May 6, 1924. 1,492,924

T. F. KNIGHT

METHOD AND APPARATUS FOR UNLOADING HIGH EXPLOSIVE SHELLS

Filed April 17, 1923

Fig. 1.

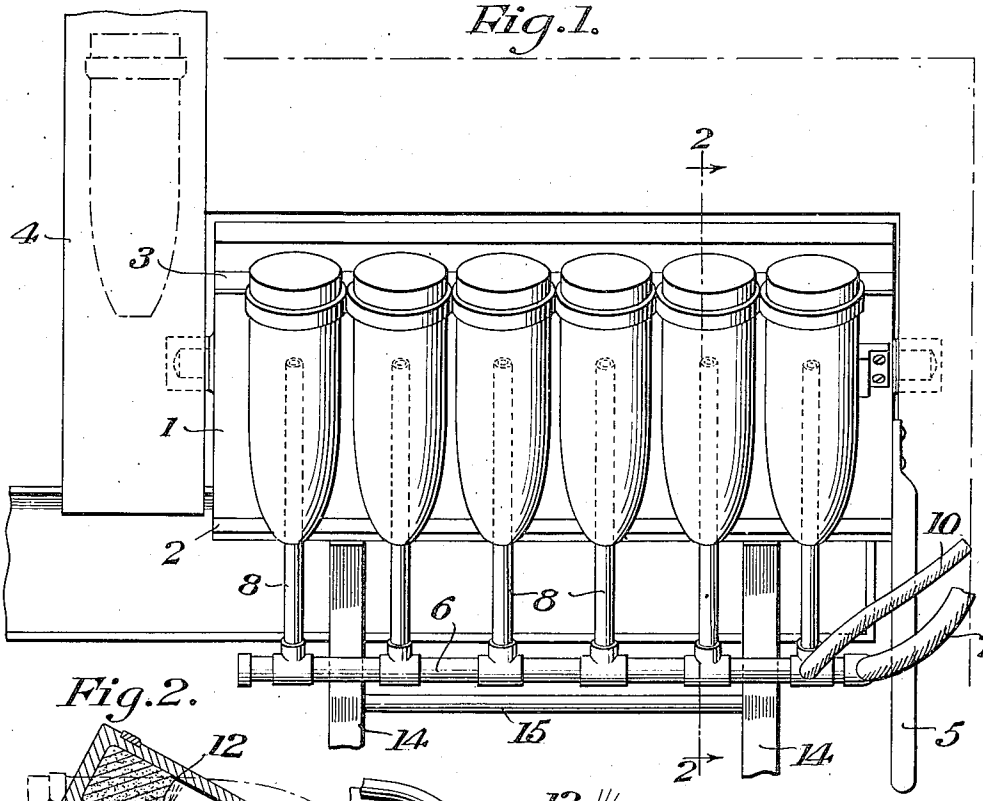


Fig. 2.

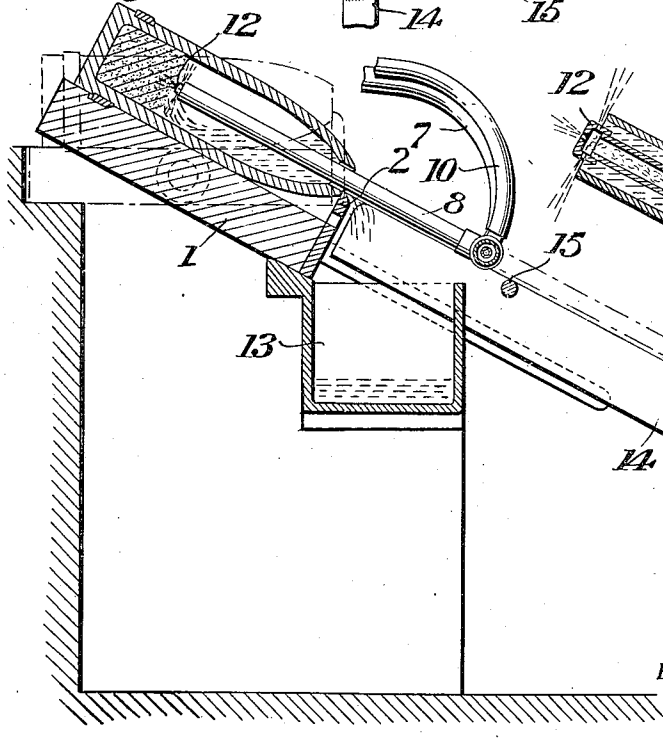
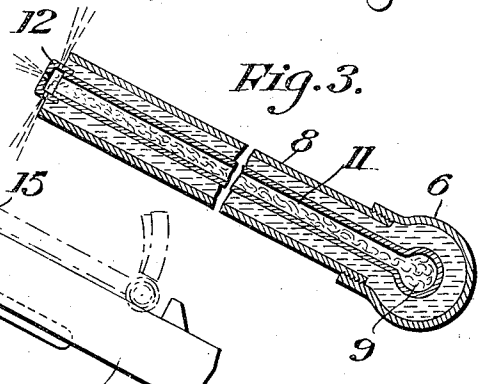


Fig. 3.



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Patented May 6, 1924. 1,492,924

UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR UNLOADING HIGH-EXPLOSIVE SHELLS.

Application filed April 17, 1923. Serial No. 632,674.

To all whom it may concern:

Be it known that I, THOMAS F. KNIGHT, a subject of the King of Great Britain, and resident of Lyndhurst, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Methods and Apparatus for Unloading High-Explosive Shells (Case No. 1), of which the following is a specification.

The main object of this invention is to provide a new and useful method and apparatus for unloading high explosive shells. It is necessary that the entire high explosive charge be removed from the shells in order that the empty shells may be safely melted or reduced in a blast furnace or otherwise. These shells are of high quality steel and are valuable provided the explosive charge is entirely removed.

A high explosive shell for artillery use, consists ordinarily, of a hollow steel shell filled with a charge of high explosive, said charge being substantially solid when cooled and forming a practically homogeneous dry mass which substantially fills the shell. The shell is usually pointed at one end and said pointed end is known as the nose. In the nose is formed a longitudinally extending threaded aperture in which is screwed a flanged adapter ring; and said ring carries a booster casing and a fuse. Before the shells can be unloaded, that is to say, the charge removed, the adapter ring carrying the booster casing and the booster charge must be removed. The fuse, or fuse stock, is inserted only when making the shell ready for firing. These high explosive charges are fluid or semi-fluid at certain temperatures and are usually poured into the shell in a fluid or semi-fluid state. When the charge cools it solidifies within the shell and becomes a substantially solid and homogeneous mass of material which completely fills the entire shell except for a small space at the nose which space is designed to receive the booster casing.

The main purpose of this invention is to provide a method and apparatus for safety, completely and quickly removing these high explosive charges from the shells.

In the drawing, Fig. 1 is a plan view of an apparatus for carrying out the invention;

Fig. 2 a vertical sectional view taken on the line 2—2 of Fig. 1; and

Fig. 3 a central sectional view of one of the steam and water nozzles.

In carrying out this invention the adapter ring and the booster casing are first removed thereby leaving the threaded aperture in the nose of the shell open so that access may be had therethrough to the interior of the shell.

The shells are arranged side by side on a tiltable table 1 with their open ends along the front edge thereof. The table is provided with an upstanding flange 2 at its front end against which the open nose of the shells rest. The table is provided with a longitudinal groove 3 near its rear end in which groove the rifling band of the shell fits. The flange 2 serves to hold the shells in position on the table when the table is tilted forwardly and downwardly as shown in the drawing. The shells are preferably moved along a support 4 in order to bring them in position to be rolled on to the table 1. The support 4 may be a conveyor or an inclined board or chute. It is desirable to deliver the shells in a horizontal position at one end of the table so that they may be conveniently rolled on to the table and arranged side by side with their open ends directed toward the flange 2. The table is provided with a lever 5 by which it may be tilted downwardly and forwardly in order to place the shells in an inclined position with their open ends pointing downwardly.

Arranged along the front edge of the table is a water supply pipe 6 to which is connected a suitable flexible hose 7. Connected to the pipe 6 are water nozzles 8, one for each shell to be treated. These water nozzles are adapted to be passed into the shells through the open ends thereof and the free ends of these nozzles are open. Within the water supply pipe 6 is arranged a steam supply pipe 9, said pipe 9 having a flexible connection 10 through which steam passes to the pipe 9. The pipe 9 is provided with steam nozzles 11 arranged concentrically within the water nozzles 8. Each nozzle 11 is provided with a perforated spraying cap 12 secured to the end thereof and adjacent the end of the water nozzle. The cap 12 is provided with perforations so arranged as to direct jets of steam laterally across the end of the water nozzle.

A trough 13 is arranged along the front edge of the table and directly below it and is

designed to receive the liquid material discharged from the shells. The steam and water supply pipes are arranged to slide up and down on inclined guide ways 14 so that the nozzles may be moved into and out of the shells. The guide ways 14 are connected by a horizontal supporting rod 15 which serves as a convenient support for the nozzles when they are entirely withdrawn from the shells.

When the table is filled with shells it is swung on its pivots and then the steam and water nozzles are moved up into the shells and preferably into contact with the solidified charge therein. The steam and water supply is then turned on. The steam jets blowing across the open ends of the water nozzles produce a highly heated water spray within the shell and said highly heated spray is directed against the solidified charge. The spray heats, moistens and liquefies the charge and causes it to be discharged in liquid form through the lower open ends of the shells. The steam not only produces a hot water spray but thoroughly agitates the material within the shells and causes it to swirl around and disintegrate the mass. As the mass is dissolved or liquefied the nozzles are moved up into the shells in order to keep the hot water spray close to the unliquefied mass. The operator manually moves the nozzles into the shells by sliding the supply pipe along the inclined guides 14.

When the charge is completely liquefied and discharged the nozzles are removed and the table swung up into horizontal position. The shells may then be removed from the table back to the support 4 and a new supply of loaded shells placed on the table.

What I claim is:

1. The method of removing a solidified explosive charge from a shell, consisting in placing the shell with its open end directed downwardly, inserting a water and steam nozzle within the open end of said shell, causing steam and water to flow through said steam and water nozzles to produce a highly heated water spray within the shell, and moving the steam and water nozzles into the shell as the solidified charge is liquefied and discharged through the lower open end of the shell.

2. An apparatus for unloading solidified explosive charges from high-explosive shells, comprising a shiftable nozzle, means for supplying fluid to said nozzle, means for guiding the nozzle to move endwise into and out of the open end of a shell body, and a tiltable shell support movable from a shell-receiving position to a position for presenting a shell in longitudinal alignment with the nozzle with the open end of the shell directed toward the discharge end of the nozzle.

3. An apparatus for removing charges from artillery shells, comprising a reciprocable fluid discharge nozzle, means guiding the nozzle to move endwise with its discharge end directed upwardly, shell delivering means, and a movable shell support located between said delivery means and said nozzle and shiftable from a position for receiving a shell from the delivering means to a position for presenting a shell in longitudinal alignment with said nozzle with the nose of the shell directed downwardly toward the discharge end of the nozzle.

4. An apparatus for removing charges from artillery shells, comprising a reciprocable fluid discharge nozzle, means guiding the nozzle to move endwise with its discharge end directed upwardly, shell delivering means, a movable shell support located between said delivering means and said nozzle and shiftable from a position for receiving a shell from the delivering means to a position for presenting a shell in longitudinal alignment with said nozzle with the nose of the shell directed downwardly toward the discharge end of the nozzle, and means for receiving the solution draining from a shell into which a jet from the nozzle is directed.

5. In an apparatus of the class set forth, the combination of a rotatable shell support, a fluid supply nozzle mounted adjacent said support and having its discharge end normally below the support, means for rotating the support to present a shell in alignment with the nozzle with the nose end of the shell directed downwardly toward the discharge end of the nozzle, and means for guiding the nozzle for endwise movement into and out of a shell on the support.

6. In an apparatus of the class set forth, the combination of a shell support rockable from a horizontal shell-receiving position to an inclined position for holding shells with the nose ends thereof directed downwardly, a fluid discharge nozzle, and means supporting said nozzle for diagonal movement endwise upwardly into a tilted shell on the support.

7. In an apparatus of the class set forth, the combination of a shell support rockable from a horizontal shell-receiving position to an inclined position for holding shells with the nose ends thereof directed downwardly, a fluid discharge nozzle, means supporting said nozzle for diagonal movement endwise upwardly into a tilted shell on the support, and a solution collecting means located below the path of movement of the nozzle in position to receive a solution draining from a shell on the support when said support is in tilted position.

In testimony whereof I hereunto affix my signature.

THOMAS F. KNIGHT.