

No. 625,648.

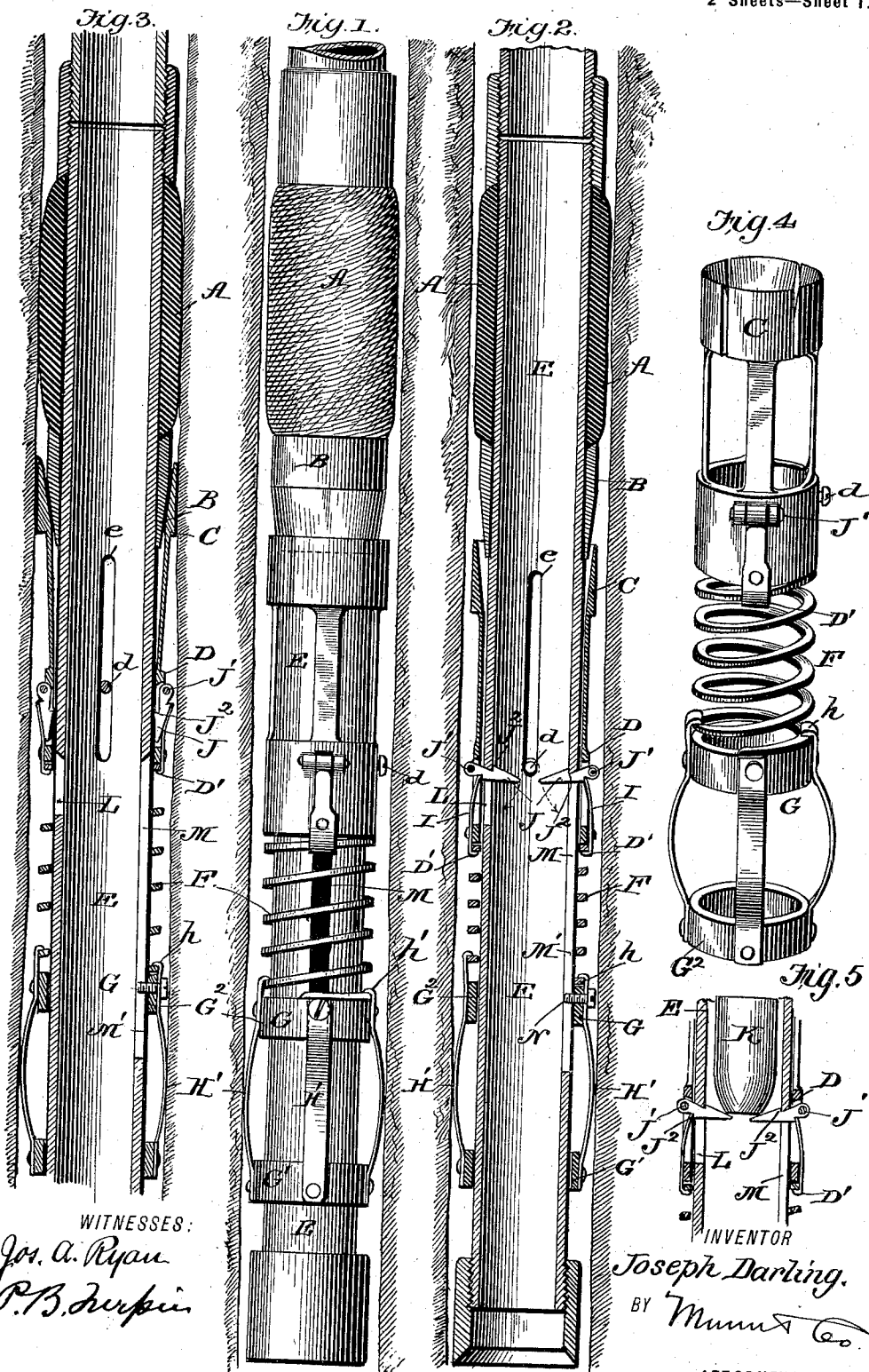
Patented May 23, 1899.

J. DARLING.
OIL WELL PACKER.

(Application filed Apr. 18, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

Jos. A. Ryan
P. B. Surpin

INVENTOR
Joseph Darling.

BY Munn & Co.

ATTORNEYS.

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Fig. 6.

Fig. 9.

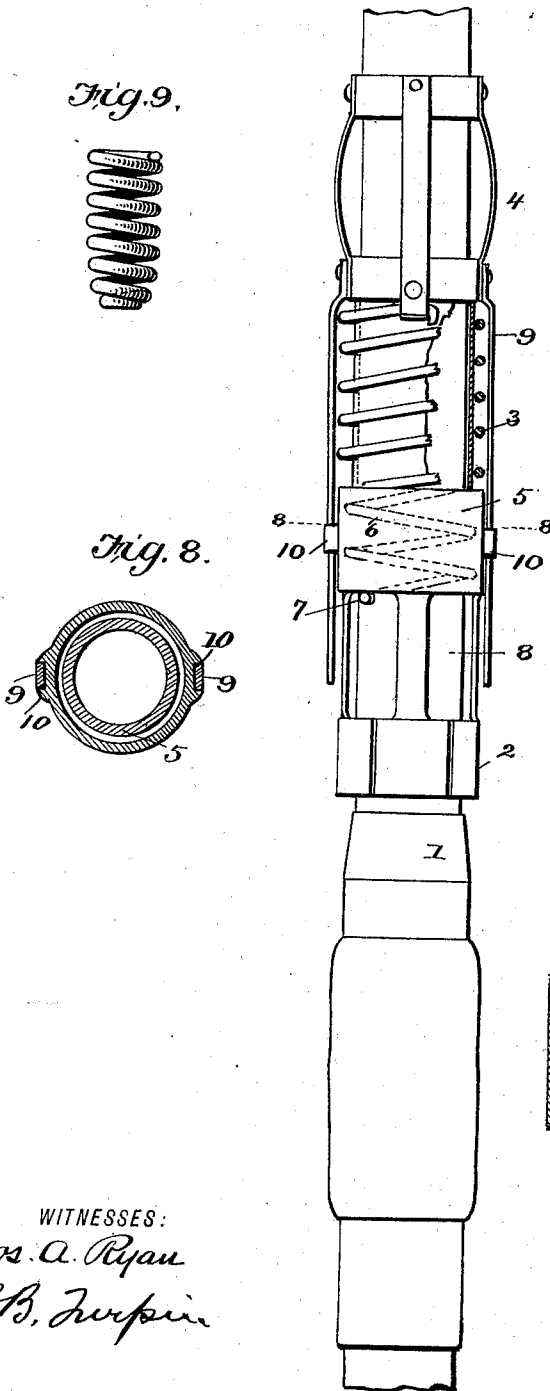


Fig. 7.

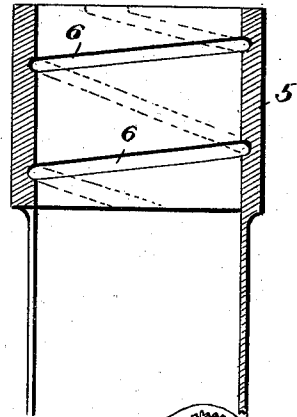
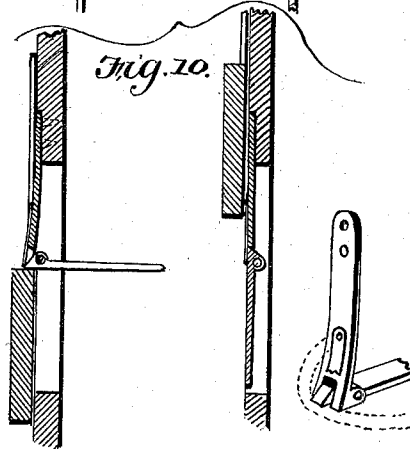


Fig. 10.



WITNESSES:

Jos. A. Ryan
P. B. Turpin

INVENTOR

Joseph Darling.

BY Munn & Co.

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOSEPH DARLING, OF CHICORA, PENNSYLVANIA.

OIL-WELL PACKER.

SPECIFICATION forming part of Letters Patent No. 625,648, dated May 23, 1899.

Application filed April 18, 1898. Serial No. 677,985. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DARLING, residing at Chicora, in the county of Butler and State of Pennsylvania, have made certain new and useful Improvements in Oil-Well Packers, of which the following is a full, clear, and exact specification.

My invention is an improvement in oil-well packers, and has for an object, among others, to provide, in connection with the usual packer and the slips coöperating therewith, detent devices for restraining the slips which may be set and reset, as will more fully appear hereinafter; to furnish in connection with the slips a spring connected at one end with the slips and a holder at the other end of the spring to bind within the well-hole, and to furnish the novel construction of detent devices which may be automatically readjusted to secure the resetting of the packer at either a higher or a lower level, as may be desired.

The invention consists in certain novel constructions and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a side view of my improvement in a well-hole, the detents being adjusted in position to restrain the slips and the spring which operates the slips being expanded. Fig. 2 is a sectional view on about line 2 2 of Fig. 1, the parts being in the same position, except that the spring is compressed so it will throw the slips into engagement with the packer-cone when the detents are released. Fig. 3 is a view similar to Fig. 2, except that the detents have been released and the slips thrown by the spring into locking position in engagement with the packer-cone. Fig. 4 is a detail perspective view of the packer-operating device. Fig. 5 is a detail sectional view illustrating the operating weight in connection with the detents which it operates. Fig. 6 illustrates an arrangement whereby the invention is utilized in connection with an up-packer. Fig. 7 is a detail view of the packer-sleeve used in the construction shown in Fig. 6. Fig. 8 is a detail cross-section on about line 8 8 of Fig. 6. Fig. 9 is a detail view illustrating the spring-operating weight, and Fig. 10 shows the detent device supported on the casing.

The packer-sleeve A and its cone B may

be of ordinary construction and may operate in connection with the slips C when the latter are in contact with the cone B in the ordinary manner and need not be described in detail herein. The slips C have the sleeve or collar D, which encircles the casing E and is slidable thereon, being held from turning on said casing by the screw or projection *d* on the collar D entering the longitudinal slot *e* in the casing, as will be understood from Figs. 2 and 3, the projection *d* sliding in the slot *e*, as will be understood from Fig. 3. To the slips I connect at one end the spring F, the other end of which is connected with the holder G, which binds within the well-hole and operates to clamp the packer-operating device in any desired position in the well-hole and to permit the movement of such device with the casing up and down the well-hole, as may be desired.

The holder G comprises the end rings G' and G² and the springs H, connecting said rings and outwardly bowed between the same at H' to bind in the well-hole and yet permit the movement of said holder under stress up and down said well-hole, as may be desired. The ends of the springs H are extended and bent at *h* adjacent to the ring G² to form a seat, into engagement with which a coil-spring F may be turned, and the collar D has similar projecting portions D', which are preferably formed by the extended ends of the springs I, which actuate the dogs presently described. These parts D' and *h* furnish a simple means whereby the spring may be connected with the slip and holder without the necessity of separate fastening devices, as will be understood from the drawings.

In this class of devices it is desirable to provide means whereby the well-hole may be packed at one point and then after a period of operation be unpacked at such point and packed at a higher or lower level, as circumstances may demand. One object of my invention is to accomplish this result and another is to accomplish such result by devices which may be automatically readjusted to set the packer without any rotary motion of the casing, and I preferably accomplish such results by means of the devices seen in Figs. 1, 2, 3, and 4 and which I will now describe.

In connection with the slips I provide a detent or detents, which may be released to permit the slips to move to locked position and may automatically readjust in resetting the slips independent of any rotary motion of the casing, and I show the detent in the form of a dog or dogs J, pivoted at J' to the slips and arranged to protrude at their free ends into the casing, so they may be operated by a descending weight K, as presently described. I provide two of these dogs to secure a more certain operation, and in order that if one should become clogged and fail to operate at any time the other will secure the desired results; but it will be understood that my invention is embodied in one of these dogs and that the other might be omitted without departing from the broad principles of my invention. The dogs operate through openings L and M in the casing, the latter being the upper end of a slot M', in which a projection N on the ring G² operates, this construction permitting longitudinal movement of the holder on the casing and yet holding the said holder from turning on the casing. The dogs are provided at J² with shoulders to engage the casing when in locked position, as shown in Fig. 2, and they are automatically pressed into such position and engagement by the springs I, as best shown in Fig. 2, such springs pressing and holding the dogs in locked position, permitting them to be forced out of such position by a descending weight and exerting on said dogs a constant tendency to return to such locked position, as will be understood from Fig. 3, which will be effective at any time the dogs are brought opposite their openings L and M.

In the operation of the described construction the packer-operating devices, as shown in Fig. 4, may be applied to the casing, as shown in Fig. 2, with the dogs J in the position shown in said figure, and the casing, with the packer and its operating devices in such position, may be inserted in a well-hole and dropped to the position where it is desired to pack the casing, which may be ascertained or determined in any well-known way. When in such position, the holder will bind within the well-hole, and if stopped on the downward movement of the casing the relation of the holder and the casing to the slips will be that shown in Fig. 2, and the spring will be compressed ready for operation. If the packer be stopped on its upward movement, the spring will be expanded, as shown in Fig. 1, and it will be necessary to give a slight downward movement to the casing to compress the spring, the holder meanwhile binding in the well-hole, and the spring will be compressed, it may be, as shown in Fig. 2, so it will properly operate to throw the slips upward when the detent is released. If now it be desired to expand the packer, it is only necessary to drop a weight (see Fig. 5) down the casing, which will trip the detent, thus releasing the slips from the casing, and such

slips will be forced upward by the spring into engagement with the cone B and operate in the usual manner to bind the cone in the well-hole and enable the spreading of the packing A, as may be desired. Now to readjust the packer - operating devices to the position shown in Fig. 2 it is only necessary to lift the casing, when it will slide upward through the packer-operating devices, the slips being held by the wall of the well and being drawn downward by the spring connected with the holder, which is engaged by the well-hole until the dogs J come opposite and escape through their openings into the casing, as shown in Fig. 2. It is obvious that these operations of holding, releasing, and readjusting the slips are effected independent of any rotary movement of the casing and that in these operations the holder G being slidable upon the casing operates both as a means for compressing the spring, so it will actuate the slips when the latter are released, and also operates to drag such slips back in readjusting the same out of engagement with the cone B of the packer.

It may be preferred to make the weight K in the form of a spiral spring to cushion the stroke of same on the detent, and I illustrate a form of cushioned weight in Fig. 9 of the drawings.

It is sometimes desirable to produce an up-packer—that is to say, a packer which packs against pressure from below—and I illustrate in Fig. 6 a construction for such purpose which is somewhat different from the specific construction before described, but does not depart from the broad principles of my invention. In the said construction shown in Fig. 6 the cone 1, the slips 2, the spring 3, and the holder 4 are similar to the corresponding parts shown in Figs. 1, 2, and 3; but the collar 5 of the slips has a spiral groove 6, which is entered by a projection 7 on the casing 8, so the casing may be turned to free the slips or to reset the same, as will be understood from Figs. 6 and 7, and a guard-sleeve O fits within the spring 3. In the operation of this construction the holder 4 binds within the well-hole and is thereby prevented from turning with the casing, and straps 9, secured to the holder, fit in grooves 10 in the collar 5, thus preventing the slips from turning and at the same time permitting the movement of said slips upon the casing independently of the holder 4, as will be understood from Figs. 6 and 8.

While I prefer to support the detent-dogs on the slips, it will be understood they might be supported on the casing without departing from my invention, such a construction being shown in Fig. 10.

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

1. In an apparatus substantially as described the combination of the slips, the spring connected with the slips, the holder

adapted to bind in the well-hole whereby to form an anchor for the spring in withdrawing the slips and a bearing to receive the pressure of such spring when it is compressed to actuate the slips, the casing slidable longitudinally relative to the holder, and a detent for holding the slips against the pressure of such spring substantially as set forth.

2. In an apparatus substantially as described a packer-operating device comprising the slips, a spring for actuating said slips and detent devices provided with means whereby they are automatically readjusting such detent devices being connected with the slips and movable therewith as the slips are set into and out of packing position, substantially as set forth.

3. A packer-operating device comprising the slips the spring for operating the slips, detent device and means whereby such device may be automatically reset whereby the slips may be held against the tension of said spring and when released may be readjusted substantially as set forth.

4. A device substantially as described comprising the slips, the spring connected with the slips for operating the same and a detent for holding the slips against the tension of said spring, said detent being connected with the slips and movable therewith into and out of set position substantially as described.

5. The combination of the casing, the slips, means whereby the slips are held from moving rotarily on the casing, the spring for actuating such slips, a detent by which to hold the slips against the tension of the spring and means whereby the detent may automatically adjust into locked position in resetting the slips independent of any rotary movement of the casing substantially as set forth.

6. A packer-operating device comprising the slips, the spring for operating the same and an automatically-readjusting detent composed of a dog pivoted to the slips and protruding when set into the casing whereby it may be operated by an object dropped through the casing substantially as set forth.

7. An apparatus substantially as described

comprising the packer, the casing, the slips, the spring for actuating such slips, a detent by which the slips are held against the tension of the actuating-spring and a spring operating the detent, such detent being arranged for operation independent of any turning of the casing and to automatically readjust whereby to effect a resetting of the slip substantially as set forth.

8. A packer-operating device substantially as described comprising the slips and the holder both having at their ends projecting portions fitted to receive the coils of a spring and the coil-spring connecting said slips and holder and movable rotarily into and out of engagement with the projecting portions thereof substantially as described.

9. The combination substantially as herein described of the casing, the packer, the slips, the holder adapted to bind in the well and movable longitudinally upon the casing, the coil-spring connecting the holder and slips and secured to both said parts and the detent for securing the slips against the tension of said coil-spring substantially as set forth.

10. An apparatus substantially as described comprising the casing, the slips, means to cause the relative movement of the casing and slips, the detent pivotally connected at one end with the slips protruding when set into the bore of the casing and having a shoulder to engage the casing and lock the detent into set position substantially as set forth.

11. In an apparatus substantially as described the combination of the casing, the slips, means to cause the relative movement of the casing and slips, a detent pivotally connected with the slips protruding in set position across the bore of the casing, having a portion to engage the casing whereby to lock the detent in set position, and a spring whereby to actuate the detent substantially as set forth.

JOSEPH DARLING.

Witnesses:

SOLON C. KEMON,
PERRY B. TURPIN.