Jan. 12, 1943. H. R. ZIMMERMAN 2,307,816

BLASTING MACHINE

Filed Jan. 6, 1942 2 Sheets-Sheet 1

Fig. 1.

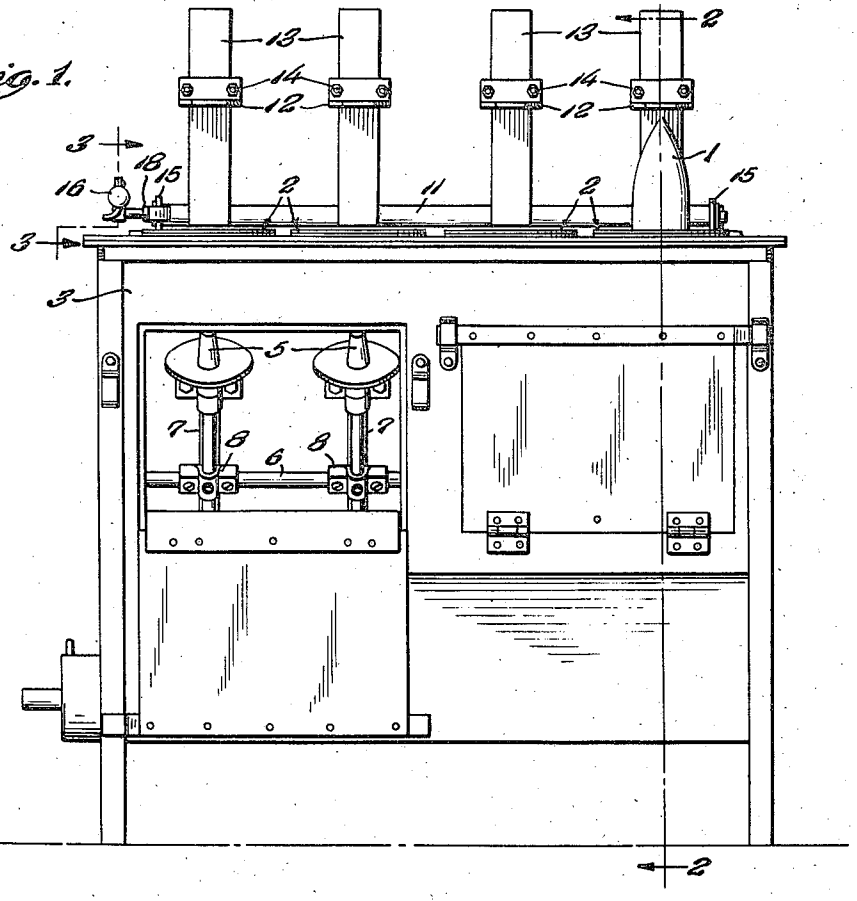


Fig. 5.

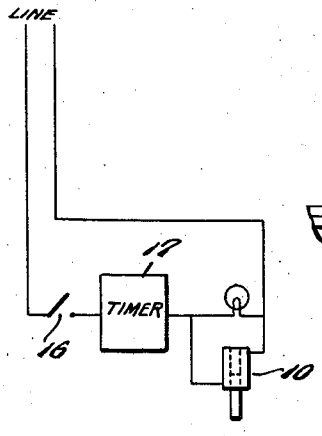
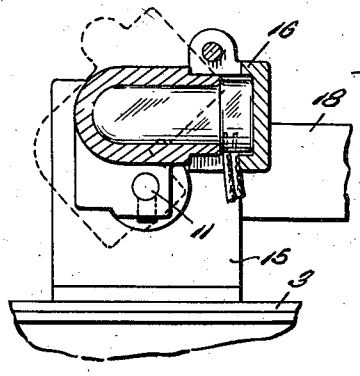


Fig. 3.



Inventor

Harry R. Zimmerman

By Spear, Mondaldson + Hall

Attorney

Jan. 12, 1943. H. R. ZIMMERMAN 2,307,816

BLASTING MACHINE

Filed Jan. 6, 1942 2 Sheets-Sheet 2

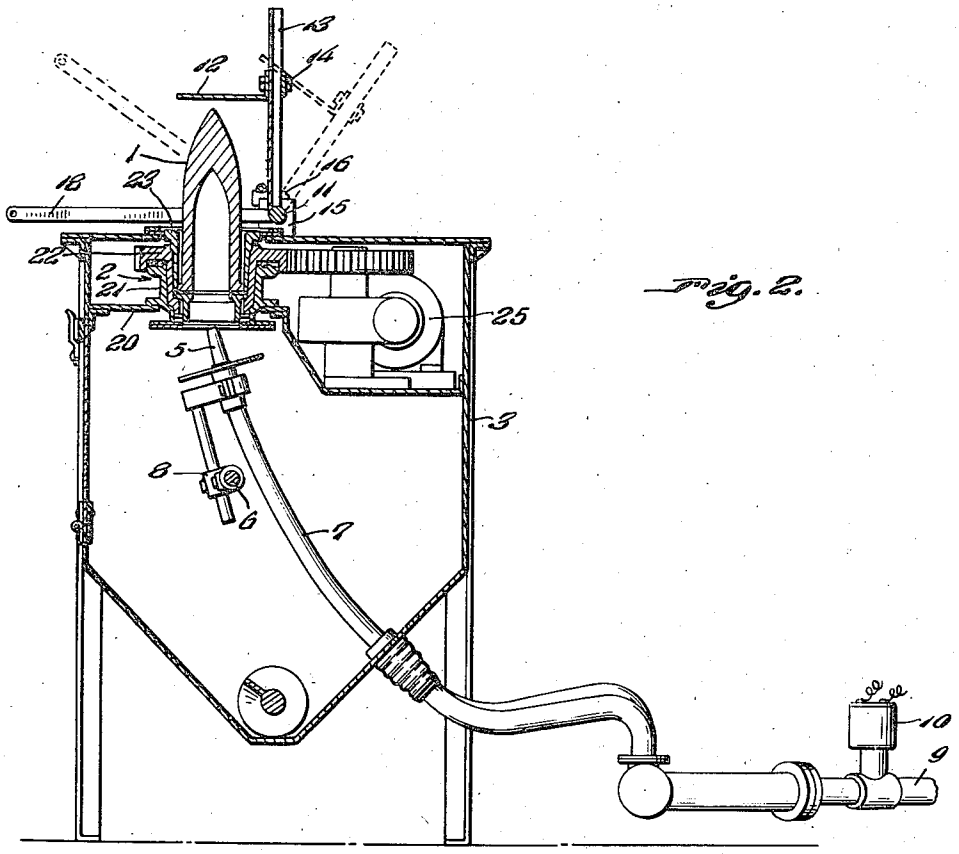


Fig. 2.

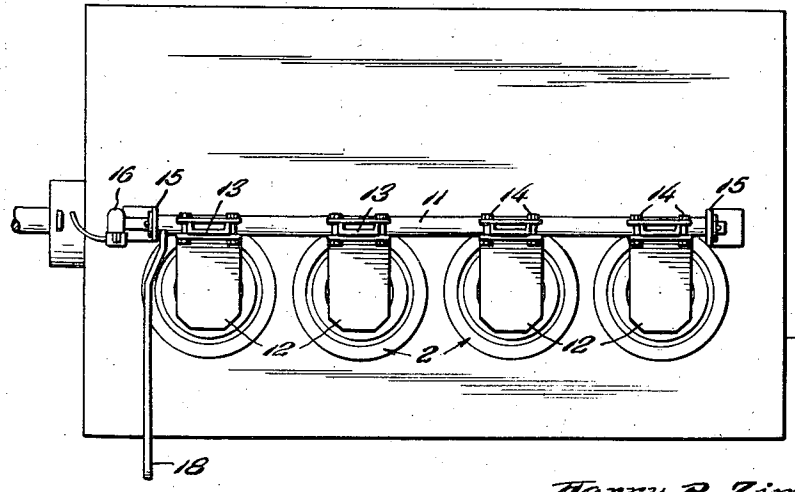


Fig. 4.

Inventor

Harry R. Zimmerman

By Spear, Monaldson & Hall

Attorney

Patented Jan. 12, 1943

2,307,816

UNITED STATES PATENT OFFICE

2,307,816

BLASTING MACHINE

Harry R. Zimmerman, Hagerstown, Md., assignor to Pangborn Corporation, Hagerstown, Md., a corporation of Maryland

Application January 6, 1942, Serial No. 425,799

4 Claims. (Cl. 51—15)

This invention relates to blasting machines for cleaning hollow articles, such as artillery shells, and more particularly to a safety device for use upon such a blasting machine.

In machines for blast cleaning artillery shells, it is important that means be present to prevent removal of the shells during the time that the blasting operation is occurring. If a shell were removed while the blasting is being proceeded with, the blast stream would escape into the outside room and cause injury to the operator and damage to the surrounding equipment as well.

In accordance with the invention, means are provided to automatically shut off the blast in the event that an attempt is made to remove a shell being blasted. Moreover, the blast cannot be turned on until the safety device is placed in operation.

In the drawings

Figure 1 is a front elevation of the blasting machine embodying the invention, one of the front doors of the cabinet being opened to show the interior construction.

Fig. 2 is a section on the line 2—2 of Figure 1.

Fig. 3 is a view taken on the line 3—3 of Figure 1.

Fig. 4 is a plan view of the machine of Figure 1.

Fig. 5 is a wiring diagram for the electrical circuit involved in the invention.

The shells 1 to be internally cleaned are located with their open ends downwardly in holders 2 in the top wall of a blasting cabinet 3. The holders 2 are disposed in a line lengthwise of the top of the cabinet. In the apparatus shown, the blasting chamber 3 is large enough to accommodate four holders 2 in its upper wall. It will be understood, however, that a number greater or less than four shell holders may be provided by proportionately changing the size of the cabinet.

The shell holders 2 include a stationary support 21 which is mounted upon and secured to a partition 20 within the cabinet 3. A chuck 22 is rotatably carried by the stationary support 21 and within this chuck is an adapter 23. The adapter 23 is readily replaceable so that the proper one may be inserted to fit the particular shell being blasted. The chuck 22 is rotated through a gear drive by motor 24, and in this manner the shells being blasted are all rotated.

To clean the interiors of the shells 1, an air blast nozzle 5 is positioned beneath each holder 2 to blast in an upward direction. These nozzles 5 are supported by a bar 6 extending lengthwise of the casing 3 and supported by the opposite end walls of the casing. The clamp 8 by which each nozzle 5 is attached to the bar 6 permits the nozzle to be adjusted to best direct its abrasive stream into the shell being cleaned. Access to the clamps 8 is had through the doors in the front of the cabinet.

Each nozzle 5 is connected by a hose line 7 to a main conduit 9. Air under pressure and abrasive are supplied to the conduit 9 so that abrasive is discharged from the nozzle 5 by the pressure of the air stream.

To control the flow of air and abrasive through conduit 9, a solenoid operated valve 10 is connected into the conduit. The valve 10 will be opened only when the solenoid of this valve is energized by the supply of an electric current thereto. When the valve 10 is closed, the supply of air and abrasive to the nozzles 5 will be cut off.

To prevent the upward movement of the shells 1 from their holders 2, an overlying guard plate 12 is provided for each shell. Each guard plate 12 is supported by an upright arm 13 to which it is clamped by means of bolts 14. By means of this clamping attachment, the guard plates 12 can be adjusted vertically so that they closely overlie the shells.

The lower ends of the upright arms 13 are secured to a rotatably mounted shaft 11. The ends of the shaft 11 are rotatable in bearings 15 mounted upon the casing 3. A handle 18 projecting forwardly of the machine enables the operator to rotate the shaft 11, and thereby swing the upright arms 13 rearwardly away from the shells 1. This will carry the guard plates 12 away from their position overlying the shells to the position shown in dotted lines in Fig. 2. With the guard plates 12 so displaced, the cleaned shells may be removed from their holders 2 and other shells to be cleaned may be placed within the shell holders.

Secured to the shaft 11 is a mercury switch 16. When the shaft 11 is rotated to bring the arms 13 to their upright position and locate the guard plates 12 over the shells 1, the mercury switch 16 will be in its circuit closing position. When the shaft 11 is rotated to remove the guard plates 12 from their position overlying the shells 1, the mercury switch 16 will be opened.

The mercury switch 16 is located in series with the solenoid of the solenoid valve 10, as is shown in Fig. 5. A timing device 17 may also be located in series in this circuit. This circuit will receive current from a power line, as is also indicated in Fig. 5.

As is apparent from Fig. 5, the solenoid valve 10 can be energized to open the valve in the air conduit 9 only when the mercury switch 16 and also the timing device 17 are in their circuit closing positions. It is consequently impossible for the nozzles 5 to be blasting at the time that the guard plates 12 are in their displaced position, inasmuch as the mercury switch 16 will be opened at this time and solenoid valve 10 will therefore be closed.

In operation, the operator places the shells 1 to be cleaned within their respective holders 2 and then turns the shaft 11 to the position to bring the guard plates 12 over the shells. This automatically closes the mercury switch 16. The timing device 17 is then set to blast the shells for the desired length of time, and blasting will then start.

If during this blasting operation an attempt is made to remove one of the shells, the blast will at once be cut off due to the necessary movement of the guard plate 12 away from its position over the shell in order to permit such removal of the shell. Inasmuch as a shell can be removed only by first rotating shaft 11 to move the guard plates 12, to their displaced position, the mercury switch 16 will necessarily be opened and blasting will cease before removal of the shell can be accomplished.

The invention is also of importance because the force of a strong blasting stream may lift one or more shells 1 from their holders. Such a lifting of a shell will break the seal between it and its holder, and allow the escape of abrasive from the cabinet. If such a lifting of the shell occurs, the shell will strike its overlying guard plate 12 and thereby swing the shaft 11 to such a position that mercury switch 16 will be opened. This will cause the blast stream to be automatically shut off so that abrasive will not be discharged outwardly from the blast cabinet and into the surrounding room.

I claim:

1. The combination with a blasting machine having a cabinet, a seat for receiving an article to be blasted, a blast nozzle for directing a blast stream through said seat, and a valve controlled conduit supplying air under pressure to said nozzle, of a guard element normally occupying an active position over an article upon said seat which is being cleaned, a support for said guard element for permitting its movement from its active position to a displaced position which will permit removal of said article, and means connecting said support and the valve in said conduit to shut off the flow of air to said nozzle when the support is moved to bring the guard element to its displaced position.

2. The combination according to claim 1 in which the valve in said conduit is electrically controlled, and said means connecting the support and the valve includes an electric switch operated by said support and a circuit connecting said switch to said valve.

3. The combination with a blasting machine having a cabinet, a seat for receiving an article to be blasted, a blast nozzle for directing a blast stream through said seat, a conduit supplying air under pressure to said nozzle, and a solenoid actuated valve in said conduit, of a guard element normally occupying an active position over an article upon said seat which is being cleaned, a rotatably mounted shaft by which the guard element is supported for permitting movement of the guard element from its active position to a displaced position which will permit the removal of said article, an electrical switch actuated by movement of said shaft, a circuit connecting said switch to said solenoid, said switch serving to close said circuit when the shaft is in position to locate the guard element in its active position and to break the circuit when the shaft is turned to locate the guard element in its displaced position.

4. The combination with a blasting machine having a cabinet, of a plurality of seats for receiving articles to be blasted, said seats being disposed in a line, a blast nozzle for directing a blast stream through each of said seats, a conduit supplying air under pressure to all of said nozzles, a solenoid actuated valve in said conduit, of a guard element normally occupying an active position over each of the articles upon said seats which are being cleaned, a common shaft supporting all of said guard elements for moving them in unison from their active position over the articles being cleaned to a displaced position which will permit removal of the articles, an electric switch supported by said shaft, and an electric circuit connecting said switch to said solenoid operated valve, said switch serving to close said circuit when the guard elements are in their active position and being movable with said shaft to a circuit opening position when the guard elements are moved to their displaced position.

HARRY R. ZIMMERMAN.