Aug. 10, 1965 O. A. GARDNER 3,199,399

SHOT HOLE LOADING DEVICE

Filed May 17, 1963 2 Sheets-Sheet 1

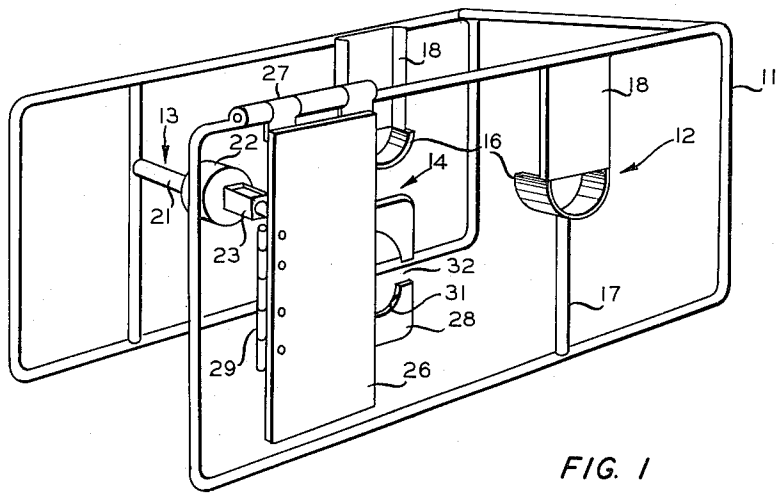


FIG. 1

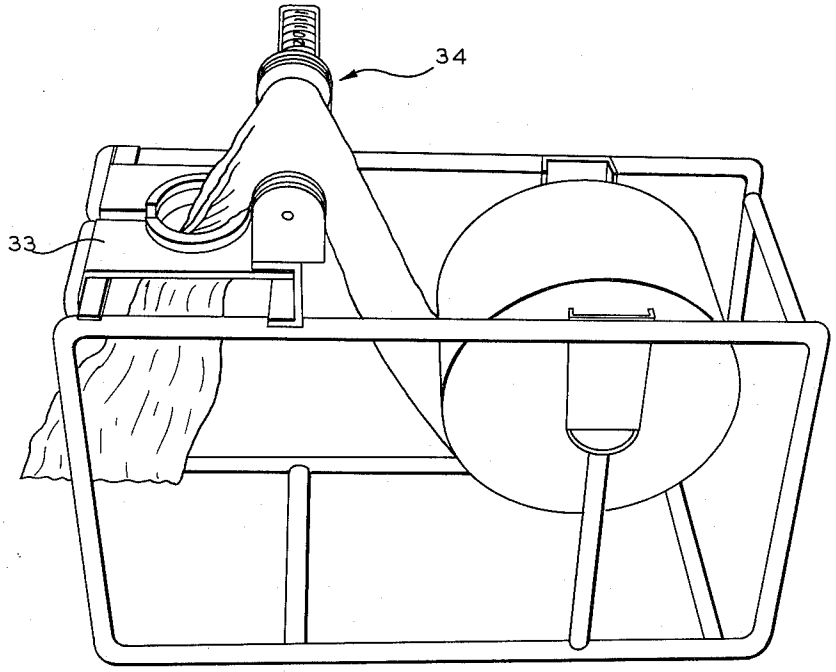


FIG. 2

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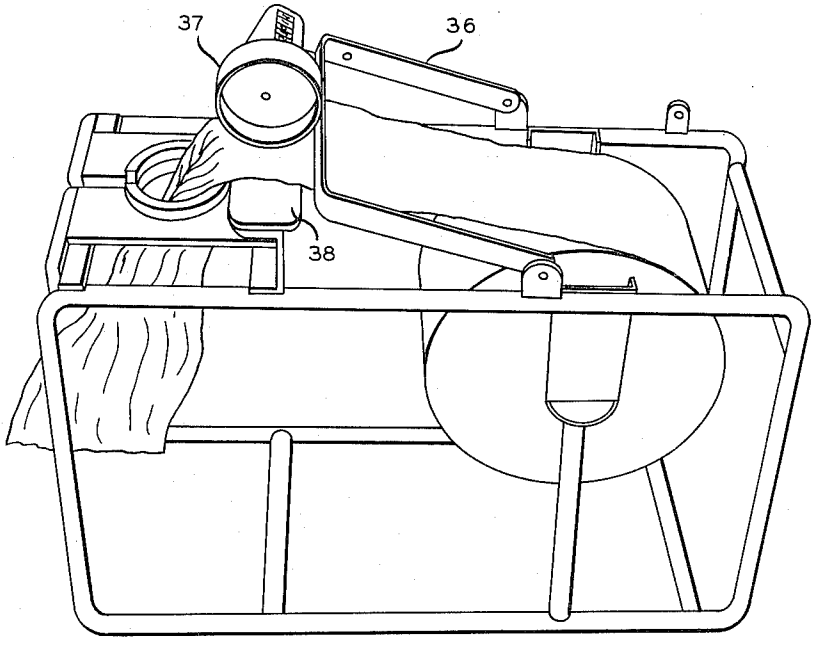


FIG. 3

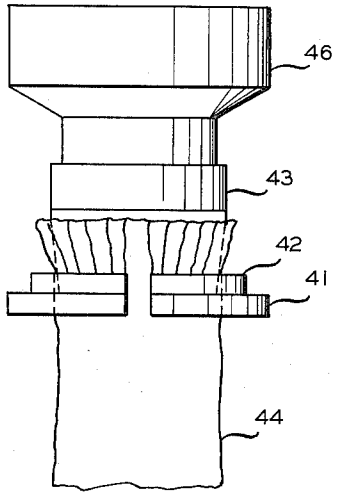


FIG. 4

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SHOT HOLE LOADING DEVICE

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1 Claim. (Cl. 86—20)

This invention relates to preparing a shot hole for blasting. In one aspect the invention relates to a method for lowering a plastic tube liner into a shot hole. In another aspect the invention relates to apparatus for lowering a plastic liner into a drilled hole.

Drilled shot holes or blast holes frequently are used in seismic exploration as well as in mining operations. Ammonium nitrate plus a sensitizer forms a very efficient and inexpensive explosive for such use. A very practical way to load such a hole with this type of explosive is to pour particles of the explosive into the hole and place a detonating charge or timer and suitable tamping material if desired. However, such explosive is water sensitive and, if the hole contains water or if water seeps in from the surrounding formation, proper detonation may be prevented. A plastic tube can be used to line such a hole to protect the water-sensitive explosive.

An object of my invention is to prepare a shot hole for blasting.

Another object of my invention is to lower a plastic liner into a drill hole and place a granular explosive inside the liner.

Another object of my invention is to provide apparatus for placing a plastic liner into a drill hole, inserting a detonator wire and removing the apparatus prior to blasting without cutting the wire.

Other aspects, objects and advantages of my invention are apparent in the written description, the drawing and the claim.

According to my invention, means are provided for lowering a plastic liner into a well bore, placing granular explosive in the tubing, placing a detonator wire in the tubing, and removing the means from the tubing without breaking the wire, comprising a frame which supports a reel for the tubing, counting means to measure the length of tubing placed in the hole and a supporting head or plate, having a hole through which the upper end of the tubing extends and into which the tubing is held by a cylindrical wedge through which the explosive is poured into the tubing, and having a slot through which the detonator wire can be removed to permit removal of the apparatus prior to blasting.

Further, according to my invention there is provided a method for preparing a shot hole for blasting comprising lowering a tubing past counting means for determining the length of tubing, severing the upper end of the tubing and supporting the severed end in an opening in a support plate by means of a cylindrical wedge, pouring granular explosive into the tubing through the annular wedge, placing a detonator wire in the tubing, pouring additional explosive into the tubing, removing the wedge and removing the wire and tubing from the plate.

In the drawing, FIGURE 1 is a diametric view of an apparatus according to my invention.

FIGURE 2 is a diametric view of another embodiment of my invention.

FIGURE 3 is a diametric view of still another embodiment of my invention.

FIGURE 4 is a vertical elevation of a portion of the apparatus showing a plastic liner held at the surface in position for placing granular explosive therein.

The apparatus of FIGURE 1 includes a frame **11**, reel supporting means **12**, counter means **13**, and support plate assembly **14**. Reel supporting means **12** comprises

a pair of bearings **16**, a pair of support rods **17**, and aligning and reinforcing plates **18**, preferably welded together and to frame **11**, thus forming guide and support means for a reel, not shown in this figure. Counter means **13** comprise a supporting shaft **21**, a wheel **22** over which the plastic tubing rides while being lowered in the hole and a counter mechanism **23** driven by wheel **22** and preferably co-ordinated with wheel **22** to read in feed. For example, if the circumference of wheel **22** is one foot, then each revolution of wheel **22** is counted as one unit by counter **23**. Support plate assembly **14** includes a support member **26**, hinged to frame **11** by hinge **27**, and a support plate **28** hinged to member **26** by hinge **29**. As illustrated, the assembly has been moved away from its operative position. When in use, the entire assembly is swung around hinge **27** and over the top of frame **11**, member **26** being long enough to rest on the opposite side of frame **11**, thus providing a rigid support for the assembly. Plate **28** is then swung around hinge **29** to extend forward of member **26**. Plate **28** is provided with an opening **31** having a slot **32** therein extending to the periphery of plate **28**.

In operation of the apparatus of FIGURE 1, a reel of plastic tubing is placed in reel support means **12** and the tubing extended over wheel **22** and lowered into the hole. When the desired length of tubing has thus been extended into the hole, preferably with its lower end closed and with a weight provided therein, the tubing is severed. Assembly **14** is swung in place over the top of frame **11** and plate **28** extended forward. The severed end of the tubing is pulled through the hole **31** and held in place with a cylindrical, hollow wedge. The support of the tubing in the hole by means of a cylindrical wedge is illustrated in FIGURE 4 and described below. With the wedge in place, an amount of the particulate granular explosive is poured into the tubing. Subsequently, the wedge is lifted to permit the installation into the top of the tubing of a suitable detonation or primer device with its associated detonator wire. If it is desired to place additional explosive, the detonator wire is drawn into slot **32**, still within the tubing, and the wedge reinserted. When the desired amount of explosive has been placed the wedge is removed, thus permitting the tubing to be removed from plate **28**, the detonator wire passing through slot **32** for complete disengagement.

In the apparatus of FIGURE 2, the frame and reel support means are substantially the same as those illustrated in FIGURE 1. The support plate **33** is fixed in place on the frame, and the counter assembly **34** also fixed in place in the proper location to permit the tubing to be lowered over counter assembly **34** and through the opening in plate **33**, the operation being substantially the same as that described with respect to FIGURE 1.

In FIGURE 3 the reel support means, frame and support plate are substantially the same as those shown in FIGURE 2. However, a hinged frame **36** is provided for the counter assembly **37** and a smooth support pad **38**, preferably of a self-lubricating material such as solid polyethylene, positioned so that, when it is desired to measure the tubing passing through the opening of the plate, the counter assembly **37** is swung in place on hinged frame **36** and presses down on the tubing so that the tubing turns a wheel of the counter assembly, the tubing sliding smoothly over pad **38**.

In FIGURE 4 a support plate **41**, which is similar in configuration to either support plate **28** or support plate **33**, is shown in horizontal position and is provided with a lip **42** surrounding the opening in which tubing is suspended. A cylindrical wedge **43** has been placed within the opening in plate **41**, thus pressing the opened severed end of tubing **44** in tight contact with the inner portion

of lip 42, to hold the tubing open and simultaneously support it. The explosive can be poured directly through wedge 43 or, if desired to simplify the operation, a funnel 46 can be provided.

In one embodiment, to simplify the operation, the wedge 43 also is provided with a slot and, when using this embodiment, it is not necessary to remove the wedge when installing the detonator wire since both the wedge and the support plate can be withdrawn, the wire passing through the slots. If it is used, the funnel 46 also can be provided with a slot although, for proper operation as a funnel, it is preferable to use an unslotted funnel and remove it when installing the detonator wires and pull the wires to one side when installing the funnel.

When using an unslotted wedge, the detonator wire can be run through the wedge if it is not inconvenient to strip the wedge over the wire after the explosive and detonator are in place.

Reasonable variation and modification are possible within the scope of my invention which sets forth method and apparatus for preparing a shot hole for blasting by lowering thereinto a protective, waterproof liner, and placing explosive and detonation means therein.

I claim:

Means for handling flexible tubing being lowered from a reel into a shot hole, comprising:

a supporting frame;

a pair of supporting bearings to rotatably support said reel;

a counter wheel which contacts said tubing while said tubing is being lowered into said hole to measure the length of said tubing;

a supporting member hinged to said frame to be swung into a horizontal position adjacent said hole; and

a plate, hinged to said supporting member to be swung into a horizontal position over said hole supported by said supporting member, said plate including an opening in which said tubing is supported in open position for filling, and an unobstructed slot connecting said opening with the periphery of said plate through which a detonator wire is removed from said opening.

References Cited by the Examiner

UNITED STATES PATENTS

755,300	3/04	Leick et al.	33—129
1,162,752	12/15	Colley	33—129
2,745,346	5/56	Aitchison et al.	
3,005,373	10/61	Ransom	102—22
3,064,572	11/62	Aitchison	102—23

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