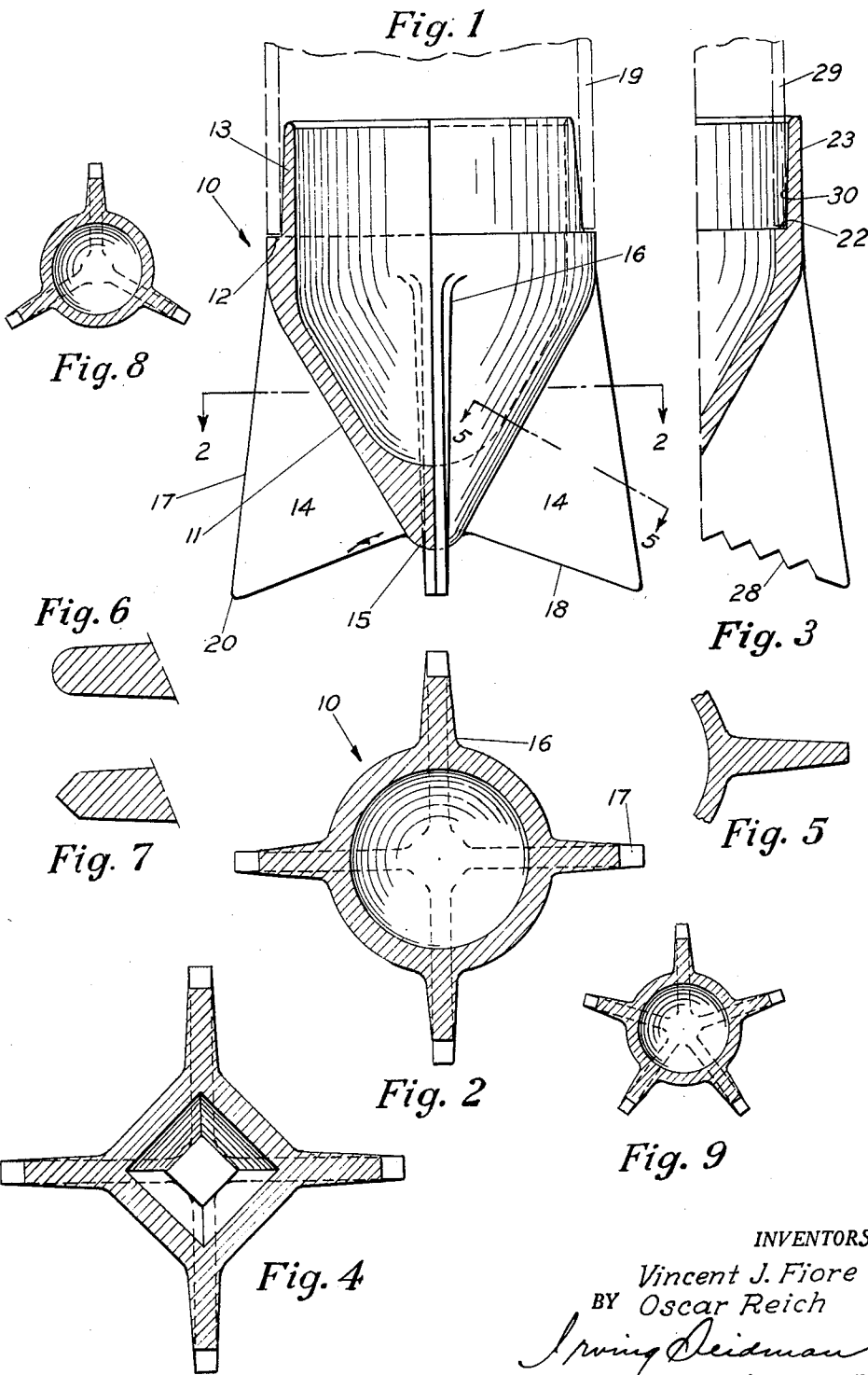


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DRIVING POINTS FOR PILES

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DRIVING POINTS FOR PILES

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This invention relates to tips or driving points for closed-end pipe piles, pipe-shell composite piles, and mandrel driven steel shells.

Broadly, it is an object of the invention to provide a novel fin-type of pile driving point for use as a tip for piles which can be driven through layers of gravel and hardpan to rock or gravel boulder formations overlying rock. This point may also be used as shoes for wood piles to facilitate penetration of layers of coarse sand and gravel or of seating piles into them.

Pile driving is accomplished by means of power driven pile driving hammers of various weights and distances of drop with the pile usually held in leads to direct the hammer upon a driving head directly over the top of the pile.

At the present time pile tips used for closed-end pipe piles or for mandrel driven shells consist of flat steel plates or of conical or hemispherical steel castings. Piles driven with such tips cannot, as a rule, penetrate layers of hardpan or coarse sand overlying compressible material, or if penetrating, become bent or torn and result in rejected piles. When encountering sloping rock, piles with such tips slide off rock following rock contour resulting in bent or so-called "doglegged" piles or piles otherwise damaged, incapable of inspection and thus unacceptable.

Our present invention of the fin-type of pile tip will act as a cutter, penetrating heavy layers of dense material such as decomposed rock; that when meeting boulders on its way down to proper bearing material, our tips will either cut through such material or push such material aside. When encountering sloping bedrock, our fin-type of pile tip results in a properly seated straight pile with the fins embedding themselves into rock and gripping such rock firmly. Thus, the probability of damaged or crushed tips or the shortened pile is reduced to a minimum and there is no danger of overdriving insofar as our tip is concerned.

For a fuller understanding of the nature and objects of the invention, reference is had to the following detailed description, in connection with the accompanying drawing, in which:

Fig. 1 is a side elevational view of a fin-type pile tip, partly in vertical section which is seated within the end of a pipe.

Fig. 2 is a sectional view taken through line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional partial view of a modified pile tip which is seated around the outside circumference at the end of a pipe.

Fig. 4 is a cross-sectional view of another modified pile tip of a pyramid formation.

Fig. 5 is a sectional view taken through line 5—5 of Fig. 1.

Fig. 6 is a partial sectional view taken through the outer end of a fin to show a rounded edge.

Fig. 7 is a partial sectional view taken through the outer end of a modified fin to show a blunt pointed edge.

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Figs. 8 and 9 are horizontal sectional views of modified pile tips showing three and five fins, respectively.

Referring to Figs. 1 and 2, numeral 10 represents a fin-type pile driving point made preferably of cast steel but may be made of other materials, such as cast iron, or other metals or alloyed metals. The lower portion or end 11 of the point is formed as a hollow inverted circumferential cone and has a circumferential shoulder 12 at its upper end and a slightly tapered circumferential collar 13 extending above the shoulder 12. On the outside circumferential face of the cone there are a multiplicity of integrally cast fin-like lugs or fins 14 extending below the tip or vertex 15 of the cone. In Figs. 1, 2 and 4 only four such fins are shown. However, two or many more such fins may be used. In Figs. 8 and 9, three and five such fins have been shown, respectively. Fins 14 are wedge shaped, being thicker at the cone, as shown at 16, thinner at the outer edge 17 and also thinner at the cutting edge 18. We have found that a good thickness at the outer and cutting edges is three quarters of an inch. The outer edges 17 and cutting edges 18 of the fins 14 may be semi-circular or pointed as shown in Figs. 6 and 7, respectively. The cutting edges 18 may be either straight, as shown at 18, Fig. 1, or serrated, as shown in Fig. 3 at 28. The lowermost points 20 of the fins 14 extend below the vertex 15 of the cone.

Instead of the fins 14 being integrally cast, as aforesaid, the fin-shaped plates 14 of adequate thickness may be welded to the cone shaped portion 11.

The tapered collar 13 is made to fit the inside of a pipe 19 so that the pipe 19 can slide down the collar 13 to the shoulder 12 and be somewhat wedged therein because of the taper of the collar 13. The shoulder 12 is wide enough to accommodate the thickness of pipe 19. It is then preferable to weld the collar 13 and the pipe 19 together to insure that the collar 13 will not become dislodged from the pipe when it is driven into the ground.

The pile tips 10 are made in various sizes corresponding to the various diameters and thicknesses of pipe ordinarily used for piles. The tip 10 of our fin-type pile driving point may also be adapted to the various makes and diameters of mandrel driven shells and to serve as shoes for wood piles.

While we have shown the cones of Figs. 1 and 2 to have an angle of about 60°, greater or lesser angles can be used to about 90°.

The inner portion of the driving point 10 is hollow to accommodate the end of a wood pile or to be filled with concrete together with pipe or shell pile to act as a unit and constitute an integral part of the foundation.

Fig. 3 is a modified pile driving point very much like the tip shown in Figs. 1 and 2, except that the cutting edge 28 is serrated and the sleeve 23 is made to receive the outside diameter of pipe 29. Our type of driving points act very much like a cutter and penetrate heavy layers of dense material. When boulders are met on the way down, our tips will cut through or push aside such dense material. The serrations 28 help to break up dense material. It should be noted that the inside wall 30 of the upper tip is tapered upwardly so that the end of pipe 29 is somewhat wedged therein and becomes seated upon the inner shoulder 22. In this type of driving point it is also preferable to weld the sleeve 23 and the pipe 29 together for the same reason given for the point shown in Figs. 1 and 2.

Of course, the features shown on the driving point shown in Fig. 3 can be used on the driving point shown in Figs. 1 and 2, or vice versa.

In Fig. 4 there is shown another modified driving point in the form of the frustum of a pyramid and while it is shown as four sided it is possible to make it multiple

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sided. The inside may be hollow and the inner walls may conform to the slope of the outer faces or may be conical in formation. In all other respects this driving point may be constructed like the points shown in Figs. 1 and 3, or a combination of the elements shown on same.

The sectional views shown in Figs. 8 and 9 are modifications of the driving points heretofore described except that such driving points have three and five fins, respectively. In all other respects such driving points are similar in construction to the driving points of Figs. 1 and 3, or may be of a combination of the elements shown on same.

To sum up, our driving points, above described, will penetrate heavy layers of dense material, will either cut through boulders on the way to bearing material or push such material aside; the tip will not slide off sloping rock but embed itself into such rock; the tip will seat the pile straight and plumb regardless of the shape of the bedrock; the tip will not be crushed by projecting rock and will reduce the danger of pile failure due to overdriving.

It is obvious that various changes and modifications may be made in the details of constructions, the kind of materials used, and the arrangement of parts without departing from the general spirit of the invention.

We claim:

1. A pile driving point for vertical downward penetration of soil by successive power hammer blows, said point having a multiplicity of identical radial fins, each of said fins having an outer edge, a lower edge and a point, each of said fins being symmetrical about a radial axis and extending downwardly to said point, said point of said fins being below said driving point, the lower edge of each of said fins being blunt and constituting a cutting edge, said lower edge being tapered upwardly toward said driving

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point, the upper end of said outer edge of each of said fins beginning at the largest dimension of said driving point.

2. The pile driving point set forth in claim 1 in which each of said fins is uniformly reduced in thickness towards its outer edge.

3. The pile driving point set forth in claim 2 in which said lower edge of each of said fins is serrated.

4. The pile driving point set forth in claim 1 in which the outer edge of each of said fins is directed outwardly and downwardly.

5. The pile driving point set forth in claim 1 including an outer shoulder around the upper portion of said driving point and a tapered collar extending around said upper portion and above said shoulder.

6. The pile driving point set forth in claim 1 including an inner shoulder around the upper portion of said driving point and a tapered collar extending around said upper portion and above said shoulder.

7. The pile driving point set forth in claim 1, wherein said driving point is conical in form.

8. The pile driving point set forth in claim 1, wherein said driving point is the frustum of a pyramid of multiple sides.

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