C. L. CRUTCHER.

PIPE SPEAR.

APPLICATION FILED DEC. 13, 1920.

1,418,538. Patented June 6, 1922.

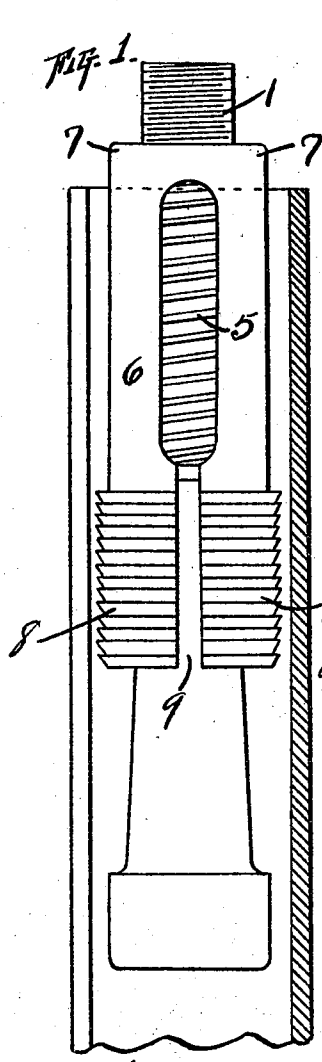


FIG. 1.

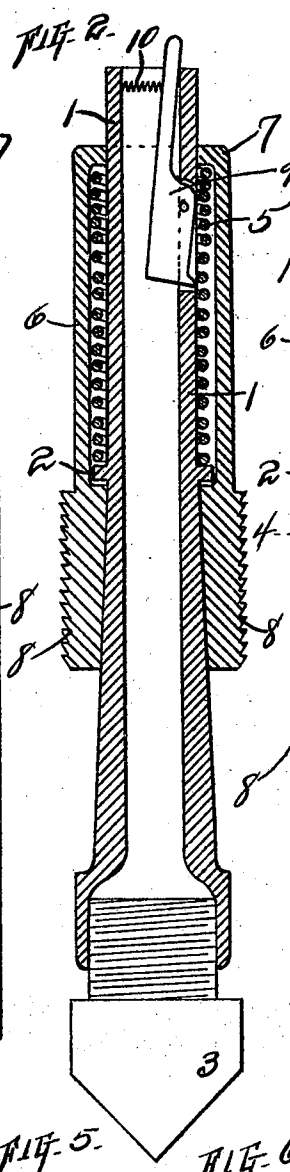


FIG. 2.

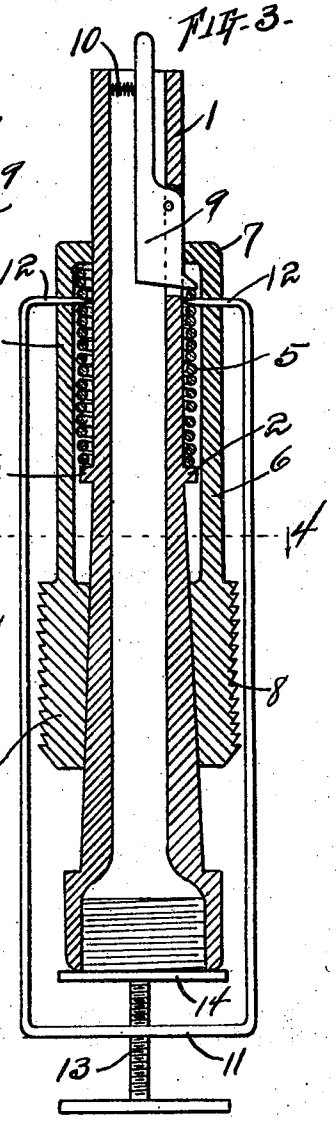


FIG. 3.

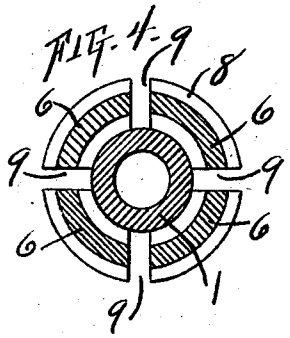


FIG. 4.

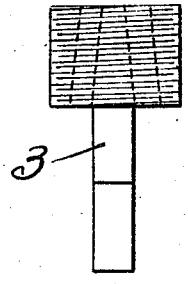


FIG. 5.

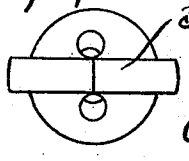


FIG. 6.

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PIPE SPEAR.

1,418,538. Specification of Letters Patent. Patented June 6, 1922.

Application filed December 13, 1920. Serial No. 430,172.

To all whom it may concern:

Be it known that I, CLARENCE L. CRUTCHER, a citizen of the United States of America, residing at Fort Worth, in the county of Tarrant and State of Texas, have invented certain new and useful Improvements in Pipe Spears, of which the following is a specification.

Reference is had to the accompanying drawings which form a part of this application.

The invention relates to improvements in casing spears.

It is an object of the invention to provide a casing spear in which the pipe gripping fingers carried by the slip are forced or thrown from contact with the inner walls of the casing by a resilient member upon a slight downward movement of the arbor to permit the spear to be readily removed from the casing at the end of an operation, thus saving a substantial amount of time and materially reducing the labor of the operator. It will of course be understood that the gripping portions of the slip are forced into lifting association with the casing upon an upward movement of the tapered arbor in a manner which is apparent to all those skilled in the art.

More specifically the invention embodies a spear of the character described having a suitable tapered arbor at its lower end upon which the pipe slip is slidably mounted, and adapted upon the lifting of the arbor to force the gripping portions thereof into contact with the casing in view of the fact that the lower end of the arbor gradually increases in diameter and thus throws the gripping fingers of the slip outwardly as the same is lifted. The slip prior to being placed within the casing is drawn to a predetermined position with respect to the arbor by a suitable tool, compressing a coil spring encircling the arbor and resting at one end upon a shoulder thereon and at its opposite end bearing against the upper portion or collar of the slip, the spring being retained in its compressed condition by means of a pivoted dog so that no influence is exerted upon the slip at this time. After this initial adjustment of the slip, the spear is then inserted within the casing until the pipe gripping fingers contact with the inner walls thereof, and thence a slight upward movement of the arbor will force the yieldable pipe gripping fingers of the slip outwardly to binding contact with the casing after which the casing may be raised or lowered as desired. When the arbor is raised the pivoted dog that is adapted to hold the spring compressed upon the initial adjustment of the slip is released by the upper end or collar of the slip, and after the completion of an operation and when it is desired to withdraw the spear from the casing it is merely necessary to give the arbor a slight downward thrust, so that the yieldable gripping fingers of the slip will recede from binding contact with the casing and the coil spring which then bears against the upper end of the slip will instantly force the same over the decreasing portion of the arbor, towards its outer end to permit the spear to be readily withdrawn from the casing.

In the drawings the preferred embodiment of the invention is illustrated, but it will of course be understood that many changes may be made without departing from the spirit thereof.

In the drawings:

Figure 1 is a side elevation of the improved pipe spear located in a section of well casing. Fig. 2 is a vertical section of the arbor and slip, showing the slip in a released condition. Fig. 3 is a vertical section of the arbor and slip, showing the slip as initially set. Fig. 4 is a horizontal section of the slip and arbor, taken on the line 4—4 of Fig. 3. Fig. 5 is a side elevation of a bit at right angles to the bit as shown in Fig. 2. Fig. 6 is an inverted plan view of the same.

Referring now more particularly to the drawings, wherein like reference characters indicate corresponding parts the numeral 1 designates the arbor of the spear having a lower portion gradually increasing in diameter towards its end so as to provide a tapered exterior surface against which a suitable pipe gripping slip is adapted to rest. The arbor intermediate its ends is provided with a circumferential collar 2, and that portion of the arbor above the collar is of substantially a uniform width for a purpose which will hereinafter appear. The arbor is preferably hollow and has attached thereto at its end a suitable bit 3 of any de-

sired construction to permit the insertion of liquid through the hollow interior of the arbor to the casing.

Surrounding the arbor and adapted to normally occupy the position disclosed in Figure 1 is the slip 6 having a collar portion 7 preferably of integral formation and adapted to surround the upper portion of the arbor which is of uniform diameter from the shoulder to its upper end to permit the collar to be raised and lowered over this portion of the arbor without any wedging or binding action. The slip 6 is also provided with a plurality of pipe gripping fingers 8, spaced from each other by slots 9, so that the fingers are somewhat yieldable and follow the tapered surface of the arbor when the same is moved up or down for either throwing the gripping fingers into binding contact with the inner wall of the casing, or to allow the fingers to recede to follow the converging surface of the arbor.

The slip 7 at its upper end provides an abutment or stop for the outer end of the coil spring 5, and when the slip is moved downwardly or the arbor raised the coil spring which rests at its opposite end upon the circumferential shoulder 2 of the arbor is compressed. The slip is drawn downwardly upon the arbor by means of a suitable tool whereby the same is initially placed in a set position and the structure of the tool will be hereinafter described. To retain the spring in its compressed condition a suitable dog 9 is pivotally mounted upon the arbor at its upper end and has a nose portion extending through the wall in the arbor and adapted when the slip is forced downwardly to engage the upper end of the coil spring and prevent the spring from exerting any stress upon the collar portion of the slip which would tend to push the same upwardly upon the arbor, it of course being understood that the dog holds the spring in its compressed condition. The dog 9 is normally maintained in an inoperative position by the coil spring 10, disposed within the hollow interior of the arbor, but when the slip is set into position as designated in Figure 3 the dog is shifted and the nose thereof engages the upper end of the spring to retain the same compressed and prevent the spring from bearing upon the collar of the slip.

Any suitable means may be employed for initially setting the slip prior to its insertion within the casing, but I preferably provide a setting tool 11 of substantially U-shape formation having offset ends 12, passing through the slotted portions of the slip and engaging the upper end of the coil spring 5. The base of the tool has a threaded socket therein receiving the shank 13, upon which is fitted a collar 14 bearing against the lower end of the arbor and when the shank is rotated by a suitable handle the slip is drawn downwardly compressing the spring 5. When the slip has reached a predetermined position with reference to the arbor the dog 9 is thrown into position as shown in Figure 3 to engage the upper end of the spring and prevent the same from bearing against the collar of the slip.

After this initial adjustment of the parts of the spear the setting tool is removed and the spear inserted within the casing so that the pipe gripping portions of the slip contact with the walls thereof. A slight upward movement of the arbor will then cause the pipe gripping portions 8 of the slip to be forced outwardly by the diverging portion of the arbor, which action will also cause the collar of the slip to release the dog 9 by forcing the beveled nose thereof inwardly, and the collar of the slip will then act as a stop for the outer end of the spring 5 which tends to force the slip upwardly. However, at the time when the trip is released the gripping portions of the spear have been thrown into biting contact with the casing and the expanding influence of the spring will cause no material effect on the same, as the connection between the slip and the casing is very tight, and when the slip is in this position the casing is either raised or lowered in keeping with the desire of the operator but as soon as it is necessary to remove the spear from the casing only a downward thrust of the arbor is required, withdrawing the gripping fingers of the slip from biting contact with the casing and the coil spring will rapidly raise the slip by its expanding action, so that the spear may be readily withdrawn from the casing. It will be understood that during the raising of the slip by the coil spring the pipe gripping fingers thereof follow the converging surface of the arbor and are completely withdrawn from the casing. The latch 9 that is located within the hollow interior of the arbor may be shifted so as to throw the same into an operative position in any suitable manner, such for instance as inserting a tool within the hollow portion of the arbor to shift the latch into the position as shown in Figure 3.

From the foregoing it will be seen that I have provided a simple and efficient device by which a casing can be easily raised or lowered, and the arrangement and construction of the parts of the device permit the same to be instantly removed from the casing at the end of an operation by simply giving the arbor a slight downward thrust to permit the compressed spring interposed between the arbor and the slip to exert its influence on the slip and raise the same to throw the gripping finger in contact with the casing.

The slips may be used either on a stand-

ard or rotary arbor which may be solid or hollow. Various changes in the sizes, construction, proportions, and arrangement may be made without departing from my invention.

What I claim is:

1. A pipe spear comprising an arbor having a tapering lower portion, a slip mounted thereon, a yieldable member interposed between the arbor and slip and a trip for holding said yieldable member in a compressed condition when the slip is set upon the arbor, the pipe gripping portion of the slip being forced into contact with the casing and the trip released upon an upward movement of the arbor by the diverging surfaces thereof, the said spear being removed from the casing upon a slight downward thrust of the arbor to withdraw the slip from biting contact with the casing and permit the yieldable member to expand to lift said slip.

2. A pipe spear comprising an arbor having a tapering lower portion, a slip mounted thereon, a yieldable member interposed between the arbor and slip, and a trip for holding said yieldable member in a compressed condition when the slip is set upon the arbor, the pipe gripping portion of the slip being forced into contact with the casing and the trip released upon an upward movement of the arbor by the diverging surfaces thereof, the said spear being removed from the casing upon a slight downward thrust of the arbor to withdraw the slip from biting contact with the casing and permit the yieldable member to expand to lift said slip, the said yieldable member comprising a coil spring resting upon a collar surrounding the arbor at one end and bearing at its opposite end against the upper portion of the slip.

3. A pipe spear comprising an arbor having a tapering portion, a slip slidably mounted thereon, a yieldable member interposed between the arbor and the slip and surrounded by said slip, a rocking trip normally occupying an inoperative position adapted to be shifted to engage the upper end of said yieldable member to hold the same compressed and prevent the spring from exerting any influence upon the slip when the slip is in a set position, the gripping portion of the slip being forced into biting contact with the casing and the rocking trip released upon a lifting of the arbor, the spear being removed from the casing by a slight downward thrust of the arbor to withdraw the gripping portion of the slip from biting contact with the casing and permit the yieldable member to expand and bear against a portion of the slip to raise the same.

4. A pipe spear comprising an arbor having a tapering portion, a slip mounted thereon having a collar at its upper end and a plurality of downwardly extending separated gripping fingers, a coil spring interposed between the arbor and slip, a trip mounted on the arbor for holding the spring compressed when the slip is placed in a set position to prevent the spring from having any influence upon the slip, the said trip having a nose portion disposed within the path of travel of the slip, the gripping fingers of the slip being forced into contact with the casing and the trip released by a portion of the said slip contacting with the nose of the trip upon an upward movement of the arbor, the said spear being removed from the casing by a downward thrust of the arbor to withdraw the fingers from biting contact with the casing and permit the coil spring to expand to raise the slip.

In testimony whereof I hereunto affix my signature.

CLARENCE L. CRUTCHER.