C. A. WOODBURY.

SHELL FILLING APPARATUS.

APPLICATION FILED NOV. 2, 1916.

1,329,565. Patented Feb. 3, 1920.

Fig. 1

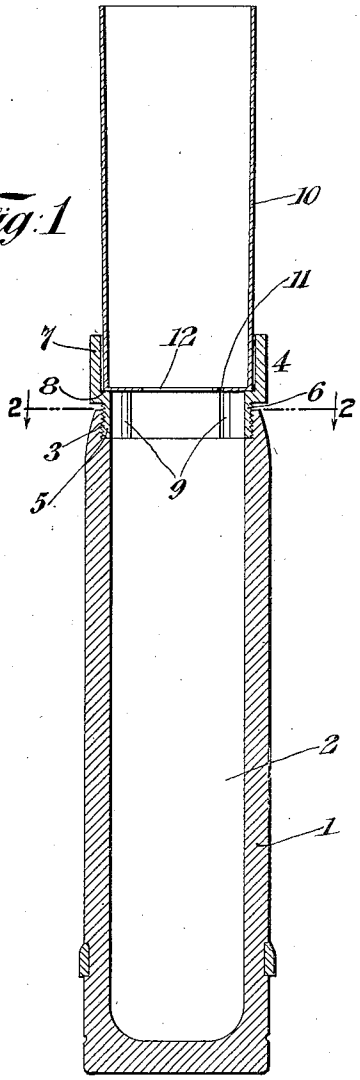
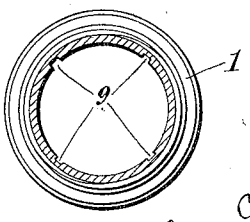


Fig. 2



Inventor

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By his Attorneys

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UNITED STATES PATENT OFFICE.

CLIFFORD A. WOODBURY, OF MIDDLETOWN TOWNSHIP, DELAWARE COUNTY, PENNSYLVANIA, ASSIGNOR TO E. I. DU PONT DE NEMOURS AND COMPANY, OF WILMINGTON, DELAWARE, A CORPORATION OF DELAWARE.

SHELL-FILLING APPARATUS.

1,329,565. Specification of Letters Patent. Patented Feb. 3, 1920.

Application filed November 2, 1916. Serial No. 129,058.

To all whom it may concern:

Be it known that I, CLIFFORD A. WOODBURY, of Middletown township, in the county of Delaware, and in the State of Pennsylvania, have invented a certain new and useful Improvement in Shell-Filling Apparatus, and do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to an apparatus for facilitating the filling of shells.

The object of my invention is to provide an apparatus of this character by means of which shells may be conveniently filled with an explosive charge, as for example, trinitrotoluene or picric acid. A further object is to provide means whereby the shells may be entirely filled when the explosive charge solidifies, notwithstanding the contraction of the latter which takes place upon solidification. A further object is to provide a filling means whereby the excess of material used in the filling operation may be readily detached from the charge of the explosive, which is allowed to remain in the shell. A further object is to protect the screw-thread in the shell so as to prevent the explosive entering the same. A further object is to fill the shell in such a manner that the body of explosive contained therein may be thereafter bored to form the primer opening without danger of the explosive charge rotating in the shell. A further object of my invention is to provide an apparatus of this character in which the parts are so arranged as to prevent the accumulation of bubbles of air in the upper portion of the charge of explosive in the shell.

While my invention is capable of embodiment in many different forms, for the purpose of illustration I have shown only one form thereof in the accompanying drawings, in which—

Figure 1 is a vertical section of an apparatus made in accordance with my invention shown as applied to a shell; and

Fig. 2 is a horizontal section taken through the same on line 2—2.

In the drawings I have shown a shell 1 having a cavity 2 to be filled with an explosive charge as, for example, trinitrotoluene or picric acid. The cavity 2 has, at the mouth of the shell, a screw-thread 3 in which there is fitted an adapter 4 having a lower cylindrical portion 5 provided with a screw-thread 6 fitting in the screw-thread 3, and an upper cylindrical portion 7 of larger diameter, providing a shoulder 8 on the interior of the adapter. On the interior of the lower portion 5 of the adapter there are provided a number of vertical grooves 9 to receive the explosive so that thereafter when the body of explosive is drilled to produce the primer opening, the body of explosive will not rotate in the shell during the drilling operation. In the upper portion 7 of the adapter there is loosely received a pouring cylinder 10 the upper portion of which may have a slightly larger diameter than the lower portion thereof. The lower end of the cylinder 10 has an inwardly-directed flange 11, provided with a central circular opening 12, said flange 11 being adapted to be supported upon the shoulder 8.

In the operation of my invention, the adapter 4 is screwed into the shell 1, after which the pouring cylinder 10 is inserted into the upper portion of the adapter 4 in such a manner that it rests upon the shoulder 8. A body of the molten explosive as, for example, trinitrotoluene or picric acid, is now poured into the pouring cylinder 10, and it flows downwardly until the cavity 2 is filled, and the body of explosive extends well above the opening 12. Any air bubbles which may rise in the body of molten explosive will pass above the upper end of the shell 1, as the flange 11 on the pouring cylinder 10, where the bubbles accumulate if at all, is above the upper end of the shell 1. The body of explosive cannot reach the screw-thread 3 as it is covered by the adapter 4. The hardening or solidification of the explosive charge in the shell is accompanied by shrinkage. This shrinkage would naturally produce a cavity in the top of the charge in the shell unless some provision is made to supply more molten explosive to take care of the shrinkage. The pouring head of explosive located above the shell and contained in cylinder 10, serves to supply the explosive necessary to take care of the shrinkage. The pouring head of explosive in the cylinder 10 can now be readily severed from the body of explosive in the cavity 2 by a slight lateral movement of the cylinder 10 with regard to the shell 1, so as to sever the two

portions of the explosive at the opening 12. The pouring head of the explosive in the cylinder may now be readily removed from said cylinder by longitudinal pressure through the opening 12, inasmuch as the taper in the cylinder 10 allows the pouring head to readily advance along said cylinder 10. After the pouring head has been removed in this manner, the body of explosive in the shell 1 may be readily drilled so as to provide an opening for receiving the primer, and during the drilling operation the body of explosive in the cavity 2 will not rotate owing to the fact that it extends into the grooves 9. In the drilling operation the explosive is removed at least to the bottom of the thread 3 of the shell and the adapter protects the thread during the drilling operation. After the explosive has been drilled the adapter is removed from the shell. Although the apparatus is described above in connection with an adapter and pouring cylinder, it is to be understood that the shells may be filled if desired by the use of the adapter alone or the pouring cylinder alone, and that it is not necessary in every instance for the adapter and pouring cylinder to be used simultaneously.

While I have described my invention above in detail, I wish it to be understood that many changes may be made therein without departing from the spirit of my invention as defined in the following claims.

I claim:—

1. A shell filling device comprising a hollow receptacle having an inwardly projecting flange at its lower end and means to hold said receptacle in an open mouth of said shell.

2. A shell filling device comprising a hollow receptacle having an open upper end and an inwardly projecting flange at its lower end and means to hold said receptacle in an open mouth of said shell.

3. A shell filling device comprising an open ended hollow receptacle having an inwardly projecting flange forming a constricted opening at its lower end and means to hold said receptacle in an open mouth of a shell.

4. A shell filling device comprising a hollow adapter arranged to be fixedly secured in an open mouth of a shell and an internal longitudinal groove in said adapter.

5. A shell filling device comprising a hollow adapter arranged to be fixedly secured in an open mouth of a shell, an internal longitudinal groove in said adapter and an open ended hollow receptacle shaped to be supported by said adapter.

6. A shell filling device comprising a hollow adapter having an external thread arranged to cover an internal thread in an open mouth of a shell and a series of longitudinal internal grooves in said adapter.

7. A shell filling device comprising a hollow adapter having an external thread adapted to cover an internal thread in an open mouth of a shell, a series of longitudinal internal grooves in said adapter, an internal ledge in said adapter and an open ended hollow receptacle shaped to fit within said adapter and having an inwardly projecting flange arranged to rest on said ledge.

In testimony that I claim the foregoing I have hereunto set my hand.

CLIFFORD A. WOODBURY.

Witnesses:

MILO C. BURT,

O. P. ROBINSON.