Feb. 16, 1937. E. A. SMITH 2,071,047

APPARATUS FOR FORMING CONCRETE FOUNDATION COLUMNS

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Fig. 1

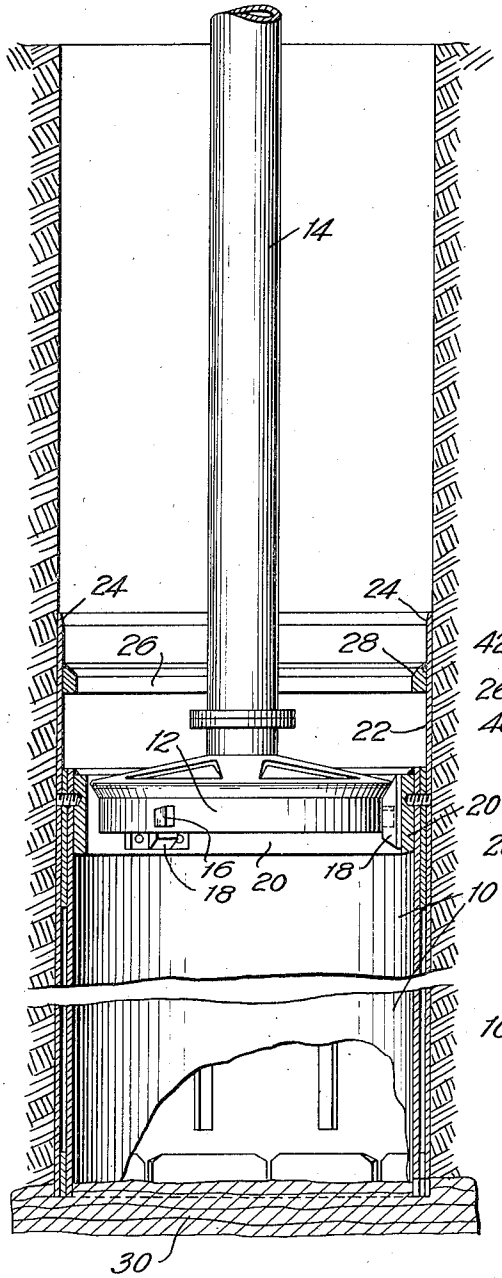
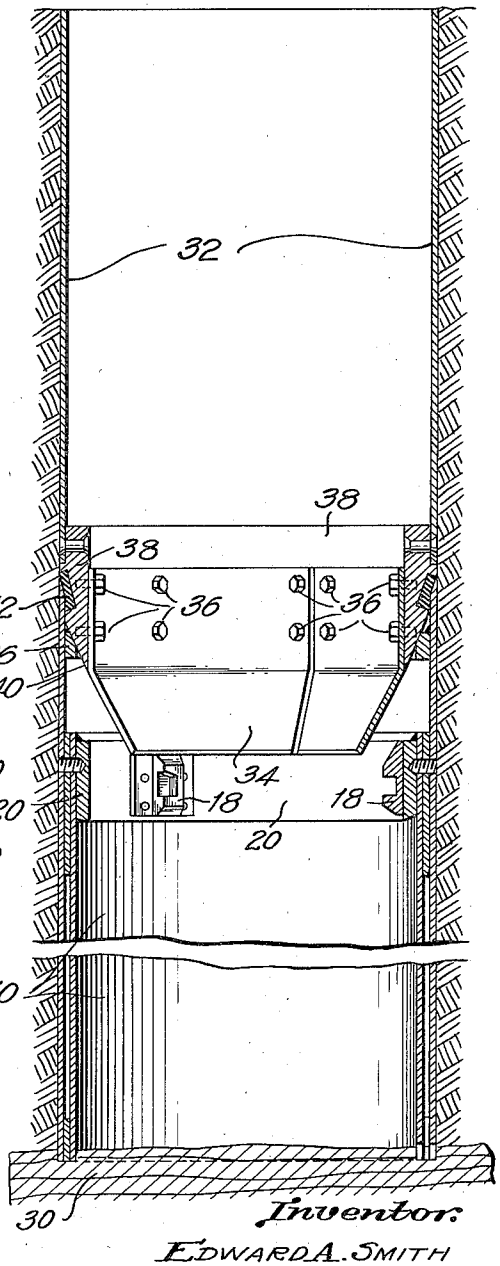


Fig. 2



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Fig. 3

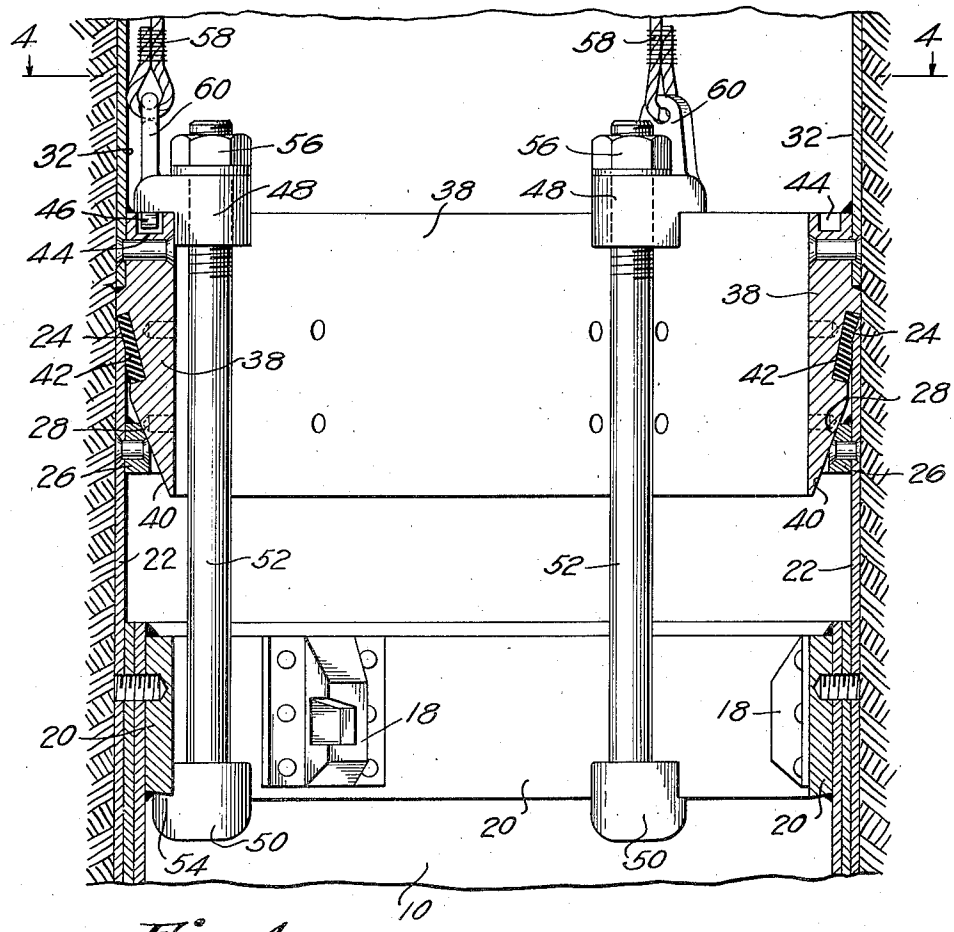
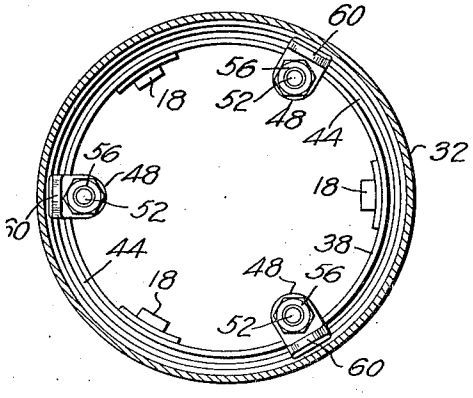


Fig. 4



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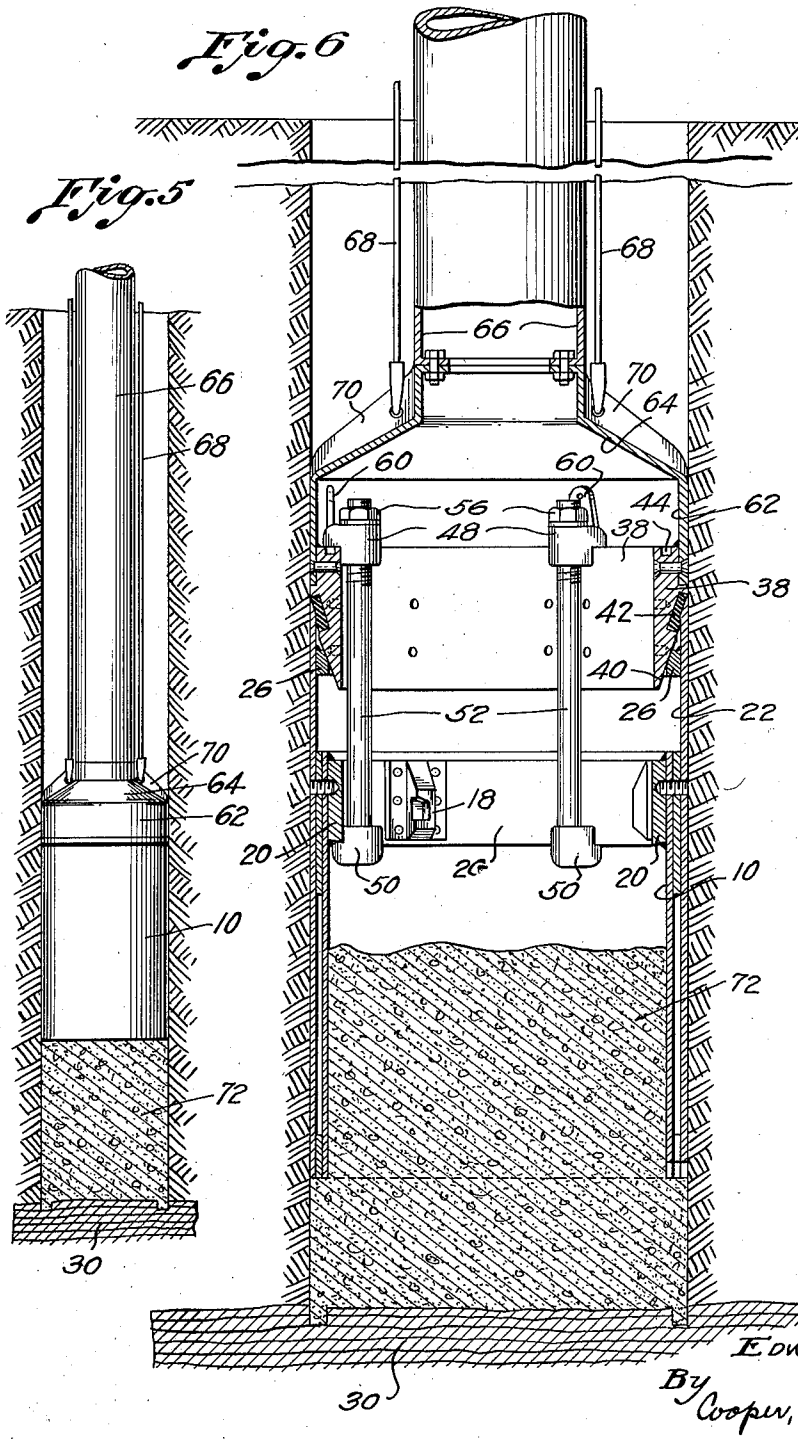
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Fig. 6

Fig. 5



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UNITED STATES PATENT OFFICE

2,071,047

APPARATUS FOR FORMING CONCRETE FOUNDATION COLUMNS

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Original application October 5, 1933, Serial No. 692,255. Divided and this application August 16, 1934, Serial No. 740,041

11 Claims. (Cl. 61—57)

This application is a division of my copending application, Serial No. 692,255, filed October 5, 1933, and pertains to improvements in apparatus for forming concrete columns, as disclosed in Hart and Schroeder Patent No. 1,931,845.

In that disclosure the hole in the ground is sunk by means of an annular drill or core cutter which forms the lower section of the casing for the mold, the upper casing section following the lower section down into the hole as the drilling proceeds.

The present invention contemplates keeping the upper casing section out of the hole until the lower section comprising the drill has reached the desired depth, then lowering the upper section into watertight relationship with the lower section so that the hole may be pumped out and inspected, after which the hole is filled with concrete to form the column, the casing sections being either left in the hole to become part of the column, or withdrawn during or after the pouring of the concrete.

Further and other objects and advantages will be apparent from the specification and claims, and from the accompanying drawings which illustrate what is now considered the preferred embodiment of the invention.

Fig. 1 shows the annular drill in position after drilling has been finished and before removal of the driving head and shaft.

Fig. 2 is the same as Fig. 1 after the driving head has been removed and the upper section of the casing has been lowered into position on the lower section, the conical guide ring being still attached to the bottom of the upper section.

Fig. 3 is an enlarged detail showing clamps for locking upper and lower casing sections together, and the hoisting cables.

Fig. 4 is a view on line 4—4 of Fig. 3.

Fig. 5 illustrates a modification in which the casing is of reduced diameter with reference to the cutter, the casing and cutter being partially withdrawn.

Fig. 6 is an enlarged sectional view of Fig. 5.

In the drawings (Fig. 1) 10 designates a drill barrel of the type disclosed in the above mentioned Hart et al application. 12 is the drive head and 14 is the hollow drive shaft. The drive head has ears 16, adapted for automatic engagement or disengagement with lugs 18 welded or riveted to a steel ring 20 integral with the drill barrel. The outer shell of the drill is extended upwardly above ring 20 to form a skirt 22 with its upper edge beveled as at 24 and having an internal circumferential ring 26 having its upper edge beveled as at 28 to form a conical seat.

Fig. 1 shows the above mechanism at the completion of the drilling operation, with the hole and drill barrel full of mud, or mud-laden fluid (not shown) which prevents caving of the unlined hole above the drill, the mud usually consisting of earth loosened by the drill and water fed to the drill. Under certain circumstances mud-laden fluid is even fed to the drill to act as a cutting agent. The cutting edge of the drill has penetrated into rock 30, and the drive head and drive shaft are in operative position.

Fig. 2 shows the layout after head 12 and shaft 14 have been removed and the upper section of casing 32 has been lowered through the mud. The lower end of casing section 32 is provided with a detachable sectional conical guide ring 34 secured by bolts 36 to a steel ring 38 integral with the upper casing. The lower outer surface of ring 38 is conical as at 40 to form a continuation of the outer conical surface of guide ring 34. Set into the outer surface of ring 38, above its conical portion, is a ring 42 of rubber or other resilient packing. It will be observed that first ring 34, and then ring 38, engage the upper end of skirt 22 to align casing section 32 with the drill barrel, the conical portion 40 of ring 38 being seated on the conical seat 28 of ring 26 and the beveled edge 24 of the skirt being imbedded in packing ring 42, thus providing a fluid tight joint between the drill barrel and casing 32.

The mud-laden fluid is then pumped from the casing and drill barrel, after which a man is lowered into the casing to loosen bolts 36 so that guide ring 34 may be removed. Then any solids which have settled into the drill barrel are removed and the bottom of the hole (usually rock) is cleaned off for receiving the concrete. The hole may then be filled with concrete to form the column, leaving casing and drill barrel in place, or, if desired, the casing and barrel may be removed.

If removal of barrel and casing is desired, they are first clamped together as shown in Fig. 3. The upper surface of ring 38 is provided with sockets or a groove 44 (Figs. 3 and 4) to accommodate lugs 46 of upper clamp jaws 48 to prevent them from slipping out of place when the hoisting strain is applied. The lower clamp jaws 50 are heads of bolts 52 and have inclined lips 54 adapted to engage the beveled lower edge of ring 20. As many clamping bolts as may be needed are applied as in Figs. 3 and 4 and are

clamped tight by means of nuts **56**. Hoisting cables **58** are attached to upwardly extending ears **60** integral with upper jaws **48**. Then as the concrete is poured or after the pouring is completed, casing and drill barrel are withdrawn from the hole, in well known manner.

Although the drill barrel must always be the full diameter of the hole, the casing above the drill barrel may, under certain conditions, be of less diameter (Figs. 5 and 6). This is important from the standpoint of economy, because a single casing may be used with several sizes of drills. To connect the reduced-diameter casing to a core barrel an adapter may be used, having a short full-diameter section **62** with a conical roof **64**, to which is bolted the bottom section **66** of the reduced casing, which need only be of sufficient diameter to permit passage of a man and possibly a pump.

After the drill barrel and casing **66** are pumped out, the mud remains undisturbed above roof **64** and around the outside of casing **66**, thereby preventing caving of the walls of the hole.

When the reduced-diameter casing is used, the hoisting cables **68** may be attached to ribs **70** on roof **64**, to permit withdrawal of the drill and casing progressively as the concrete **72** is poured.

It is to be understood that the invention is not limited to the specific embodiment herein illustrated and described, but may be used in other ways without departure from its spirit as defined by the following claims.

I claim:

1. In apparatus of the class described, in combination, an annular drill, means for sinking said drill into the ground to form a hole in the ground, an annular casing, and means for automatically sealing the bottom of said casing to the top of said drill when said casing is lowered through the hole into contact with said drill.

2. In apparatus of the class described, in combination, an annular drill, means for sinking said drill into the ground to form a hole in the ground, an annular casing, and means for automatically sealing the bottom of said casing to the top of said drill when said casing is lowered through the hole into contact with said drill, said sealing means comprising a surface on the upper end of said drill adapted to engage a resilient packing ring on the lower end of said casing.

3. In apparatus of the class described, in combination, an annular drill, means for sinking said drill into the ground to form a hole in the ground, an annular casing, and means for automatically sealing the bottom of said casing to the top of said drill when said casing is lowered through the hole into contact with said drill, said sealing means comprising a conical seat on said drill and a surface on said casing adapted to engage said seat to form a tight joint therewith.

4. In apparatus of the class described, in combination, an annular drill adapted for forming a hole in the ground, an annular casing adapted to be lowered onto said drill in the hole to form with the drill a lining for the hole, and means for automatically guiding the lower end of said casing into alignment with said drill during the lowering operation.

5. The invention set forth in claim 4 in which said guiding means comprises an annular conical fitting attached to said casing, and a detachable conical ring attached to said fitting and adapted to guide said fitting into the top of said drill.

6. The invention set forth in claim 4 in which said drill has an upwardly extending skirt and said guiding means comprises an annular fitting attached to said casing and adapted to make a tight joint with said skirt.

7. The invention set forth in claim 4 in which said drill has an upwardly extending skirt and said guiding means comprises an annular fitting attached to said casing and having a resilient packing ring adapted to make a tight joint with said skirt.

8. In apparatus of the class described, in combination, an annular drill adapted for forming a hole in the ground, an annular casing adapted to be lowered onto said drill in the hole to form with the drill a lining for the hole, and means for clamping said casing and drill together.

9. In apparatus of the class described, in combination, an annular drill adapted for forming a hole in the ground, an annular casing of less diameter than said drill and adapted to be lowered into the hole formed by said drill, and an adapter member for joining the upper end of said drill to the lower end of said casing.

10. In apparatus of the class described, in combination, an annular drill adapted for forming a hole in the ground, an annular casing of less diameter than said drill, means for attaching the lower end of said casing to said drill, said casing extending upwardly from said drill, and means passing downwardly into the hole alongside said casing for withdrawing said drill and said casing from the hole.

11. In apparatus of the class described, in combination, an annular drill adapted for forming a hole in the ground, an annular casing of less diameter than said drill and adapted to be lowered into the hole formed by said drill, an adapter member on the bottom of said casing for automatically engaging the top of said drill to form a tight joint therewith, and means engaging said adapter for withdrawing said casing and drill from the hole.

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