

Nov. 12, 1968

E. M. YOUNG

3,410,097

PILE CAPPING MECHANISM

Filed March 21, 1966

2 Sheets-Sheet 1

Fig. 1

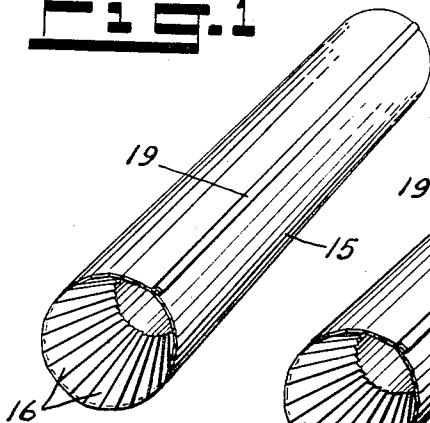


Fig. 7

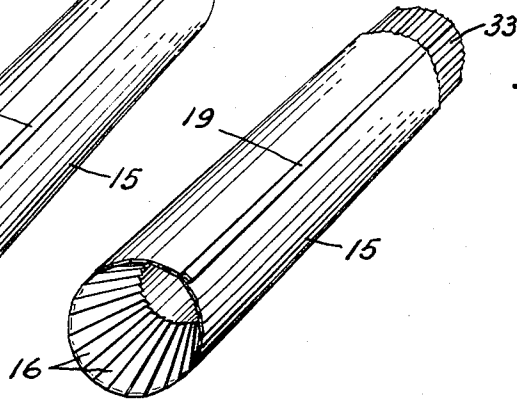


Fig. 2

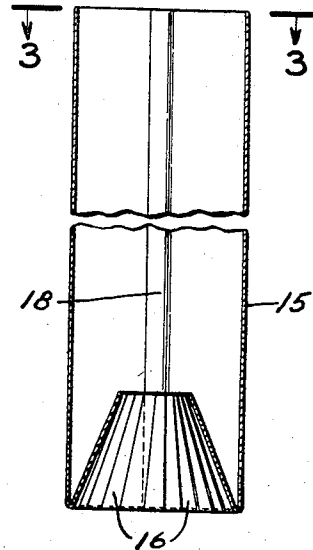


Fig. 4

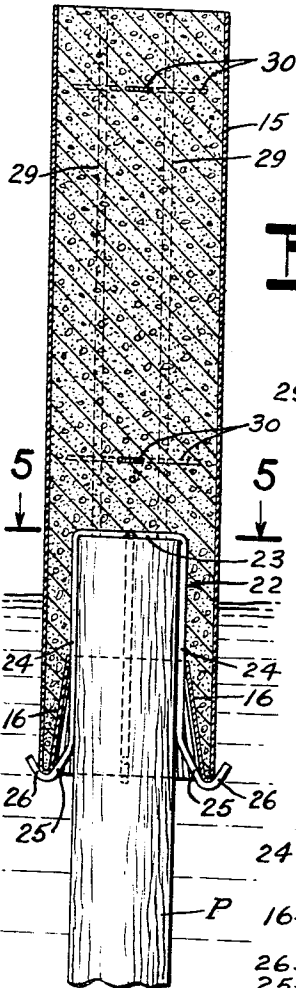


Fig. 5

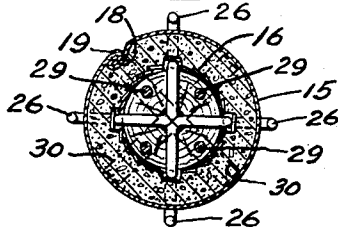


Fig. 3

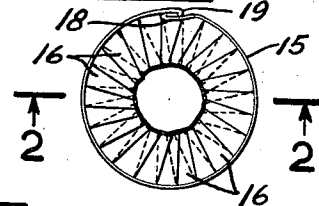


Fig. 8

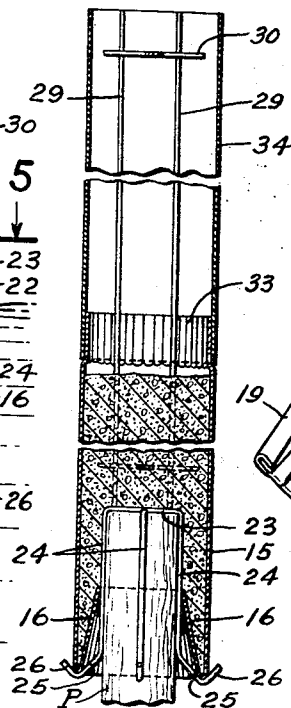
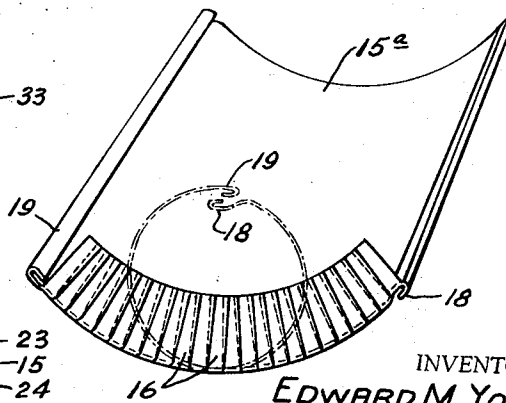


Fig. 6



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2 Sheets-Sheet 2

FIG. 9

FIG. 10

FIG. 11

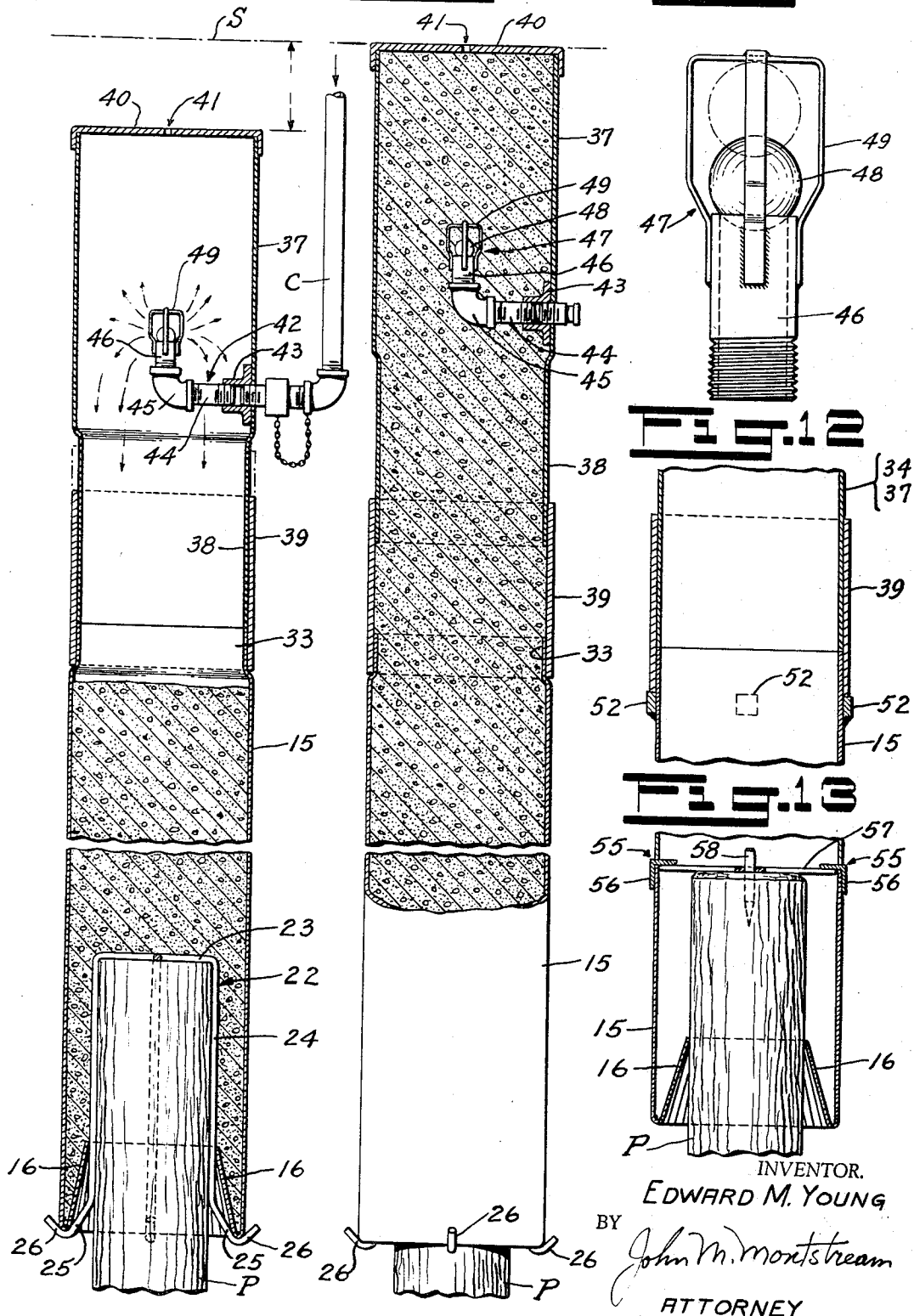


FIG. 12

FIG. 13

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1

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PILE CAPPING MECHANISM
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ABSTRACT OF THE DISCLOSURE

A pile capping mechanism for rehabilitating the tops of old piles and also to provide concrete caps for new piles, the mechanism having a bottom member or portion of integral overlapping flexible fingers directed inwardly and angularly upwardly and of such length as to provide a central opening smaller than the pile and a casing extending from the bottom. The mechanism may provide U shaped side edges for the casing which are interengaged by contracting the casing and including internal braces when assembled to prevent inadvertent contraction of the casing and disengagement of the edges.

The invention relates to a capping mechanism by means of which old piles having deteriorated tops can be cut off and rehabilitated with a concrete cap. This mechanism is also suitable for capping new piles with concrete tops which will not deteriorate. The mechanism is also designed so that a deteriorated pile supporting existing structure may be cut off and a concrete cap for the pile is provided which engages the structure which was supported by the old pile. The construction herein presents a different form of capping mechanism having advantages over the construction described and claimed in my earlier application S.N. 385,138, filed July 27, 1964, now Patent No. 3,338,058.

It is an object of the invention to provide a capping mechanism which is supportable on the top of a pile so that the pile may be capped with a concrete cap.

A further object is as above and, in addition thereto, provides a capping cylinder structure which can be stored and shipped flat or relatively flat and nested for economy of space.

Another object is as above in which reinforcing means prevents collapse of the capping cylinder or separation of interlocking means at the longitudinal edges of the cylinder.

A still further object is to provide an extensible capping mechanism which is suitable for rehabilitating piles supporting any structure which are deteriorated at their upper ends without requiring reconstruction of or affecting in any way the pier frame and pier surface which the pile supported.

Other objects of the invention will be more apparent from the following description when taken in connection with the accompanying drawings illustrating preferred embodiments of the invention in which:

FIG. 1 is a perspective view of a capping cylinder;

FIG. 2 is a longitudinal section of the cylinder taken on line 2—2 of FIG. 1;

FIG. 3 is a top view of the capping cylinder as viewed from lines 3—3 of FIG. 2;

FIG. 4 is a longitudinal section through a capped pile;

FIG. 5 is a cross section taken on line 5—5 of FIG. 4;

FIG. 6 is a perspective view of a cylinder in opened form;

FIG. 7 is a perspective view of a capping cylinder adapted to rehabilitate old piles under a pier or other structure;

FIG. 8 is a longitudinal section through a pile using the capping cylinder of FIG. 7;

2

FIG. 9 is a longitudinal section through an extensible capping mechanism for rehabilitating old piles without affecting existing pier or other structure supported by the pile;

FIG. 10 is a longitudinal section through the capped pile of FIG. 9 with the extensible cylinder extended to engage the supported structure;

FIG. 11 is an enlarged view of a valve within the capping cylinder through which the concrete is passed into the cylinder;

FIG. 12 shows a modified construction of cylinder coupling; and

FIG. 13 shows another form of supporting means.

The capping mechanism includes a capping cylinder 15 having inwardly and upwardly angularly directed resilient fingers 16 to close the lower end thereof when it is mounted on a pile P. The capping cylinder, particularly illustrated in FIG. 1, is made from a plate 15a, FIG. 6, which may be shipped and stored flat or nested on top of other cylinder plates. The cylinder plate may be bent somewhat in arcuate form in order to assist bending of the plate into circular form. The capping cylinder plate has longitudinal edges with interlocking means 17 and 18 to interlock and retain the plate in cylindrical form. The lower portion of the cylinder or cylinder plate has flat fingers 16, shown as integral, which are bent angularly inwardly and upwardly thereby providing a resilient bottom. The upper ends of the fingers form an opening having a diameter less than that of the diameter of the pile on which the cylinder is to be mounted. This flexible bottom can be pressed down over a pile and the fingers adjust to variations in the pile diameter or easily pass over or conform to any projections which may extend beyond the general periphery of the pile.

When integral flexible fingers are provided they are formed by straight slitting from the bottom of the cylinder or plate and then are bent inwardly and angularly upwardly so that the adjacent edges of one finger overlaps the faces of the adjacent fingers thereby closing the slits which may exist between the fingers. The interlocking edges of the capping cylinder plate are constructed so that the resiliency of the plate retains the interlocking edges engaged and hold the cylinder in circular form. The diameter of the cylinder is substantially greater than that of the pile, the illustrated ratio of diameter being 5 to 3, although the relative diameter may vary considerably. If compactness of shipping and storing is of no concern, then a cylindrical pipe may be slitted at the bottom and the fingers formed thereby are bent inwardly and angularly upwardly. The fingers should be short enough so that their ends are free to be bent into the cylinder, that is, they have a length less than the diameter of the cylinder but long enough to be bent angularly upwardly.

Suitable supporting means are provided carried by the pile to support the capping cylinder when it is projected over the end of the pile and to properly position the bottom of the capping cylinder from the top of the pile. The supporting means is a form of spider. In rehabilitating an old pile, it is cut off adjacent the water level and suitable supporting means is provided below the top of the pile to support the capping cylinder. This could be spikes or other means driven into the side of the pile, however, this would be below the water line and not conveniently accomplished. A more desirable construction, suitable for capping new piles or old piles, provides a supporting frame 22 which is positioned on top of the pile and extends a desired distance below the top. The supporting means shown comprises two or more rods suitably secured together, such as by welding, having a portion 23 which rests on the top of the pile and spaced downwardly extending portions 24 which receive the end

of the pile. The supporting frame shown has four such portions. The lower ends 25 of the downwardly extending portions are bent angularly downwardly and outwardly and then angularly upwardly to form a cradle or notch 26 at a diameter the same as the capping cylinder to receive the end of the cylinder and support the latter on the pile. The flexible fingers of the capping cylinder will flex to accommodate the rods of the supporting frame.

In capping a pile, the supporting means or frame 22 is slipped over the upper end of the pile. The capping cylinder is then pressed over the upper end of the pile until the end thereof engages in the notches or cradle 26 of the supporting means. The angularly directed surfaces of the cylinder fingers serve as camming surfaces to spread the fingers and the ends thereof engage the periphery of the pile to close or seal the end of the capping cylinder. Even though the fingers are flexed outwardly, the bottom of the capping cylinder is closed by the overlapping edges of the flexible fingers.

If desired, a reinforcing structure, shown as bars 29 with suitable spacers 30, may be inserted into the cylinder with the reinforcement resting on the top of the pile. The reinforcing rods 29 are secured together in spaced relation by the spacers which may be welded to the rods. These spacers are such that concrete will easily pass thereover and may be nothing more than straps with holes to receive the rods and welded thereto. The straps extend crosswise of the reinforcing rods and preferably are long enough to approximately engage the inner surface of the cylinder whereby they also prevent inadvertent collapse of a capping cylinder formed from a plate 15a which may disengage the interlocking means 18, 19 at the longitudinal edges.

If a concrete cap of greater length is desired, this may be accomplished by using the capping cylinder of FIG. 7 which is the same as that shown in FIG. 1 and coupled to a second cylinder. The coupling means shown has the upper end 33 of the cylinder contracted, such as by ridging the same, so as to receive a second or extension cylinder 34 of the same diameter which is slipped over the contracted end of the capping cylinder. The ridge formed by the reduction in diameter of the cylinder provides abutment means to engage the end of the other cylinder. This second cylinder may be formed from at least one plate with interlocking means at the longitudinal edges in the manner of the plate of FIG. 6. In this construction, the capping cylinder is mounted on the end of the pile as previously described after which the second cylinder is slipped thereover and reinforcing means of suitable length is inserted into the cylinder after which concrete is poured into the cylinders from the open top of the second cylinder. It is clear that either the upper end of the capping cylinder or the lower end of the second cylinder may be contracted to provide a coupling means between the cylinders that receive the end of the other cylinder.

Many old piles supporting overhead structure, such as piers, have their upper parts deteriorated and can be rehabilitated by the construction of capping mechanism illustrated in FIGS. 9, 10, and 11 without affecting the pier structure. The overhead structure is indicated generally by the line S, which marks the lower surface of the structure which the pile supported. This capping mechanism comprises two sections, namely a capping cylinder, which is essentially that shown in FIG. 7 and a second cylinder 37 which is extensible with respect to the capping cylinder. The supporting means for the capping cylinder is the same as that illustrated in FIGS. 4 and 8. The two cylinders are suitably coupled together so that this second or extensible cylinder 37 may move upwardly with respect to the first or capping cylinder. In the coupling shown in FIGS. 9 and 10, the extensible cylinder is provided with a suitably contracted or reduced diameter 38 at its lower end upon which a coupling sleeve 39 is slidably received. A simpler construction merely uses a smaller diameter of cylinder corresponding in diameter with the contracted

portion. When the second cylinder is one having a reduced diameter at the lower end thereof, this lower contracted part has a length at least as long as the length of the coupling sleeve. This second cylinder has a closed top or cover 40 secured thereto which has an air vent 41. The length of the reduced diameter of the lower end of the extensible cylinder and the length of the coupling sleeve 39 is such that the extensible cylinder may have sufficient upward extensibility to engage the lower surface S of the overhead structure and yet have ample support between the coupling sleeve and the extensible cylinder. The extensible cylinder may be formed from a flat plate having longitudinal edges which edges are provided with interlocking means as described with respect to the first or capping cylinder. An inlet connection is provided into one of the cylinders and it is convenient to provide it for the second cylinder.

In this capping mechanism, the supporting means 22 and the first or capping cylinder is assembled on the end of the pile and concrete may be poured therein at this time, if desired. The extensible cylinder 37 has the coupling sleeve 39 fully on the reduced diameter lower portion 38, as illustrated in dot-dash lines so that the second extensible cylinder and the sleeve may be inserted over the capping cylinder after which the coupling sleeve is slipped down over the reduced diameter on the upper portion of the capping cylinder. Concrete is then forced into the second cylinder through an inlet connection 42 under sufficient pressure so that the second cylinder is forced upwardly until the cover engages the lower surface S of the pier structure. There is no reason why the second cylinder may not be raised with exterior mechanical means either alone or in conjunction with the internal concrete pressure. The inlet connection is suitable connected with a pipe line C connected with a source of concrete.

It is desirable that a valve be provided in the inlet connection to the second or extensible cylinder to be closed when the capping mechanism is filled with concrete. The valve shown is within the cylinder. This second cylinder has a flanged pipe coupling 43 suitably secured to the wall of the cylinder, that shown being secured to the inner wall thereof. A short length of pipe or nipple 44 with an elbow 45 is threaded to the flanged coupling. A valve having a valve pipe 46 is attached to the elbow. The valve 47 is shown as a ball type valve wherein the ball 48 rises above the end of valve pipe which provides a valve seat. When concrete under pressure is forced through the inlet connection, the ball valve is raised to pass the concrete. A ball cage 49 is carried on the valve pipe to retain the ball valve in position and guide it back onto the valve seat. When the concrete is forced through the valve, the ball rises and the pressure is maintained on the concrete within the second cylinder long enough so that the ball valve moves downwardly through the soft concrete to seat on the valve and close the inlet at the end of the valve pipe. The pressure may then be released on the pipe line C leading to the cylinder and the pipe line disconnected from the source of concrete under pressure. In this construction, the valve and its inlet pipe remain within the second cylinder.

FIG. 12 shows a simpler form of coupling means between the capping cylinder and the second cylinder. The second cylinder may be the extension cylinder 34 or the extensible cylinder 37. In this form, sleeve abutment means, shown as circumferentially spaced lugs 52, is provided on one of the surfaces of the capping cylinder spaced from the end of the cylinder. The lugs are shown on the exterior surface and lugs are preferred on a capping cylinder plate so that bendability is not affected. A coupling sleeve 39 has a diameter to be received exteriorly of or within the capping cylinder with its end engaging the sleeve abutment means. The second cylinder then is received upon the coupling sleeve and the end of the capping cylinder provides abutment means. This form avoids the need to reduce the diameter of an end 33 or the

diameters of the ends 33, 38 of the cylinders. If the second cylinder is an extension cylinder 34, the coupling sleeve may be short and it may be welded to either cylinder and form a part thereof. For a second cylinder which is an extensible cylinder to be upwardly movable within the coupling sleeve, it should be longer to accommodate for the upward movement of the extensible cylinder with respect to the capping cylinder and sleeve and provide sufficient support therefore when it has reached its raised position in contact with a pier structure S.

Another form of supporting means for the capping cylinder is shown in FIG. 13. This form provides support at or adjacent the top of the pile and within the cylinder so that there are no supporting means rods or portions 24 engaging or separating the flexible fingers 16. Also the capping mechanism is given lateral support above the flexible fingers. The form shown provides for insertible supporting brackets. In this form circumferentially spaced slits 55 are provided in the capping cylinder, two diametrically located is sufficient, into which is pressed or hammered an angle bracket 56 to hold the bracket against inadvertent displacement. A spider 57 comprising outwardly extending arms, such as four, suitably anchored to the pile such as by a headless spike 58 and a hole in the spider receives the spike. Instead of a spike, the form of anchorage of the supporting means 22 with short bent down portions to embrace the end of the pile is suitable in which construction the supporting brackets may be lower. The insertable brackets do not interfere with or reduce the ability to the nesting together of capping plates 15a. The ends of the arms of the spider are adjacent to the inner surface of the cylinder so that the latter give lateral support to the capping mechanism at or adjacent to the top of the pile.

In using the supporting means of FIG. 13, the spike 58 is driven into the pile, the angle brackets 56 are inserted into the slits in the capping cylinder and the capping cylinder is inserted over the top of the pile. The spider 57 is located on the spike and turned until an end of opposite spider arms are under an angle bracket whereupon the capping cylinder is pressed down on the pile so that the brackets engage the spider arms. The spider then supports the capping cylinder on the top of the pile and gives lateral support to the capping mechanism.

With each of the forms of supporting means shown, the lower end of the concrete cap may be below the water line without requiring any work on the pile below the water surface.

This invention is presented to fill a need for improvements in a pile capping mechanism. It is understood that various modifications in structure, as well as changes in mode of operation, assembly, and manner of use, may and often do occur to those skilled in the art, especially after benefiting from the teachings of an invention. This disclosure illustrates the preferred means of embodying the invention in useful form.

What is claimed is:

1. A capping mechanism for a pile having a diameter comprising a capping cylinder, a bottom for the capping cylinder having a plurality of integral flexible fingers directed inwardly and angularly upwardly into the end of the cylinder, the fingers having upper ends forming a circular opening smaller than the diameter of the pile to be received therein, each finger having parallel edges to provide a width to overlap the edges of its adjacent fingers at least for approximately the full length thereof, and the angularly directed fingers forming a camming surface to

spread the fingers when the cylinder is pressed downwardly on top of a pile.

2. A capping mechanism as in claim 1 in combination with supporting means carried by the pile and engaging the capping cylinder to support the latter in position on the pile.

3. A capping mechanism as in claim 2 in which the supporting means includes a frame having an end to rest upon the top of the pile and a plurality of downwardly portions to receive the end of the pile, an outwardly extending portion at the lower end of each downwardly extending portion having a radial dimension greater than the radius of the cylinder, and means adjacent the ends of the outwardly extending portions corresponding with the diametrical dimension of the cylinder to receive the latter.

4. A capping mechanism as in claim 2 in which the supporting means includes flanges carried by the capping cylinder circumferentially spaced from each other, and a spider engaging the top of the pile and the flanges to support the capping cylinder and retain the latter against lateral displacement.

5. A capping mechanism as in claim 1 in which the capping cylinder is at least one bendable plate means having longitudinal edges, U-shaped interlocking means carried by the longitudinal edges engaged by contracting the cylinder to retain the plate means in cylindrical form, reinforcing means received within the cylinder having cross braces, the cross braces having a length approximating the inner diameter of the cylinder to prevent separating of the interlocking means.

6. A capping mechanism as in claim 1 including a second cylinder a coupling sleeve slidably mounted on the second cylinder and slidably receiving the first cylinder, the coupling sleeve having an extent of movement on the second cylinder to bring the lower end of the coupling sleeve and the lower end of the second cylinder at least into alignment, and abutment means carried by the capping cylinder spaced from the upper end thereof a distance less than the coupling sleeve length to limit the downward movement of the coupling sleeve, a cover on the upper end of the second cylinder and closing the same, and an inlet connection into one of the cylinders.

7. A capping mechanism as in claim 1 including the supporting means for the capping cylinder having at least two inwardly directed and circumferentially spaced brackets carried by the capping cylinder spaced from the bottom thereof, a spider to be anchored to the pile having at least four arms extending outwardly at least two of which engage a bracket, and the arms having a radial length approximately equal to the inner radius of the capping cylinder to give lateral support to the cylinder.

References Cited

UNITED STATES PATENTS

910,453	1/1909	Black et al.	61—54
1,947,132	2/1934	Hay	61—54 X
2,181,526	11/1939	Upton	61—54
2,222,481	11/1940	Ferguson et al.	61—53 X
3,134,236	5/1964	Baittinger	61—54 X
3,188,816	6/1965	Koch	61—54
3,295,332	1/1967	Dougherty	61—54

FOREIGN PATENTS

169,839 12/1959 Sweden.

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