

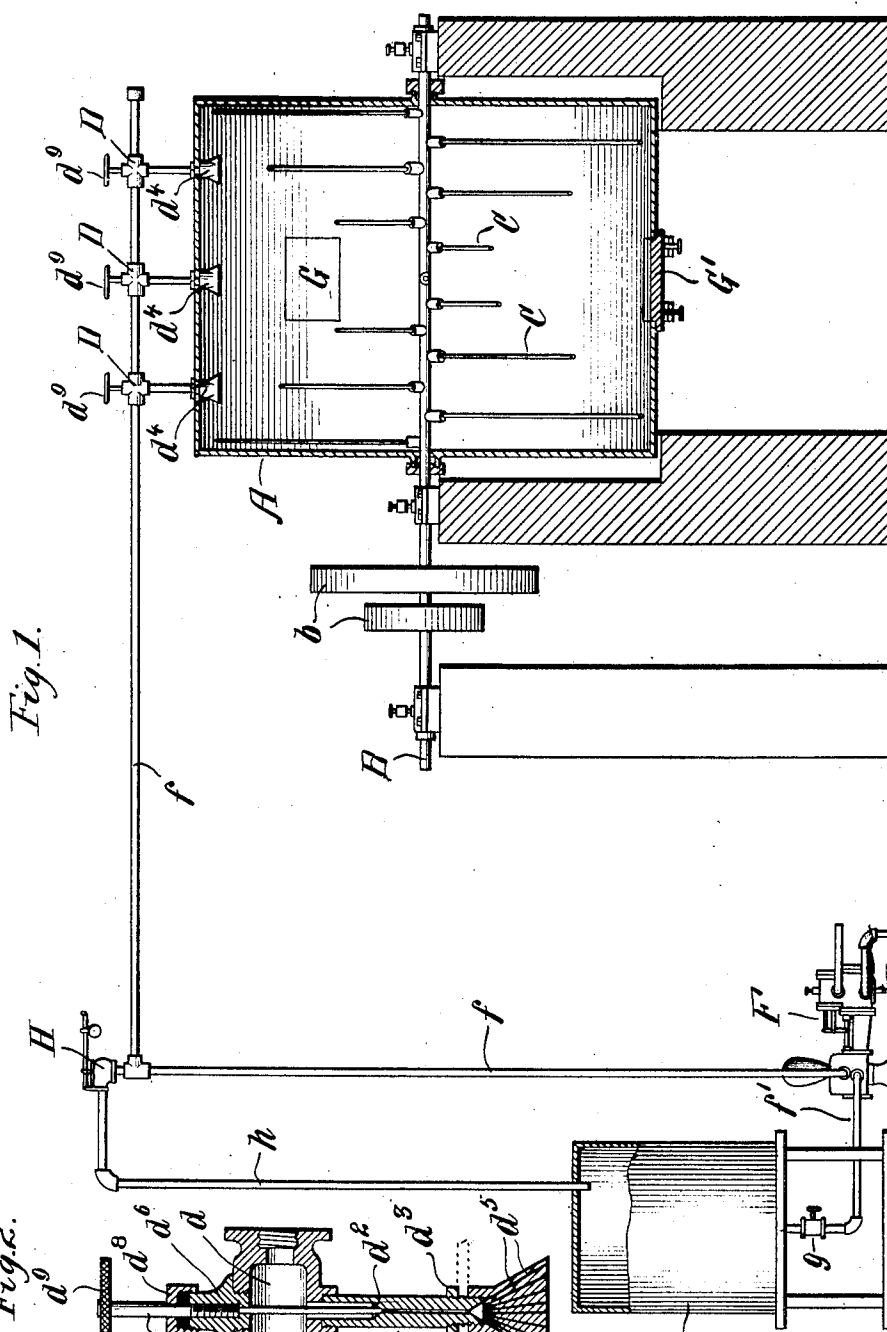
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PATENTED JUNE 11, 1907.

G. W. GENTIEU.

APPARATUS FOR MANUFACTURING SMOKELESS POWDER.

APPLICATION FILED APR. 18, 1906.



WITNESSES:
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UNITED STATES PATENT OFFICE.

GEORGE W. GENTIEU, OF PEORIA, ILLINOIS.

APPARATUS FOR MANUFACTURING SMOKELESS POWDER.

No. 856,859.

Specification of Letters Patent.

Patented June 11, 1907.

Application filed April 16, 1906. Serial No. 312,031.

To all whom it may concern:

Be it known that I, GEORGE W. GENTIEU, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Apparatus for Manufacturing Smokeless Powder; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawing which illustrates one form in which I have contemplated embodying my invention and the invention is fully disclosed in the following description and claims.

My present invention relates to an improved apparatus for manufacturing smokeless gun powder in accordance with my improved process which forms the subject matter of my application for Letters Patent of the United States, filed April 2, 1906 and given Serial No. 309,485, although it may be used for any other purpose for which it may be applicable, and it includes a receptacle or tank, fitted with any well known form of stirring devices, a spraying nozzle for discharging a solvent supply into said receptacle or tank, a solvent supply, a liquid forcing device located between said solvent supply and the nozzle, and an automatic safety valve located in such position that a constant pressure will be maintained upon the solvent delivery, all of which are more fully hereinafter described.

The main objects of my invention are to produce a simple inexpensive, efficient apparatus for the manufacture of smokeless powder, and one in which the solvent may be applied to the moist explosive material in the form of a minute stream of high velocity, delivered in a downward direction, contrary to the upward movement of the material agitated in the receptacle, the said stream of solvent being delivered at a constant known rate of pressure, which is accomplished by the arrangement of the different parts of the apparatus.

The effect on the explosive material by the use of this apparatus, is to produce a compact form of smokeless powder grain, in a comparatively short time and without the use of heat. The results secured by treatment in this apparatus do not affect the

original stability of the explosive material which is treated.

Referring to the drawing, Figure 1 represents a sectional view partly in elevation of my improved apparatus. Fig. 2 is an enlarged detail sectional view of the spraying device and valve controlling the same. Figs. 3 and 4 are detail views of the spraying nozzle.

In the drawings A represents a receptacle or tank, preferably cylindrical in form, supported in any desired manner and provided with man holes at top and bottom closed by man hole covers G, G' for the introduction and removal of the material to be treated. A stirrer shaft or axle B passes through the cylindrical tank A, is mounted in suitable bearings and provided with driving means such as pulleys *b* of different diameters, as shown, for driving it at various speeds. Within the tank A, the shaft B is provided with a series of radially disposed agitating arms or blades C for the purpose of tossing the material operated upon upward and thoroughly agitating it; the arms or blades are preferably arranged spirally around the axle and are of equal length, their outer ends extending to near the inner surface of the wall of the cylindrical tank.

J represents a small cylindrical tank which is used as a receptacle or reservoir to contain the liquid solvent used in the manufacture of smokeless powder; *f*' is the suction pipe connecting the reservoir J with a suitable pump F which may be a steam pump, as indicated in the drawing, or any other suitable form of liquid forcing device and the suction pipe *f*' is provided with a controlling valve *g* to shut off the supply of liquid when desired.

f is the delivery or discharge pipe which leads from the pump F to a series of jet valves D, D, D arranged to deliver the liquid in the form of a fine spray, and with great force and velocity into the interior of the tank A.

H is a safety valve arranged in the pipe *f* and provided with an adjustable weight by means of which the valve can be set to open at a certain pressure and deliver the surplus solvent through a by-pass pipe *h* from said valve back to the reservoir J, thus maintaining a constant pressure upon the liquid in the pipe *f* from the pump to the spraying nozzle, which pressure can be regulated from time to time by means of the weight on the lever of the safety valve H.

One of the jet valves D is shown in detail in Fig. 2, in section and consists of a hollow body d provided at opposite ends with screw connections, said hollow body being provided at one side with a tubular extension d' having an enlarged bore at the end adjacent to the valve body terminating in a needle valve seat d^2 and being provided with a fine bored passage extending from the needle valve seat to the end of the extension d' . The outer end of the extension d' is threaded on its exterior and is provided with a shoulder d^3 in this instance in the form of a nut to engage the exterior of the wall of the tank A. d^4 represents a spraying nozzle illustrated in detail in Figs. 3 and 4 and which is adapted to be screwed onto the end of the extension d' . This nozzle is fan-shaped and is provided with an interiorly threaded aperture at its inner end for engaging the extension d' , and with a series of diverging passages d^5 extending from said threaded aperture to the outer end of the nozzle. I also prefer to provide the outer end of the extension d' with a flaring recess communicating with the fine bore, as shown, in order to insure a supply of liquid to all of the passages in the spraying nozzle. The hollow body d is provided on the side opposite the extension d' with a boss d^6 which may be formed integrally with the hollow body or separately and attached thereto and this boss is threaded interiorly to receive the threaded portion of a needle valve d^7 , which extends through the hollow body d and has its end engaging the seat d^2 . The boss d^6 is also externally threaded to receive the usual packing gland d^8 , which is recessed to contain rubber or other packing surrounding the needle valve stem and the needle valve stem is provided at its outer end with a hand wheel d^9 , or other suitable device for adjusting it.

The operation of my improved apparatus, in carrying out my improved process before referred to, is as follows: A quantity of nitro-cellulose of a suitable degree of nitration is ground or pulped to a finer state than is ordinarily required in the present methods of making smokeless powder and is treated in a centrifugal wringer to deprive it of a portion of its moisture, but leaving a certain percentage of moisture therein, preferably from 15% to 40%. The nitro-cellulose is then charged into the tank A by means of the man hole G and the shaft or axle B is rotated at the desired speed to toss and agitate the nitro-cellulose by means of the arms or blades C. A suitable solvent which is miscible or soluble in water has previously been introduced into the reservoir J and the pump F being set in motion, the solvent is drawn through the suction pipe f' , the valve g being open, and is delivered under considerable pressure through the pipe f to the jet valves D D and

is thence discharged through the fan-shaped manifold spraying nozzles d^4 in fine streams of very high velocity. These streams coming forcibly into contact with the grains of moist nitro-cellulose, the solvent is driven into the material with great force, breaking it into smaller particles or grains and at the same time combining with the water present in the nitro-cellulose to effect a deterrent colloidizing of the nitro-cellulose, thus enabling the grains to become colloidized slowly and uniformly throughout the entire mass of material. The safety valve H will ordinarily be set to open at about 125 pounds to the square inch, although I do not limit myself to the exact pressure, which may be varied as desired. When the pressure in the pipe f exceeds that for which the safety valve H is set, the valve will open slightly and deliver a sufficient quantity of the liquid through the by-pass h back to the reservoir J, to relieve excess pressure and by this means the pressure from the pump to the jet nozzles is maintained uniform. In order to insure the delivery of the liquid under this high pressure, the pump F is arranged to have a greater delivering capacity than the combined orifices of the nozzles d^4 . After colloidizing the grains they are removed through the lower man hole G' and placed in any suitable solvent recovery apparatus, not shown, and subjected to a temperature not exceeding 43° C., to dry the grains and recover the solvent.

In attaching the jet valves and nozzles to the tank A as clearly shown in Figs. 1 and 2, apertures are provided in the top of the tank wall to permit the passage of the threaded end of the extension d' of each of these devices, so as to bring the shoulder d^3 against the outer surface of the wall. The nozzles d^4 are then screwed onto the threaded ends of the extension d' and engage the inner surface of the tank wall, thus securely clamping the nozzles and jet valves in position.

The process for the manufacture of smokeless powder before described, is not claimed herein as it forms the subject matter of my former application before referred to.

What I claim and desire to secure by Letters Patent is:—

1. Apparatus for the manufacture of smokeless powder, comprising among its members, a receptacle, stirring devices located therein, a spraying nozzle discharging within said receptacle, a liquid supply connected to said nozzle, and a liquid forcing device interposed between said liquid supply and said nozzle having a greater capacity than the delivery orifices of said nozzle, and automatic pressure relieving device for maintaining an uniform pressure on the nozzles, substantially as described.

2. In apparatus for the manufacture of smokeless powder; the combination with a receptacle, stirring devices located therein, a

spraying nozzle located adjacent to the upper part of said receptacle and discharging downwardly therein, and a liquid forcing device connected to said nozzle, means for maintaining an uniform pressure of the liquid at the nozzle, and a regulating device for varying the pressure at which the liquid is discharged, substantially as described.

3. Apparatus for the manufacture of smokeless powder, comprising among its members, a receptacle, stirring devices located therein, a spraying nozzle discharging within said receptacle, a liquid forcing device connected to said nozzle, a pipe from said forcing device to said nozzle, a by-pass from said pipe to the liquid supply and an automatic pressure operated valve for controlling said by-pass, substantially as described.

4. Apparatus for the manufacture of smokeless powder, comprising among its members, a receptacle, stirring devices located therein, a spraying nozzle discharging within said receptacle, a liquid supply for said nozzle, a liquid forcing device connected therewith, and having a greater capacity than the discharge orifices which it supplies, a pipe connecting said forcing device with said nozzle, a by-pass connected with said pipe and leading to said liquid supply, and an adjustable pressure operated valve controlling said by-pass, substantially as described.

5. In apparatus for the manufacture of smokeless powder, the combination with a receptacle, stirring devices located therein, a spraying nozzle located adjacent to the upper part of said receptacle and discharging downwardly therein, and a liquid forcing device connected to said nozzle, and a pressure operated valve located between the liquid forcing device and the nozzle for regulating the pressure of the liquid delivered from said nozzle, substantially as described.

6. An apparatus for the manufacture of smokeless powder, comprising among its members, a tank, stirring devices located therein, a spray controlling valve located outside of the tank, and having a tubular extension, passing through the tank, a spraying nozzle, secured to said extension within the tank and provided with a plurality of discharge passages, a liquid forcing device connected with said valve, and an automatic pressure operated valve interposed between said pump and said spray controlling valve, for maintaining an uniform pressure upon the liquid supplied to said nozzle, substantially as described.

In testimony whereof I affix my signature, in the presence of two witnesses.

GEORGE W. GENTIEU.

Witnesses:

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