June 1, 1943. C. W. KANDLE 2,320,611

GRAPPLE HOOK

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FIG. 1.

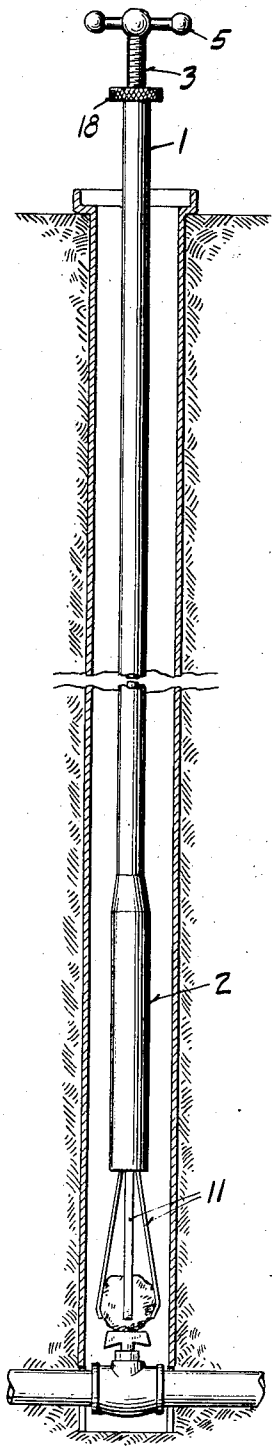


FIG. 2.

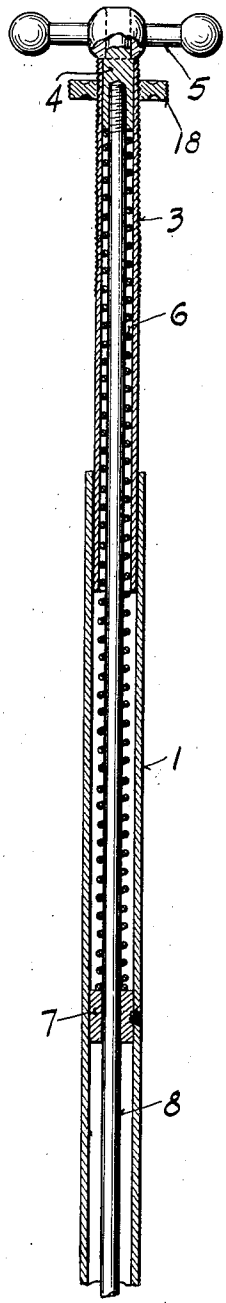
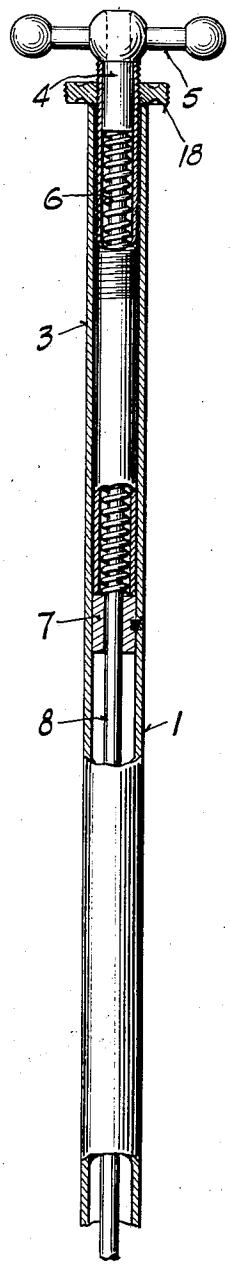


FIG. 3.



Charles W. Kandle
INVENTOR.

BY Irvin A. Andrus
ATTORNEY.

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FIG. 4.

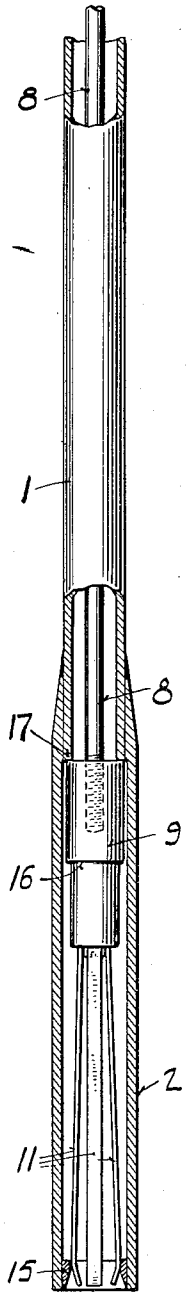


FIG. 5.

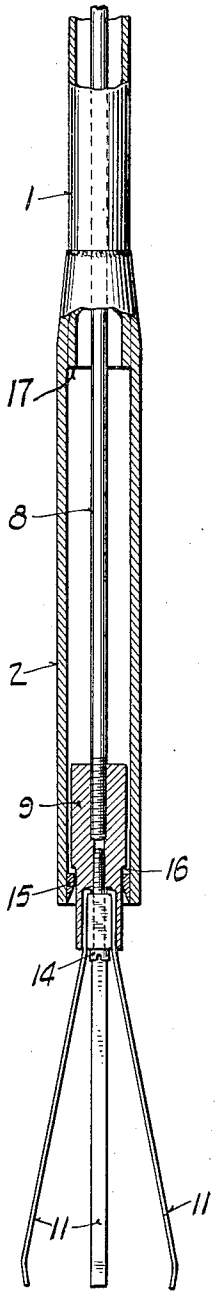


FIG. 6.

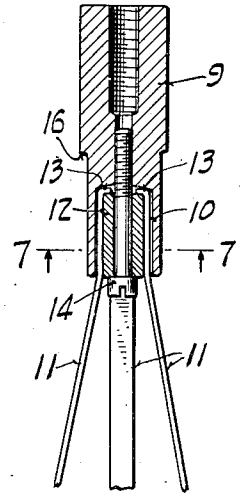


FIG. 8.

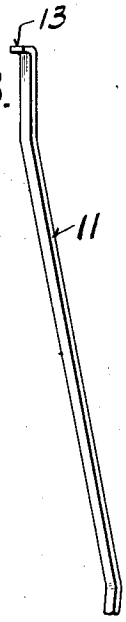
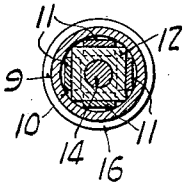


FIG. 7.



Charles W. Kandle
INVENTOR.

BY Elvin A. Andrus
ATTORNEY.

Patented June 1, 1943 2,320,611

UNITED STATES PATENT OFFICE

2,320,611

GRAPPLE HOOK

Charles W. Kandle, Chicago, Ill.

Application January 31, 1941, Serial No. 376,866

9 Claims. (Cl. 294—100)

This invention relates to improvements in grapple hooks for picking objects out of holes, as in the cleaning of stones and debris from curb boxes and the like.

Hooks for this purpose have been constructed heretofore with expansible fingers at the lower end of a casing, which fingers are actuated by a rod reciprocating longitudinally relative to the casing.

The present invention constitutes an improvement upon this general type of grapple hook and in its several phases it provides a more practical device which can be manufactured more economically and which is easier and more certain in its use.

The general objects of the invention are to provide a better grapple hook which is more simple in construction and manufacture and which will readily pick an object out of a hole without danger of injury to the operator and without loss in time.

Another object is to provide such a grapple which can readily and quickly be assembled and disassembled for repair purposes.

An embodiment of the invention is illustrated in the accompanying drawings in which:

Figure 1 is a side elevation of the device in use with the central part broken away;

Fig. 2 is an enlarged longitudinal central section through the upper part of the device showing the parts in one extreme position;

Fig. 3 is a section similar to Fig. 2 with the parts in the opposite extreme position;

Fig. 4 is an enlarged longitudinal central section through the lower part of the device showing the parts in one extreme position corresponding to that of Fig. 2;

Fig. 5 is a section similar to Fig. 4 with the parts in the opposite extreme position, corresponding to that of Fig. 3;

Fig. 6 is an enlarged section through the head;

Fig. 7 is a transverse section on line 7—7 of Fig. 6; and

Fig. 8 is a perspective view of one of the spring hooks.

The grapple hook comprises in general an outer tubular casing 1 having a lower end housing 2 for the grapple hook mechanism of slightly larger diameter than the casing proper. The maximum diameter of the housing will range from about fifteen-sixteenths inch, for one inch holes, to a considerably larger size for larger holes.

The upper end of the casing 1 telescopes a tubular shank 3 driven on a central plug 4 attached to the operating handle 5. A coil spring 6 is inside shank 3 and extends downwardly to engage a ring 7 secured in casing 1 at a distance from shank 3 not less than the distance of the telescoping movement of the parts. Where the ring 7 is positioned to engage the end of shank 3, it serves to limit the telescoping movement of the parts in the direction of contraction as shown in Fig. 3. The spring serves to keep the parts in normal position with the handle extended from casing 1 as shown in Fig. 2.

Extending downwardly through the casing is the actuating rod 8 which has its upper end threaded into plug 4 and its lower end threaded into the grapple base 9 inside of housing 2.

The grapple base 9 comprises a cylindrical block having a recess or hole 10 in the lower end for receiving the grapple hooks or fingers 11. Ordinarily four grapple hooks are employed, although three may be used and in large grapples a larger number may be used. The grapple hooks 11 are preferably small strips of spring steel bent in the shape indicated in Figure 8 so that when they are positioned with their inner ends arranged along the respective sides of a four sided head 12, the outer end of the hooks naturally diverge at an angle. The head 12 will have the same number of sides as there are hooks 11 and each hook has an inturned flange 13 at its inner end to be clamped between the head 12 and the inside end of hole 10 in base 9. In assembly the hooks 11 are applied to the sides of head 12 and the parts inserted in hole 10 with the hooks extending outwardly. A screw 14 passing longitudinally through head 12 and into base 9 secures the head and hooks in place.

In operation, when the handle 5 is extended relative to casing 1, the base 9 and its grapple hooks 11 are withdrawn inside of housing 2. In this position the housing biases the hooks inwardly toward each other. When the casing 1 and shank 3 are contracted against spring 6 the actuating rod 8 shoves base 9 toward the lower end of housing 2, and as the hooks 11 protrude from the housing they spring outwardly to their expanded position as shown in Fig. 5. In this position the lower end portion of each hook is bent almost parallel to the casing axis and when the base 9 is again retracted into housing 2 it causes the hooks to move radially inward forming a somewhat closed bottom at the outer end of the hooks for supporting stones or other objects within the space between the hooks.

For the purpose of insuring a rapid contraction of the hooks upon an object, a ring 15 is pressed

into the end of housing 2, thereby making this part of smaller diameter than the housing. This also makes it possible to provide a ring of better wearing material than the housing proper, making for longer life of the grapple. Rings can be replaced more readily and at less cost than the housing.

A shoulder 16 on the base 9 is spaced from ring 15 in all normal operating positions of the base, but should the base become accidentally unthreaded from the rod 8, the shoulder will engage ring 15 and prevent the base and grapple from falling out.

The shoulder 17 constituting the end of casing 1 at the upper end of the housing limits the upward movement of base 9 in the housing.

Removal of ring 15 from the housing allows the base 9 to be removed and in turn the hooks can be readily disassembled from the head 12. Heretofore, hooks have been riveted or otherwise secured to an actuator, and their disassembly and replacement has not been easy. With rivet holes through the spring steel of the hooks there was a tendency for the latter to break at the location of the holes. Furthermore, in manufacture many hooks were spoiled during drilling adding considerably to the cost of the grapple.

The nut 18 threaded on the upper end of the shank 3 can be used to force or hold the grappling of an object where the spring 6 is insufficient in strength. In such case the nut is threaded down against the end of casing 1 and then continued to be screwed down to force the extension of the shank from the end of the casing. Either the nut 18 or spring 6 may be employed alone, but the combination of the two in a single structure gives a wider range of use for the grapple without making the spring so strong as to make ordinary use difficult to the operator. The nut 18 may be used to merely hold the grapple tight on an object after it has been caused to grab it.

The present invention provides a simple mode of holding the hooks in place without danger of spoiling hooks in manufacturing or weakening the same so that they break in use. It also provides a simple clamping member which allows ready assembly and disassembly at all times.

The invention may have various embodiments within the scope of the accompanying claims.

I claim:

1. In a device of the class described, a tubular casing carrying a reciprocable grapple hook at one end, an actuating rod extending longitudinally through the casing from said grapple hook and out of the other end of the casing, a handle on the outer end of said actuating rod spaced from the end of the casing a distance not less than the reciprocating travel of said grapple hook relative to the casing, a tubular member covering the exposed end of said actuating rod and extending from the handle to a point inside said casing, said tubular member fitting snugly in said casing and being telescoped thereby to provide for reciprocation of the actuating rod by the handle, and a coil spring inside said tubular member and casing and extending from said handle to an inside projection on the casing to bias the parts to normal position.

2. In a device of the class described, a tubular casing having an end portion constituting a housing, a grapple hook reciprocable inside said housing and comprising a base member fitting within the housing and secured to the end of an actuating rod extending longitudinally through the casing, a block inserted in an axial opening in the end of said member and forming therewith a plurality of longitudinally extending openings, and a plurality of independent removable spring grapple members extending into said openings and secured therein by end flanges clamped between said block and said base member, the outer ends of said spring members being expansible radially when protruding from the end of the housing and being contractible when withdrawn into the housing.

3. In a device of the class described, a tubular casing having an end portion constituting a housing, a grapple hook reciprocable inside said housing and comprising a base member fitting within the housing and secured to the end of an actuating rod extending longitudinally through the casing, said member having a plurality of longitudinal openings therein, a plurality of independent removable spring grapple hooks extending into said openings, and means securing said hooks in place, the outer ends of said hooks being expansible radially when protruding from the end of the housing and being contractible when withdrawn into the housing.

4. In a device of the class described, a tubular casing having an end portion constituting a housing, a grapple hook reciprocable inside said housing and comprising a base member fitting within the housing and secured to the end of an actuating rod extending longitudinally through the casing, said member having a plurality of longitudinal openings therein, a plurality of independent removable spring grapple hooks extending into said openings, means securing said hooks in place, the outer ends of said hooks being expansible radially when protruding from the end of the housing and being contractible when withdrawn into the housing, and means at the outer end of the housing for quickly contracting the hooks by a relatively small retracting movement of the base member into the housing.

5. In a device of the class described, a head for a grapple hook comprising a cylindrical base having means at one end for attaching to an actuator rod and a round opening of substantial depth at the other end for receiving the grapple hooks, a block of polygonal cross section inserted in said opening with threaded means securing the same therein, and a plurality of spring strips forming the hooks with their main parts diverging at an angle when extended and having parallel shank portions secured in the space between the respective sides of the block and the inner wall of the opening in said base.

6. In a device of the class described, a head for a grapple hook comprising a cylindrical base having means at one end for attaching to an actuator rod and a round opening of substantial depth at the other end for receiving the grapple hooks, a block of polygonal cross section inserted in said opening with threaded means securing the same therein, and a plurality of spring strips forming the hooks with their main parts diverging at an angle when extended and having parallel shank portions in the space between the respective sides of the block and the inner wall of the opening in said base, the inner ends of said strips being bent inwardly over the inner end of said block to secure said hooks in place.

7. In a device of the class described, a tubular housing, a grapple body disposed for reciprocation longitudinally therein, a plurality of imperforate fingers of highly resilient spring metal removably secured to said body and normally extending diagonally therefrom in different ra-

dial directions substantially uniformly distributed about the circumference, said fingers being retractible by the housing upon withdrawal of the fingers therein by said body and being expansible to normal position upon extension thereof from the end of the housing.

8. In a device of the class described, a tubular casing, a tubular housing fitting over the end of said casing and secured thereto, an expansible grapple hook reciprocable into and out of the end of said housing, an actuating rod extending axially through the casing and removably secured to the base of said grapple hook, and a ring of wear resistant metal at the end of said housing for biasing the grapple hook in its movement and serving to prevent loss of the grapple hook should the actuating rod become disengaged therefrom, the end of said casing in said housing serving to engage the base of the grapple hook and limit the inward movement thereof.

9. In a device of the class described, a tubular casing carrying a reciprocable grapple hook at one end, an actuating rod extending longitudinally through the casing from said grapple hook and out of the other end of the casing, a handle on the outer end of said actuating rod spaced from the end of the casing a distance not less than the reciprocating travel of said grapple hook relative to the casing, a tubular member covering the exposed end of said actuating rod and extending from the handle to a point inside said casing, said tubular member fitting snugly in said casing and being telescoped thereby to provide for reciprocation of the actuating rod by the handle, a coil spring inside said tubular member and casing and extending from said handle to an inside projection on the casing to bias the parts to normal position, and a nut threaded freely on the outer end of said tubular member to engage the end of said casing and assist said spring in holding the grapple hook contracted upon an object.

CHARLES W. KANDLE.