

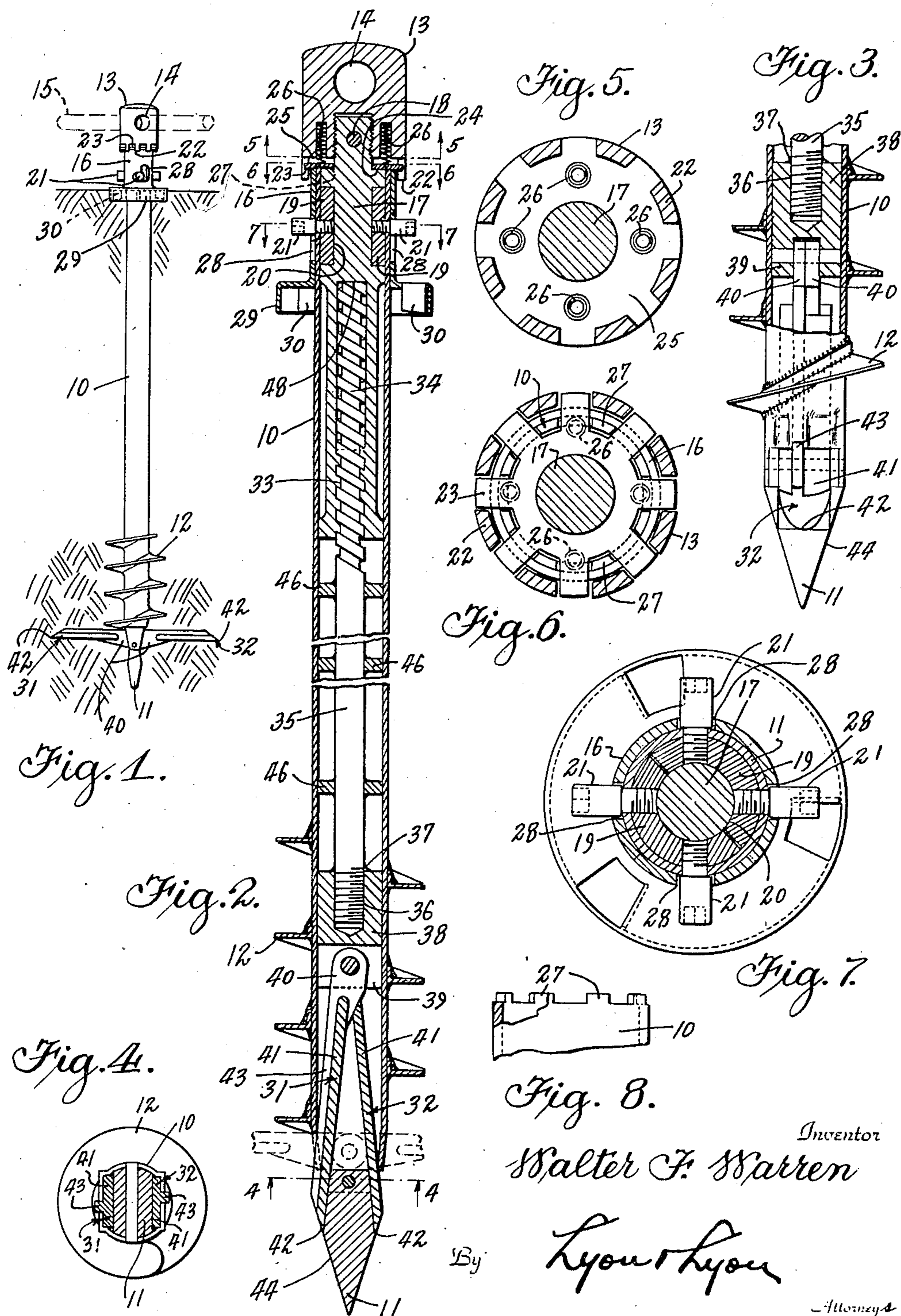
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ANCHOR

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ANCHOR

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This invention relates to anchors of the type that can be set into the ground without making an excavation therefor, and is particularly useful in small, light-weight anchors such as may be carried by aircraft for mooring the craft when on the ground.

An object of the invention is to provide an anchor of the type referred to which can be easily set in and removed from the ground, while at the same time affording good anchorage.

A more specific object is to provide a screw-type anchor that can be readily started into the ground.

Still another object is to provide an anchor of the self-setting type that is relatively free from clogging, and is reliable in operation.

Another object of the invention is to provide an anchor that can be set and expanded rapidly.

Another object is to provide an expanding anchor which is both set and expanded by application of torque to a single member.

Other more specific objects and features of the invention will become apparent from the following detailed description with reference to the drawing of a particular embodiment of the invention.

Briefly, the anchor in accordance with the present invention consists of a pointed, tubular member having a screw thereon, whereby it may be forced into the ground by rotation, and having flukes which are contained within the body of the tubular member while the latter is being screwed into the ground but are forced out into solid ground that has been undisturbed by the screw, after the member has been set to full depth. Such devices are broadly old, and the present invention resides in details that result in a more practicable device.

One such detail is a construction whereby entry of sand or soil into the tubular member through the fluke openings is minimized.

Another detail is a construction that permits pounding on the upper end of the anchor to start it into the ground and enable the screw to obtain a purchase on the soil.

Another detail is a simple and effective clutch mechanism whereby a single rotating member positioned at the top of the anchor can be selectively coupled to the hollow tubular member for screwing it into the ground, or uncoupled from the tubular member for rotation relative thereto to set the flukes of the anchor.

Other features will become apparent from the detailed description with reference to the drawing, in which:

Fig. 1 is an elevation view of my anchor shown set in the ground with its flukes extended;

Fig. 2 is a longitudinal section through my anchor with the flukes contracted.

Fig. 3 is a detail view of the lower portion of the anchor taken at right angles to the view of Fig. 2, and taken partly in elevation and partly in section;

Figs. 4, 5, 6 and 7 are cross-sections taken in the planes IV—IV, V—V, VI—VI, and VII—VII, respectively, of Fig. 2; and

Fig. 8 is a detail view of the upper end of the tubular housing of the anchor.

Referring first to Fig. 1, the anchor therein disclosed comprises as its main external elements a tubular housing 10 terminating at its lower end in a point 11 and having a screw flange 12 positioned a short distance above the point 11. The housing 10 is surmounted by a heavy cap 13 having an eye 14 therein for receiving a cross bar 15 for turning it, or for receiving a cable to be anchored. There is positioned just below the cap 13 a trigger sleeve 16 which is used to engage and disengage the cap 13 to and from the tubular housing 10.

Thus referring to Fig. 2, the driving cap 13 is screwed onto the upper end of a spindle 17 which is rotatable within the housing 10. The cap 13 is further positively locked to the spindle 17 by a pin 18 which is extended transversely through the cap and the spindle. The spindle 17 is held against vertical movement with respect to the housing 10 by a split sleeve 19 which engages an annular groove 20 in the spindle and is rigidly secured to the housing 10 by a plurality of bolts 21.

The cap 13 has a downwardly extending notched skirt 22 which overhangs the sleeve 16, and the notches of which at all times engage the teeth of a notched disc 23, which lies on top of the housing 10 and is centered with respect thereto by the spindle 17, which extends through a central hole in the notched disc. The latter is thinner than the vertical space between a shoulder 24 on the spindle 17 and the main under-surface 25 of the cap 13, so that it is movable vertically through a short distance. It is normally held in the lower position shown in Fig. 2 by a plurality of compression springs 26 mounted in recesses extending upwardly into the cap 13. In this lower position, the notches in the disc 23 not only engage the teeth in the notched skirt 22 of the cap 13, but also engage the teeth 27 on the upper edge of the tubular housing 10, so that

the disc 23 locks the housing 10 to the spindle 17 and the cap 13, for rotation therewith.

However, by moving the notched disc 23 upwardly against the force of springs 26, it is carried clear of the teeth 27 on the upper end of the tubular housing 10, so that the cap and the spindle 17 can be rotated relative to the housing 10. The disc 23 can be moved upwardly by the trigger sleeve 16, the upper edge of which is substantially flush with the bottoms of the notches in the upper end of the housing 10 when the trigger sleeve is in its lower position. This lower position is determined by bayonet slots 28 in the trigger sleeve which engage with the bolts 21 extending from the housing. In Fig. 1 the sleeve 16 is shown elevated and rotated to lock it in upper position in which the cap 13 is disconnected from the tubular housing 10. Except when the trigger sleeve 16 is forcibly restrained in upper position, the compression springs 26 maintain the trigger sleeve and the disc 23 in lower position, locking the housing 10 for rotation with the cap 13.

The trigger sleeve 16 is provided with an outwardly extending flange 29 at its lower end, which flange has sections 30 thereof turned down to engage the soil when the anchor approaches full depth, and also has a downwardly extending skirt extending substantially coextensive, vertically, with the section 30.

The spindle 17, when rotated relative to the tubular housing 10, functions to set or retract a pair of flukes 31 and 32 which are shown in set position in Fig. 1 and in retracted position in Fig. 2. To this end, the lower portion of the spindle 17 is provided with internal threads 33 which engage a screw 34 on the upper end of a rod 35, which extends down through the housing 10 and is rigidly attached at its lower end, as by threads 36 and welding 37, to a carriage block 38 slidably mounted within the housing 10. This carriage block 38 is bifurcated at its lower end, and between the bifurcations 39 there are pinned the hinge lugs 40, 40 of the flukes 31 and 32, respectively. Each of the flukes comprises a flat blade portion 41 having a chisel edge 42 at its free end and having a reinforcing rib 43 extending along its upper side and constituting a continuation of the butt portion 40.

When the flukes are fully retracted, as shown in Fig. 2, the beveled lower ends of the flukes constitute continuations of the conical surface 44 of the point 11, and recesses are provided in the tubular housing 10 immediately above the point 11 through which the flukes project. As best shown in Fig. 3, these openings are configured to substantially snugly receive the flukes when in the retracted position as shown in Fig. 2, whereby the openings are substantially completely closed by the flukes to prevent the entry of soil into the housing while the anchor is being forced down into the ground. However, the notches in the openings provide room for passage of the vertically thin butt portions 43 of the flukes when they are moved into expanded position, as shown in Fig. 1 and in dotted lines in Fig. 2.

The rod 35 is preferably provided with flanges 46 at intervals therealong, which flanges slidably engage the inner surface of the tubular housing 10 and prevent the rod 35 from buckling when it is being forced downward to extend the flukes 31 and 32.

My anchor may be operated as follows: While in the condition shown in Fig. 2, the point 11 is

started into the ground by hammering on the cap 13 with a suitable maul or hammer. It is preferably driven into the ground until an appreciable portion of the screw 12 is in engagement with the soil. Thereafter the cross bar 15 (Fig. 1) is inserted into the eye 14 of the cap, and the bar rotated and pressed down simultaneously. With the anchor in the condition shown in Fig. 2, the trigger sleeve 16 is in lower position, in which the disc 23 is in engagement with the teeth 27 in the upper end of the housing 10, so that the entire anchor is rotated with the cap 13. This causes the screw to draw the anchor into the ground. Continued rotation and downward movement of the anchor finally carries the downwardly depending members 30 of the trigger sleeve into contact with the soil, so that the latter tends to rotate the sleeve counter-clockwise and simultaneously lift it, with respect to the tubular housing 10. Continued rotation and downward movement of the anchor finally develops sufficient upward and counter-clockwise force on the trigger sleeve 16 to carry it into its upper position as shown in Fig. 1, disengaging the disc 23 from the teeth 27 of the housing 10 so that the cap 13 can thereafter rotate with respect to the anchor housing. Accordingly, further rotation of the hand bar 15 rotates the spindle 17 with respect to the threaded rod 35, forcing the latter downwardly within the tubular housing to set the flukes 31 and 32 into the extended position shown in Fig. 1. Complete setting of the flukes is indicated by increased resistance to rotation of the cap 13. The bar 15 is then removed from the cap 13 and the cable to be anchored is inserted in the eye 14 and secured in place.

When the anchor is to be removed from the ground, the handbar 15 is again inserted in the eye of the cap 13 and rotated in counter-clockwise direction. This elevates the rod 35 to retract the flukes 31 and 32 back into the housing. When retraction is completed, further relative movement between the spindle 17 and the rod 35 is prevented by contact of the upper end of the rod with the end 48 of the recess therein, so that further rotation of the cap is transmitted to the housing 10. This causes the trigger sleeve 16 to be carried in the reverse direction, moving the notches in the bayonet slots away from the bolts 21 so that upon further lifting movement of the anchor sufficient to carry the members 30 of the trigger sleeve clear of the soil, the trigger sleeve can drop down to again permit engagement of the teeth of the disc 23 with the notches in the upper end of the housing 10.

Rotary movement of the carriage 38 with respect to the tubular housing 10 is prevented by the flukes 31 and 32, which interlock with their passages in the housing. However, it may be desirable in some instances to provide additional locking means for preventing rotation of the carriage block 38 and the rod 35. This additional means might incorporate a longitudinal key on the inner surface of the housing 10 engaging suitable grooves or show keyways in the carriage block 38 and the flukes 45.

It will be obvious that it is not essential to always operate the device in the exact manner described. Thus the trigger sleeve 16 can be actuated manually to set the flukes 32, without relying upon the reaction of the soil to perform this function. This method of manual actuation of the sleeve 16 can be employed when it

is desired to extend the flukes 31 and 32 without first screwing in the anchor to its full depth.

Various departures from the exact construction shown and described can be made without departing from the invention; the latter is, therefore, to be limited only to the extent set forth in the appended claims.

I claim:

1. An anchor comprising a tubular body member adapted to be penetrated into the ground and having a fluke-opening therein, a fluke adapted to be moved between a retracted position lying substantially completely within said tubular body member and parallel thereto and an extended position in which the fluke is extended through said opening, means movable longitudinally in said body member for projecting and retracting said fluke through said opening, said opening being substantially filled by said fluke when the latter is in retracted position within and extending parallel to said body member and said body member and the underside of said fluke having cooperating similar contact surfaces which contact with each other over a substantial area extending inwardly from the orifice of said opening when said fluke is in retracted position, whereby entry of soil through said opening during ground-penetrating movement of said anchor member is minimized.

2. An anchor comprising a tubular body member adapted to be penetrated into the ground and having an approximately conical point on its lower end, with a fluke-opening immediately above said conical point, a fluke adapted to project through said opening and means within said body member pivotally connected to the inner end of said fluke for moving it vertically within said tubular member to extend and retract said fluke, said fluke having a beveled outer end dimensioned to fill said opening and shaped to extend substantially flush with and constitute a continuation of the surface of said conical point when the fluke is in retracted position.

3. A screw anchor comprising a tubular body member having a screw thereon for forcing said body member into the ground in response to rotation thereof, a fluke movably supported for movement between a retracted position and an extended position with respect to said body, a member rotatably mounted within said body, and means for extending and retracting said fluke in response to rotation of said rotatable member, a turning member on the upper end of said body member and means permanently connecting it to said rotatable member for movement in unison therewith, and clutch means selectively operable for selectively locking said turning member to said body member for rotation therewith or releasing said turning member for rotation with respect to said body member to actuate said fluke.

4. A screw anchor comprising a tubular body member having a screw thereon for forcing said body member into the ground in response to rotation thereof, a fluke movably supported for movement between a retracted position and an extended position with respect to said body, a member rotatable within said body, and means for extending and retracting said fluke in response to rotation of said rotatable member, a cap secured to said rotatable member and extending beyond the upper end of said tubular body member, said cap having a notched skirt extending down around the upper end of said body member, a notched disc concentric with

said body member and positioned between the later and said cap, said notched disc having teeth extending radially past said body member into engagement with the notched skirt on said cap, the upper end of said tubular member having notches overlapping said notched skirt and engageable with the notches in said disc when the latter is in a lower position, the disc being movable into an upper position clear of the notched upper end of said body member, and means for selectively positioning said disc in either said upper or said lower position.

5. A screw anchor as described in claim 6, in which said means for selectively moving said notched disc comprises a sleeve surrounding said tubular member and adapted to engage its upper edge against the underside of said disc, and means for releasably supporting said sleeve in an upper position in which it engages said disc and lifts it clear of the notched upper end of said tubular body member.

6. A screw anchor comprising a tubular body member having a screw thereon for forcing said body member into the ground in response to rotation thereof, a fluke movably supported for movement between a retracted position and an extended position with respect to said body, a rotatable member within said body, and means for extending and retracting said fluke in response to rotation of said rotatable member, a turning member on the upper end of said body member, clutch means for selectively connecting and disconnecting said turning member to and from said body member, clutch-control means movable downwardly with respect to said body member for engaging said clutch and movable upwardly with respect to said body for disengaging said clutch, said clutch-control means including means extending radially from said body member at such longitudinal position thereon as to encounter the ground when said body member has been screwed into the ground to a predetermined depth, whereby when said depth is reached said clutch-control means is restrained from downward movement with said body member, and disengages said clutch to permit rotation of said rotatable member by said turning member without rotation of said body member.

7. A screw anchor comprising a tubular body member adapted to be penetrated into the ground, a fluke movably supported within the lower portion of said body member for movement between a retracted position substantially completely within said body, and an extended position in which a portion of said fluke is exterior of the body member, means for moving said fluke comprising a carriage block pivotally connected to the fluke and slidably mounted for longitudinal movement within said body member, a rod secured to and extending from said carriage block upwardly through said tubular body member, means in the upper portion of said body member for applying a downward thrust to said rod to move said carriage block, said rod having a flange intermediate its ends in sliding engagement with the interior of said tubular body member for preventing buckling of said rod in response to compressive forces applied thereto.

8. An anchor comprising a tubular body member adapted to be penetrated into the ground and having a fluke-opening therein, a fluke adapted to be extended through said opening, means movable longitudinally in said body mem-

ber for projecting and retracting said fluke through said opening, said opening being substantially filled by said fluke when the latter is in retracted position within said body member, said fluke having a flat blade portion lying in approximately a horizontal plane when the fluke is extended and a flat butt portion substantially perpendicular to said flat blade portion and

merging into a rib extending along said blade portion, and said opening being of T shape whereby it conforms to and is filled by the outer end of said fluke when the latter is retracted to minimize inlet of soil through said opening during ground-penetrating movement of said anchor member.

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