

Dec. 6, 1949

D. C. HUBBARD

2,490,355

EARTH ANCHOR

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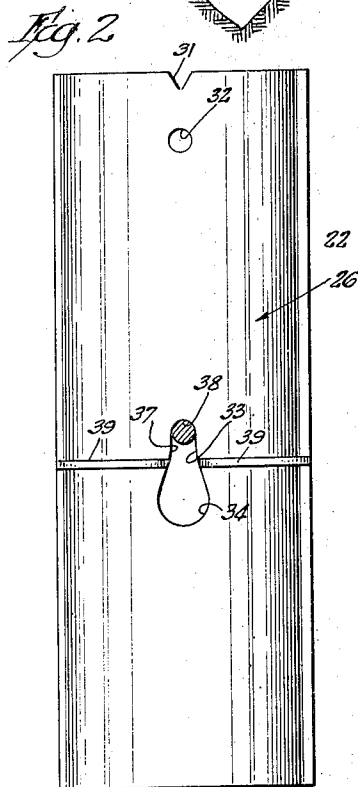
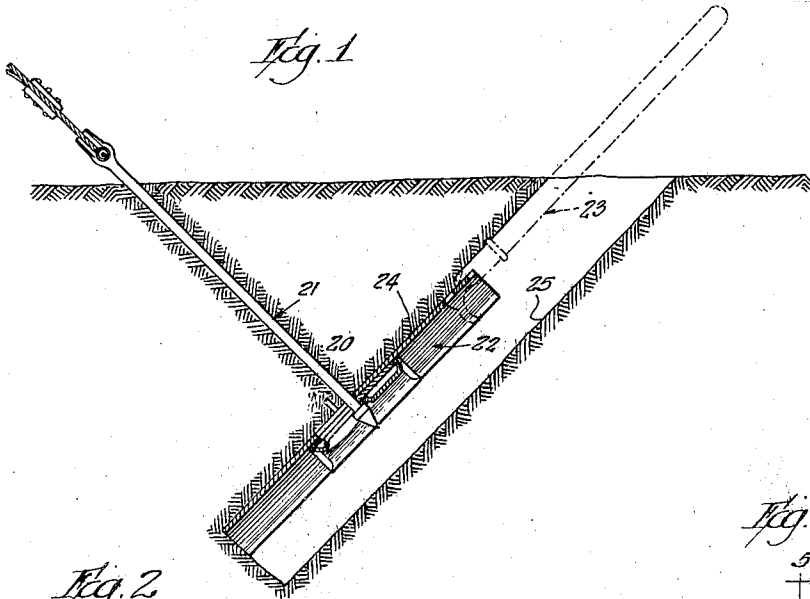
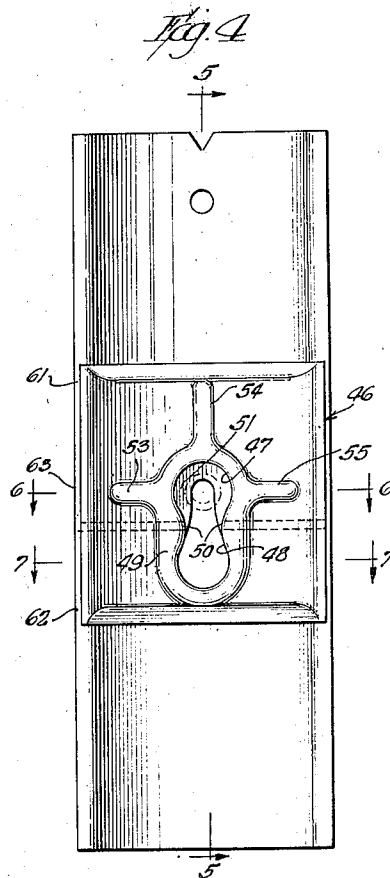
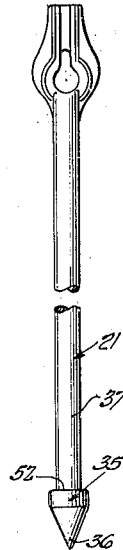


Fig. 3



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2 Sheets-Sheet 2

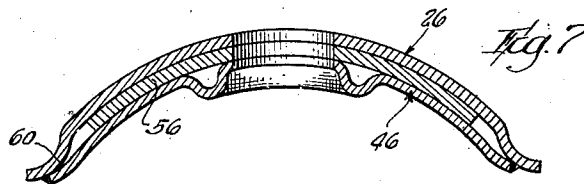
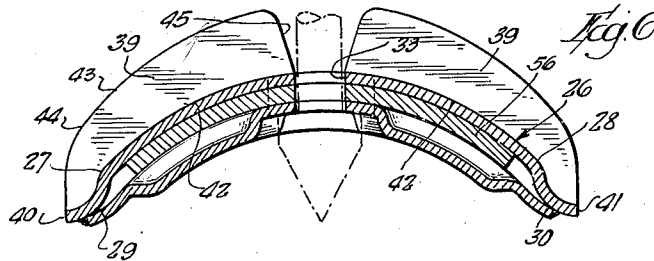
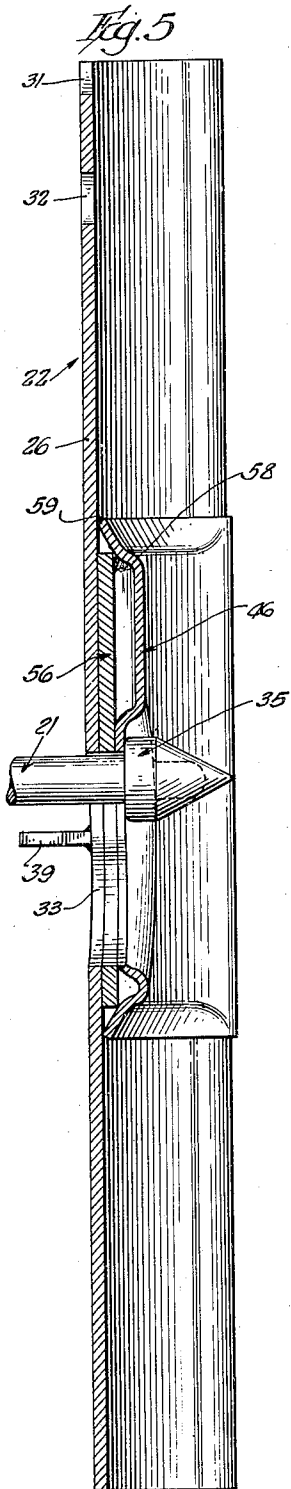


Fig. 8

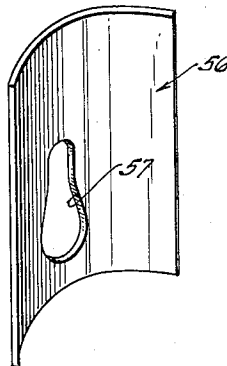
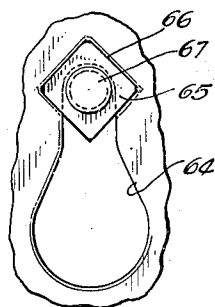


Fig. 9



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UNITED STATES PATENT OFFICE

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EARTH ANCHOR

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3 Claims. (Cl. 189—90)

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The present invention relates to earth anchors, and is particularly concerned with the provision of an improved earth anchor of the type which is adapted to be connected with a guy rod which has been driven through undisturbed earth into a transversely extending, diagonal hole, so that the anchor will be engaged with undisturbed earth when the guy rod is pulled outward by the guy.

One form of such anchor is that disclosed in the prior patent of Albert B. Chance, No. 1,384,825, dated July 19, 1921, which is exemplary of the prior art anchors of this type which have been made of malleable cast iron.

One of the objects of the invention is the provision of an improved anchor of the type described, which is stronger than the anchors of the prior art of the same size.

Another object of the invention is the provision of an improved anchor of the class described which may be manufactured out of sheet metal, such as sheet steel, and which is also adapted to withstand greater loads than any of the devices of the prior art of the same size.

Another object of the invention is the provision of an improved anchor of the class described which utilizes a minimum amount of metal, which may be manufactured at a low cost, and which is also adapted to perform the same functions as the malleable cast iron anchors of the prior art, but with still greater efficiency.

Another object of the invention is the provision of an improved earth anchor structure of the class described, the structure of which has been so arranged that the points of failure of prior anchors of similar construction have been eliminated and strengthened.

Another object of the invention is the provision of an improved anchor of the class described which is more easily attached to the headed end of a guy rod in the previously bored hole for the anchor, and in which the guy rod may be guided into place, even though the anchor is held at the wrong angle.

Another object of the invention is the provision of an improved anchor of the class described which is equally adaptable for use with the headed guy rod members which have a point and the guy rods which utilize a threaded end and a nut.

Referring to the drawings, of which there are three sheets,

Fig. 1 is a vertical sectional view taken through the ground and through an anchor embodying

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the invention, with the guy rod shown in elevation, illustrating the application of the anchor to a guy rod.

Fig. 2 is a top plan view of the anchor.

Fig. 3 is an elevational view of the guy rod.

Fig. 4 is a bottom plan view of the anchor.

Fig. 5 is a sectional view taken on the same plane as that shown in Fig. 1, that is, the line 5—5 of Fig. 4, showing the details of structure of the anchor and the mode in which it is located one the guy rod.

Fig. 6 is a transverse sectional view taken on the plane of the line 6—6 of Fig. 4, looking in the direction of the arrows.

Fig. 7 is a transverse sectional view taken on the plane of the line 7—7 of Fig. 4, looking in the direction of the arrows.

Fig. 8 is a view in perspective of one of the reinforcing plates.

Fig. 9 is a fragmentary view similar to Fig. 4, showing the change in shape of the socket of the anchor when it is to be used with a guy rod, having a threaded end and a nut located in the socket.

Referring to Fig. 1, the anchor assembly is here indicated by the numeral 20, and it comprises a guy rod 21 and an anchor 22. The handle 23, which is shown in dotted lines, is withdrawn from the assembly before the anchor 22 is pulled up against the side 24 of the diagonally extending hole 25. Various types of guy rods may be employed with my anchor, of which that shown in Figs. 1 and 3 is merely exemplary.

Referring to Figs. 2 to 7, the body plate 26 of anchor 22 is preferably constructed of a sheet of hot rolled steel strip which, for equivalent thickness, width or weight, is stronger than malleable iron. This strip is originally flat, and is preferably stamped to the section shown in Figs. 6 and 7. Thus the body plate 26 of the anchor is substantially partially cylindrical from the point 27 to the point 28, describing approximately one-quarter of a circle, and the curvature is preferably substantially that of the hole 25 within which the anchor is to be used.

At the points 27 and 28 the body plate 26 is curved more abruptly inward in Figs. 6 and 7, and at the points 29 and 30 the body plate 26 is again curved outwardly with an easy bend. Thus the curvature at each edge of the body plate 26 is substantially an S-shaped curvature, except that the curves are less than that usually employed in the letter S. This curvature may be described as a pair of reverse bends adjacent the two edges of the anchor.

As compared with anchors which have merely a transversely extending reinforcing flange at each of its edges, I find that the present structure is much stronger and does not buckle as readily with a reverse bend as it does with a single, transversely extending flange at each edge.

The shape of the body plate 26 is substantially rectangular, except that there is a V-shaped groove 31 adjacent one end, located midway between the side edges. In order to provide for a releasable grip by means of the handle 23, the body plate also has an aperture 32 for engagement with the customary fitting carried by the end of handle 23. Groove 31, aperture 32 and the centrally located aperture 33 may all be punched out before or after the stamping operation which forms the plate 26 to substantially cylindrical shape.

The aperture 33 has a substantially round, enlarged portion 34 at one end, generally the lower one, for passing the head 35 of the pointed end 36 of the guy rod 21. From the enlarged portion 34 of aperture 33 this aperture tapers upwardly and is provided with the parallel sides or edges 37 terminating in a relatively small, round portion 38 which may be of the same size as the shank 37 of the guy rod.

On its convex side the body plate 26 is preferably provided with a pair of transversely projecting steel plates 39, the edges of which are seen in Fig. 2. The shape of these steel plates 39, 39 is shown in Fig. 6, where they are seen located on opposite sides of the aperture 33 and extending from this aperture to the side edges 40, 41 of the body plate 26.

The plates 39 are adapted to cut into the earth on the upper side 24 of the hole 25 and to prevent the anchor from creeping outward out of the hole in the event the guy rod is not so disposed as to eliminate such a tendency. There is such a tendency when the guy rod has an acute angle with the axis at hole 25 on the upper side of the guy rod.

The shape of the plates 39 is illustrated in Fig. 6. Their lower edges 42 are shaped to have a substantial fit with the outer convex surface of the plate 26 to which these plates need only be welded at spaced points such as, for example, adjacent each end on one side of the plate 39 and midway between the ends of each plate 39 on the other side. Complete welding of the lower edge of the plate 39 to the body plate 26 is not necessary, and would only increase expense of the anchor.

The outer edge 43 of each plate 39 may be the same, and, beginning at the edge 40 of the anchor, the outline may be as follows: edge 43 may extend in the direction of the axis of the guy rod for substantially the width of the plate 39, which is then provided with an easy rounded curve at 44, while the remainder of edge 43 may be concentric, or substantially concentric, with the outer convex surface of the body plate 26.

Adjacent the hole 33 the end of the plate 39 is beveled at 45 so as to present a tapered opening between these two plates, assisting in guiding the guy rod into place.

The use of two such plates 39, separated from each other at the middle, permits the plates 39 to be located at substantially the middle of the anchor, where they are most effective, without interfering with the guy rod which may extend from the aperture 33 angularly between the plates 39, because of the tapered aperture between the edges 45. This is of great advantage when the

guy rod 21 has been driven down into the hole 25 and the anchor is being placed on the end of the guy rod with the handle 23.

The body plate 26 is preferably provided with a first reinforcing plate 46 which is located medially between its ends, and preferably extends across the full width of the body plate 26. This reinforcing plate 46 is preferably located on the lower side of the anchor, and it is also preferably formed with a socket or depression 47 for receiving the head 35 of the guy rod and tending to retain the anchor on the guy rod to give a maximum bearing between the head and the anchor when a pull is exerted on the guy rod.

The reinforcing plate 46 is provided with an aperture 48 of the same size and shape as the aperture 33 in the body plate 26 with which it is intended to register. In order to reinforce the anchor further against bending strains exerted at the center of the anchor the aperture 48 is preferably bordered by an outwardly projecting curved reinforcing rib 49 which also extends around the socket 47, forming a complete oval with a pair of inwardly projecting portions 50. This reinforcing rib 49 is bordered at the socket 47 by a substantially flat, partially circular portion 51 which the upper annular edge 52 of the guy rod head 35 engages.

The reinforcing plate 46 is also preferably made of a rectangular sheet of metal, such as a low carbon steel which can be worked by stamping. In addition to the oval rib 49, this plate is preferably formed with three radially projecting pressed ribs 53, 54 and 55. The ribs 53 and 55 are preferably located in line with the axis of the guy rod aperture portion 38 so that they reinforce the body plate, against collapse which would change the transverse curvature.

The rib 54 is preferably located along the axis of the anchor so that it will reinforce the body plate against changes of curvature and strains, which would tend to cause it to buckle transversely.

Anchor plates have been made which omitted these reinforcing ribs, and it is found that these reinforcing ribs materially increase the strength of the anchor.

The reinforcing plate 46 is preferably so shaped that its edges will engage the body plate 26 when a second reinforcing plate 56 is interposed between the body plate 26 and reinforcing plate 46. This second reinforcing plate is shown in perspective in Fig. 8, and it may be made of a rectangular piece of sheet metal, such as a medium carbon or high carbon steel plate.

The reinforcing plate 56 is curved cylindrically so that it is concentric with the body plate 26 against which its convex surface engages. Reinforcing plate 46 is also curved cylindrically so that it engages the inner concave surface of the plate 56 against which it has a substantial fit, except for the points where the ribs 53—55 and 49 are located.

The size of the reinforcing plate 56 is preferably such that it is shorter than the plate 46 and narrower than the plate 46 by an amount which permits the plate 46 to have its edges bent inwardly toward the body plate 26 to which they are welded. The plate 56, Fig. 8, also has an aperture 57 of the same size and shape as the apertures 33 and 48, with which it registers.

At each end the reinforcing plate 46 is bent inwardly at 58 so that its end edges 59 may come into engagement with the inner concave surface of the body plate 26 when the smaller plate 56 is

interposed between plates 26 and 46, as shown in Fig. 5.

At each of the side edges the reinforcing plate 46 may be curved slightly outward at 60 to come into engagement with the curved portions 29 and 30 on the body plate 26 to which they are welded.

It should be noted that it is not necessary to weld the reinforcing plate 56 to either of the bodies, as the shape of the plates 26 and 46 is preferably made such that plate 56 is firmly clamped between them when the former two plates are welded together. Neither is it necessary to weld plate 46 to plate 26 around its full periphery. For example, welds may be placed at the points 61, 62 adjacent each end of the plate 46, and 63 opposite the guy rod on each side.

Welding at spaced points in this manner is found to provide ample strength without increasing the welding expense, as would be the case if the plates were welded fully around the periphery of plate 46. The increase in strength by full welding would not be worth the extra cost of welding.

Referring to Fig. 9, this is a modification of the anchor, which differs only in that the aperture 64 for passing ahead of the guy rod must be large enough to pass the nut 65, and the socket 66 corresponding to the socket 47 is of approximately rectangular or square shape to provide a socket for the nut 65 instead of the round head 35. In such case the nut 65 engages the threaded end 67 of the guy rod, and the threaded type of guy rod must be employed instead of the headed and pointed type.

It will thus be observed that I have invented an improved anchor which may be made of sheet steel, and which is not only as strong as the malleable iron anchors of the prior art, but, due to its specific structure and arrangement of its parts, it may be even stronger.

The present steel anchors may be manufactured at a very low cost, as they involve only stamping, punching and welding operations, and thus the present invention may be placed on the market at a lower price than devices of the prior art embodied in the malleable cast iron anchors.

The structure of the anchor is so arranged that it is relatively easy to handle, as it is lighter than the iron anchors and easier to assemble with the guy rod in the previously bored hole made for the anchor. The ribs on the convex side of the anchor are so arranged that they do not interfere with the guy rod as it is being secured to the anchor, and these ribs or plates actually assist in guiding the rod into proper place.

The present anchor may be used not only with pointed and headed guy rods, but with the type having a threaded shank and a nut.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In an earth anchor, a substantially elongated rectangular metal member constructed of sheet steel bent to partially cylindrical form to conform to and engage the sides of a round aperture in the ground, said member being formed with an aperture having a narrow portion which is partially circular and adapted to fit and pass

a guy rod, and said aperture having a widened portion communicating with the narrow portion and adapted to pass the head or nut of a guy rod, said member being formed along its longest sides with an inwardly turned offset flange extending along each of said sides, a clamping plate of relatively thin sheet metal adapted to be pressed into shape and having a substantially complementary concentric curvature with respect to the inside of said member, said plate being substantially rectangular and extended to engage said inwardly turned flanges so that the body of said plate is spaced from said member, said plate having a similar aperture registering with the first-mentioned aperture and being formed with a pressed downwardly projecting rib formation surrounding said aperture, said rib formation being spaced from the narrow portion of said aperture to provide a socket for the head of the guy rod, and a second sheet steel plate of tougher and stiffer characteristics having a similar registering aperture, clamped between said member and said first-mentioned plate, the member and first-mentioned plate being welded together, and the second plate providing a stiffening and a reinforcing for the anchor by virtue of its being housed and held between said member and first-mentioned plate.

2. In an earth anchor, a substantially elongated rectangular metal member constructed of sheet steel bent to partially cylindrical form to conform to and engage the sides of a round aperture in the ground, said member being formed with an aperture having a narrow portion which is partially circular and adapted to fit and pass a guy rod, and said aperture having a widened portion communicating with the narrow portion and adapted to pass the head or nut of a guy rod, said member being formed along its longest sides with an inwardly turned offset flange extending along each of said sides, a clamping plate of relatively thin sheet metal adapted to be pressed into shape and having a substantially complementary concentric curvature with respect to the inside of said member, said plate being substantially rectangular and extended to engage said inwardly turned flanges so that the body of said plate is spaced from said member, said plate having a similar aperture registering with the first-mentioned aperture and being formed with a pressed downwardly projecting rib formation surrounding said aperture, said rib formation being spaced from the narrow portion of said aperture to provide a socket for the head of the guy rod, and a second sheet steel plate of tougher and stiffer characteristics having a similar registering aperture, clamped between said member and said first-mentioned plate, the member and first-mentioned plate being welded together, and the second plate providing a stiffening and a reinforcing for the anchor by virtue of its being housed and held between said member and first-mentioned plate, said first-mentioned plate being formed with offset flanges adjacent each end, extending beyond the second-mentioned plate into engagement with the inner curved surface of said member, to which said latter offset flanges are welded.

3. In an earth anchor, a substantially elongated rectangular metal member constructed of sheet steel bent to partially cylindrical form to conform to and engage the sides of a round aperture in the ground, said member being formed with an aperture having a narrow portion which is partially circular and adapted to fit and pass a guy rod, and said aperture having a widened portion

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communicating with the narrow portion and adapted to pass the head or nut of a guy rod, said member being formed along its longest sides with an inwardly turned offset flange extending along each of said sides, a clamping plate of relatively thin sheet metal adapted to be pressed into shape and having a substantially complementary concentric curvature with respect to the inside of said member, said plate being substantially rectangular and extended to engage said inwardly turned flanges so that the body of said plate is spaced from said member, said plate having a similar aperture registering with the first-mentioned aperture and being formed with a pressed downwardly projecting rib formation surrounding said aperture, said rib formation being spaced from the narrow portion of said aperture to provide a socket for the head of the guy rod, and a second sheet steel plate of tougher and stiffer characteristics having a similar registering aperture, clamped between said member and said first-mentioned plate, the member and first-mentioned plate being welded together, and the second plate providing a stiffening and a reinforcing for the anchor by virtue of its being housed and held between said member and first-

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mentioned plate, said first-mentioned plate being formed with offset flanges adjacent each end, extending beyond the second-mentioned plate into engagement with the inner curved surface of said member, to which said latter offset flanges are welded, and said anchor being provided on its convex side, adjacent the narrow portion of said aperture, with a pair of outwardly projecting sheet metal fins, said fins being shaped to and welded to the outer surface of the anchor, to prevent deformation of the anchor with respect to its lateral curvature and to bite into the earth and prevent the anchor from creeping upward or downward in its hole.

DAVID C. HUBBARD.

REFERENCES CITED

The following references are of record in the file of this patent:

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