July 28, 1936. J. F. BERTELING 2,048,677

METHOD AND APPARATUS FOR BLASTING

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Fig. 1.

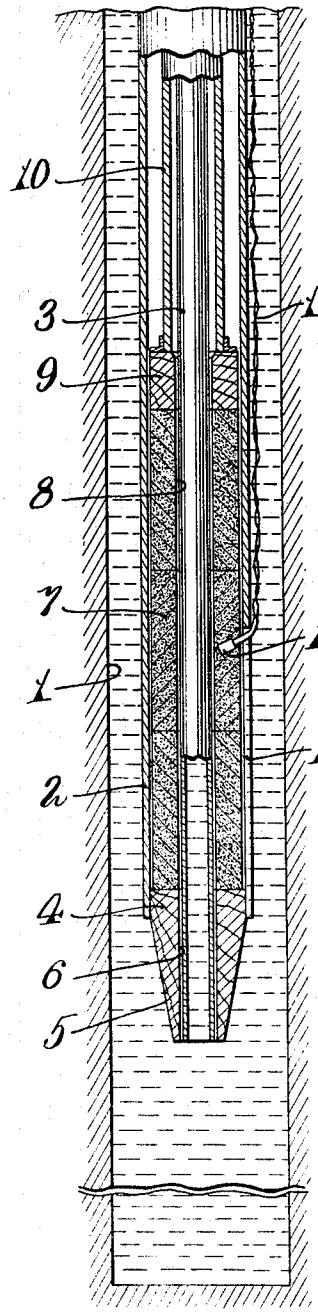


Fig. 2.

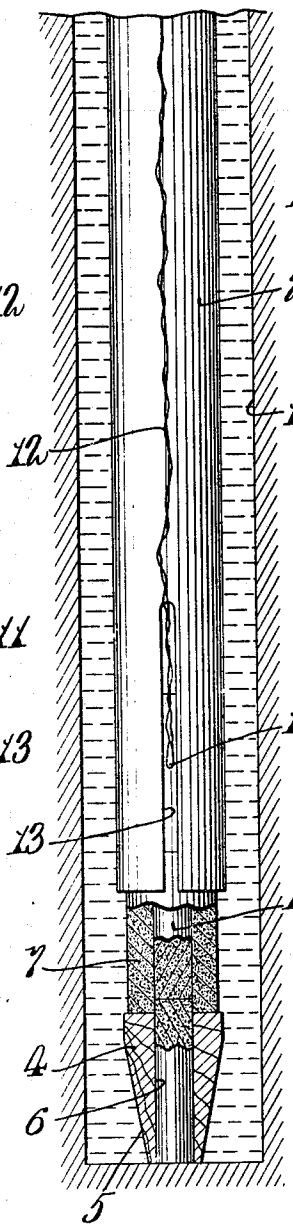
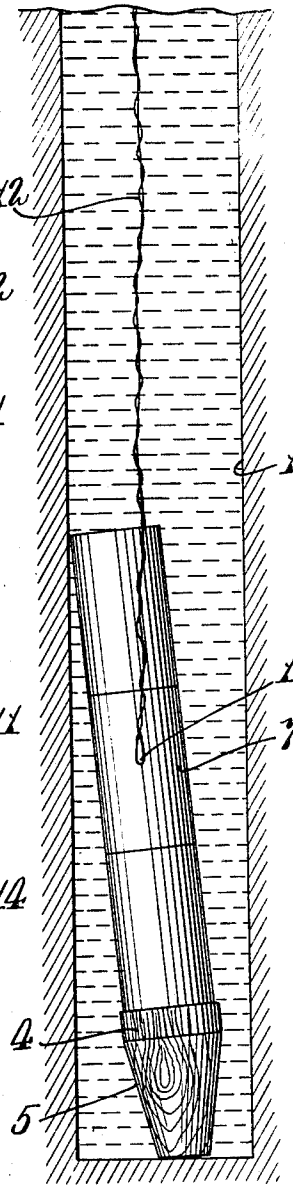


Fig. 3.



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METHOD AND APPARATUS FOR BLASTING

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13 Claims. (Cl. 102—5)

This invention relates to a method of and apparatus for blasting, and more particularly to a method of preparation for and apparatus for blasting in submarine drilling operations.

Heretofore, in submarine drilling and blasting operations, loading the blast holes has been found more difficult and time consuming than the actual drilling of the holes. Upon completion of a submarine drill hole, caving of the walls of the hole or from the top of the hole often occurs, and this caved material must be in some manner removed from the drill hole to permit the insertion of the loading tube within the drill hole. Frequently a wash pipe for conducting water under pressure is inserted within the drill hole to clean out the caved in material so that the loading tube can be inserted. It will thus be seen that due to the caving of the drill hole, two separate operations have been necessary before the actual blasting operation, namely the lowering of the wash tube to clean the hole and thereafter the lowering of the loading tube to permit insertion of the blasting charge within the bottom of the drill hole. As location of the hole is oftentimes troublesome, considerable time is lost.

An object of this invention is to provide an improved apparatus combining the washing tube with the loading tube so that when the loading tube is lowered into the drill hole the latter is simultaneously washed clean to permit insertion of the blasting charge within the bottom of the hole. Another object is to provide an improved blasting apparatus, especially designed for use in submarine drilling operations. Another object is the provision of an improved method of loading for submarine blasting. These and other objects and advantages of the invention will, however, hereinafter more fully appear in the course of the following description and as more particularly pointed out in the appended claims.

In the accompanying drawing there is shown for purposes of illustration one form which the invention may assume in practice.

In this drawing,—

Fig. 1 is a longitudinal section through a submarine drill hole showing the washing and loading tubes in position therein during the lowering of a blasting charge.

Fig. 2 is a view similar to Fig. 1 showing the blasting charge partially removed from the loading tube, the loading tube being shown in elevation.

Fig. 3 is a longitudinal section through the drill hole showing the blasting charge in position therein.

In this illustrative embodiment of the invention, the drill hole is indicated at 1, the loading tube at 2 and the wash water tube at 3. Pressed within the lower end of the loading tube is a wooden plug 4 having a conical lower end 5 and a central opening 6 for receiving the lower end of the water tube 3. Arranged within the loading tube 2 above the bottom plug are a number of large sticks of dynamite 7 having extending centrally therethrough openings 8 through which the water tube 3 extends in the manner shown in Fig. 1. A wooden piston or plunger 9 is slidable in the loading tube around the wash water tube and engages the upper end of the dynamite sticks. A plunger actuating element, herein in the form of a pipe 10, passes down through the loading tube and is secured to the upper end of the wooden plunger 9, the water tube 3 extending centrally downwardly through the pipe 10. The igniter 11 for the dynamite sticks has connected thereto blasting wires 12 extending through a longitudinal slot 13 formed in the loading tube 2.

In Fig. 1 of the drawing the blasting apparatus is shown in position in the drill hole, and as the apparatus is lowered within the hole the tapered end of the wooden plug 4 tends to guide and centralize the apparatus. As the apparatus is lowered within the drill hole, water under pressure is pumped down through the wash tube 3 and the caved-in material filling the bottom of the drill hole is washed upwardly around the loading tube 2 and from the hole. When the loading tube reaches the bottom of the hole, the wash water may be turned off and the tube 3 withdrawn if desired, and then, with the plunger 9 held stationary, the loading tube 2 may be moved upwardly relative to the plunger to release the dynamite from the loading tube. The longitudinal slot 13 in the loading tube permits freeing of the igniter wires from the loading tube as the latter is withdrawn upwardly. After the water tube and loading tube have been withdrawn, a tamping operation may be resorted to if the nature of the charge permits and it is found desirable. Tamping is, however, unnecessary.

It will be evident that if desired, instead of conducting the wash water down through the water pipe 3, the wash water may be pumped down through the drill hole between the walls of the hole and the loading tube to the bottom of the drill hole, and the caved-in material or water may flow from the hole upwardly through the central water tube 3. It will also be noted that if desired, upon removal of the central water tube 3, small dynamite sticks 14 (shown in Fig. 2) may be in-

serted down through the plunger actuating pipe 10 to fill the holes 8 in the large dynamite sticks 7, before freeing the blasting charge completely from the loading tube 2. Under certain conditions, it is possible to lower the tubes and blasting charge to a position somewhat above the bottom of the hole and thereafter force the plunger 9 downwardly relative to the tube 2 and 3 to press the charge down through soft mud in the hole to the bottom of the latter. It will still further be noted that the wooden plug 4 and dynamite sticks 7 of the blasting charge may be enclosed in a separate metal cover or if desired the elements may be connected by a separate metal tube extending through the plug and dynamite sticks and surrounding the loading tube 2.

As a result of this invention, it will be noted that an improved method and apparatus for blasting in submarine drilling operations are provided wherein the means for washing the drill hole and for lowering the blasting charge into the drill hole are combined into a single unit, thereby permitting washing of the hole and lowering of the loading tube in a single operation. These and other uses and advantages of the invention will, however, be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

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

1. A method of preparation for blasting in submarine drilling operations comprising lowering a loading tube into a drill hole, washing the hole during lowering of the loading tube by effecting a continuous opposite flow of fresh and burdened wash water on opposite sides of the wall of the loading tube, removing the blasting charge from the loading tube while said water flow continues, and thereafter withdrawing the loading tube and wash water conducting means from the drill hole.

2. A method of preparation for blasting in submarine drilling operations comprising lowering of a loading tube within the drill hole, simultaneously maintaining a circulation of washing fluid down through the loading tube and upwardly externally of the latter during lowering of the latter, and thereafter removing the blasting charge from the loading tube.

3. A blasting apparatus for use in submarine drilling operations comprising a loading tube adapted to be lowered within the drill hole, means for simultaneously conducting washing fluid around the loading tube and back through the latter during lowering of the latter, and means for thereafter removing the blasting charge from the loading tube.

4. A method of preparation for blasting in submarine drilling including the step of lowering a series of hollow explosive rings into a drilled hole while effecting washing by operations involving a flow of liquid within the space included in the bores of said rings.

5. A method of preparation for blasting in submarine drilling including the steps of lowering a series of hollow explosive rings into a drilled hole while effecting washing by operations involving a flow of liquid within the space included in the bores of said rings, and then filling the space within said bores with further explosive.

6. In a blasting apparatus, a loading tube, a concentric wash water tube, and a blasting charge carried within the lower end of the loading tube and through which the wash water tube extends.

7. In a blasting apparatus, a loading tube, a concentric wash water tube, a blasting charge carried within the lower end of the loading tube and through which the wash water tube extends, and a plunger extending down through the loading tube for forcing the blasting charge from the loading tube.

8. An apparatus for blasting comprising concentric outer and inner loading and wash water tubes, spaced plugs arranged within the loading tube around the wash water tube, and hollow dynamite sticks arranged within the loading tube between the plugs.

9. An apparatus for blasting comprising concentric outer and inner loading and wash water tubes, spaced plugs arranged within the loading tube around the wash water tube, and hollow dynamite sticks arranged within the loading tube between the plugs, said wash water tube extending centrally through said plugs and hollow dynamite sticks.

10. In a blasting apparatus, means for circulating wash water in the drill hole during lowering of a blasting charge in the latter including a wash water conducting means lowerable into the hole, and means coaxial with and movable with said wash water conducting means for lowering the blasting charge into the drill hole.

11. In a blasting apparatus, a loading tube carrying a blasting charge, and means inside said loading tube for circulating wash water in the drill hole during lowering of the blasting charge therein.

12. In a blasting apparatus, a plurality of concentric tubes cooperating with a drilled hole to form a series of thin substantially concentric passages, an explosive charge in one of said passages, said other passages providing for oppositely moving columns of fresh and burdened wash water, and means for effecting release of said charge from said first mentioned passage when at the bottom of such drilled hole.

13. In a blasting apparatus, a wash water tube for conducting wash water to a drill hole, a series of hollow explosive rings surrounding said tube adjacent the lower end thereof, means for positioning said rings during lowering of the tube, and means for effecting separation of said rings with respect to the lower end of said wash water tube when said rings have been lowered to the desired position.

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