(No Model.)

D. W. BLACK.

DEEP WELL PACKER.

No. 588,385. Patented Aug. 17, 1897.

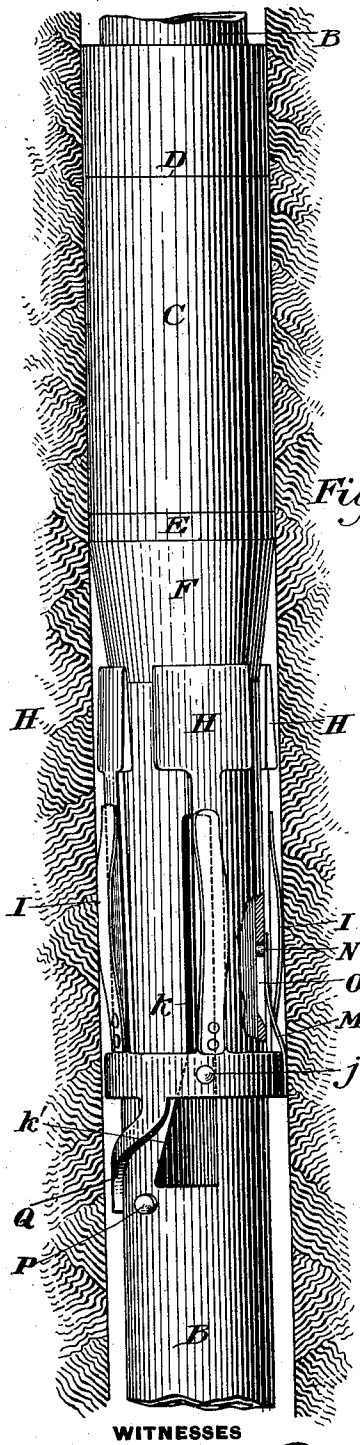


Fig. 1.

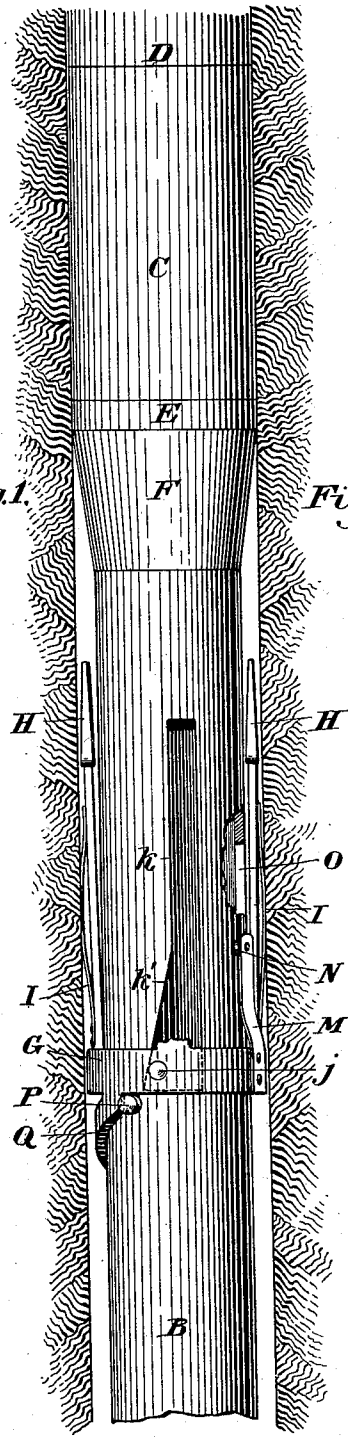


Fig. 2.

Fig. 3.

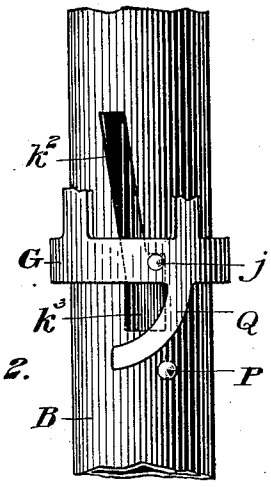
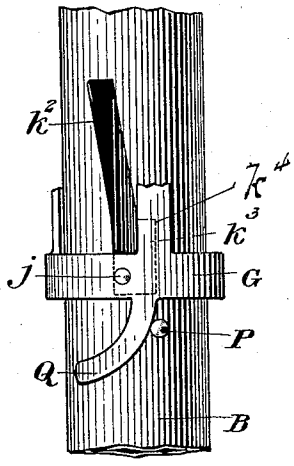


Fig. 4.



WITNESSES

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UNITED STATES PATENT OFFICE.

DAVID W. BLACK, OF BUTLER, PENNSYLVANIA, ASSIGNOR TO BENJAMIN MASSETH, OF SAME PLACE.

DEEP-WELL PACKER.

SPECIFICATION forming part of Letters Patent No. 588,385, dated August 17, 1897.

Original application filed March 2, 1897, Serial No. 625,702. Divided and this application filed March 17, 1897. Serial No. 627,953. (No model.)

To all whom it may concern:

Be it known that I, DAVID W. BLACK, of Butler, in the county of Butler and State of Pennsylvania, have invented a new and useful Improvement in Deep-Well Packers, of which the following is a full, clear, and exact description.

The present specification is designed to claim, specifically, certain types of packers for deep wells, which are shown and are claimed, generically, in the claims of a prior patent application, Serial No. 625,702, filed by me on the 2d day of March, 1897. The general purpose of the device is to provide means whereby a deep-well packer can be expanded and set in position in the well, and when desired can be released and shifted to another place in the well, whether at a higher or a lower position, without the necessity of first withdrawing the packer entirely from the well.

The device is illustrated in the accompanying drawings, wherein—

Figure 1 shows in side elevation one of my improved packers in the position it assumes while being lowered in the well. Fig. 2 is a similar view showing the parts in the position which they assume when the packer is raised in order to shift the collar and to enable the packer to be expanded. Figs. 3 and 4 are side elevations of a modified construction, showing the same in two positions, the first in the position which the parts occupy while the packer is being lowered and in Fig. 4 the position which the parts occupy when they have been shifted so as to adapt the packer to be set or expanded.

In Figs. 1 and 2 I show as a part of the packer the anchor, means for expanding the same, and a rubber tubing. These parts are not shown in Figs. 3 and 4.

In Figs. 1 and 2, B represents a portion of the pipe-section on which the packer is mounted. C is an expansible packer-tube set thereon and preferably made of rubber in the usual manner. One end of this packer-tube C bears against a shoulder D on the pipe, and the other end bears against a shoulder E, formed, preferably, by the end of a tubular section F, which fits loosely around the pipe B, so as to be capable of longitudinal motion in setting the packer. This tubular section F is externally tapering or of wedge shape. A collar G is fitted loosely around the pipe and carries arms or slips H, which, together with the collar, constitute the anchor. The arms or slips have leaf-springs I or otherwise project laterally, so as to bear with slight rubbing friction against the side of the hole. A guide-stud *j* is fixed to the collar G and is fitted in a vertical slot *k*, one side *k'* of which is oblique. I also attach to the collar a spring M, having a locking-stud N, which, when the arms are in locked position, fits within a slot O. The upper end of the slot O is abrupt, so that it will act as a stop to prevent the collar G, with its arms, from moving upwardly when the stud N is in the slot, but its other end is tapered, so that on lifting the casing the stud can ride over said tapered portion and thus free itself from the slot. P is a stud on the casing adapted to engage an oblique arm Q, which projects from the collar, so as to act in conjunction with the side *k'* of the slot *k* in forming means for turning the collar in either direction, as explained below.

If now the stud N is fitted in the slot O, the packer can be lowered to any desired position in the well, for said slot will prevent the arms or slips from moving upwardly on the tapering section F. When it is desired to set the packer, the operator raises it somewhat, the effect of which is, first, to cause the stud N to pass below the slot O, and, next, the engagement of the arm Q with the stud P will turn the collar G, so as to bring the stud N out of line from the slot O. Thereupon the operator again lowers the packer somewhat and the pipe B, moving down within the arms or slips, causes the latter to engage the tapering section F and to be expanded. This motion is possible because, as above stated, the stud N is out of line from the slot O and does not enter the same, but toward the end of the upward relative motion of the arms on the pipe the collar will have been turned sufficiently on the pipe by engagement of the stud P with the oblique side *k'* of the slot to bring the stud N again into line with but above the slot O. If afterward

it is desired to unpack the packer and to reset it, say at a lower position, the operator raises it, thereby moving the tapering section F up within the arms or slips until finally the stud N slips into the slot O, with which it is then in a vertical line. The arms or slips then being released from the sides of the well by the lifting of the tapering section F above the same are held from subsequent upward motion by engagement of the stud with the end of the slot, so that the packer can be lowered and again reset at any position.

In Figs. 3 and 4 I show a modification of my invention which resembles the construction above described, except that it dispenses with the slot O and stud N. In this case the guide-slot k^2 is oblique and has at its lower end an enlarged portion k^3. The arm Q and the stud P are used as in Fig. 4. When the arms are in locked position, so that the packer may be lowered into the well, the stud j on the collar G bears against the shoulder k^4 at the upper end of the enlarged lower portion k^3 of the slot, which upper end acts as a stop. When it is desired to set the packer in the well, the operator raises it slightly, thus causing the stud P to engage the arm Q and turn the collar G a little to the right, so as to disengage the guide-stud j from the part k^3 of the slot and to bring it opposite to the part k^2. Thereupon the packer is again lowered, when the stud j will move within the slot k^2 and the pipe B will have unrestrained motion within the arms. The conical section F will thus be moved within the arms and expand the same.

When the packer is to be unpacked and moved, say, to a lower position in the well, the operator raises the packer, thereby shifting the guide-stud j to the lower end of the slot k^2, which, or the lower end of which, being oblique, causes the stud when it passes beyond the end of the slot to be opposite to the shoulder k^4 at the corner of the part k^3, so that when the packer is then lowered the engagement of the stud with the shoulder k^4 will prevent the arms or slips from moving up on the pipe B. The parts are then locked and the packer may be lowered and reset at any desired place.

Care should be taken, in releasing the packer and locking it, so that it may be set at a lower position, to raise the packer only enough to bring the guide-stud j out of the oblique slot k^2 without lifting the same far enough to cause the stud P to engage the arms Q and to turn the collar, since otherwise it would bring the parts into unlocked position prematurely and would thus defeat the object sought for.

I claim—

1. The combination with the anchor and collar, of a locking device comprising an oblique guide-arm on the collar, and a stud or projection against which it bears, whereby on vertical motion of the device the collar may be shifted laterally.

2. The combination with the anchor and collar, of a stop, a locking device comprising an oblique guide-arm on the collar, and a stud or projection against which it bears, whereby on vertical motion of the device the collar may be shifted laterally and brought into and out of locking engagement with said stop.

3. The combination with the anchor and collar, of a locking device comprising an oblique guide-arm on the collar, a stud or projection against which it bears, whereby on vertical motion of the device the collar may be shifted laterally in one direction, and an inclined guide-surface by which it may be shifted in the other direction.

In testimony whereof I have hereunto set my hand.

DAVID W. BLACK.

Witnesses:
THOMAS W. BAKEWELL,
H. M. CORWIN.