

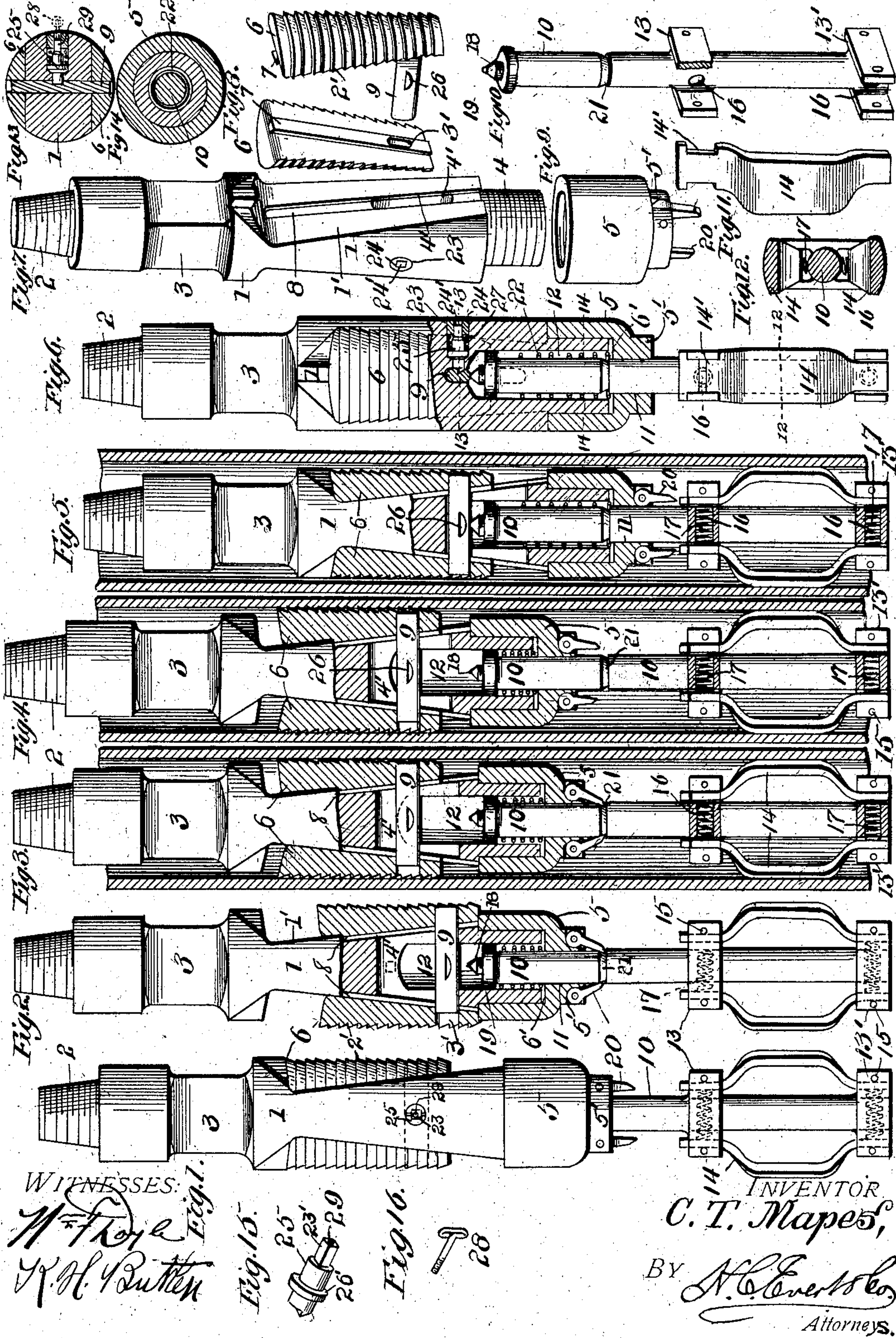
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PATENTED AUG. 30, 1904.

C. T. MAPES.
TRIP CASING SPEAR.

APPLICATION FILED FEB. 10, 1904.

NO MODEL.



UNITED STATES PATENT OFFICE.

CLARENCE T. MAPES, OF CRAFTON, PENNSYLVANIA.

TRIP CASING-SPEAR.

SPECIFICATION forming part of Letters Patent No. 769,097, dated August 30, 1904.

Application filed February 10, 1904. Serial No. 192,981. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE T. MAPES, a citizen of the United States of America, residing at Crafton, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Trip Casing-Spears, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in casing-spears such as are used in connection with oil, gas, and Artesian and like wells for the purpose of removing or "pulling" the tubing, casing, or pipe from the well; and the invention has for its object the provision of means whereby the spear may be disengaged from the tubing, casing, or pipe at will if it should be found impossible to remove or "pull" the same or should it be desired to disengage the spear from the tubing, casing, or pipe for any reasons.

A further and one of the main objects of my invention is to provide a spear of this type adapted to conform to any weight of a given size tubing, casing, or pipe instead of necessitating a certain spear for each weight of a given size casing.

A still further object of the present invention is to provide a spear in which the unlocking means for the slips of the spear are controlled at the base of the spear.

A still further object of the present invention is to provide a casing-spear with slips adapted to enter the interior of the casing, tubing, or pipe and be forced outwardly into engagement with the walls of the said casing, tubing, or pipe.

In the art of well-drilling, and particularly in the drilling of oil and gas wells, it is frequently desirable and necessary to remove the casing, tubing, or pipe for one cause or another. Heretofore and before my invention it has been the general practice to employ a spear designed especially for the particular diameter of casing, tubing, or pipe to be removed—that is, different-sized spears were required for the different weights per foot of a given-sized casing, tubing, or pipe. In the casing, tubing, or pipes now used they are made of four or five different weights, the ex-

terior diameter remaining equal throughout the different weights, but the inside diameter varies according to the weight per foot, and the main object of my invention is to provide a spear adjustable to these inside diameters. The former practice heretofore referred to is not only therefore a costly one, but an inconvenient one as well, as frequently the operator does not have at hand a spear adapted or designed for the particular size of casing, tubing, or pipe that it may be desired to remove from the well. My invention, on the contrary, as will be readily understood from the aforesaid objects, will obviate this inconvenience and will materially reduce the expense, as it will require but one spear for use in all weights of a given-sized casing, tubing, or pipe within of course any given minimum and maximum limit or range for a particular size tool or device.

In the accompanying drawings I show and will describe in detail a practical embodiment of my invention in a form as it has been practiced by me without, however, limiting myself to the precise construction shown and described, as various equivalents may suggest themselves to those skilled in the art without departing from the spirit or the scope of the invention as described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of the spear in its "unset" or normal position. Fig. 2 is a central vertical sectional view showing the tool "set" ready for insertion in the casing, tubing, or pipe. Fig. 3 is a central vertical sectional view of the spear inserted in the casing, tubing, or pipe, showing the slips forced into engagement with the walls of said casing, tubing, or pipe with the plunger still set. Fig. 4 is a like view showing the spear started on its upward movement and tripped. Fig. 5 is a central vertical sectional view of the spear, showing the plunger and slips in the retracted locked position to permit the withdrawal of the spear from the casing, tubing, or pipe. Fig. 6 is a similar view taken at right angles to Fig. 5. Fig. 7 is a detail perspective view of the body of spear. Fig. 8 is a detached detail perspective view of the wedge-shaped gripping-slips. Fig. 9 is a detached detail per-

spective of the cap or nut that forms the lower end of body. Fig. 10 is a detached detail perspective view of the plunger or mandrel. Fig. 11 is a detached perspective view of one of the bow-shaped wings carried by the plunger or mandrel. Fig. 12 is a cross-sectional view taken on the line 12 12 of Fig. 6. Fig. 13 is a like view taken on the line 13 13 of Fig. 6. Fig. 14 is a like view taken on the line 14 14 of Fig. 6. Fig. 15 is a detail perspective view of the snap or locker, and Fig. 16 is a like view of the draw-screw employed for releasing the locker.

Like numerals of reference refer to like parts in the several figures.

1 represents the body of the spear, which is provided at its upper end with a screw-joint 2 to attach same to the tools (not shown) upon which it is to be used, the said body being usually provided also with a squared or other suitably-faced portion 3 to receive a wrench for the purpose of screwing the spear on or off the tools. The two opposite side faces 1' of the body are made at an incline whereby to make this portion of the body substantially wedge-shaped, and on these inclined faces of the wedge-shaped portion of the body the gripping-slips are adapted to operate, as will be hereinafter more fully described, while the body terminates at its lower end in a threaded portion or neck 4, adapted to receive a nut or cap 5 threaded thereon and forming, consequently, the extreme lower end of the body. The inclined faces 1' of the wedge-shaped portion of the body are each provided with longitudinally-extending grooves or ways 8, preferably of dovetail form, open at their lower ends, and which grooves receive the tongues 7, (corresponding in form to the grooves 8,) that are formed on the slips 6, that work on the inclined faces 1'. These slips are preferably constructed from tempered steel and are made substantially wedge shape in form, being provided on their exterior with teeth or wickers 2', so made or cut in the faces of the slips as to bite or take into the inner face of the casing, tubing, or pipe on the upward movement of the spear. It is to be observed that the exterior faces of the slips are convex, the radius of these convex toothed surfaces conforming to the inside diameter of the smallest (or heaviest weight) of the given size of casing, tubing, or pipe which the spear is made for, the diameter of the spear taken through the slips when the latter are retracted and locked in their inoperative position being less than the body proper upon which said slips are mounted, but that the slips when unlocked and in the vertical position, as in use, move downward of their own weight upon the wedge-shaped body, thus increasing their own diameter. The uniform movement of these slips upward and downward on the wedge-shaped body is insured by means of a key 9, which passes entirely through the body, the latter being slot-

ted, as at 4', for a distance equal to the fall or travel given the slips, said key fitted tightly or stationary in the opening 3' in one slip and sufficiently loose in the corresponding opening in the opposite slip, so that as the slips are operated up or down on the wedge-shaped body the key works forward and backward in the one slip. The slips are thus required to drop uniformly together to the face of the cap or screw-bowl 5, which acts as a stop or limit to the travel of the slips.

The lower end of the body is cored, as at 12, and extending into this cored end through an opening 11 in the cap or screw-bowl 5 is a plunger or mandrel 10, which works vertically in the cored portion of the spear-body, the lower portion of said mandrel or plunger being designed to form a friction-cage. To this end I provide on opposite sides of the plunger or mandrel some distance above its lower end two cross-bars or projections 13 and likewise adjacent the extreme lower end of the plunger or mandrel two similar cross-bars or projections 13', each of which pairs of projections are slotted to receive bow-shaped wings 14. The exposed or outer surfaces of these wings are convex in form, and the wings are suitably held in place, as by providing notched necks 14' at the upper ends to enter the slotted projections 13 and inserting rivets or pins 15 through the slotted projections 13 and 13'. The plunger or mandrel is cored transversely or provided with openings 16, extending through the mandrel at the projections 13 13', and in which openings are placed springs 17, that are slightly compressed against the respective ends of the two wings. The plunger or mandrel is provided at its upper end with a threaded portion 18 to receive a nut or collar 19, whereby the plunger is held within the body. Two dogs or pawls acting as lockers are hinged or pivoted to the cap or nut 5, and a convenient and practical embodiment of construction which I have employed in this connection is to provide the cap or nut 5 with an annular flange or collar 5' at its lower end in which to pivot or hinge the lockers, the ends or points of the lockers fitting or taking into a groove 21, cut around the mandrel or plunger 10, and in which groove they are retained when set by the compression of the spiral spring 22, arranged on the plunger or mandrel between nut or collar 19 and the shoulder 6' in nut or cap 5.

Means is provided for holding or locking the spear in the set position for insertion into the casing, tubing, or pipe, and to this end I provide at the point of the uppermost position of the key 9, which joins the slips 6 6, a hole 23, drilled into the body extending therein transversely to the slot 4', and which hole is tapped at the surface to receive a threaded plug 24, having a squared hole 24' there-through to receive the squared end or portion 23' of the locking-pin 25, which is notched at

its end to fit into a groove or notch 26, provided therefor in the key 9, the locker or locking-pin being forced into engagement with the notch in the key 9 by means of the spiral spring 27, arranged on the shank of the pin between the annular shoulder 26' thereof and the plug 24. For the purpose of releasing the locker I provide a draw-screw 28, which is engaged in the tapped portion 29 of the locking-pin, and the pin thereby pulled outward. It will be evident in this connection that various equivalent releasing means for the locker may be employed.

The construction of the spear will, it is thought, be perfectly clear from the foregoing description, and I will now describe briefly and concisely the manner in which same is operated. When the spear has been attached to the tools upon which it is to be lowered into the casing, tubing, or pipe, it is then set, so as to be able to disengage. This is effected by pulling downward on the plunger or mandrel 10 and pressing the two dogs or pawls 20 into the groove 21 cut around the plunger or mandrel to receive them, the pressure of the spring 22 between nut or collar 19 and shoulder 6' in the cap or screw-bowl 5 holding the dogs or pawls rigidly in their seated engagement in the groove. The draw-screw 28 is then inserted in tap 29 and the locking-pin 25 pulled outwardly, so as to disengage the inner end of the same from notch 26, which operation releases the slips 6 and allows the same to drop by their own weight uniformly, as heretofore described. As the spear enters the casing, tubing, or pipe the two wings 14 of the friction-cage are compressed to the diameter of the casing, tubing, or pipe, and the slips 6 as they enter the casing, tube, or pipe are forced upward on the wedge-shaped body until they form a diameter that permits them to enter the casing, tubing, or pipe, and in this condition the spear is lowered into the casing, tubing, or pipe to the position where it is desired to engage the same. As the tools to which the spear is attached are lifted upward the slips 6 engage the inner wall of the casing, tubing, or pipe, and under pressure of the upward lift a slight expansion occurs at the point of contact. Through frictional contact of the wings 14 with the casing, tubing, or pipe the friction or spring-cage, which forms the lower end of the plunger or mandrel, the same has remained stationary, and as the body of the spear moves upward the two dogs or lockers 20 are released and of their own weight drop away from the groove 21 in the plunger 10. The operator continues the effort to pull the casing, tubing, or pipe; but should it be desired to disengage the spear the same is accomplished by lowering the tools. During such movement the spring or friction-cage remains stationary, and as the key 9 which joins the two slips 6 comes into

contact with the top of the plunger 10 the slips are forced upward on the inclined faces 1' of the wedge-shaped portion of the body and firmly locked as they reach their extreme upper position by the pin 25 being forced under action of spring 27 into engagement with the notch 26 in the key 9. The tools, with the spear attached, may then be removed.

In the practice of the invention various changes may be made in the details of construction without departing from the spirit of the invention or the scope thereof as claimed.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a casing-spear, the combination of the body formed on opposite sides with inclined faces having grooves therein, said body having a cored lower end and having a transverse opening, slips working on the inclined faces of the body, a key connecting said slips, a cap fitted on the lower end of the body, a plunger working through the cap and extending into the cored portion of the body, pawls carried by the cap to engage in a groove provided therefor in the plunger, and a friction-cage carried by the plunger as and for the purpose specified.

2. In a casing-spear, the combination with the body provided with inclined faces on opposite sides, gripping-slips movable on said faces, and means for locking said slips at a certain position on the faces, of a plunger extending into the lower end of the body, two pairs of projections on said plunger arranged respectively at the lower end and approximately midway the length of the plunger, bow-shaped wings having notched upper ends received in the upper pair of projections, the lower ends of said wings received in the lower pair of projections, and pins passed through the projections to hold the wings therein, substantially as described.

3. In a casing-spear, the combination of the body having oppositely-disposed inclined faces, toothed slips working on said faces, means for locking the slips against movement, means for causing the slips when released to move in unison, a cap secured to the lower end of the body, a plunger working through the cap and into the body, pawls carried by the cap to engage a groove provided therefor in the plunger, means within the body for holding said pawls in engagement with the groove, and spring-pressed bow-shaped wings carried by the plunger, substantially as described.

4. In a casing-spear, a body having a cored lower end and provided with an oblong transverse opening, toothed slips working on opposite side faces of the body, a key extending through the transverse opening in the body, and connecting the toothed slips, said key working vertically in the transverse opening and movable longitudinally in one of the slips,

means carried by the body for engagement with the key to hold the slips at a certain position on the body, a cap secured to the lower end of the body, pawls carried by said cap, a
5 plunger working through the cap and provided with a groove to receive the pawls, and a friction-cage carried by the plunger, substantially as described.

10 5. In a casing-spear, a body, toothed slips working on opposite faces of said body, means for locking said slips at the highest point of their travel on the body, a cap secured to the lower end of the body, a plunger working through the cap and into the body and pro-
15 vided with a groove, pawls carried by the cap to take into the groove and hold the plunger in its lowermost position, and a friction-cage carried by the plunger, substantially as described.

20 6. In a casing-spear, a body, toothed slips working on opposite faces of said body, means for locking said slips at the highest point of their travel on the body, a cap secured to the lower end of the body, a plunger working
25 through the cap and into the body and provided with a groove, pawls carried by the cap to take into the groove and hold the plunger in its lowermost position, and spring-pressed bow-shaped wings carried by the plunger,
30 substantially as described.

35 7. In a casing-spear, a body, toothed slips working on opposite faces of said body, means for locking said slips at the highest point of their travel on the body, a cap secured to the lower end of the body, a plunger working through the cap and into the body, means carried by the cap for engagement with the plunger to hold the latter in its lowermost position, a spring within the body and surround-

ing the plunger for holding the latter in the 40 elevated position when the means carried by the cap is disengaged from the plunger, and a friction-cage carried by the plunger, substantially as described.

8. In a casing-spear, a body having inclined 45 faces on opposite sides, gripping means working on said faces, means connecting the gripping means and working in the body to insure uniform movement of the gripping means on each side of the body, means for locking the 50 gripping means at the highest point of their travel on the body, a plunger working in the body, means carried by the body to engage the plunger and hold the same in its lowermost position, a friction-cage carried by the 55 plunger, and means for holding the plunger in the elevated position when the aforesaid means carried by the body is released from engagement with the plunger.

9. In a casing-spear, a body having inclined 60 faces on opposite side faces thereof, toothed slips working on said faces, means connecting the slips to cause uniform movement thereof, a spring-pressed locking-pin engaging said connecting means to hold the slips at their 65 highest point of travel on the inclined faces of the body, a plunger working in the lower end of the body, means for engagement with the plunger to hold the same in its lowermost position, and a friction-cage carried by the 70 plunger, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

CLARENCE T. MAPES.

Witnesses:

H. C. EVERT,
K. H. BUTLER.