

C. A. STEVENS.
 PILE BASE EXPANDER.
 APPLICATION FILED DEC. 16, 1920.

1,413,503.

Patented Apr. 18, 1922.

Fig. 1.

Fig. 2.

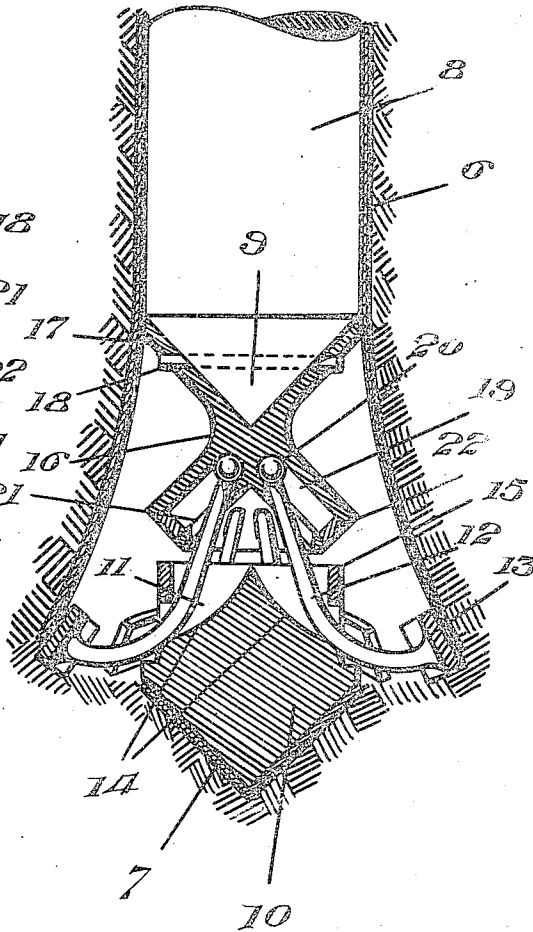
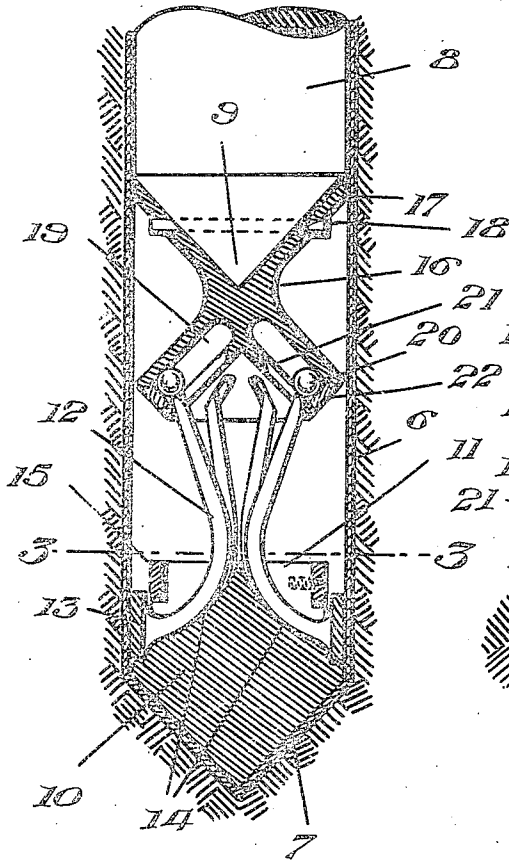
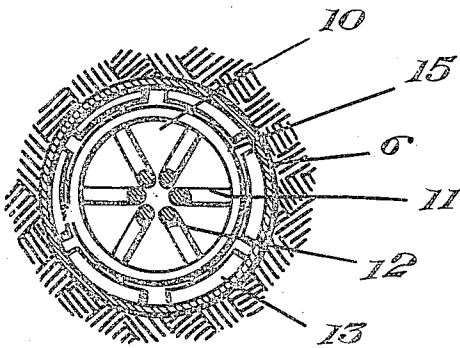


Fig. 3.



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PILE-BASE EXPANDER.

1,413,503.

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To all whom it may concern:

Be it known that I, CARLTON A. STEVENS, a citizen of the United States, residing at Baltimore, in the county of Baltimore City and State of Maryland, have invented certain new and useful Improvements in Pile-Base Expanders, of which the following is a specification, reference being had therein to the accompanying drawing.

The present invention relates to a device for expanding the lower end portion of the sheet metal or similar shell of a pile which has been driven into the ground to receive concrete, and aims to provide such a device to expand or enlarge the lower end portion or base of the shell, in order that the concrete in filling the enlarged cavity will form an enlarged base for the pile, and thereby securely anchor the pile and prevent the displacement thereof in an efficient and practical manner.

A further object is the provision of such a device of novel construction which can be let down into the shell, after such shell is driven into the ground, and which is so constructed and operable that the lower end portion of the shell can be expended or enlarged in an efficient and desirable manner.

With the foregoing and other objects in view, which will be apparent as the description proceeds, the invention resides in the construction and arrangement of parts hereinafter described and claimed, it being understood that changes can be made within the scope of what is claimed without departing from the spirit of the invention.

The invention is illustrated in the accompanying drawing, wherein:

Figure 1 is a vertical section of the device lowered to the lower end of the shell.

Fig. 2 is a similar view showing the device in position with the shell expanded.

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1.

In making concrete piles "in situ," it has been the practice to drive a metal shell or tubular casing 6 down into the ground, such shell being usually formed with a lower pointed end 7 to facilitate the driving of the shell. Such shell is usually driven down into the ground with a core 8 therein, having a lower pointed end 9 to fit within the lower end 7 of the shell, as well known. After driving the shell to the desired depth, the core 8 is removed and the shell filled with

concrete, which when it sets, forms a concrete pile having the metal shell thereon. However, the pile is not securely anchored to the ground, and is apt to become dislodged, or to sink deeper in the ground, especially because of the fact that the lower pointed end 7 of the shell makes it easier for the pile to sink deeper under weight imposed on the pile.

The present device is intended for the purpose of expanding the lower end portion of the shell 7, whereby to form an enlarged base for the pile, to securely anchor same within the ground, and prevent displacement of the pile. This device in the embodiment illustrated, comprises a lower member 10, which is pointed or otherwise shaped so as to fit snugly within the lower end portion of the shell 6 and said member having a suitable number of radial slots 11 in its upper corner extending to the top and circumference of said member to receive the expanding arms 12, which have jaws 13 at their lower ends. Said arms are curved, so that their lower ends extend outwardly, and the bottoms of the slots 11 are also curved, as at 14. The curved arms 12 bear down on the curved bottoms of the slots and when the arms are pushed or forced downwardly they will be deflected outwardly. The bottoms of the slots thus provide deflectors or cams which diverge downwardly to spread the jaws 13 when the arms 12 are slid downwardly. The upper end portion of the deflecting member 10 is of reduced diameter, and has a ring 15 secured thereon around the arms 12, whereby to hold said arms assembled with said member 10, and to lift said member with the arms when the device is lifted out of the shell, although said ring does not interfere with the limited sliding and swinging movements of the arms in the slots 11. The circumference of the member 10 is also preferably reduced in diameter or recessed to receive the jaws 13, which are arcuate to fit snugly against the periphery of said member 10 when the parts are in normal position for movement downwardly or upwardly within the shell.

The device includes an upper actuating and controlling member 16, which, as shown, is adapted for attachment to the lower end of the core or driving ram 8. Thus, the member 16 has a conical pocket 17 for receiving the lower pointed end 9 of the core

8, and said pocket is secured to the core by means of a pin 18 inserted transversely through the pocket and end of the core, although other securing means can be used for attaching the device to the lower end of the core when the core has been lifted out of the shell after driving such shell into the ground.

The member 16 has bores 19 diverging and extending radially downward from a central point, and the upper ends of the arms 12 have balls or enlargements 20 movable in said bores. The lower end of the member 16 has slots 21 underneath said bores for the movement of the arms 12 inwardly and outwardly, and to permit said balls 20 to slide longitudinally in the bores inwardly and outwardly. Plugs 23 are preferably secured within the outer ends of the bores 19 to prevent the upper ends of the arms becoming accidentally disengaged from the member 16.

In using the device, after the shell 6 has been driven into the ground and the core 8 withdrawn from the shell, the member 16 is secured to the lower end of the core and the core is then lowered into the shell with the device below such core. The weight of the member 10 will pull the arms 12 downwardly, thereby sliding the balls or enlargements 20 thereof to the lower ends of the bores 19, and swinging the upper ends of said arms outwardly, and the jaws 13 are moved snugly against the sides of the member 10, so that the device can move down the shell without interference. The member 10 will seat on the lower end of the shell or the bottom of the hole, and the core 8 is then driven downwardly with sufficient force to expand the shell. When the core 8 and member 16 are driven downwardly, the balls 20 will be forced inwardly by the cam action of the upper inclined walls of the bores 19, and when such balls reach the inner ends of the bores, the arms 12 are slid downwardly. Said arms are swung inwardly at their upper ends and outwardly at their lower ends, and are then forced downwardly, so that the deflecting portions 50 deflect the arms outwardly. This will spread the jaws 13 and open and expand the lower end portion of the shell, as seen in Fig. 2. The arms 12 and jaws 13 have a combined swinging and sliding movement which will effectively expand the lower end portion of the shell into substantial conical form, or the shell can be suitably split or otherwise formed so as to be bulged or expanded in various ways, as will be evident to those skilled in the art.

The core 8 is then removed from the shell, and lifts the device with it, and the arms 12 are pulled upwardly within the slots 11 until the jaws 13 seat against the member 10. The arms 12 are also swung to normal

position inasmuch as the lower walls of the inclined bores 19 will deflect the balls 20 outwardly to thus swing the upper ends of the arms outwardly. The device thus returns to the position shown in Fig. 1 and can be readily lifted out of the shell.

The lower end of the shell being expanded or enlarged as shown and described, and will form a cavity that will be filled with concrete, thereby constituting an enlarged base for the pile, which will effectively anchor the pile in the ground and prevent displacement of the pile, the advantages of which are apparent and readily recognized.

Having thus described the invention, what is claimed as new is:—

1. A pile base expander comprising a member to seat at the lower end of a pile shell, a second member above said member, and arms loosely connected to the second member for swinging movement and slidable within the firstnamed member, the firstnamed member being formed so as to spread said arms and move them outwardly when they are driven downwardly with the second member relatively to the firstnamed member, the firstnamed member having a portion thereon surrounding said arms for supporting said member from the arms when the members are being lowered into or lifted from the shell.

2. A pile base expander including a member to seat at the bottom of a shell, a second member above said member movable relatively thereto, and arms loosely connected to the second member and slidable within the firstnamed member, said arms having transverse arcuate jaws to be disposed adjacent to and to surround the firstnamed member, and to be moved outwardly with the arms, said firstnamed member being arranged to spread the arms when they are driven downwardly relatively to said member.

3. A pile base expander comprising a member to seat at the lower end of a pile shell and having radial slots, a second member above said member, arms loosely connected to the second member and extending downwardly into said slots to be moved outwardly when driven downwardly through said slots, said arms having jaws at their lower ends to be disposed adjacent to the firstnamed member when the members are separated, and a ring embracing the firstnamed member around said arms for supporting the firstnamed member from said arms when the members are being lowered into or raised from the shell.

4. A pile base expander comprising a member to seat at the lower end of a pile shell, a second member above said member having downwardly-diverging guide portions, and arms having their lower portions slidably engaging the firstnamed member

to be directed outwardly away from said member when the arms are slid downwardly relatively to the firstnamed member, the upper ends of said arms having portions 5 slidable in said guide portions for moving the upper ends of said arms inwardly and outwardly when the second member is moved downwardly and upwardly, respectively, relatively to the firstnamed member.

10 5. A pile base expander comprising a member to seat at the lower end of a pile shell, arms having curved portions at their lower ends to bear on said member, said member being arranged to deflect said arms 15 outwardly when moved downwardly relatively to said member, and means connected to the upper portions of said arms for driving them downwardly and raising said arms and constructed and arranged for swinging 20 the upper ends of the arms inwardly toward one another when they are driven downwardly, and to separate the upper ends of the arms when they are raised.

6. A pile base expander comprising a 25 member to seat at the lower end of a pile shell and having radial slots, a second member above said member, and arms loosely connected to the second member and extending downwardly into said slots, the bottoms 30 of said slots being formed to provide deflecting portions for deflecting the arms outwardly from the first named member when said arms are driven downwardly with the second member, so as to spread and ex- 35 pand the shell.

7. A pile base expander comprising a member to seat at the lower end of a pile shell, a second member above said member, arms slidable in the firstnamed member, 40 the firstnamed member being so formed as to spread said arms when they are driven downwardly for spreading and expanding the shell, the second member and upper ends of said arms having portions connecting 45 said arms and second member for sliding and swinging movements, said connections including portions operable for moving the upper ends of the arms toward the center when the second member is driven down- 50 wardly relatively to the firstnamed member and operable to move the upper ends of the

arms outwardly when the second member is raised.

8. A pile base expander comprising a member to seat at the lower end of a pile 55 shell having radial slots whose bottoms provide deflecting portions, a second member above said member having downwardly-diverging guide portions, and arms having their lower end portions curved and disposed 60 within said slots to be spread by said deflecting portions when the arms are driven downwardly, the upper ends of said arms having portions slidable in said guide portions for moving the upper ends of said arms in- 65 wardly and outwardly when the second member is moved downwardly and upwardly, respectively.

9. A pile base expander comprising a member to seat at the lower end of a pile 70 shell, arms having curved portions slidable in said member to move the lower ends of said arms outwardly from said member when said arms are driven downwardly, and means connected to the upper end por- 75 tions of said arms for driving the arms downwardly and swinging the upper ends of said arms inwardly toward one another when they are driven downwardly and for raising the arms and swinging the upper ends of said 80 arms outwardly when they are raised.

10. A pile base expander comprising a member to seat at the lower end of a pile shell, arms movable in said member for slid- 85 ing and swinging movements and having jaws to be disposed adjacent to said member and to be moved away from said member with the arms when said arms are slid down- 90 wardly in said member, and means connected to said arms for swinging and sliding them to spread and expand the shell by the move- 95 ment of said jaws.

11. A pile base expander comprising a member to seat at the lower end of a pile shell, arcuate transverse jaws adjacent to 95 and surrounding said member at the sides thereof, and means connected to said jaws for moving them outwardly from said member to spread and expand the shell.

In testimony whereof I hereunto affix my 100 signature.

CARLTON A. STEVENS.