Nov. 19, 1935. ST. JULIEN R. MARSHALL 2,021,735

CONCRETE PILE

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Fig. 1.

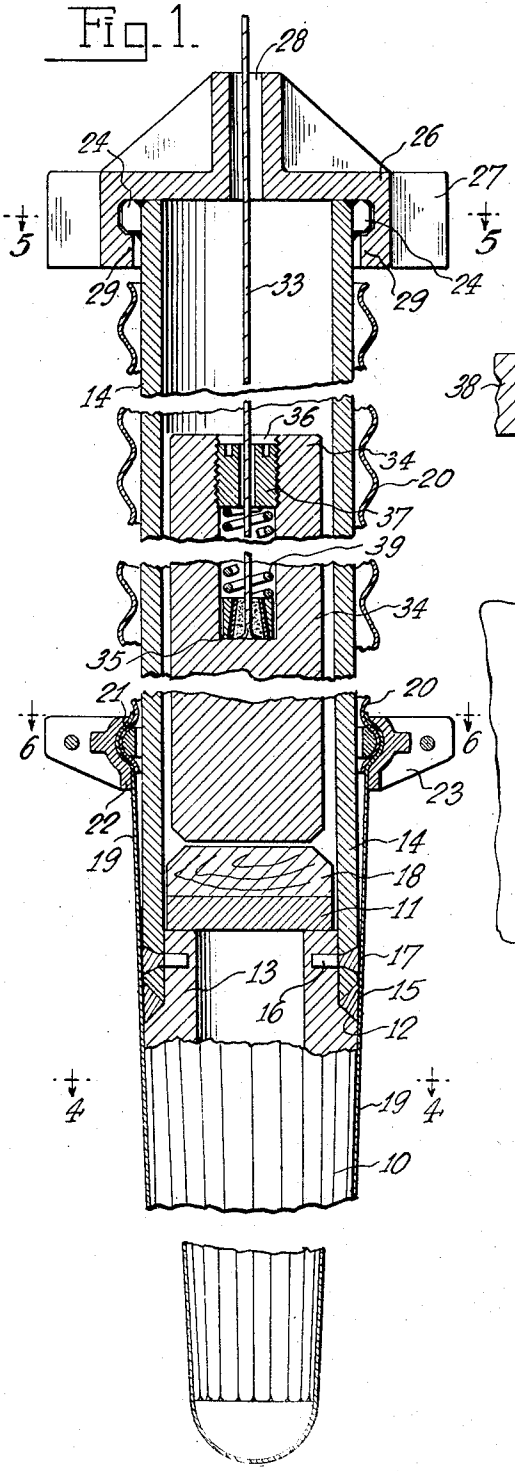


Fig. 2.

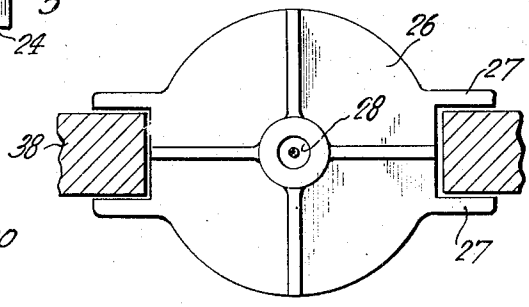


Fig. 3.

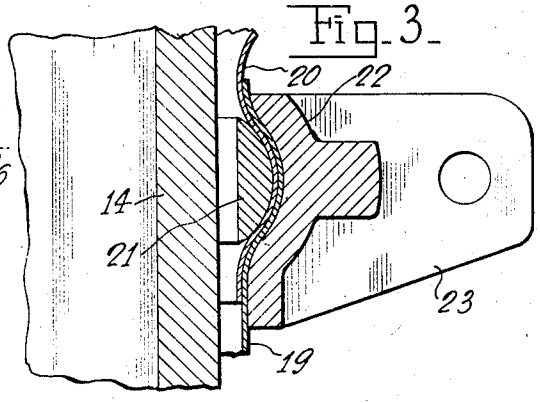
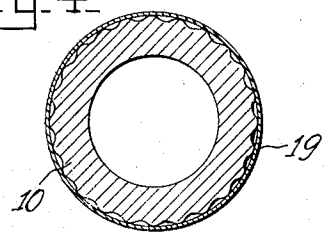


Fig. 4.



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Fig. 5.

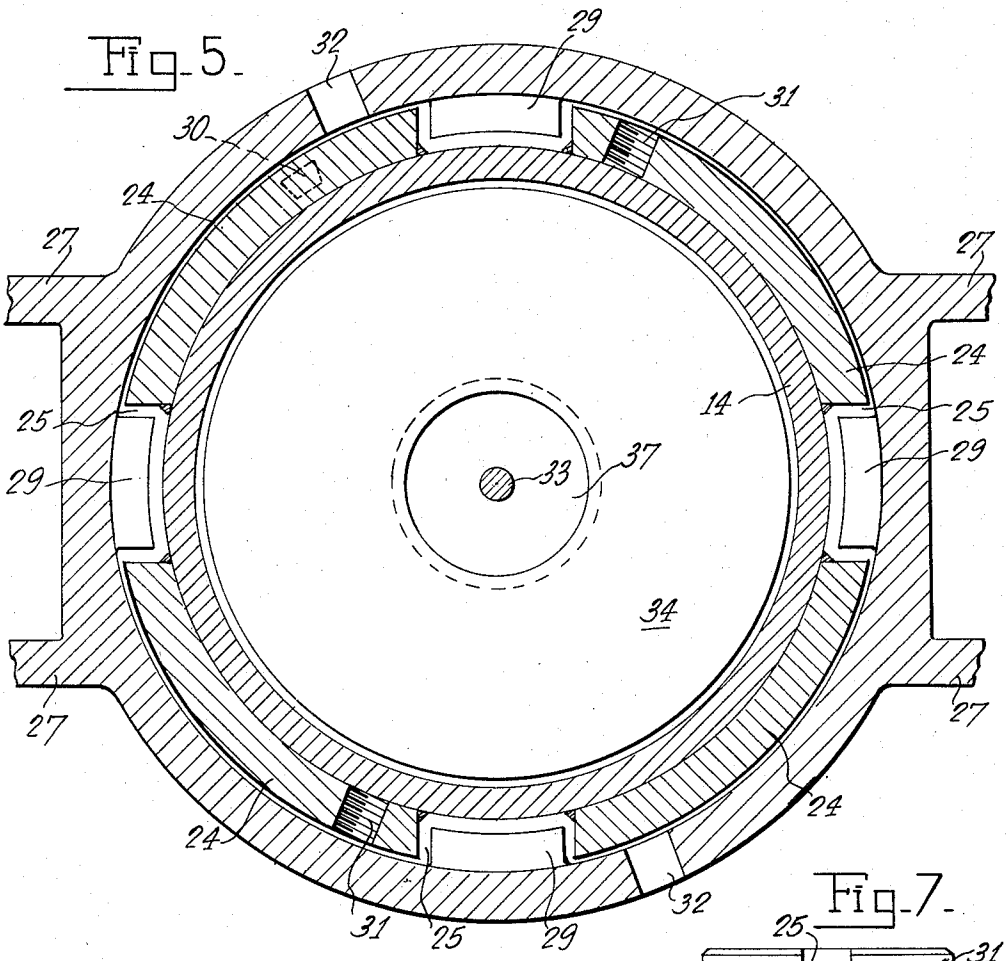


Fig. 6.

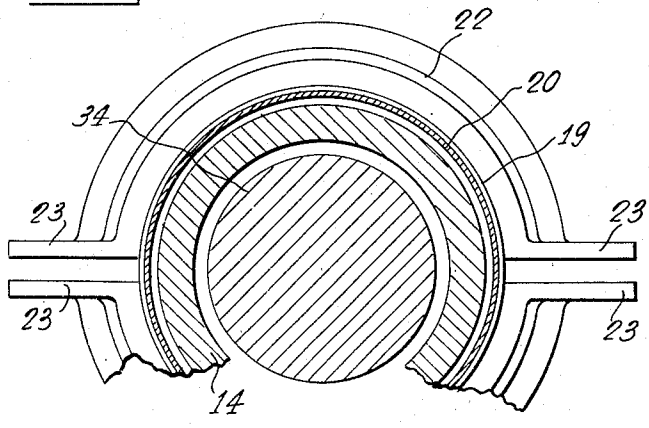
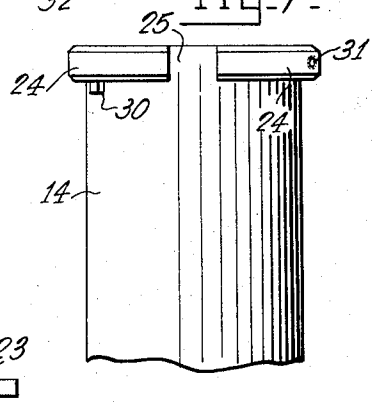


Fig. 7.



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UNITED STATES PATENT OFFICE

2,021,735

CONCRETE PILE

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Application July 21, 1934, Serial No. 736,324

5 Claims. (Cl. 61—78)

The main object of this invention is the provision of an improvement in so-called concrete piles for supporting buildings and the like, which are driven hollow into the ground and then filled with concrete or other filler.

Another object is the provision of such a pile with a tapering fluted mandrel which is inserted into the tapering conical pile shell to drive the shell into the ground, the channels between the fluted mandrel and the conical shell serving to reduce friction and permit air entry into the shell to facilitate extraction of the mandrel after the shell has been driven home.

A further object is the provision of a cylindrical hollow tube securely welded or otherwise attached to the upper end of the downwardly tapering mandrel, and a corrugated extension shell surrounding said tube and secured to the tapering pile shell by a widened joint which also serves as an anchor to the pile shell when the shell has been driven home into the ground.

Another object is the provision of a hammer for driving the shell into the ground, the hammer being reciprocally mounted within the afore-mentioned hollow tube, the latter having a removable cap which serves as a limit stop to the upward stroke of the hammer, the hammer being provided with resilient means located within a capped bore in the hammer to reduce the shock of the upward stroke against the cap during driving down of the shell and of the downward stroke against the mandrel during extraction of the mandrel from the shell.

A still further object is the provision of a cushioning means mounted between the mandrel and the hammer.

The invention consists of the above and other improvements which are set forth in detail in the following description, in which characters of reference refer to like-named parts in the drawings.

Referring briefly to the drawings, Figure 1 is an elevational view, with parts shown in section, of the assembled device.

Figure 2 is a plan view of the removable cap shown at the top of Figure 1.

Figure 3 is an enlarged view of one side of the lock joint between the mandrel and the corrugated shell.

Figure 4 is a cross-sectional view on the line 4—4 of Figure 1.

Figure 5 is an enlarged cross-sectional view taken on the line 5—5 of Figure 1.

Figure 6 is an enlarged cross-sectional view taken on the line 6—6 of Figure 1.

Figure 7 is an elevational view of the upper end of the cylindrical extension tube of the mandrel, with the cap removed.

Referring in detail to the drawings, the numeral 10 represents a hollow tapering mandrel having its surface fluted. A beveled shoulder 12 is provided near the top of the mandrel to form a neck or hub 13 of narrower diameter. A cylindrical steel extension tube 14 fits telescopically over the hub 13, and is tapered at its lower edge to provide a groove 15 between the shoulder 12 and the tube 14. These two members are welded together around this groove 15. Just above this groove a number of peripherally spaced-apart radial holes are provided on the hub 13, which are aligned with conical holes 17 in the shell 14. Pins 16 are set into the holes in the hub 13 with their head projecting into the conical holes 17, the union being sealed in the remaining spaces of the holes 17 by welding. A cushion block 18 of wood or other cushioning means rests on the disc 11.

The pile shell comprises the tapering shell 19 and the corrugated tube or extension shell 20. The upper periphery of the shell 19 and the lower periphery of the shell 20 are locked together by a joint shown in Figures 1 and 3. An internal split ring 21 in this joint on the inside and a grooved ring 22 on the outside provided with extending ears 23, locks these peripheries between them.

At its top the tube 14 is provided with four spaced-apart peripheral segments 24, rigid thereon, the spaces between the segments being indicated at 25. A cap 26 having ears 27 and a narrowed central opening 28, is provided with four lugs 29 spaced a quadrant apart from each other, which are adapted to slip through the spaces 25. In mounting the cap 26, after this has been done, the cap is given a fractional turn until one of the lugs 29 strikes the stop 30. In this position, the openings 32 in the cap 26 align with the threaded holes 31 in the shell 14, and screws are entered therein to lock the two parts together.

The hammer 34, which is suspended from a cable 33, is formed of a solid mass, and is provided with an axial threaded bore 36 at the top in which a worm block 37 is mounted. The latter is also provided with a central bore through which the cable 33 passes. The cable end is anchored in an annular block 35 by filling the block with lead, or in any other suitable way, the block 35 being slidable in the bore 36. A stout coiled spring 39 surrounds the cable 33 between the anchor 35 and the block 37.

In use, the mandrel and its cooperating parts

are inserted into the shell 19—20, and the whole is set in place by suspending the same from a boom over the spot into which the shell is to be driven. Vertical guides 38 are set up over this spot, and the ears 27 of the cap 26 are guided vertically by these guides. With the whole assembled as in Figure 1, the cable 33 is reciprocated by suitable means, not shown, and the hammer 34 reciprocates between the cap 26 and the cushion 11, the hammer being alternately raised to the cap as a limit and dropped. The spring 39 serves to lessen the shock against the cap on each stroke. When the shell 19—20 has been driven home, the ears 23 of the joint between the shells 19 and 20 serve as an anchor for the shell in the ground, and the corrugations on the shell 20 further serve to resist extraction of the shell. When the mandrel is to be extracted, the cable is operated so as to strike harder on its upward stroke against the cap, thus loosening the mandrel from the shell. During this operation the channels between the shell 10 and the fluted mandrel surface facilitate the extraction of the mandrel. When longer piles are to be driven, the length of the shell 20 may be increased, together with that of the tube 14, to the desired length. By thus having the upper portion of the pile cylindrical instead of conical, it is possible to drive in very long piles without obtaining too great a diameter at the top, which would be the case if the entire shell were tapered.

Obviously, modifications in form and structure may be made without departing from the spirit of the invention.

I claim:

1. A pile shell comprising a hollow tapering body adapted to penetrate the earth, a cylindrical extension tube extending upwardly from said body, and a lock joint locking said two members together, said lock joint having radial ears projecting outwardly therefrom to serve as an anchor when the shell has been driven into the ground.

2. In combination with a pile shell adapted to be driven into the ground, a fluted mandrel adapted to be inserted into said shell, the fluted surface of the mandrel providing air channels between the shell and the mandrel, a cylindrical extension tube firmly secured to and extending upward from said mandrel, a shoulder on said mandrel having a cushion thereon, a cap having extending guide ears and being removably mounted on the upper end of said tube, and a hammer slidably mounted within said extension tube.

3. In combination with a pile shell adapted to be driven into the ground, a mandrel adapted to be inserted into said shell, an extension firmly secured to and extending upward from said mandrel, a shoulder on said mandrel, a disk supported on said shoulder, a cap having an opening therein removably mounted on the open end of said extension tube, a hammer slidably mounted within said extension tube, a cable passing through said opening, said hammer having a threaded bore therein, a screw cap threadably engaging said bore and having a hole therein, said cable passing through said hole, a block slidably mounted in said bore having the end of said cable anchored therein, and a spring surrounding said cable between said screw cap and said block.

4. In combination with a pile shell adapted to be driven into the ground, a mandrel adapted to be inserted into said shell, an extension tube firmly secured to and extending upwardly from said mandrel, a shoulder on said mandrel, a disc supported on said shoulder, a cap removably mounted on the open end of said extension tube, a hammer slidably mounted within said extension tube and adapted to be reciprocated between said disc and said cap, and resilient means secured to said hammer for reducing the shock of impact of said hammer.

5. In combination with a pile shell adapted to be driven into the ground, a mandrel adapted to be inserted into said shell, an extension tube firmly secured to and extending upwardly from said mandrel, a cap removably mounted on the open end of said extension tube and having guide ears extending therefrom, and a hammer slidably mounted within said extension tube.

ST. JULIEN R. MARSHALL.