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MUD RING FOR THE DEVELOPMENT OF PASSIVE
RESISTANCE IN SOFT SOILS
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Fig. 1.

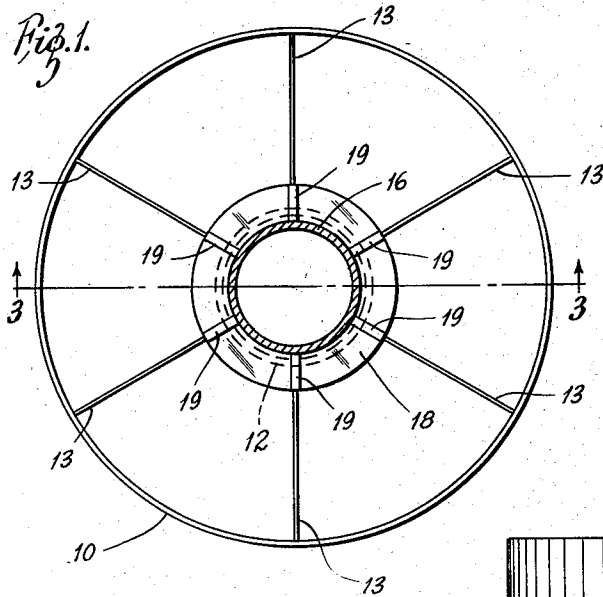


Fig. 2.

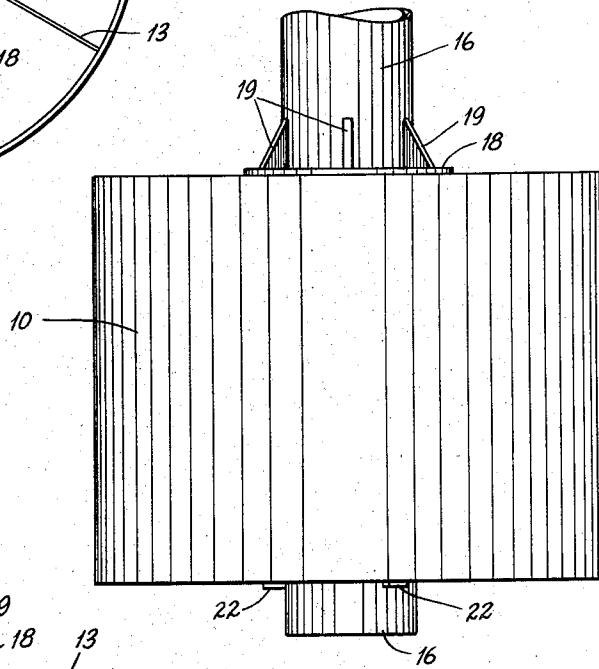


Fig. 3.

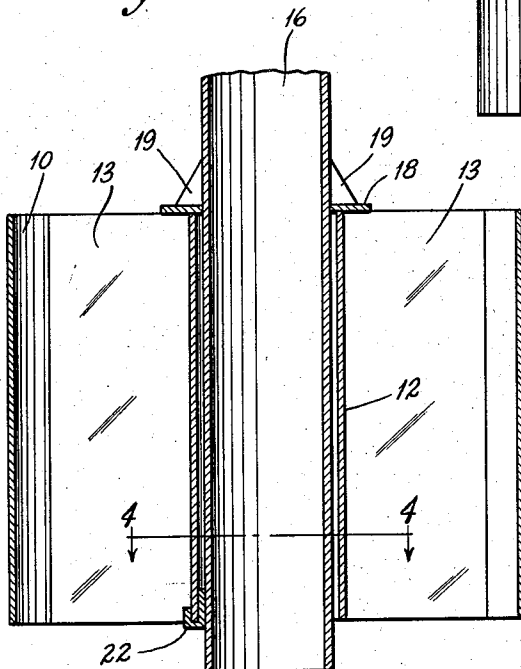
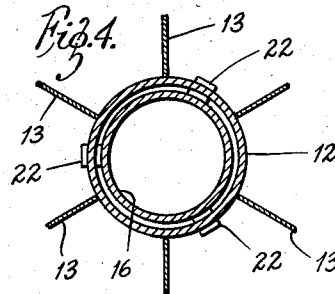


Fig. 4.



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MUD RING FOR THE DEVELOPMENT OF PASSIVE RESISTANCE IN SOFT SOILS

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5 Claims. (Cl. 61—53)

The present invention relates to a mud ring used to develop passive resistance of loose soils in order to stabilize structural elements such as piling, and to prevent having to provide excessive penetration. Specifically, the invention consists of an enlarged frame or shell that can be attached to piles or the like that are to be driven into soft earth to sustain structures such as buildings, thereby to give a much enlarged area of contact with the soil, much wider load distribution, and, consequently, reduction in the required penetration by the piling.

The mud ring consists of a steel cylinder open on both ends, stiffened by vertical steel plates that radiate out from a hub. The hub is shaped to fit the structural member for which the resistance is being developed. In the present design, the entire device is arranged to be driven downwardly by the structural element, such as the pile, through the medium of a positive driving connection between the element and the mud ring device. However, there is a relatively weak connection holding the piling against being withdrawn from the mud ring device, so that the pile may be withdrawn from the earth without the necessity of drawing the mud ring out of the soil.

The objects of the invention are to provide a mud ring device of the foregoing type, which has the advantages evident in that description, together with other advantages that will appear from the disclosure to follow.

In the drawings:

Figure 1 is a plan view of the mud ring device on a steel tubular pile;

Figure 2 is a side elevation thereof;

Figure 3 is a section taken on the line 3—3 of Figure 1; and

Figure 4 is a fragmentary sectional plan view taken on the line 4—4 of Figure 3.

The device includes a steel outer cylinder 10 open at both ends. Typically, it may be of a three-eighths inch plate rolled to the required diameter, although it will be understood that this is typical and not limiting. In one example, where the cylinder is used to stabilize a sixteen inch pipe pile, the diameter of the outer ring may be about fifty inches, and its height may be about forty-two inches.

The outer cylinder 10 is connected to an inner hub 12 by a plurality of vertical steel plates 13 that extend radially from the outer cylinder 10 inwardly to the inner member in the form of a hub 12, and provide supports for the outer member. The plates are preferably welded at their inner and outer edges to the respective cylinders. In the case of the sixteen inch tubular pipe pile, as illustrative, the inner ring or cylinder 12 may be an eighteen inch pipe sleeve. The radial plates may be three-eighths inch plate steel.

The connection between the pile 16 and the mud ring device is such as to provide a positive downward driving of the mud ring device, but a withdrawal of the pile from the mud ring device when the piling is withdrawn upwardly. To this end, the structural member or piling 16 is provided with a driving device, including a ring 18

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that rests over the inner cylinder 12. This plate 18 is rigidly attached to the structural member 16 and is backed by a plurality of plates 19. These plates are illustrated as being triangular in shape, and are welded along their vertical edges to the structural element 16 and along their horizontal edges to the top of the plate 18. Thus, the plate 18 forms a ledge on the structural element 16, that overlies the upper end of the mud ring device. By this means, a positive driving means is provided between the structural element 16 in the top of the mud ring.

The lower end of the mud ring device is releasably secured to the structural element 16. To this end, a plurality of clips 22 are welded or otherwise secured to the structural element 16 at the bottom of the mud ring device. These clips are U-shaped, and may be formed of strip stock bent outwardly and upwardly so that they can engage under the lower edge of the inner cylinder 12. By this arrangement, the mud ring can be easily assembled onto the structural element 16 and secured in place by bending the clips 22 upwardly. Of course, other orders of construction may be practiced.

In use, the mud ring device is assembled onto the structural element 16 as illustrated in the drawings. The structural element 16 is then conducted to the point where it is to be pushed into the ground. In this action, the upper holding plate 18 and the clips 22 hold the mud ring against falling off of the structural element 16. When it reaches the place of use, the piling is driven into the earth. In this action, the reinforced ring 18 provides adequate force-conducting means between the structural element 16 and the mud ring, to permit the driving force supplied to the top of the structural element 16 to drive the mud ring into the earth. It will be seen that the mud ring device is of sufficient lateral and vertical extent to provide a wide distribution of force from the structural element 16, so that that element need not be driven into the ground so far. The plates can penetrate soft earth, and yet can be surrounded inside and out with the earth, so as to resist displacement and to withstand crushing forces.

Should it become necessary to withdraw the structural element 16, it is highly desirable not to have to withdraw the mud ring device at the same time, because of the intended resistance of that device to being moved, once it is in place. Consequently, the clips 22 are designed so that they will not withstand the resistance to withdrawal of the mud ring device when a withdrawal force is applied to the structural element 16. The clips 22 then shear off or bend down so that the upward force on the element 16 can withdraw that element from the mud ring.

It is evident that a mud ring device has been provided that will enable piling and the like to have satisfactory stability at reduced penetration, and that will enable the piling to be withdrawn without the necessity of withdrawing the mud ring device.

What is claimed is:

1. A piling comprising a pile member adapted to be driven into the earth and a mud ring device including an inner member adapted slidably to receive and surround the pile and to engage it along a substantial part of its length so as to provide a stable connection between the pile and the mud ring; means engaging the pile and the inner member to transmit pile-driving forces from the pile to the mud ring; a shell-like outer member outwardly spaced from the inner member and being several times as large in cross section as the pile and the inner member; and support means connecting the outer member to the inner member and forming a sturdy device capable of being driven into the ground, the outer member being formed of sheet metal and providing vertical wall com-

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ponents resisting lateral displacements of the device when it is submerged in the earth, the support means comprising plate-like elements secured to the inner and outer members, and the outer and inner members and the support means constituting an assembly that is open at the top and bottom.

2. The device of claim 1, wherein the outer and inner members comprise cylindrical, vertical plates.

3. A piling comprising a pile member to be driven into the earth, and a mud ring device including an inner member shaped to receive and engage the pile member along its length so as to aid in providing a stable mounting of the mud ring on the pile; an outer member outwardly spaced from the inner member; support means connecting the outer member to the inner member and forming a sturdy device capable of being driven into the ground, the outer member providing vertical wall components resisting lateral displacements of the device when it is submerged in the earth; means to secure the device to the pile to be driven into the earth, comprising driving-force transmitting means connecting the pile and the mud ring device to transmit driving forces from the pile to the mud ring device; and frangible holding means to support the

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mud ring device on the pile and prevent its falling off the lower end of the pile during handling, but yieldable to permit withdrawal of the pile from the device when the latter is submerged into the ground.

4. The combination of claim 3, wherein the frangible means comprises clips between the element and a lower edge of the inner member.

5. The combination of claim 3, wherein the driving-force transmitting means includes an overhanging ledge on the structural element overlying the end of the inner member.

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