No. 827,535. PATENTED JULY 31, 1906.

J. KAHN.

CONCRETE PILE.

APPLICATION FILED SEPT. 22, 1905.

2 SHEETS—SHEET 1.

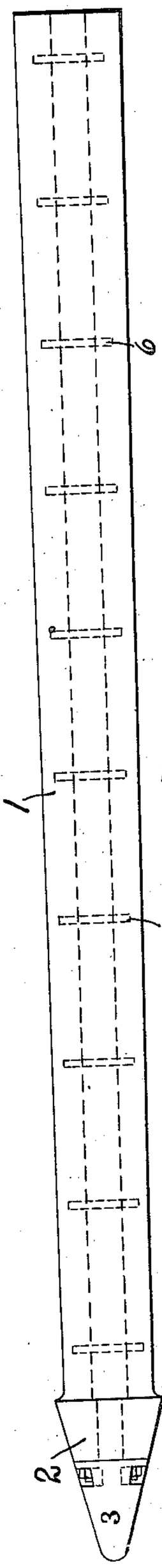

Fig. 1.

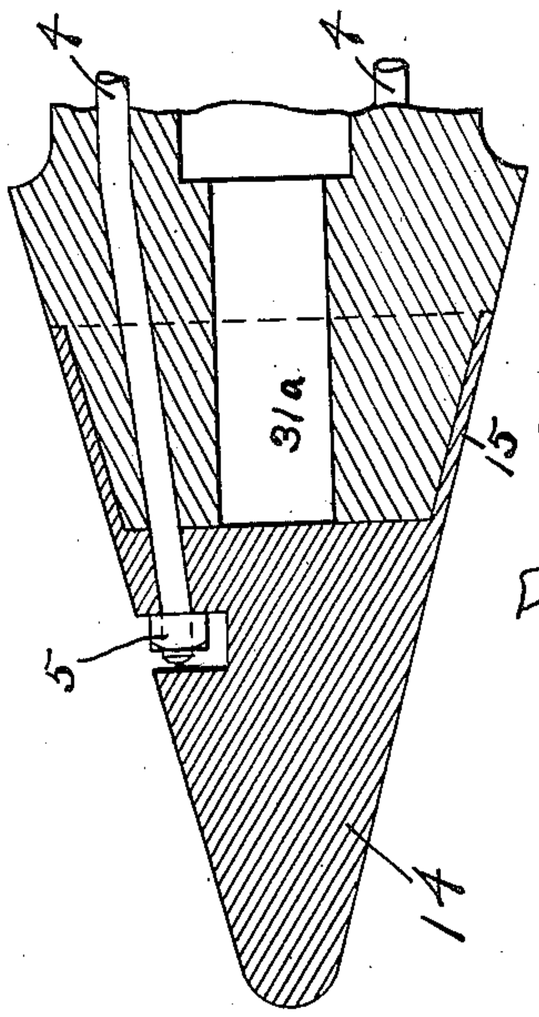

Fig. 3.

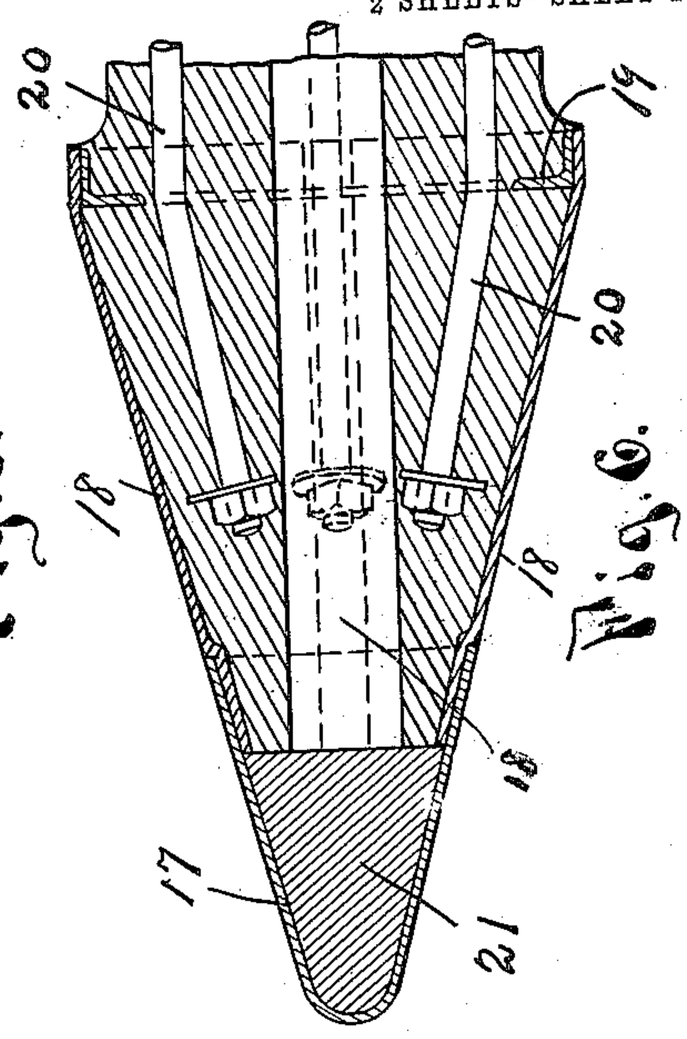

Fig. 6.

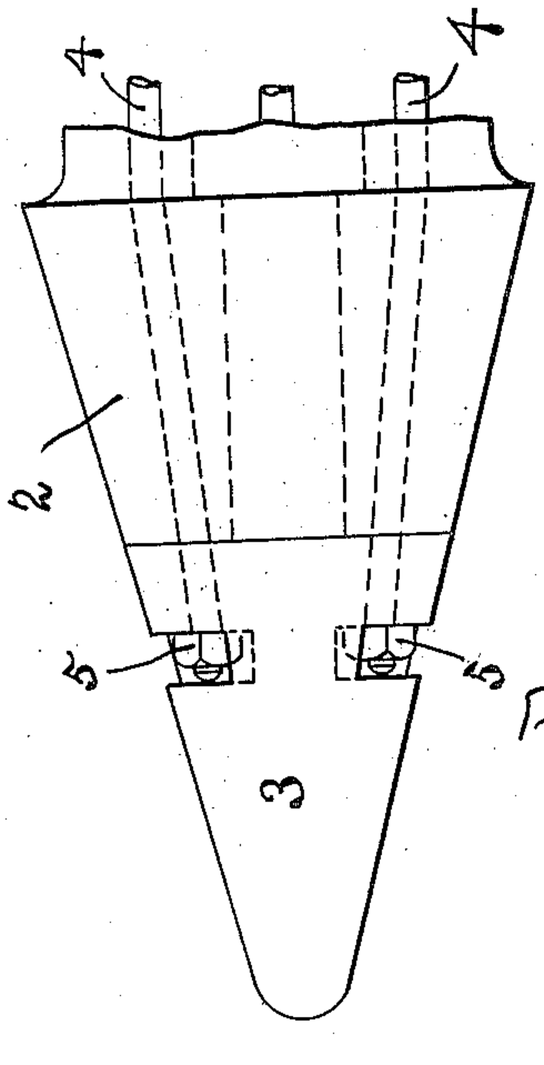

Fig. 2.

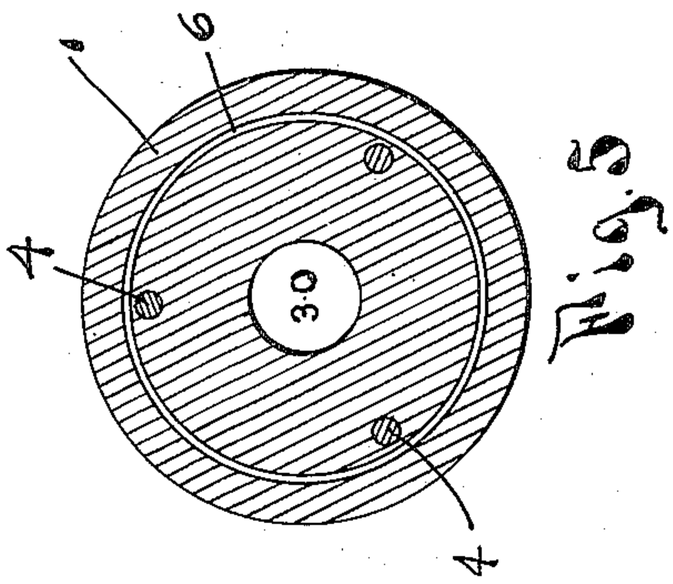

Fig. 5.

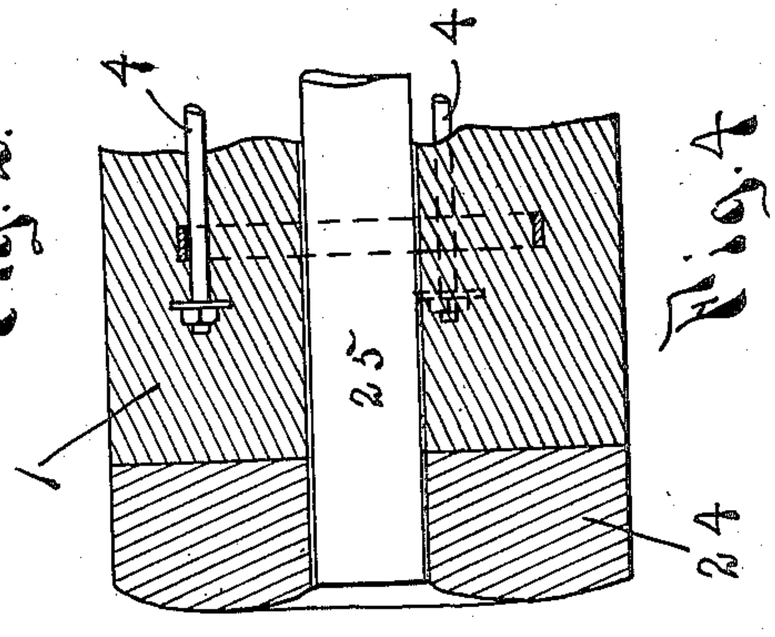

Fig. 4.

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2 SHEETS—SHEET 2.

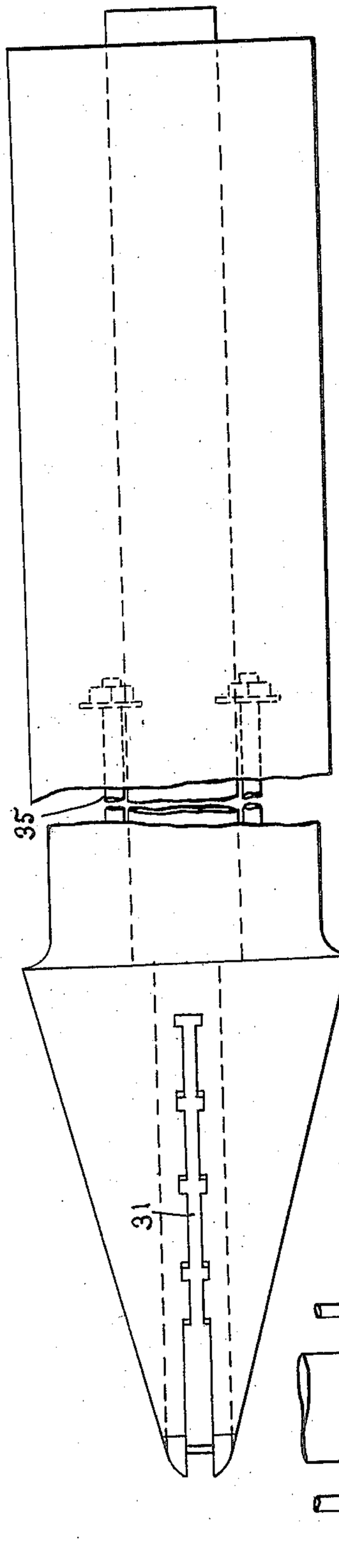

Fig. 7.

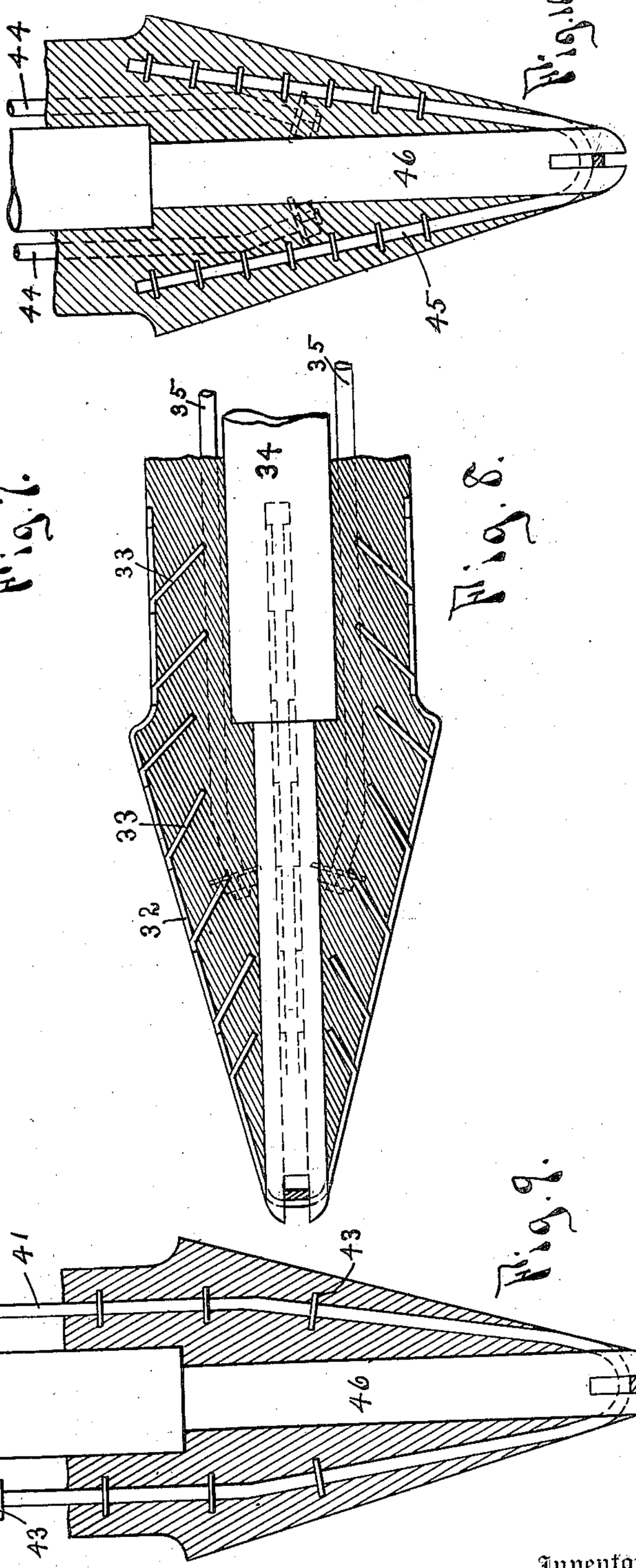

Fig. 5.

Fig. 8.

Fig. 9.

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CONCRETE PILE.

No. 827,535. Specification of Letters Patent. Patented July 31, 1906.

Application filed September 22, 1905. Serial No. 279,585.

To all whom it may concern:

Be it known that I, JULIUS KAHN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Concrete Pile, of which the following is a specification.

My invention relates to that class of concrete piles that are formed before being driven, and the objects of my improvements are to provide a pile of this kind which shall be so constructed that the blows necessary to sink the pile into the ground may be directed upon the lower armored end of the pile, to provide a pile of this kind in which the conical point shall when driven form a hole sufficiently large that the body of the pile will be caused to follow by practically its own weight, and to provide a pile which shall be adapted to have its point driven into the ground and this point pull down the remainder of the pile. I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a view of one form of my invention. Fig. 2 is a view of the point of this pile on a somewhat larger scale. Figs. 3, 6, 8, 9, and 10 are central longitudinal cross-sections of different modifications of the points of piles. Fig. 4 is a longitudinal central cross-section of the upper end of a pile provided with a pad surrounding the end of the ram. Fig. 5 is a transverse cross-section of a pile, showing the longitudinal rods and a strengthening-ring. Fig. 7 is a view of the preferred form of my invention.

Similar reference characters refer to like parts throughout the several views.

When concrete piles are driven in the same manner as wood piles, they have a tendency to crumble and crack, because the concrete is not adapted to receive a number of heavy blows without disintegrating. In the piles shown in Figs. 1 to 6, inclusive, a longitudinal central bore permits the entrance of a ram which may reach down to the metal point, so that the blows delivered on the upper end of the ram will be transmitted directly to the metal point of the pile, or the ram may be attached directly to the piston of a steam-hammer pile-driver and move up and down in the bore. The conical point of the pile is formed to make a hole in the ground of larger diameter than the body of the pile, and rods secured to the point will pull down the pile after the point instead of driving the point down by means of blows on the upper end of the pile.

In the drawings the pile 1 has a conical point 2, the lower end 3 of which is of metal. Rods 4 are secured to the metal point by means of nuts 5 and extend along in the pile until near the upper end, where they are anchored in any desirable manner, nuts and washers, as shown in Fig. 4, being a good example. At intervals along the pile metal rings 6 are molded in the concrete to strengthen the pile. (See Fig. 5.) The lower ends of the rods 4 may be made larger than the upper ends, as the stress decreases toward the top of the pile.

In Fig. 3 the metal point 14 is shown with an extending shell 15 to form further protection for the concrete portion of the pile-point. The length of this extension may be varied as desired.

In Fig. 6 the pressed-steel cap 17 has four straps 18 secured thereto, which connect to the angle-iron ring 19. The longitudinal rods 20 have nuts and washers at their lower ends to insure good engagement with the concrete. A cast-iron cone 21 fits in the steel point and receives the blows from the ram. The number of straps 18 may be varied as desired.

With very long piles the earth is liable to slip around the pile and cause considerable friction. To overcome this, a pad 24, of sawdust or other somewhat elastic material, may be placed upon the end of the pile around the ram 25, so as to receive a portion of the blow of the hammer.

In Figs. 7 and 8 the metal tip is replaced by crossed bars 31, which extend upward along the face of the point, which bars are provided with struck-up tongues that extend into the concrete and so unite the metal and plastic materials of the point. In Fig. 8 the bars 32 are shown provided with tongues 33 and extend some distance along the body of the pile. The ram 34 is provided with grooves in its lower end, into which the bars 32 are adapted to fit. The point of the ram is really the point of this pile during the driving operation. Rods 35 extend upward from the point and may be of any desired length and diameter, the diameter of the rods de-

creasing, however, as explained before, if so desired. The bars 31 and 32 may be of any desired length, dimensions, and number so long as they accomplish the purpose of transmitting the pull of the lower end of the ram to the body of the pile.

The bore 30 of the pile will vary with the diameter and length. If desired, it may be smaller at the lower end, as indicated at 31ª in the several views, as there is little danger of the ram springing, because of the decreased diameter for such a small distance. This reduction of diameter also permits better disposition of the ends of the rods 4 and 35.

After the pile has been driven and the ram removed the bore is filled with rather wet concrete, so that the more liquid portion of the filling will flow into any cracks that may occur, because of the point striking a boulder and twisting or bending the pile. In this manner the crack or break will be repaired sufficiently to render the pile capable of giving good service. If desired, the pile may be increased in diameter toward the upper end, as shown in Fig. 1 and indicated in Fig. 7.

The construction shown in Fig. 9 differs from those heretofore described, in that the longitudinal tension members 41 extend upward in pairs from a loop at the point of the pile. They are adapted to fit into crossed grooves 42 in the end of the removable core 46 and are distorted to form disks or other enlargements 43. If desired, these enlargements may be separate from the rods and secured thereto in any desirable manner. In Fig. 10 the rods 44 are similar to the rods 35 of Figs. 7 and 8, while the bars that engage the end of the core 46 are formed similar to the members 41 of Fig. 9.

In the three forms of piles shown in Figs. 7 to 10 the core forms an essential and operative although removable portion of the pile, which is thus composed of a strong metal central portion, a shell of plastic material, and strengthening members adapted to receive the impact of the metal core and transmit it to the plastic portion of the pile, thereby pulling down the whole pile. After the pile is in place the core is pulled out and the bore filled, as before described.

Having now explained my improvements, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In a pile, the combination of the body thereof formed of plastic material and having a longitudinal bore, of a series of rings molded in said body concentric with the bore, a series of longitudinally-extending tension members, said body portion formed with a tapering point, crossed metal bars embedded in the material of the point, a removable metal core adapted to engage the crossed metal bars, and an elastic pad on the upper end of the pile.

2. In a pile, the combination of the body thereof formed of plastic material and having a longitudinal bore and a tapering point, the diameter of the body next to the point being of less diameter than that of the upper portion of the point, crossed metal bars united with the plastic material of said point and having a series of projections, and a metal core adapted to transmit the force of blows received at the upper end to said crossed metal bars.

3. A pile comprising a shell of plastic material having a tapering point, a removable metal core within said shell, longitudinal tension members embedded in said plastic material, and metal reinforcements at the lower end of said pile adapted to be engaged by the end of the metal core and transmit the longitudinal thrust of blows to the shell of plastic material.

4. In a pile, the combination of a hollow plastic body portion, a removable metal driving-core having its lower end provided with a groove, and a plurality of upwardly-extending members united with the plastic material of the body portion and adapted to transmit the longitudinal thrust of the lower end of the core to the plastic body of the pile.

5. In a pile, the combination of a hollow plastic body portion, a removable metal core having its lower end provided with grooves, and metal bars adapted to fit the grooves and adapted to transmit the thrust of the core to the plastic body of the pile.

6. In a pile, the combination of a hollow body of plastic material having a tapering point, a removable driving-core within said body, and metal reinforcement for said point adapted to transmit the longitudinal thrust of the core to the plastic body of the pile.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JULIUS KAHN.

Witnesses:
ANNA M. GREGORY,
EDWARD N. PAGELSEN.