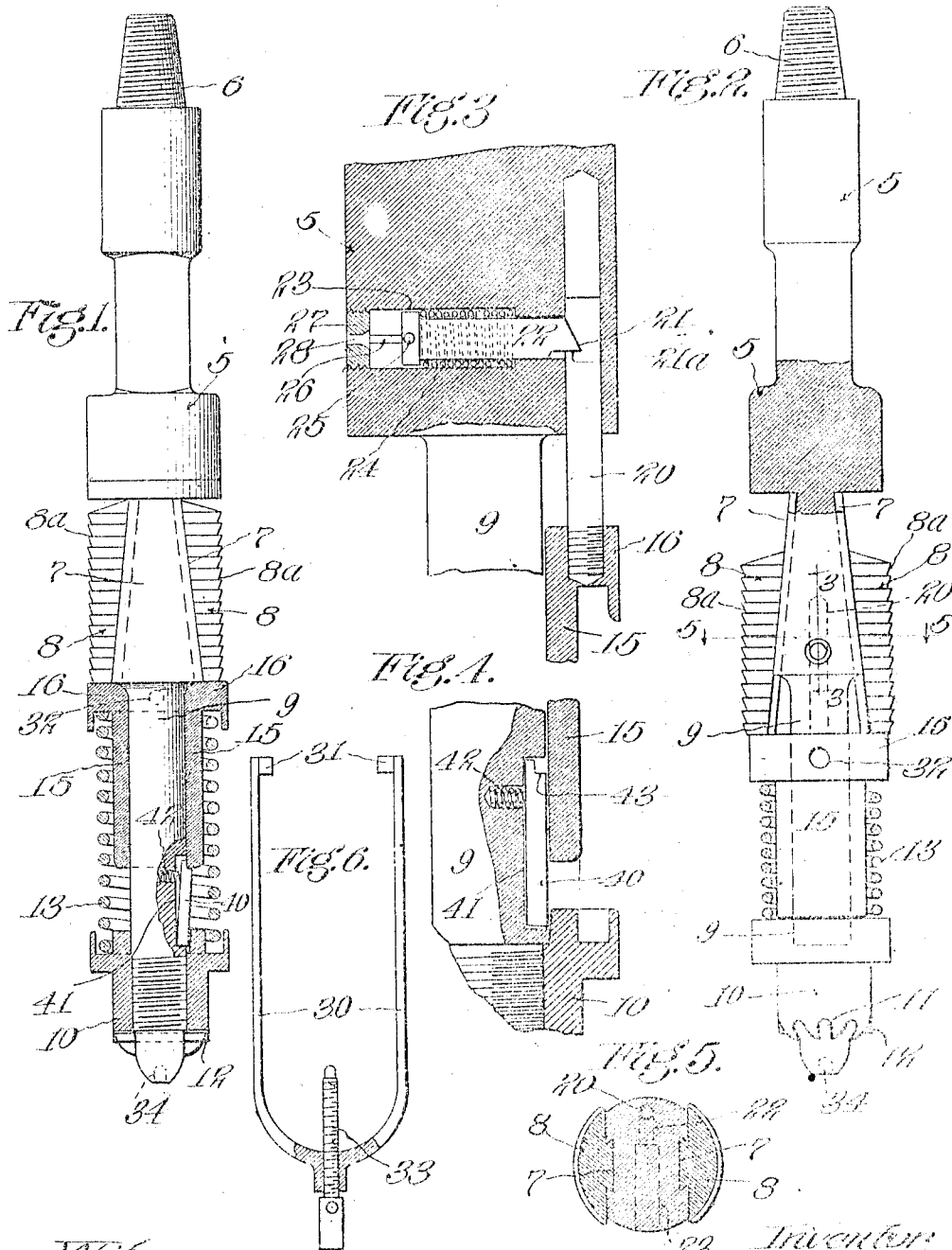


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CASING SPEAR.  
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1,054,232.

Patented Feb. 25, 1913.



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# UNITED STATES PATENT OFFICE.

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## CASING-SPEAR.

1,054,232.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed May 23, 1911. Serial No. 629,005.

*To all whom it may concern:*

Be it known that I, EDWARD L. MILLS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Casing-Spears, of which the following is a specification.

This invention relates to a casing spear adapted for engagement with the interior of a well casing for pulling upwardly thereon; and the invention consists in several constructions and combinations for providing a simple and efficient spear with minimum liability of damage and which may be operated within the hole by simple and small movements.

In my invention I have provided a mandrel having downwardly divergent ways thereon and having a cylindrical portion below the ways, with a sleeve slidably mounted on the cylindrical portion and carrying the slips which move on the ways. The construction and arrangement of this movable sleeve, in combination with certain catch mechanism, is one of the features of my invention. I have so arranged it with relation to its supporting spring that a long bearing is provided on the cylindrical portion of the mandrel and this insures against the breaking or bending of that portion of the mandrel. I have also provided catches for the purpose of holding the slips and other movable parts in position for being lowered into or drawn out of the well. These catches are simply constructed and act efficiently to hold the various parts in the desired positions.

The specific structure of my invention will be best understood from the description of a typical form given in the following specification and illustrated in the accompanying drawings, in which:

Figure 1 is a partial longitudinal section of my improved device with its parts in the relative position for removing from the well. Fig. 2 is an elevation of the same showing the parts in position as when pulling casing. Fig. 3 is an enlarged section taken on line 3-3 of Fig. 2 and showing the parts in the positions for putting down the hole. Fig. 4 is an enlarged sectional detail showing the catch near the lower end of the mandrel for holding the movable sleeve and the slips in their uppermost positions. Fig. 5 is a cross section taken on line 5-5

of Fig. 2. Fig. 6 is a view illustrating the form of device used for drawing the movable sleeve to its lower position.

In the drawings 5 designates a mandrel provided with the usual means 6 at its upper end for attachment to a string of drilling tools and provided near its center with a pair of downwardly divergent ways 7. Ways 7 are of such configuration, and slips 8 of such corresponding configuration, that the slips may slide longitudinally upon the ways without moving outwardly therefrom. I have shown the slips as two in number; but any convenient or desired number may be used. Directly below ways 7 on the mandrel is a cylindrical portion 9 extending downwardly and being screw threaded on its lower end for engagement by a nut 10. Nut 10 is provided on its lower end with notches 11 for engagement by a pin 12 which is passed through the lower end of portion 9. A compression spring 13 rests upon nut 10, or rather in an annular groove in its upper face, the compression spring extending upwardly around cylindrical portion 9. Sleeve 15 is slidably mounted on cylindrical portion 9 and has an outwardly expanding flange 16 at its upper end on which slips 8 rest. Spring 13 surrounds sleeve 15 and bears against the lower face of flange 16, thus resiliently supporting the sleeve and flange. The sleeve is made of considerable length so that it is afforded ample bearing on cylindrical portion 9; and this prevents the binding of the sleeve on the cylindrical portion of the mandrel and the consequent bending or breaking of the mandrel when one of slips 8 is pressed down more than the other. At the same time, the length of sleeve 15 allows a correspondingly ample length of spring 13, the ratio of spring compression to total length being thus reduced to a practicable and safe figure. The amount of possible compression of the spring is measured by the distance between the upper end of nut 10 and the lower end of sleeve 15; and this compression takes place when the spear is pulling on casing (the position shown in Fig. 2.) And the placement of the sleeve between the mandrel and spring also serves to space the spring from the mandrel, allowing a spring of considerable diameter and holding it in alinement.

Sleeve 15 has a stud or other member 20

which projects up into the body of the mandrel 5 above cylindrical portion 9 and this stud is provided with a V-shaped notch 21 having a square shoulder 21<sup>a</sup> on its lower side; so that the notch may be engaged by a spring pressed catch 22 to prevent the upward movement of the stud and of sleeve 15. Catch 22 is preferably mounted in a small cylindrical chamber 23 which extends transversely across the body of the mandrel from the side opposite stud 20. A small spring 24 tends to draw catch 22 from notch 21 in stud 20; the frictional engagement of the stud with the catch being normally sufficient to prevent its withdrawal. A pin 25 lying in a key-way 26 prevents the rotation of catch 22 and thus insures its being in position to engage with notch 21; while a small cap 27 closes the end of chamber 23, the cap being provided with an aperture 28 through which a suitable tool may be inserted to push the catch 22 into engagement with notch 21. This construction may be taken as typical of others embodying the same elements and action. In this, one of the prime features of my invention, I do not limit myself to details except as embodied in the claim.

When it is desired to place the spear in the hole and lower it within the casing, a device of the character shown in Fig. 6 is used. This device is comprised in a U-shaped frame 30 having lugs 31 on its upper ends, these lugs being adapted to engage with holes 32 in flange 16. At the same time, the end of a screw 33 enters a depression 34 in the lower end of mandrel portion 9 and rotation of the screw will pull frame 30 downwardly. Sleeve 15 is thus pulled down to the position shown in Fig. 2 in spite of the upward pressure exerted by spring 13. When the correct position is reached, catch 22 is pressed to the position shown in Fig. 3 and the downward pull on sleeve 15 then released. The sleeve immediately tends to move upwardly under the action of spring 13 and square shoulder 21<sup>a</sup> on stud 20 is forced into tight engagement with the under face of catch 22, friction preventing the catch from being withdrawn by spring 24. In this position the device is lowered within the casing to the point where it is desired to pull. The device is then slightly moved upwardly and the teeth 8<sup>a</sup> on the outer faces of slips 8 immediately take hold of the inner surface of the casing. In doing so they are pulled farther down on mandrel 5, forcing sleeve 15 still farther downwardly from the position shown in Fig. 2. The frictional engagement of shoulder 21<sup>a</sup> with catch 22 is thus released and catch 22 springs to the left in Fig. 3 (or if it should fail of being pressed back by spring 24, the beveled engagement of the notch with the end of the

catch will force the catch back on downward movement of the stud 20.) Spring 13 is thus free to exert its upward pressure against sleeve 15 and the slips; but the upward pull on the mandrel and the engagement of the slips with the casing prevents the spring from moving the slips upwardly on ways 7 until such time when the upward pull on the mandrel is relieved. When the slips engage the casing there is naturally a pull down on the slips, tending to spread them apart. If there were no stop provided for this downward movement the slips would move downwardly and outwardly until the casing was injured. Such a stop is provided by the lower end of sleeve 15 engaging nut 10, as shown in Fig. 2. When it is desired to release the spear from the casing, the mandrel is moved downwardly and the slips thus released from the casing. Spring 13 will immediately force the slips to the position shown in Fig. 1, the slips moving inwardly so as not to engage with the casing when the device is moved upwardly to be removed from the hole. To further insure the slips from being pulled down by accidental engagement with the casing while moving the spear upwardly, I have provided a catch 40 which normally stands vertically in a slot 41 in cylindrical mandrel portion 9 directly above nut 10. The lower end of the catch is prevented from moving outwardly by being within the nut while the upper end is held inwardly by sleeve 15. A small spring 42 presses outwardly on catch 40 and a shoulder 43 is adapted to engage under the lower end of sleeve 15 when the sleeve reaches its uppermost position as shown in Fig. 1. This is the position taken when the device is being pulled out of the casing; and catch 40 prevents the downward movement of sleeve 15 even if the slips should accidentally engage with some projection on the inner surface of the casing.

From the foregoing it will be seen that I have provided a simple and reliable device which is easily placed and locked in either of its positions and which is easily operated within the casing. Further, the device is so constructed as to be strong and durable and not liable to damage on account of uneven engagement with the casing or of accidental engagement therewith while being removed from the hole.

Having described my invention, I claim:

A casing spear, comprising a mandrel having downwardly divergent ways thereon and a cylindrical portion below the ways, slips adapted to move longitudinally on the ways, a sleeve slidably mounted on the cylindrical portion having a bearing of some considerable length thereon and having a flange upon which the slips are supported, spring means for supporting the sleeve, said

means surrounding the sleeve and bearing  
against the flange, a member projecting in-  
wardly from the sleeve into the mandrel  
and having a notch therein, a catch adapted  
5 to enter said notch, and spring means for  
moving the catch out of engagement with  
the notch.

In witness that I claim the foregoing I  
have hereunto subscribed my name this 15th  
day of May 1911.

E. L. MILLS.

Witnesses:

JAMES T. BARKELEW,  
ELWOOD H. BARKELEW.