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Improvements in apparatus
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PROVISIONAL SPECIFICATION.

“Improvements in Apparatus for the Manufacture of Nitroglycerine”.

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:—

5 This invention relates to apparatus for the manufacture of nitroglycerine, so arranged that the nitration of the glycerine, the separation of the nitroglycerine produced, as well as the operation usually known as “after-separating” are carried out in one vessel.

10 For this purpose we provide the usual nitrating vessel with an acid inlet pipe at the bottom, and a glass separation cylinder with a lateral exit or overflow pipe at the top. This cylinder is covered by a glass hood or bell jar during nitration, to direct the escaping air and fumes into a fume pipe where the flow of the latter may be assisted by an air injector. The lateral pipe in the separation cylinder is in connection with a funnel leading to the
15 pre-wash” tank.

The manufacture of nitroglycerine is carried on in this apparatus as follows:—

20 The nitrating acid is introduced into the apparatus by the inlet pipe entering at the bottom. The glycerine is then nitrated, being introduced into the vessel with the usual precautions, by means of a suitable injector such as an internal cylinder of smaller diameter than the glass cylinder, having a
perforated bottom and provided with a stopcock or valve to regulate the flow of glycerine.

25 When the whole of the glycerine has been nitrated and the temperature has fallen slightly, the air stirring, and the cold water circulation through the coils, are stopped, and the glycerine injector is removed. Then, as the nitroglycerine produced separates from the acids, there is run in through a branch in the acid inlet pipe, a quantity of waste acid from a previous charge, or acid of a similar composition. This acid, entering at the bottom, gradually raises and displaces the whole charge until the nitroglycerine begins to flow away to
30 the pre-washing vessel by the overflow pipe in the separation cylinder at the top of the apparatus. The flow of the waste acid is then regulated, by means of a cock, to suit the rate of separation of the nitroglycerine from the acids.

35 When nearly all the nitroglycerine has been separated in this manner, the acids in the apparatus may be run off as usual to an after-separating vessel for further settling, thus leaving the apparatus free for another nitration, or the nitrating vessel itself may be used as an after-separating bottle displacing the nitroglycerine with waste acid as it rises to the top, or skimming off in the usual manner.

40 When the separation of the nitroglycerine is complete, the waste acid is run off and denitrated as usual, a portion of it being reserved for the displacement of the nitroglycerine in a subsequent operation.

Dated this 8th day of August 1901.

ABEL & IMRAY,
Agents for the Applicants.

Improvements in Apparatus for the Manufacture of Nitroglycerine.

COMPLETE SPECIFICATION.

“ Improvements in Apparatus for the Manufacture of Nitroglycerine.”

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 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 apparatus for the manufacture of nitroglycerine, so arranged that the nitration of the glycerine, the separation of the nitroglycerine produced, as well as the operation usually known as “after-separating” are carried out in one vessel.

For this purpose we provide the usual nitrating vessel with an acid inlet pipe at the bottom, and a glass separation cylinder with a lateral exit or overflow pipe at the top. This cylinder is covered by a glass hood or bell jar during nitration, to direct the escaping air and fumes into a fume pipe where the flow of the latter may be assisted by an air injector. The lateral pipe in the separation cylinder is in connection with a funnel leading to the “pre-wash” tank. The accompanying drawing shews a vertical section of apparatus according to our invention.

a is a nitrating vessel of usual construction having at the bottom an acid inlet pipe with three branches, one *b* leading to the denitrating plant, *c* leading to the drowning tank and *d* which extends upwards and has two branches *e* leading to the nitrating acid tank, and *f* to the waste acid tank.

On the sloped bottom of the nitrating vessel *a* lies a coil *g* of perforated pipe for blowing air, and there are in the vessel several coils *h*, three shewn in the drawing, for circulation of cooling water.

At the top of the vessel there is a glass cylinder *i* having a lateral outlet *j* directed into the funnel mouth of a pipe *k* leading to the pre-wash tank. Over the cylinder *i* is a glass globe *l* into which opens a pipe *m* for leading off fumes which may be promoted by a compressed air jet from a pipe *r* operating as an ejector. Into an opening of the glass dome *l* is inserted a vessel *n* which is connected by a flexible pipe *p* to the glycerine tank and the bottom of *n* is perforated and covered with a disc perforated with holes registering with those through the bottom, this disc being connected by a stem with a knob *q* by which it can be turned so as to throttle or cut off passage of glycerine through the bottom. *s* is a thermometer for indicating the temperature of the contents of the vessel.

In operating with this apparatus, the nitrating acid is introduced into the nitrating vessel by opening the cock of the pipe *e*. The glycerine is then run in by introducing *n* and opening the valve at its bottom, the contents of the vessel being agitated by air blown through the perforations of the pipe *g*. When the glycerine is all nitrated and the temperature has slightly fallen, the circulation of water through the coils *h* and the air stirring are stopped, and the glycerine supply vessel *n* is removed. The nitroglycerine as it separates from the acids, is raised by introducing by the pipe *f* waste acid from a previous charge, this displacing the nitroglycerine upwards and causing it to flow by the outlet *j* and pipe *k* to the pre-washing tank.

When nearly all the nitroglycerine has been separated in this manner, the acids in the apparatus may be run off by the pipe *b* to an after-separating vessel for further settling, thus leaving the apparatus free for another nitration, or the nitrating vessel itself may be used as an after-separating bottle displacing

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the nitroglycerine with waste acid as it rises to the top, or skimming off in the usual manner.

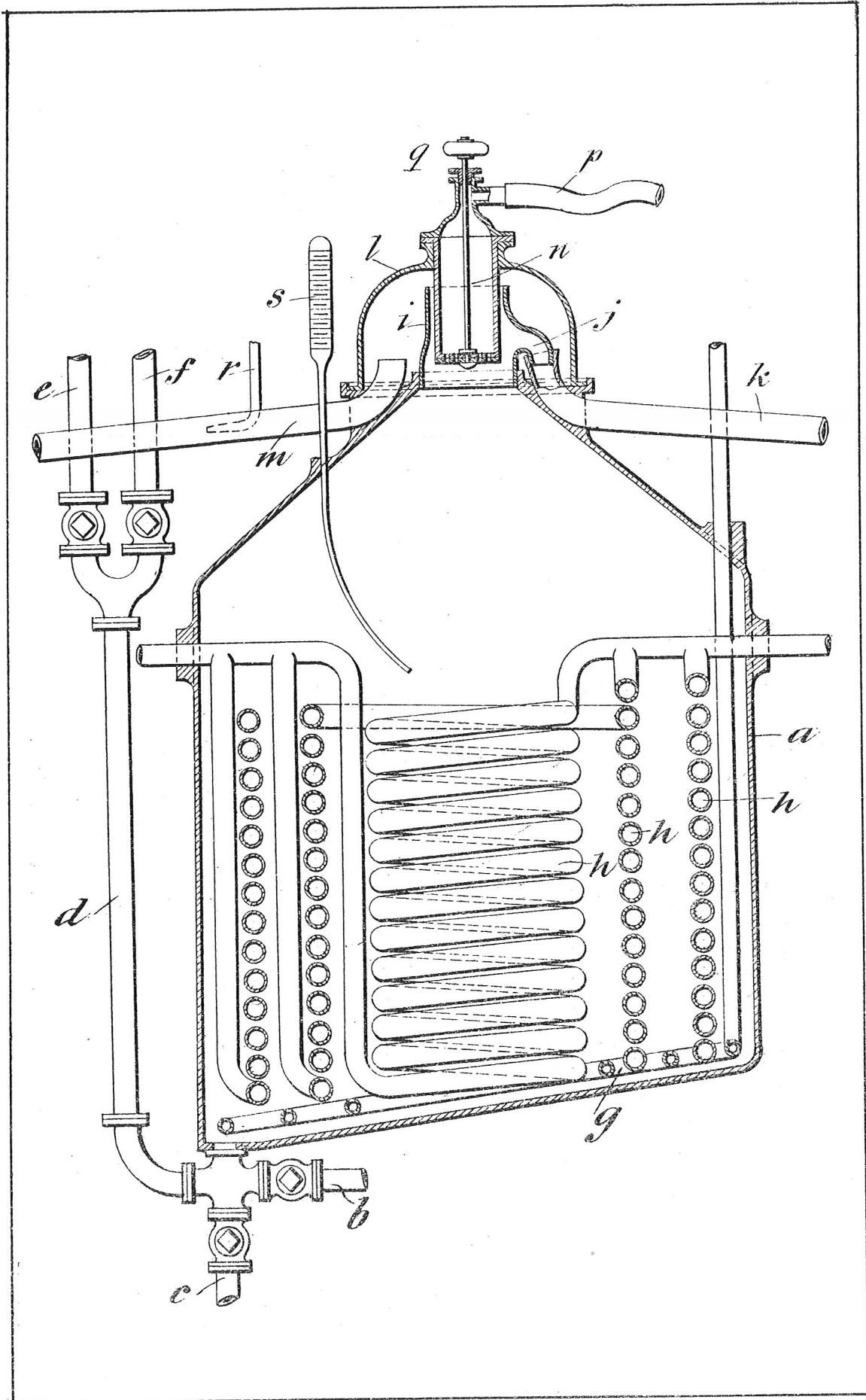
When the separation of the nitroglycerine is complete, the waste acid is run off and denitrated as usual, a portion of it being reserved for the displacement of the nitroglycerine in a subsequent operation.

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:—

10 Apparatus for the manufacture of nitroglycerine, consisting of a vessel provided with an air blast pipe, coils for circulation of cooling water, pipes for supply of acid and of waste acid for displacing the nitroglycerine as it separates, a valved arrangement for supply of glycerine and pipes for discharge of the nitro-glycerine produced and of the fumes, substantially as described.

15 Dated this 18th day of April, 1902.

ABEL & IMRAY,
Agents for the Applicants.



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