

UNITED STATES PATENT OFFICE.

ELIHU C. WILSON, OF LOS ANGELES, CALIFORNIA.

CASING-SPEAR.

SPECIFICATION forming part of Letters Patent No. 736,907, dated August 18, 1903.

Application filed May 22, 1901. Serial No. 61,471. (No model.)

To all whom it may concern:

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

An object of this invention is to provide a casing-spear which can be as successfully used where heavingsands are encountered as under more favorable conditions.

Another object of this invention is to provide a casing-spear which will operate with superior certainty and which is so constructed as to avoid liability of breakage or getting out of order, also to avoid any liability of any of the parts jarring off.

Another object of this invention is to make it possible to employ large and strong means for lifting the slips to allow the spear to be withdrawn from the well-casing, also to avoid any liability of clogging such slip-lifting means with sand or mud. This I accomplish by mounting the slip-lifting means outside the mandrel above the slips. Such slip-lifting means are preferably a large and strong spiral spring encircling the mandrel above the slips.

This newly-invented casing-spear can be constructed in various ways; but it is not necessary to illustrate all of these ways.

The accompanying drawings illustrate my invention in the preferable form, in which the slip-operating rod is contained in the mandrel and is operated by an extension-spring.

Figure I is an elevation of my newly-invented casing-spear, fragments being broken away to expose parts which would otherwise be concealed. The position of parts when the tool is ready to be inserted in the well-casing is shown in solid lines. Dotted lines at top and bottom of the slip indicate the position of parts when the means for holding the rod depressed are being released. The position of the parts when the tool is ready for withdrawal from the casing is also shown in dotted lines. The casing for the slip-spring is omitted. Fig. II is an axial section on line II II, Figs. I, III, and IV, showing the tool in a well-casing ready to lift the cas-

ing. Dotted lines indicate the position of the parts when the spring has been allowed to act to draw the slips up into releasing position. The casing for the slip-spring is shown. Fig. III is a plan section on line III III, Figs. I and II, cutting through the arms which connect the slip-operating rod with the spring. Fig. IV is a plan section on line IV IV, Figs. I and II, cutting just above the slips when the same are in position for entering the mandrel into the well-casing to lower it there-through. Fig. V is an enlarged fragmental sectional detail to illustrate the friction-spring for preventing the slips from sliding down until purposely jarred loose.

1 indicates a mandrel. 2 indicates slips having a limited longitudinal play thereon and being respectively provided with longitudinal limited ways 3. 4 indicates a rod mounted in said mandrel to play longitudinally therein and furnished with projecting-arms 5, which respectively play in said limited ways 3.

6 indicates a spring for normally holding the rod 4 and its arms 5 up to hold the slips 2 at the upper limit of their movement.

7 indicates a catch engaging a part to hold the rod 4 depressed in position with the slips intermediate the upper and lower limits of their movement. The part with which the catch 7 engages is preferably the rod 4, as shown in the drawings.

8 indicates a spring constituting means for withdrawing the catch 7 from its operative position when released from frictional contact with the part with which it engages when holding the rod depressed. The mandrel is preferably furnished with an upwardly-extending stem *a* of smaller diameter than the main body *b* of the mandrel 1. The rod 4 is preferably furnished with a notch 9, the lower wall *c* of which extends across the line of movement of the rod 4 substantially at right angles to the line of movement of the rod 4 and the upper wall *d* oblique thereto. The catch 7 consists in a bolt, as shown, to enter said notch and engage the lower wall *c* thereof and to be frictionally held thereby and to be engaged by the oblique upper wall *d* to thereby be forced out of the path of the rod when said rod descends. The inner end of the

bolt is preferably rounded, so that the slanting face or wall *d* will readily act thereon to force the bolt out with any side of the bolt up.

f indicates a removable cross-head playing in a slot *g* in the stem *a* of the mandrel, and the spring 6 preferably encircles the stem, as shown, and is fastened at its upper end to the stem by a pin *h*, the ends of which are perforated and the spring inserted through the perforation.

In practical operation to introduce the spear into the well-casing the slips 2 will be drawn down until the bolt or catch 7 enters the notch 9. Then the slips are released and the spring is allowed to draw the rod upward until the lower wall *c* of the notch engages the bolt, so that the rod is held against the pressure of the spring. Then the spear is lowered through the casing. The slips slide up along the upwardly and inwardly converging faces *i* of the mandrel to a position which will allow them and the mandrel to pass downward through the well-casing. When the spear has reached the point at which it is desired to grip the casing to withdraw it, the spear will be lifted and the slips will engage the inside of the casing while the mandrel is drawn up, thus wedging firmly between the slips until the cross head or arms 5 of the rod engage the upper ends of the limited ways 3, and thus draw the rod downward, and thereby withdrawing the lower wall or part *c* of the notch away from the bolt 7, thus allowing the spring 8 to move the bolt out of frictional contact with the part *c*—that is to say, out of the path of the lower wall *c*. If the spring should not act to withdraw the bolt from the notch 9, the upper oblique wall *d* of said notch will engage the end of said bolt to positively force the bolt outward, thus allowing the rod to move upward with relation to the mandrel. The upward pressure on the mandrel is applied sufficiently to wedge the mandrel in between the slips which engage the casing with such force that the mandrel will be frictionally supported in the casing to allow the necessary slack for upward jarring to loosen the casing; but when it is desired to remove the spear from the well the mandrel will be jarred downward to slip its converging faces downward between the slips, whereupon the rod-carrying spring 6 will force the rod 4 upward, thus lifting the slips to a position on the converging faces *i* of the mandrel, where they will be withdrawn from contact with the casing, thus allowing the mandrel to be readily withdrawn from the casing at any time that it may be desired.

In Fig. II a casing *p* is shown around the slip-operating spring; but this will ordinarily be dispensed with. *q* indicates the well-casing. *r* indicates the lower end of the tools to which the mandrel is secured. In practice when it is desired to insert the bolt into the notch this will be done by means of a pin or other instrument (not shown) inserted through a hole *s* in the stop *t*, which retains

the bolt 8 in the mandrel. *u* indicates slip-retaining springs, which are fastened to the slips, respectively, and frictionally engage the slip-operating device or arms 5, thereby to add sufficient friction over and above that of the slips on their dovetail ways *v* to retain the slips in an elevated position on the slanting faces of the mandrel and out of contact with the casing during the descent of the spear and until to release them the mandrel is suddenly stopped in its descent, thus jarring the slips loose and allowing them to fall to engage the casing, so that on the uppull of the mandrel the slips will operate as hereinbefore described. The contrivance avoids wear of the slips on the casing during the descent of the spear.

The springs *u* afford means for temporarily upholding the slips when the slip-lifting means are depressed, but readily release the slips and allow them to slide down when the spear is suddenly stopped in its descent, thus allowing the slips to engage the casing to lift it and allow them subsequently to be lifted by the slip-lifting means carried by the mandrel.

By reason of the novel construction in which the slip-lifting means are applied above the slips the main body *b* of the mandrel protects the slip-lifting means from the interference of heaving sands and other materials which are liable to clog the slip-lifting means of any casing-spear in which such means are located below the slips. Furthermore, by arranging the slip-lifting spiral spring around the mandrel above the slips a large and strong spring can be employed and positive lifting of the slips is assured whenever the slips are released after having been brought into action.

By mounting the springs *u* on the slips to engage the arms 5 I am able to temporarily sustain the slips by means of very short springs, which are inexpensive and not liable to break or get out of order.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A casing-spear comprising a mandrel, the lower portion of which forms a head and the upper portion is reduced to form a shank, the portion between the head and shank being perforated longitudinally, and the head being provided with oppositely-located inclined faces and transversely slotted, a wedge-shaped slip on each face, a support through the slot for moving the slips out of their operative position, a coiled spring around the shank, the upper end of which is rigidly secured thereto, means through said perforation for connecting the support with the free end of the spring, and means for temporarily holding the support against the tension of the spring.

2. A casing-spear comprising a mandrel, the lower portion of which forms a head and the upper portion is reduced to form a shank, the head and the shank each being slotted and

the lower portion being bored longitudinally and provided with an inclined face at each end of the slot, a rod through the bore, the upper end of which extends into the slot of the shank, arms secured to the rod and projecting through the slots of the head, a slip on each inclined face and in engagement with one of the arms, a spring around the shank, a connector through the slot of the shank and in engagement with the spring and the rod, and means for temporarily holding the rod against the tension of said spring.

3. A casing-spear comprising a mandrel, the lower portion of which forms a head and the upper portion is reduced to form a shank, the head and the shank each being slotted and the head being bored longitudinally, each side of the head being provided with an inclined face and a shoulder at each end of the incline, a longitudinally-slotted wedge-shaped slip on each face, a rod in the bore, the upper end of which enters the slot in the shank and the lower end is provided with arms which extend through the slot of the head and enter the slots of the slips, a spring encircling the shank for normally raising the rod to hold the slips in an inoperative position, a connector through the slot in the shank and in engagement with the spring and the rod, and means for temporarily holding the rod against the tension of the spring.

4. A casing-spear comprising a mandrel, the lower portion of which forms a head and the upper portion is reduced to form a shank, a spring encircling said shank and having its upper end fixed thereon, the shank and the head

each being slotted and the head being bored longitudinally and laterally, the lateral bore communicating with the upper end of the longitudinal bore and the head being provided with an inclined face at each end of its slot, a longitudinally-slotted wedge-shaped slip on each of said faces, a rod in the longitudinal bore, the upper end of which is notched and projects into the slot of the shank and the lower end is provided with arms which project into the slots of the slips, a cross-head in the slot of the shank and in engagement with the lower end of said spring and with the rod, a pin in the lateral bore of the head, the inner end of which is adapted to engage with the notched portion of the rod and hold it against the tension of the spring, and a spring for normally holding the pin out of engagement with said rod.

5. A casing-spear comprising a slotted mandrel, the sides of which are provided with oppositely-located inclined faces, a slip on each face, a slip-retaining member provided with arms, and a spring on each slip in position to engage with one of said arms by friction and temporarily hold the slips in an inoperative position.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 16th day of May, 1901.

E. C. WILSON.

Witnesses:

JAMES R. TOWNSEND,
JULIA TOWNSEND.