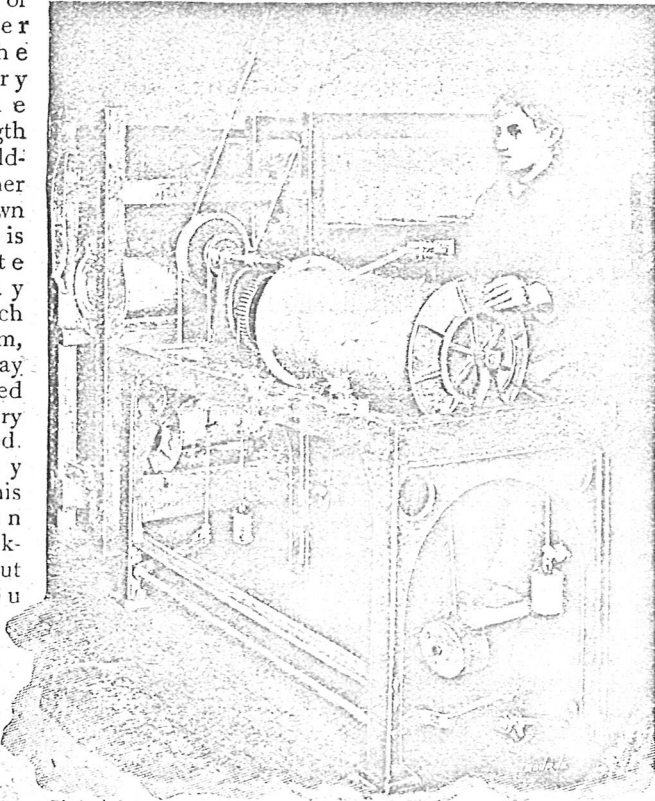


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[Thiele & Co.

A REELING MACHINE.  
Winding the explosive cordite thread.

open air. As he reached the door he glanced towards that part of the grounds occupied by the nitro-glycerine factory. There was no mistaking what had happened. The air was dark with dust, and thick with heavy masses of flying débris. A great portion of the massive solid brick embrasure was blown to pieces. A massive iron door was found in a field three hundred yards away, and fragments of the unfortunate chemist in charge and of the workmen were found all over the place. Curiously enough, a building in close proximity did not go, but another shop some twenty yards away, situated in the centre of a heavy earthwork, exploded as though from sympathy. In all probability it was fired by the concussion of the first explosion.

However, a much more extraordinary thing happened. The shock smashed the skylights of some of the shops in which cordite was undergoing mechanical treatment. The glass fell into the revolving machinery, and for some seconds—until the engine could be stopped, in fact—fragments were grinding with the cordite.

The danger from grit has already been explained. Each of the million particles of glass introduced into the machinery on this occasion might have caused another explosion, and that these other shops did not blow into fragments was regarded as nothing less than a miracle.

Needless to say, the Government sets a good example to other manufacturers of dangerous compounds, and every possible precaution suggested by science and experience is utilised where some special process is in itself dangerous. In the hydraulic pressing of gun-cotton and cordite there is some risk, and the hydraulic rams used for the purpose are fitted with curious-looking screens manufactured of rope.

In the right hand side of the bottom photograph on page 419 is seen a workman engaged in pressing gun-cotton into the  $2\frac{1}{2}$  lb. slab used for torpedoes. On his right hand are the scales in which the compressed slab is weighed to determine whether it is of correct weight. He controls the press by means of levers outside the screen, and a peep-hole in the screen enables him to watch the operation with some guarantee of safety.

It were idle to attempt a comprehensive description of the process of manufacturing any of the explosives produced at Waltham Abbey. The non-technical reader will probably be con-

tent with the brief and unscientific explanation that cordite is a compound of gun-cotton, a species of cotton waste treated with sulphuric and nitric acids; nitro-glycerine, ordinary glycerine nitrated, and mineral jelly.

By the courtesy of Major Nathan, of the factory, we are enabled to illustrate three or four of the more important rooms in full working order.

An interesting department is that devoted to the picking of the cotton waste of which gun-cotton is composed. In one corner is a pile of perfectly clean white cotton waste, perhaps twenty feet in height. At the base of this mound sit some eight or nine women, who do nothing but pick it to pieces for the purpose of detaching foreign matter and eliminating the universal enemy, "grit." When the cotton is picked it goes through the machine immediately behind the pickers. This is known as a "teaser." It pulls the waste about and, as its name suggests, teases it into some sort of order; it is then re-picked by the women.

From the picking-room the purified cotton is carried by another machine into a series of huge ovens, and when sufficiently dried it is carried over the chute represented in the next illustration to await the next process.

The cotton waste is now ready for metamorphosis into that deadly invention of modern times, gun-cotton. The tramcar on the rails in front of the pile of dried cotton is loaded with fifty-four small oblong tin boxes. Each has a round hole in the top, through which the cotton is stuffed. The tins are all of the same size, and contain  $1\frac{1}{4}$  lb. of cotton.

From the drying-room the tins are wheeled into the dipping-house. This is, perhaps, the most interesting room of all to the visitor, on account of the unique apparatus employed and the multifarious processes of interest carried on within it.

At the extreme end of the room are several tall lattice-work structures rising upwards to the roof; they enclose stacks for the purpose of carrying off the fumes. At the base of each is a large tank, attended by men with long implements very similar to the common garden hoe.

In these tanks the waste is impregnated with the acids which subsequently transform it into gun-cotton. It is then placed in curious-shaped earthenware pots to cool.

As will be seen, the floor of this immense room is divided into shallow tanks,

*Don't fail to enter our War Competition even though you cannot find all the names.*



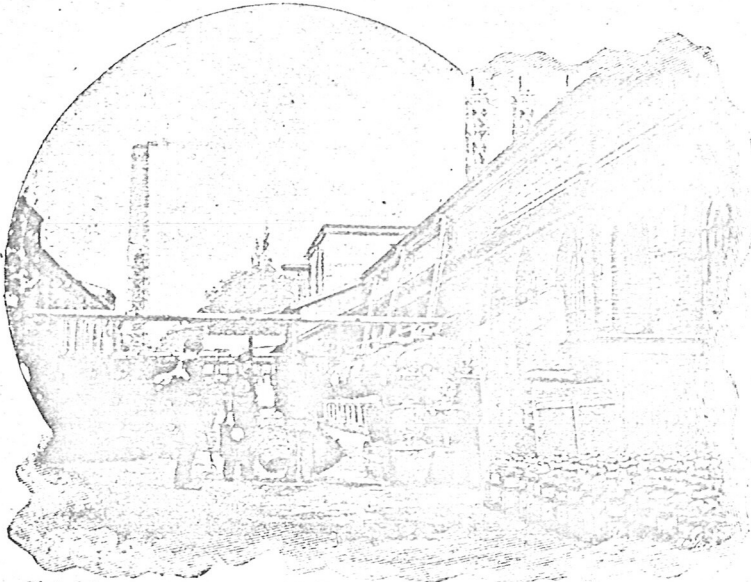


Photo by]

**DEADLY LIQUIDS.**

A yard full of acids for making explosives.

[Thiele &amp; Co.

bordered by narrow platforms. Rails are laid along the platforms on either side of each tank, in which the wheels of the travelling plank run, as seen in the illustration.

This plank travels over the pots from end to end of the tank, and enables the boy tenders to move the pots when they are sufficiently cool. They are hoisted out of the tanks by means of iron grapples, similar to those used for lifting blocks of ice.

The gun-cotton is next freed as far as possible from acid in centrifugal wringers, and then purified by means of repeated boilings in water.

Under no circumstances are visitors allowed to enter the nitro-glycerine factory. A red flag flies continually over the buildings, and it is undoubtedly the most dangerous spot in the factory. The various materials used in the preparation of this explosive require to be

NO. 35B

kept at a certain temperature. One man is stationed at a thermometer, and never takes his eyes off it during the process of manufacture. His position is one of terrible responsibility. Should the temperature vary in the slightest, one way or the other, the factory and the lives of those within it are doomed. If the thermometer shows any alteration it is his duty to see that the temperature is immediately adjusted to the specified degree.

Undoubtedly the reason for refusing entry is not only the intrinsic danger of the ingredients, but also because the authorities fear the risk of taking this ceaseless watcher's attention off the little instrument which holds the lives of all in its power.

Perhaps the most interesting fact about cordite is that it is not, as popularly supposed, a powder at all, which will explain the title, "The Reeling Room," under one of our illustrations of the factory devoted to this explosive.



Photo by]

**THE PRESSING HOUSE.**

Here cordite and gun-cotton are pressed by hydraulic rams.

[Thiele &amp; Co.

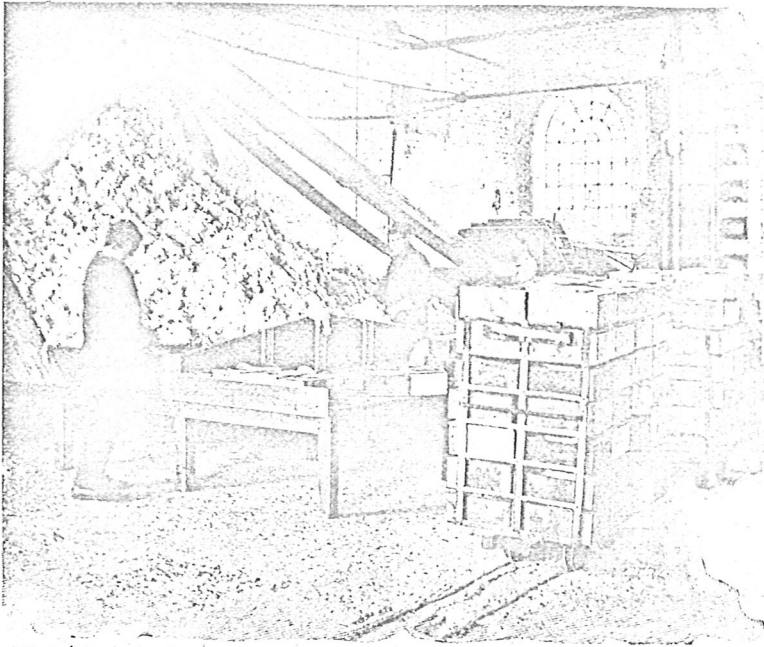


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**COTTON WASTE READY TO BE MADE INTO GUN-COTTON.**

After it has been picked it is carried over the chute into this department.

Cordite, when made, issues from the machine in the shape of a continuous yellowish-brown thread of the thickness of whipcord. It is wound on brass reels by machinery, as indicated in our photograph. However, it is made in other thicknesses. A size often used is very much like the rubber used for the driving bands of sewing machines. Another form is in hollow tubes about the size of the inner tube of a pneumatic tyre.

It is curious-smelling stuff; I know of nothing possessing a similar odour. To handle it, unless inured by use, is to court a certain headache. Although warned, I persisted in picking up specimens for examination, with the result that I was upset for the rest of the day. The explanation is that the pores of the skin absorb the nitro-glycerine.

The various sizes are cut

by machinery into lengths, each representing the regulation charge for one or other of the numberless guns used by the War Office and Admiralty.

Although not originally manufactured as powder, it is cut up in this form for use in revolver cartridges.

An interesting feature of the place is the storage yard, showing some hundreds of bottles, jars, and tubs containing the raw materials of which the explosives are made.

The sulphuric acid is contained in huge green glass bottles, protected by a wicker-work cover; the nitric acid is contained in jars; and the glycerine—the ordinary commercial variety—is delivered at the factory in gigantic iron barrels.

The actual testing of the explosives is done at Woolwich, where they are conveyed in barges from the factory to the Thames, via the River Lea and the canals.

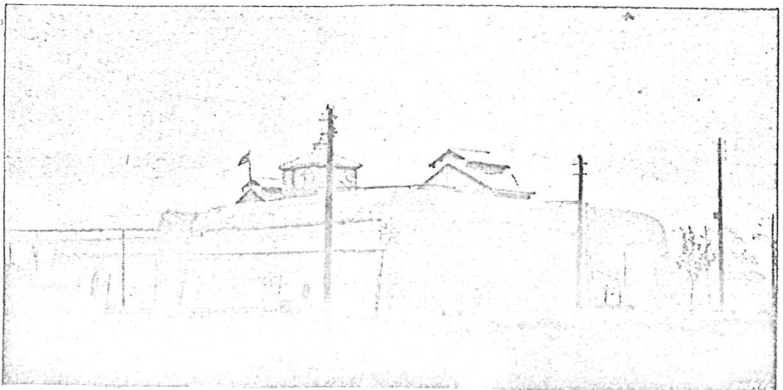


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**WHERE NITRO-GLYCERINE IS MADE.**

This building once blew up with terrible results.

[Thiele &amp; Co.



3.2.1900

Arkas, A. The deadliest spot near London. Where and how cordite, Guncotton and Nitro Glycerine are made. Photo copy plus 7 b/w photographs of processes. From the Penny Pictorial. (Compare with WASC 1059)

- 1 The guncotton dipping house full of cooling jars - here harmless cotton waste is converted into a powerful explosive
- 2 A tedious occupation - women picking the cotton waste for gun cotton
- 3 A reeling machine - winding the explosive cordite thread
- 4 Deadly Liquids - A yard full of acids for making explosives
- 5 The pressing house - Here cordite and guncotton are pressed by hydraulic rams
- 6 Cotton waste ready to be made into guncotton - After it has been picked it is carried over the shute into this department
- 7 Where nitroglycerine is made - This building once blew up with terrible results

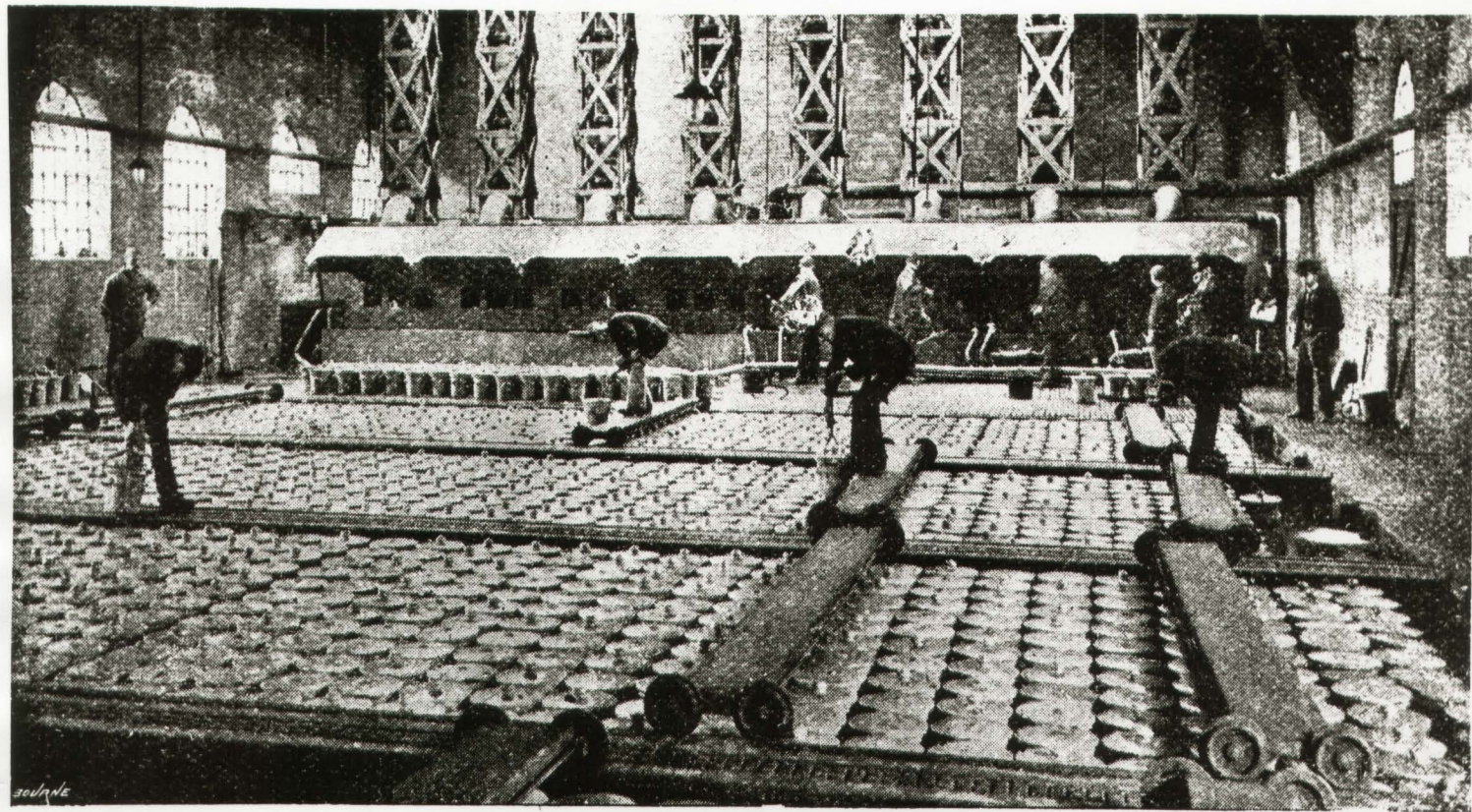
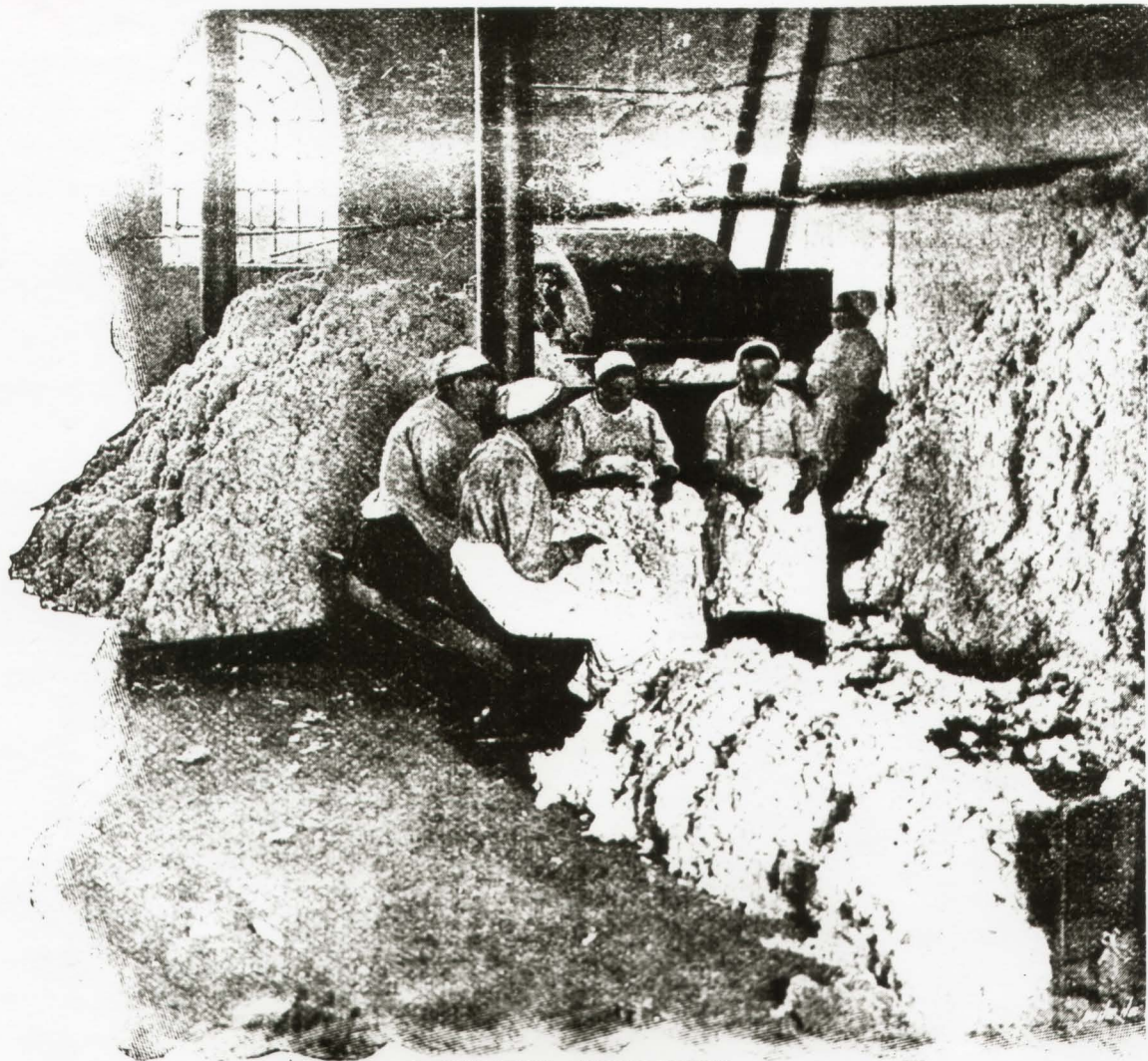


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[Thiele & Co.

**THE GUN-COTTON DIPPING HOUSE FULL OF COOLING JARS.**  
Here harmless cotton waste is converted into a powerful explosive.





*Photo by]*

**A TEDIOUS OCCUPATION**  
**Women picking the cotton waste used for gun cotton.**

*[Thiele & Co*



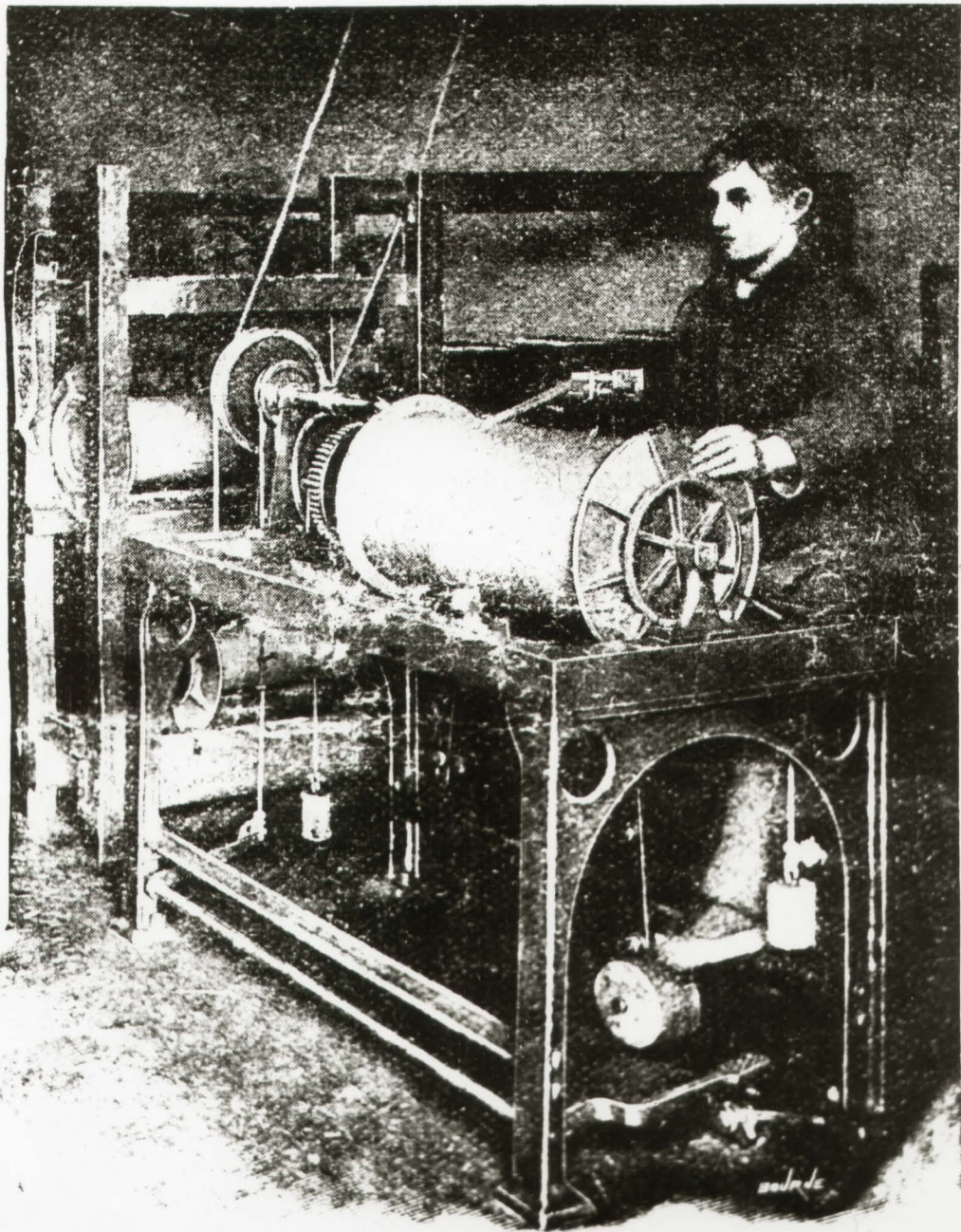
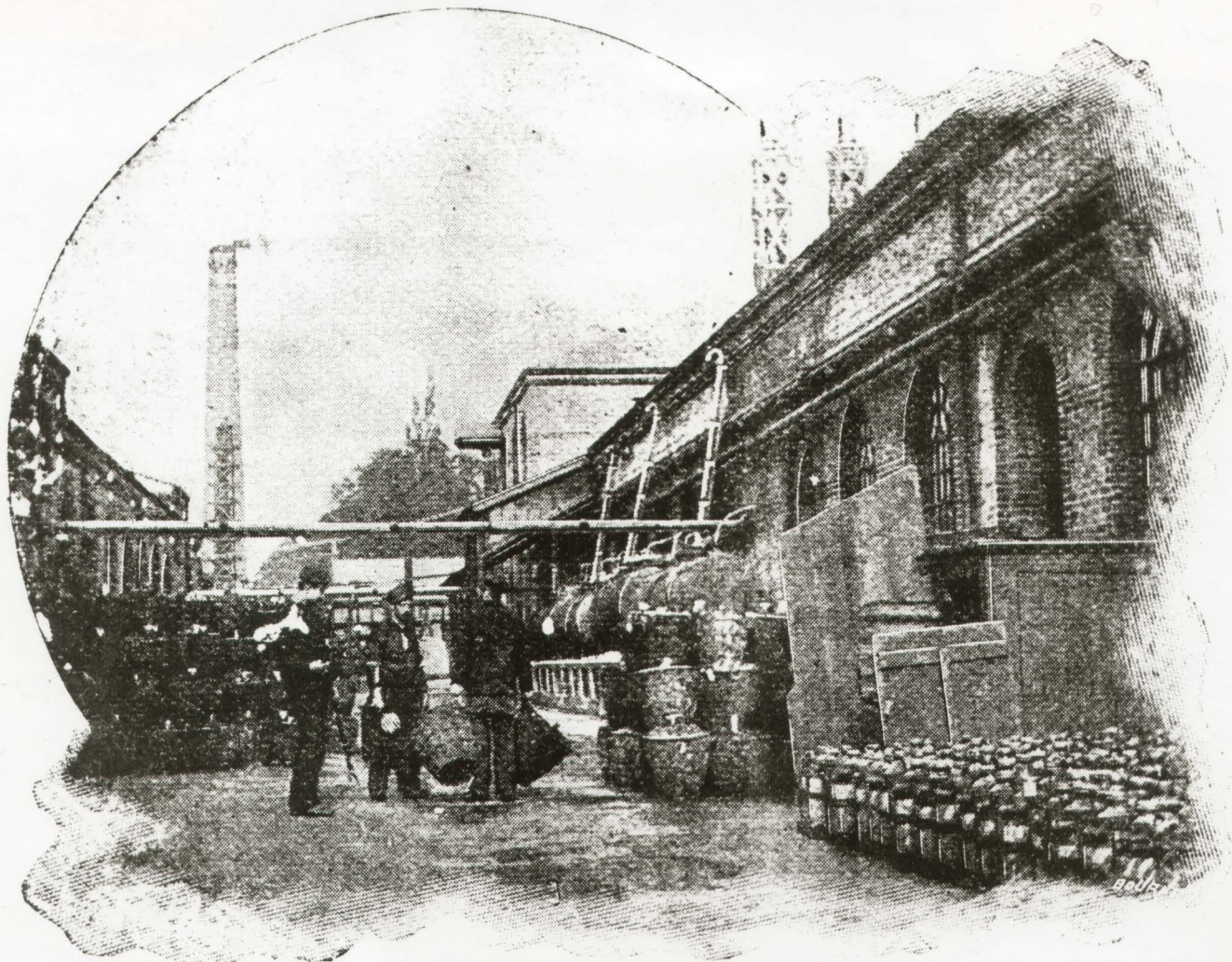


Photo (5)

(Thiele & Co.

**A REELING MACHINE.**  
Winding the explosive cordite thread.



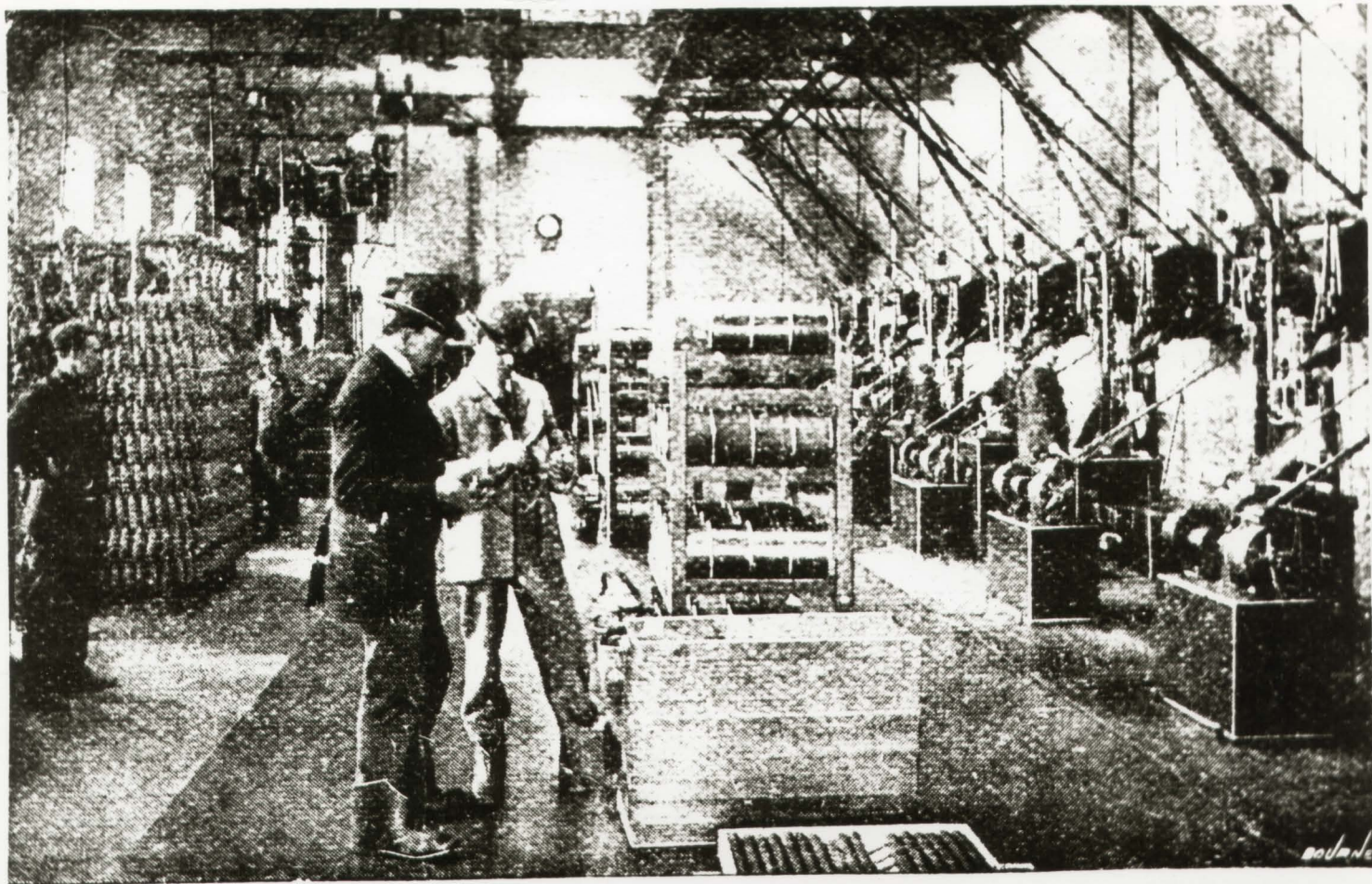


*Photo by]*

**DEADLY LIQUIDS.**  
**A yard full of acids for making explosives.**

*[Thiele & Co.*





*Photo by]*

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**THE PRESSING HOUSE.**  
**Here cordite and gun-cotton are pressed by hydraulic rams.**



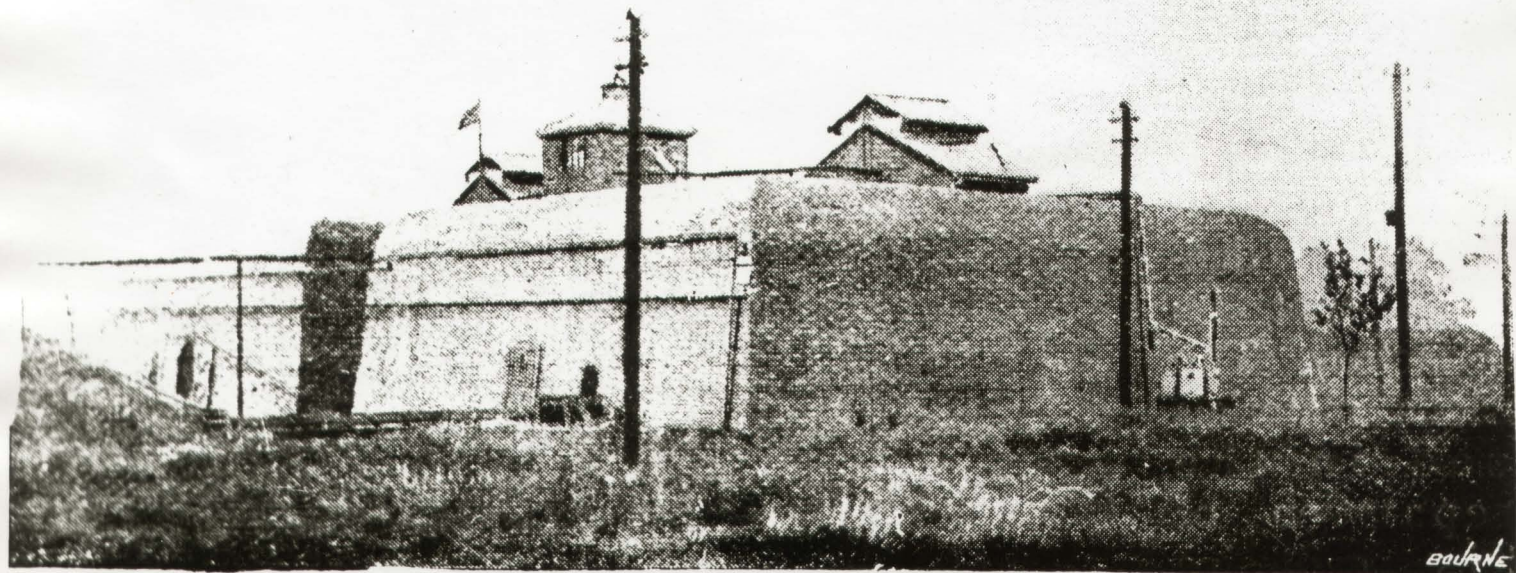


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**COTTON WASTE READY TO BE MADE INTO GUN-COTTON.**  
After it has been picked it is carried over the chute into this department.





*Photo by*

**WHERE NITRO-GLYCERINE IS MADE.  
This building once blew up with terrible results.**

*[Thiele & Co.*