Dec. 31, 1929. T. BIRKENMAIER 1,742,162

ANCHOR

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Fig. 1.

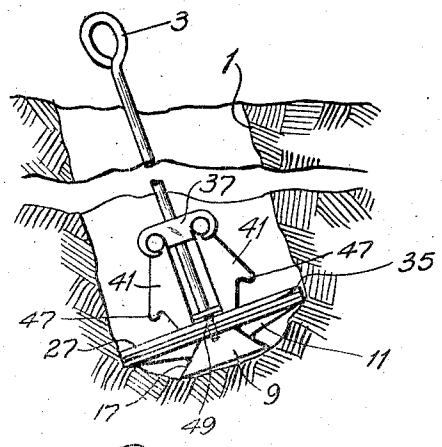


Fig. 2.

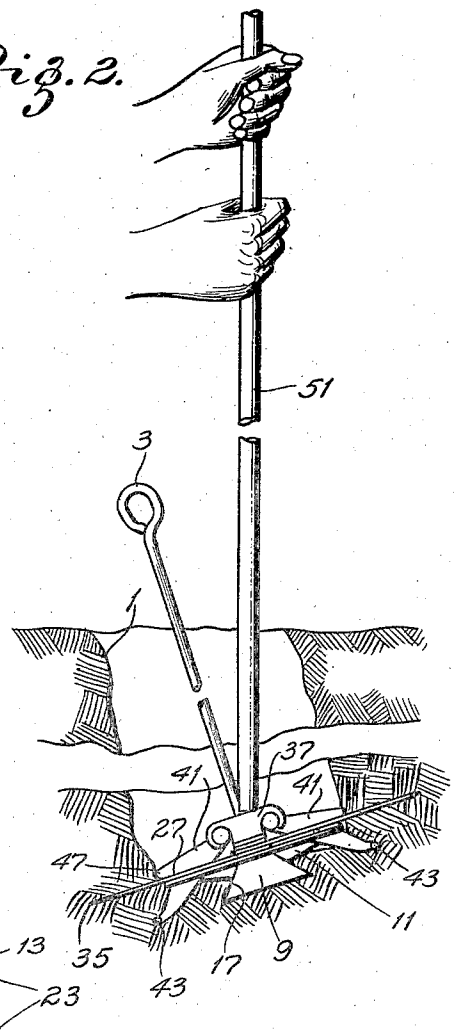
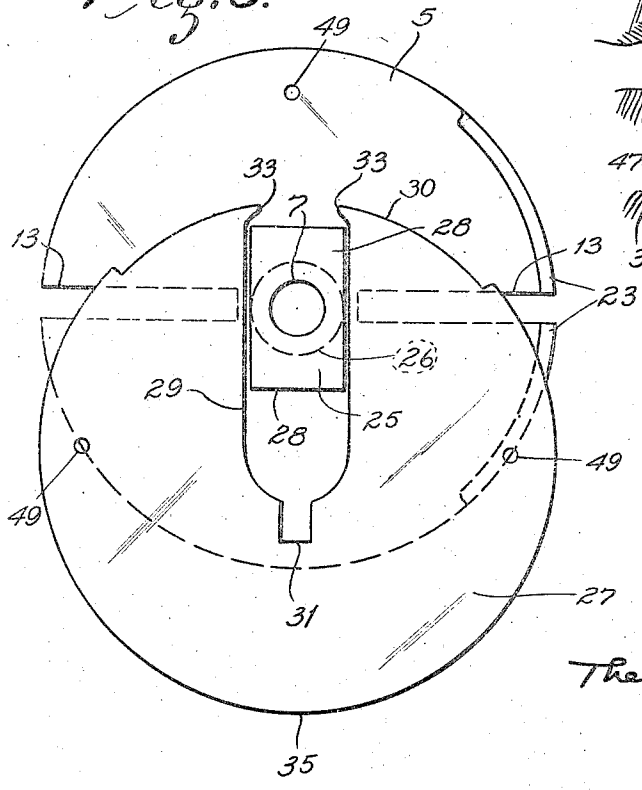


Fig. 3.



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Fig. 4.

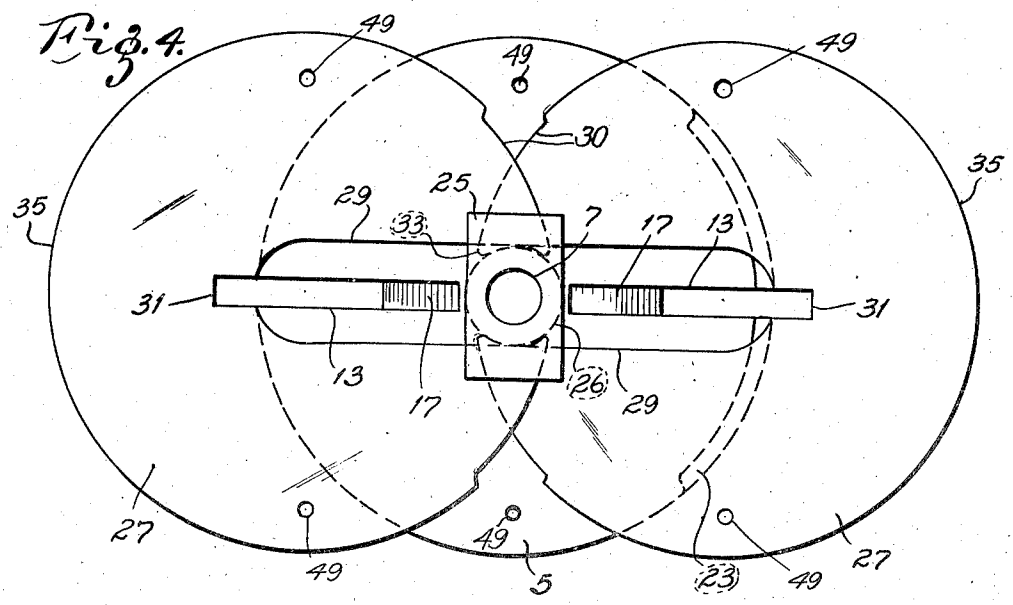


Fig. 5.

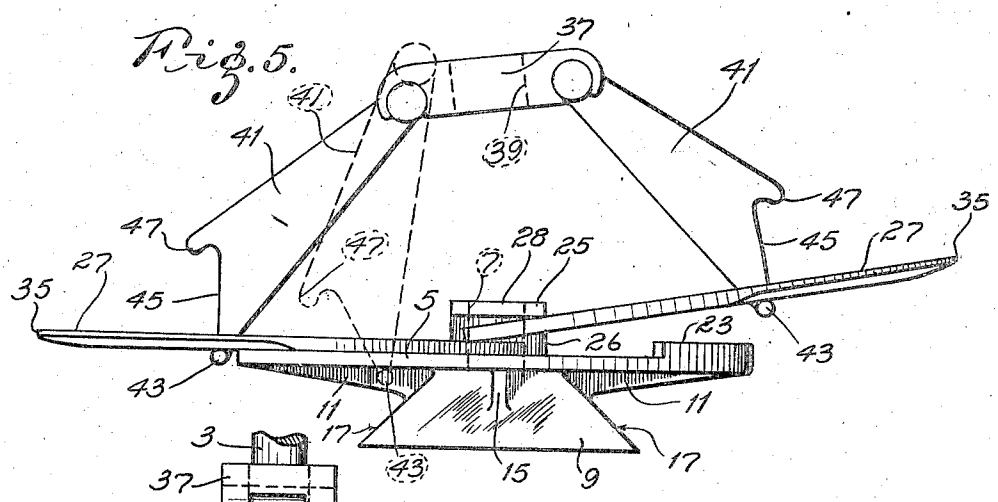
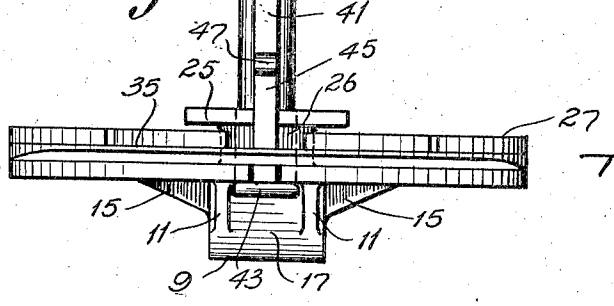


Fig. 6.



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Fig. 7.

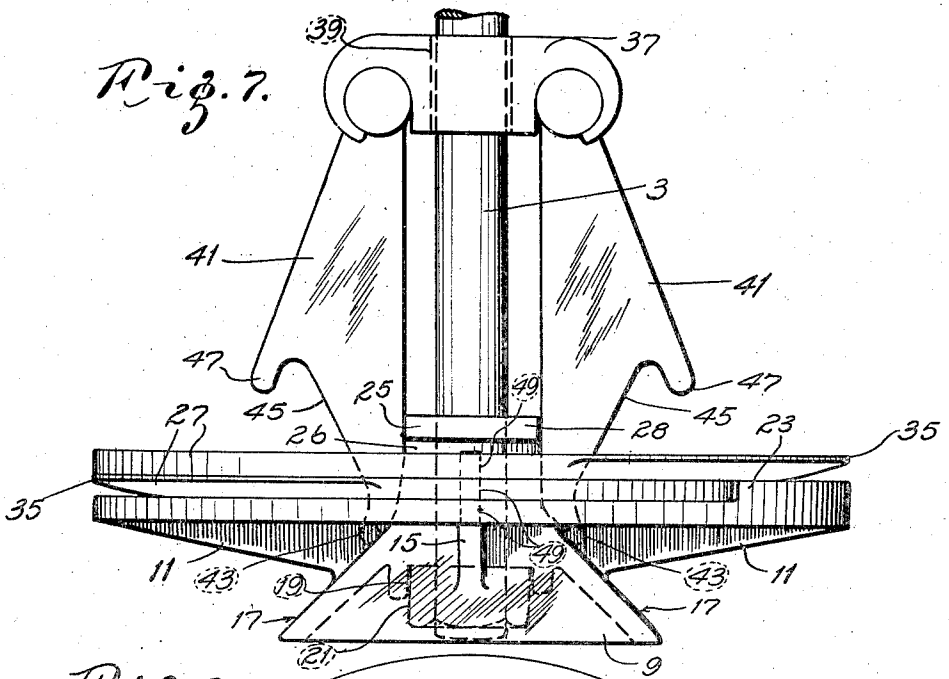
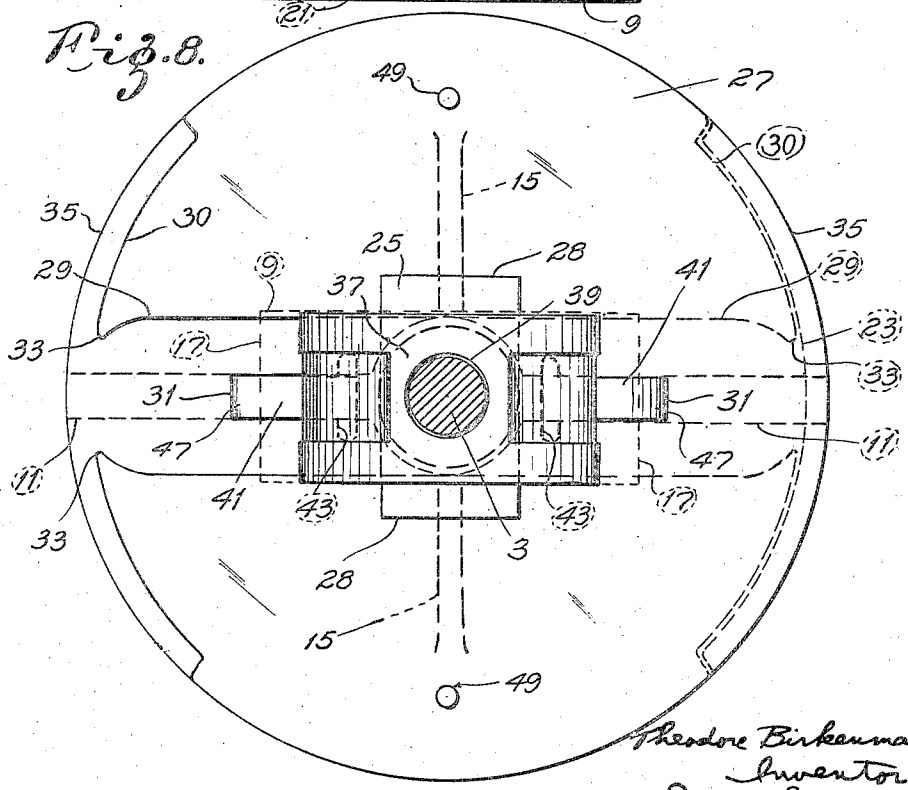


Fig. 8.



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Patented Dec. 31, 1929 1,742,162

UNITED STATES PATENT OFFICE

THEODORE BIRKENMAIER, OF ST. LOUIS, MISSOURI, ASSIGNOR TO W. N. MATTHEWS CORPORATION, OF ST. LOUIS, MISSOURI, A CORPORATION OF MISSOURI

ANCHOR

Application filed April 25, 1927. Serial No. 186,254.

This invention relates to anchors and with regard to certain more specific features, to ground anchors such as are used for holding guy wires and the like.

Among the several objects of the invention may be noted the provision of an expanding ground anchor adapted to be expanded by the mere application of blows; the provision of an anchor of the class described which incorporates in its construction the combined advantages of an opening incline or wedge or cam and the advantages of a toggle linkage; the provision of an anchor incorporating said features in such a manner that the incline is effective to start the expansion and the toggle linkage is effective to provide final expansion, the toggle action taking effect at the period of most advantageous toggle movement; and the provision of a device of the class described which is rugged and compact in construction, simple in operation and easily fabricated. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combination of elements, features of construction, and arrangements of parts which will be exemplified in the structure herinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a side elevation of an assembled anchor shown within a hole, the anchor being in retracted position;

Fig. 2 is a view similar to Fig. 1 but showing the anchor in expanded position and also showing the manner in which it is forced open;

Fig. 3 is a plan view of the anchor body and one fluke shown in position for application to said body, said position being at 90 degrees to the normal operating position;

Fig. 4 is a plan view showing the body of the anchor with its two flukes supplied thereto, the expander not being shown;

Fig. 5 is a side elevation of the parts shown in Fig. 4, the parts being so positioned as to show the means of application of the expander;

Fig. 6 is a left side elevation of Fig. 5;

Fig. 7 is an enlarged side elevation of the anchor shown in closed position; and

Fig. 8 is a plan view of Fig. 7.

Similar reference numerals indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a round or similar hole which is dug into the ground in the usual manner for the placement of anchors of the general class herein described. The general contour of the present anchor, before expansion, is round so that it may fit this hole properly. The anchor is adapted to hold a tie rod 3 in place, said tie rod being of the class adapted to be coupled to guy wires or the like.

Referring to Figs. 3 and 4, numeral 5 indicates a more or less flat body portion, having an opening 7 through its center, the opening being for the purpose of receiving the shank of said tie rod 3. Formed integrally with the body portion 5, on the lower side thereof, and traversed by said opening 7, is a wedge or cam shaped lug 9. This lug 9 is suitably braced to the body portion 5 by flanges 11, these flanges being positioned at some distance on each side of radial slots 13 formed in the body portion 5. Lateral fins or braces 15 are also used for supporting the lug 9 to the body 5.

As illustrated by dotted lines in Fig. 8, the lug 9 is rectangularly shaped, the short sides 17 (positioned transversely of the said slots 13) having flat inclined faces. The lug 9 is hollow and includes a suitable socket 19 for holding a nut 21 in place. The nut 21 forms the head for the shank of the tie rod

3, said shank fitting loosely through the hole 7.

The top of the body 5 is substantially flat, except at one end of one of the slots 13, where there is positioned a pair of upstanding spacers 23. The central portion of the body 5, just above the lug 9, has integrally formed thereto an upstanding T-head 25, the arms 28 of which are positioned laterally to the length of slots 13.

The flukes of the anchor each comprise a flat plate 27, substantially circular in contour, having a bight 30 removed from a certain portion of the periphery, said bight 30 being for the purpose of cooperating with the said spacers 23 whenever the fluke in question is used as the lower one of a pair. An opening 29 traverses each fluke from a point midway of the bight 30 to and including the center. At the end of each opening 29 is formed a notch 31. The width of each opening 29 is such as to permit passage of the T-head 25 in the fluke position shown in Fig. 3, but to prevent such passage in the fluke position shown in Fig. 4. The widths of the T-head 25 and the round, hollow portion 26 which supports it, are substantially the same. The ends of the openings 29 are restricted in the manner shown at the numeral 33, whereby removal of the fluke is prevented after it has been applied over the head 25 and turned to its Fig. 4 position. Each fluke is somewhat sharpened at its edge 35, opposite the bight 30.

It will be noticed that the flukes are equal in size and contour and may therefore be made from the same pattern. The purpose of the spacers 23 is to support the upper fluke at the outer portion thereof when the anchor is expanded, the lower fluke supporting the upper fluke at the inner portion thereof. It does not guide the fluke in a predetermined path and therefore will not bind the fluke.

The expanding means for this anchor comprises a wrist piece 37 which has a hole 39 therethrough adapted to loosely fit the rod 3. This wrist piece pivotally carries a pair of flat toggle links 41, the lower ends of which are provided with cross lugs 43 adapted to easily pass through the openings 29 of the flukes 27 (see Fig. 5) and to be positioned beneath the slots 13. The flat toggle links 41 are adapted to slidably engage said slots 13.

The progressive stages for applying an expander are shown in Fig. 5, in which the right hand side shows a fluke partly lifted with one toggle arm being pushed through the opening 29. The left hand side of the figure shows the next progressive position of the toggle during placement and the dotted lines show a more nearly final position, wherein the link 41 is positioned in the slot 13, while a lug 43 thereon is below said slot.

It may be noted that the lower ends of the toggles are formed with faces 45, above which are formed hooks or notches 47 for engaging said notches 31 of the flukes. Figs. 6 and 7 show the closed position of the anchor in which the lugs 43 engage the said wedge shaped surfaces 17 of the lug 9.

The operation of the device, starting from its assembled and retracted position (Figs. 6 to 8) is as follows:

The tie rod 3 is placed through the holes 39 and 7, the nut 21 being applied from beneath and placed in the socket 19. Aligning holes 49, passing through the body 5 and flukes may have a piece of wood or length of string or the like threaded therethrough, for the purpose of holding the anchor in a closed position while it is placed in hole 1 (see Fig. 1).

After the anchor has been positioned in the hole 1, the wrist piece 37 is struck with blows by means of a ram 51 in the hands of an operator. This results, first, in the lugs 43 being driven down the incline faces 17 and expanded outwardly by the camming or wedging action of the lug. The faces 45, engaging the notches 31, are by this means driven outwardly and in turn drive the flukes outwardly. If the anchor has been temporarily held shut in the manner described, the wooden sliver or string or the like shears. The anchor need not necessarily be held shut in the manner set forth.

It should be noted that not much resistance is at first encountered in starting the flukes into the side walls of the hole 1. Therefore, the camming action of the inclines 17 and faces 45 (at a relatively high rate of speed) is enough to start the expanding action. The flat toggle arms 41, in moving through the slots 13 guide the flukes so that they assume a proper radial movement.

As the action proceeds to a point at which the lugs 43 reach the ends of the surfaces 17, the notches 47 come into contact with the notches 31, thereby providing the action of a toggle linkage at the time when such a highly desirable linkage is most needed, that is when the forces resisting expansion are greatest. It should be remembered that a toggle is most effective, as far as mechanical advantage is concerned, when it has been somewhat flattened out in position. In its more unflattened positions, it is not so effective to increase the mechanical advantage. Hence, in this invention, the camming action is made use of in the more or less unflattened positions of the toggle and the toggle action in the flattened positions thereof. By this means, improved action is obtained, that is, the anchor is first wedged open and then toggled open, the wedging action being effective to bring the toggle into its best operating position.

As stated, by means of the blows applied from the rod 51, the toggle action is carried

on (see Fig. 2). During the final part of the operation the wedging surfaces 17 and the lugs 43 do not cooperate, the expanding action being accomplished by means of the toggle alone. The toggle comprises the wrist piece 37 and the toggle links 41, notched at 47 into the notches 31.

It is evident that the anchor may be readily assembled and dis-assembled, thereby making it desirable for a field party to merely carry a supply of parts, to be assembled on the field.

The parts of the anchor are preferably unmachined castings, although they may be machined, or stampings may be substituted.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. The anchor comprising a body, movable flukes cooperating therewith, camming surfaces associated with the body, a toggle linkage cooperating with the flukes and the body adapted under the application and blows thereto to move said flukes radially, first by a camming action on said surfaces, and, second, by a toggle action directly on the flukes and independently of said surfaces, also under application of said blows.

2. The anchor comprising a body, radially movable flukes associated therewith, spreading means comprising pivoted links cooperating with the body and the flukes adapted upon applying blows thereto, first, to spread the flukes by a cam action and, second, to spread them by a final toggle action, the body and said means having passages therethrough to permit application of the anchor to a member which is being anchored, said flukes and the body having passages through which a portion of said spreading means is adapted to pass.

3. The anchor comprising a body, movable flukes cooperating therewith, a camming lug formed beneath the body having a recess therein, a head formed above the body, a passage through the head, body and lug for receiving the member to be anchored, the head of said member cooperating with said recess, means for applying and removing the flukes to said body over said head in a given position of said flukes which is not their operative position, a linkage cooperating with the flukes and the body adapted under the application of blows thereto to move said flukes radially, first, by a camming action and, second, by a toggle action.

4. The anchor comprising a body, movable flukes cooperating therewith, camming surfaces associated with the body, an opening formed through the body for receiving the member to be anchored, a toggle linkage cooperating with the flukes and the body adapted under the application and blows thereto to move said flukes radially, first by a camming action on said surfaces, and, second, by a toggle action directly on the flukes and independently of said surfaces, also under application of said blows.

5. The anchor comprising a body, movable flukes cooperating therewith, camming surfaces associated with the body, an opening formed through the body for receiving the member to be anchored, a toggle linkage cooperating with the flukes and the body adapted under the application of blows thereto to move said flukes radially, first by a camming action on said surfaces, and, second by a toggle action directly on the flukes and independently of said surfaces, one of the members of the toggle linkage being adapted to permit the passing of said member to be anchored and the other members thereof passing through the flukes and a portion of said body.

6. The anchor comprising a body, movable flukes cooperating therewith having openings therein, a camming lug formed beneath the body having oppositely disposed camming surfaces, radial slots in the body opposite said surfaces, a head formed above the body adapted to permit application of said flukes in a non-operating position and to prevent removal of said flukes in their operating position, said head functioning as a guide for the flukes in their operating position, notches in the flukes opposite said radial slots, a toggle linkage comprising a wrist pin and toggle links, said links having means cooperating with said camming surfaces, and said notches, whereby the flukes may be cammed apart and having means adapted to cooperate in toggle fashion with the flukes when the camming action has ceased, whereby a toggle action is obtained.

7. The anchor comprising a body, movable flukes cooperating therewith having openings therein, a camming lug formed beneath the body having oppositely disposed camming surfaces, radial slots in the body opposite said surfaces, a head formed above the body adapted to permit application of said flukes in a non-operating position and to prevent removal of said flukes in their operating position, said head functioning as a guide for the flukes in their operating position, notches in the flukes opposite said radial slots, a toggle linkage comprising a wrist pin and toggle links, said links having means cooperating with said camming surfaces and said notches, whereby the flukes may be cammed apart and having means adapted to

cooperate in toggle fashion with the flukes when the camming action has ceased, whereby a toggle action is obtained, said toggle links cooperating with said radial slots and said fluke notches to guide the flukes in a radial manner.

In testimony whereof, I have signed my name to this specification this 23rd day of April, 1927.

THEODORE BIRKENMAIER.