

June 5, 1928.

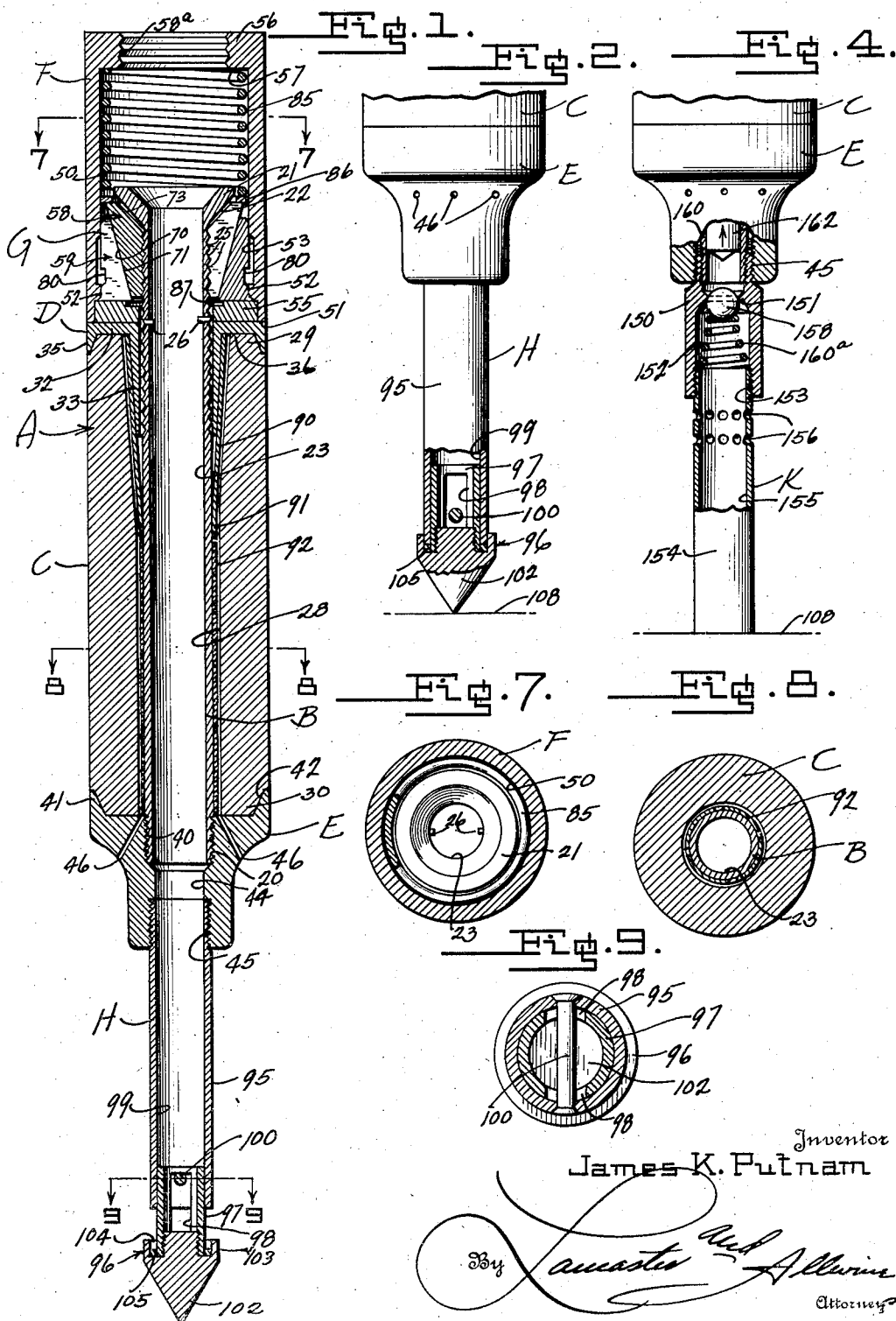
1,672,169

J. K. PUTNAM

WELL PACKER

Filed June 26, 1925

2 Sheets-Sheet 1



June 5, 1928.

1,672,169

J. K. PUTNAM

WELL PACKER

Filed June 26, 1925

2 Sheets-Sheet 2

Fig. 3.

Fig. 5.

Fig. 6.

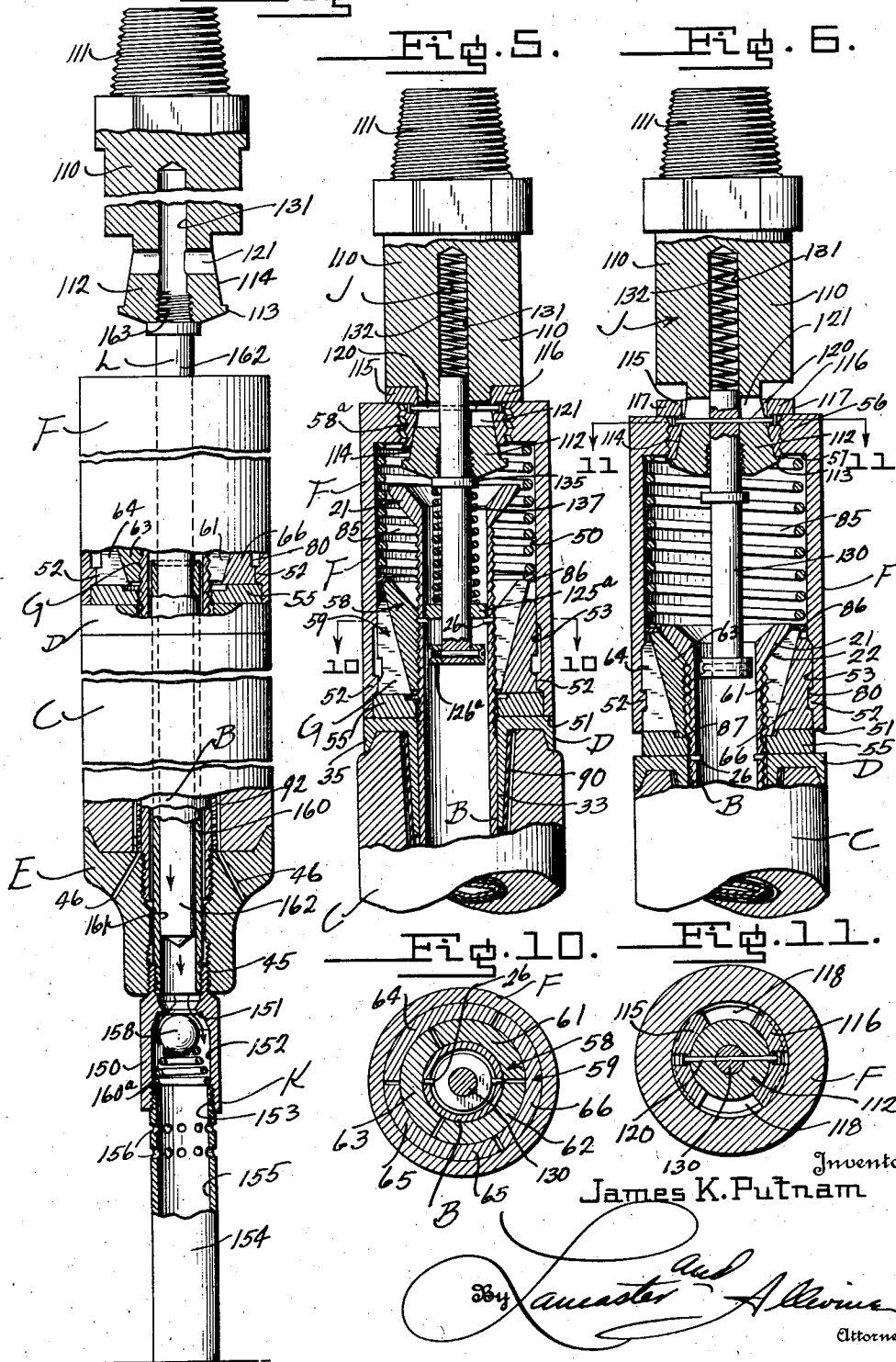


Fig. 10.

Fig. 11.

Inventor
James K. Putnam

By *Laurel and Alvin*
Attorneys

UNITED STATES PATENT OFFICE.

JAMES K. PUTNAM, OF TULSA, OKLAHOMA.

WELL PACKER.

Application filed June 26, 1925. Serial No. 39,833.

This invention relates to improvements in well packers.

The primary object of this invention is the provision of a relatively simple and efficiently operated type of well packer, which may be used to effectively seal a well at a desired point, and which embodies means by which the well may be sealed as by pumping mud, cementitious material, or other sealing material into the well.

A further object of this invention is the provision of a novel packer for wells, embodying means by which the packer element may be expanded in a novel manner.

A further object of this invention is the provision of an oil well packer device, embodying novel means by which the packer member may be expanded by gas pressure entering the well.

A further object of this invention is the provision of a novel well packer device, embodying a novel type of tool to permit its assemblage or removal with respect to the well.

A further object of this invention is the provision of a novel type of well packer, embodying mechanical means by which to expand the packer and means to utilize gas pressure entering the well for the further expansion of the packer.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a longitudinal cross sectional view taken thru the improved well packer.

Figure 2 is a fragmentary side elevation, partly in section, of the lower details of the packer, showing the valve at the lower end thereof closed.

Figure 3 is a fragmentary view, partly in section, showing details of the improved packer when the same is utilized for pumping mud or cementitious material into the well to seal the same, or to seal the water bearing stratum from the oil bearing stratum.

Figure 4 is a fragmentary end sectional view of the special type of anchor used upon the packer for mudding off of wells.

Figures 5 and 6 are sectional views of the upper end of the packer device, showing a

special type of set tool used for installing and removal of the packer.

Figures 7, 8 and 9 are sectional views taken substantially on their respective lines in Figure 1 of the drawings.

Figures 10 and 11 are cross sectional views taken substantially on their respective lines in Figures 5 and 6 of the drawings.

In the drawings, wherein for the purpose of illustration is shown only a preferred type of packer, and its associated equipments, the letter A may generally designate the improved packer, which may comprise a supporting tube B adapted to receive the expansible or elastic packer member C thereon; upper and lower heads D and E being provided for receiving the packer member C therebetween, and being respectively slidable and fixed on the tube B. A compressing head F is used in connection with the packer device, with which is associated expansible jaw means G for holding the expansible positioning of the packer member C in desired relation upon the tube or support B. A regular valved anchor H may be used upon the lower end of the packer device. A set tool J may be used with the packer head F, and other details of the invention, to effect the packer installation and removal. In the operation of the packer to mud off, or seal up the well at desired points, a special type of anchor K is used, with which is associated a plunger L operated in the supporting tube B, to pump mud, or other cementitious or sealing material into the well, as will be described with more detail hereinafter.

The metal tube B at its lower end is externally screw threaded at 20, for detachably receiving the packer receiving cap E thereon. At its upper end the tube B is provided with a circumferentially outwardly and upwardly flaring head 21, which provides a tapered surface 22 facing downwardly, and with which the expansible jaw construction G cooperates in a manner to be subsequently described. The tube B is provided with a passageway 23 therethrough, open at both ends, and below the tapered head or end 21, the tube B exteriorly thereof is circumferentially provided with V-shaped threads or grooves 25, with which the jaws of the expansible jaw construction G cooperate, in a manner to be subsequently mentioned. Diametrically opposed pins 26 are provided

upon the tube B, extending laterally inwardly of the passageway 23, a short distance below the upper end of the tube B, and with which pins certain details of the set tool J may cooperate in a manner to be subsequently described.

The packer member C is preferably formed of some expansible material, such as rubber, although other expansible materials may serve the purpose. The packer member C is hollow cylindrical in formation, and the same is flexible. It is provided with a central passageway 28 therethru, so that the same may be slipped over the tube B, and at its upper and lower ends the packer member C is reduced at 29 and 30 respectively for seating in the recessed portion of the top and bottom caps D and E to be subsequently described. The walls of the packer member C are relatively thick, although the passageway 28 is of such a diameter that the packer member C does not snugly fit upon the tube B, but is spaced therefrom to permit gases to pass upwardly thru the space, to assist in the expansion of the packer member C whenever heavy gas pressures are encountered in the well.

The upper cap D is, of course, of metal, and the same is provided with the top flange 32, which seats against the upper edge of the packer member C. An inner preferably tapered tubular projection 33 is formed integral with the flange 32, adapted to extend downwardly into the upper end of the passageway 28 of the packer member C, between the packer member C and the tube B, as is illustrated in Figure 1 of the drawings; said tube 33 being provided with a passageway upwardly thru which the tube B extends in a sliding relation. At the outer margin of the flange 32, a retaining flange 35 is provided, in spaced relation with the tubular projection 33 to provide the annular seating recess 36 within which the upper end 29 of the packer member C is retained, against liability of displacement.

The cap E at the lower end of the tube B is provided with a screw threaded socket 40 for receiving the lower screw threaded end 20 of the supporting tube or member B, and this cap E is provided with an annular retaining flange 41 at the outer margin thereof, extending upwardly to provide a recess 42 between the retaining flange 41 and the tube or support B, within which the lower end 30 of the expansible packer member C is received, against liability of displacement. The cap E is of course provided with the central passageway 44 therethrough, and it is provided at its lower end with a screw threaded socket 45 adapted to detachably receive details of the anchors H or K, as the case may be. The cap E is provided with diagonally disposed gas ports 46, arranged therein, from the lower reduced portion

thereof outletting into the space between the packer member C and the tube B, so that gas may be carried from the well upwardly thru said ports 46 into the space between the tube B and the passageway 28 of the packer member C, to act as an expansion medium which will cause the same to expand and prevent the packer from sliding upwardly in the hole incident to heavy gas pressures existing within the well.

Referring to the compressing head F the same is cylindrical in formation, of about the same external diameter as the normal diameter of the packer C. At its lower end the head F is open to the compartment 50 therein, and just upwardly a short space from the lower edge 51 of the head, an annular flange or inwardly extending lugs 52 are provided, inwardly extending from the internal periphery of the head F; the lower end of the compartment 50 being enlarged as by recessing the head F at 53, and into this recess the lugs or annular portion 52 projects, to cooperate in a novel manner with the jaws of the means G, and to engage against the upper surface at the outer marginal portion of the ring-shaped jaw base 55, which rests directly upon the sliding cap D. The head F at its upper end is provided with the inwardly extending flange 56, providing an internal shoulder 57 facing downwardly in the compartment 50; this flange 56 providing a central screw threaded or grooved opening 58^a, adapted to detachably receive details of the set tool J to be subsequently described.

Referring to the jaw means G, the same preferably comprises an inner conical shaped expansion jaw device 58; and an outer expansion jaw device 59 adapted to receive the jaw device 58 therein. As is illustrated in the drawings in the sectional view in Figure 10, the inner and outer jaw devices 58 and 59 are formed in series, so that the inner conical shaped jaw device 58 is formed of complementary segments 61, 62 and 63, annularly about the upper end of the tubular supporting rod B, just below the flaring head 21 thereof. In similar manner the construction jaw 59 includes the jaw segments 64, 65 and 66. The jaws of the inner jaw construction 58 provide outwardly tapered surfaces 70 which are convergent from the upper end 21 of the tube B towards the axis of the tube, and which rest in abutting engagement against the inner tapered surfaces 71 of the jaws of the outer jaw construction 59. The jaws of the inner jaw construction 58 are beveled at 73, at their upper portions, to rest against the tapered surface 22 of the end 21 of the tube B, when the packer is in normal position, unexpanded, and so that the jaws of the inner jaw construction 58 will be moved out of engagement with the grooves or threads 25 of the

tube B. It should be noted that the inner surfaces of the jaw segments of the inner jaw construction 58 are provided with projections for interfitting with the grooves 25 of the tube B, in order to clamp the inner jaw construction 58 to the tube B, as will be subsequently described.

The expanded and unexpanded positions of the packer member C upon the device A are illustrated in Figures 5 and 6 respectively, and it should be noted that in unexpanded position of the member C the head F is elevated, so that the lugs or the annular portion 52 of the same ride into recesses 80 provided inwardly of the outer edges of the jaw segments of the outer jaw construction 59, and the outer marginal portions of said jaw segments 64, 65, and 66 are received in the annular recess 53 of the head F, as is illustrated in Figure 6 of the drawings, and it is to be noted that in this position the lower marginal edge 51 of the head F is elevated above the head D, and the lugs or annular portions 52 are spaced above the base ring 55. It should be noted that the lower edges of the recesses 80 and the lower abutting edges of the lugs or projections 52 are sloped downwardly slightly, so that the head F may be pushed downwardly in order to slide the projections 52 off of the jaw segments 64, 65 and 66, to lower the head projections or lugs 52 against the base flange 55, into the position illustrated in Figure 5, and in this position upon forcing downwardly of the head F, the same will cause the head D to slide downwardly over the tube B, and cause compression of the member C to radially expand the same.

Above the jaw construction G, a spiral compression spring 85 is positioned, abutting at its upper end against the shoulder 57, and at its lower end engaging against a ring 86 which rests upon the upper edges of the jaw segments 61, 62 and 63, so as to force the segments 61, 62 and 63 downwardly when the head F is pulled upwardly to the position illustrated in Figure 6, and for the purpose of causing the jaw segments of the outer jaw construction 59 to enter the recess 53 of the jaw head F, and the jaws of the inner jaw construction to radially expand outwardly to loosen their connection with the supporting tube B so that the lower ends of the jaws 61, 62 and 63 enter a depression 87 formed inwardly of the upper surface of the base ring 55, as is illustrated in Figure 6 of the drawings.

Referring to the means by which gas pressure from the well may assist in expansion of the packer member C, it is preferred to provide a sealing inner tube 90, between the sliding joint connection of the cap D and the tube B, and to this end the inner tube 90 is expanded at its upper end over the tubular projection 33, and at its lower end it is wired

in a sealed relation at 91, to the tube B. A vent tube 92 is located in the space between the tube B and the packer member C, below the inner tube 90, and above the fixed cap E, and which vent tube 92 is perforated, to aid in the inflation of the rubber packer member C throughout its length. It is to be noted that the vent tube 92 is larger in diameter than the central supporting tube B, to allow the gas pressure to reach the upper part of the packer member C, to cause the same to expand throughout its length.

The anchor H is of that type which carries a stop valve which remains open only when the packer C is being installed, and this anchor may be of any desired length, comprising a tubular body portion 95, of any approved length, which is threaded at its upper end into the socket 45 of the cap E. At its lower end this tube 95 is open, and supports the stop valve structure 96, which consists of an attaching portion 97 of tubular formation, having the longitudinally extending slots or openings 98 laterally therein; the tubular portion 97 being slidable into the lower end of the passageway 99 of the tube 95, and being supported therein as by means of a pin 100 diametrically extending across the passageway 99 thru the openings 98. When supported in its downward position the openings 98 are open exteriorly of the tube 95, but the said tube 97 may be slid upwardly into the tube to close the openings 98. The tube 97 at its lower end detachably supports a conical or pointed shaped plug 102, threaded into the lower end of the tube 97, and providing a spaced flange 103 to provide an annular recess 104, which may receive the lower end of the tube 95 when the valve 96 is closed; packing 105 being provided in the groove 104 to seal the connection between the valve and tube 95, when the former is closed. The valve 96 in its closed position is illustrated in Figure 2 of the drawings, wherein it is clearly shown that when closed no fluid or material of any kind can enter the packer tube B. It is of course understood that in order to close the valve in this manner, it must rest upon a bottom 108 of the well. The purpose of providing the valve 96 is to allow fluid or gas to pass thru the central tube B to relieve pressure beneath the packer device A, as it is being placed, otherwise the packer member C, would expand because of the gas expanding feature thereof.

Referring to the tool J, the same includes a substantially cylindrical shaped body portion 110, which upwardly thereof is provided with a screw threaded coupling shank 111, and at the lower end thereof is provided with a reduced shank 112, integral with the body 110, having an outwardly extending annular flange 113 at its lower end, and with the outer surface of the reduced

shank 112 converging from the retaining flange 113 upwardly towards the body portion 110.

Means to clamp the shank 112 of the body 110 in the groove or screw threaded opening 58^a of the compressing head F is provided, which consists of a pair of segmental jaw parts 115 and 116, which are grooved or threaded at their outer surfaces for interfitting with the grooved passageway 58^a, and which at their upper ends are provided with outwardly extending flanges 117. These segmental flanges 115 and 116 are spaced at their side edges to provide openings 118 at opposite sides of the reduced shank 112, upwardly through which openings the gas or fluid may vent during the placing of the packer mechanism. The jaws 115 and 116 are slidably attached in assembled relation to the shank 112, by means of a transverse pin or rod 120, which transversely extends thru a slot 121 thru the upper end of the reduced shank 112, so that the rod 120 may move bodily across the slot 121, for a predetermined distance, to permit the jaws 115 and 116 to relatively expand or contract over the tapered surface 114 of the shank 112, and as can readily be understood. In order for the jaws 115 and 116 to so contract, it is of course understood that these jaws are slidably connected to the rod 120.

The pin 120 is fixedly connected transversely thru a sliding rod 130, which is slidable in a passageway 131 longitudinally disposed thru the body and shank of the tool J; a compression spring 132 being located upwardly in the passageway 131 and bearing against the end of the rod 130, to normally force the same outwardly from the lower end of the shank 112, and thus to position the transverse pin 120 along the lower edge of the slot 121, so that the jaws 115 and 116 are normally held expanded under the influence of this pin, as said jaws are thus forced downwardly along the tapered surface of the shank 112, to the position illustrated in Figure 6.

Referring to the method of installing the packer, the drill stem or well line is lowered into the well with the packer A connected thereto by the said tool J, which is fixed in the opening 58^a at the upper end of the compression head F, by means of the expansible jaws 115 and 116, in the relation above described, and as is illustrated in Figure 6. When the packer has been lowered to the desired point, as limited by the anchor H, upon pressure downward upon the compressing head F, the latter will be forced to slide off the outer jaw construction 59, from the position illustrated in Figure 6 to the position illustrated in Figure 5, until the lugs or annular portions 52 abut against the base ring 55, or until the compression head abuts

against the sliding cap D of the packer mechanism, and upon continued pressure upon the compressing head F, the packer member C will be mechanically compressed to radially expand the same into engagement with the walls of the well, as can readily be understood. This downward pressure of the cap D along the tubular supporting stem B, will cause the expansible jaw structures 58 and 59 to move downwardly along the screw threaded or grooved portion of the rod incident to the follower action of the compression spring 85, and when the operator releases the downward pressure upon the packer mechanism, it can readily be understood that the tendency of the packer member C to push upwardly upon the head F, and the action of the spring 85 will cause the jaws of the jaw structures 58 and 59 to lock the head D in its set position upon the supporting tube B, with the packer member C expanded to perform its expanding function, and as is illustrated in Figure 5 of the drawings.

During the expansion of the packer and the installation of the same, it is to be noted that the tool J contains the parts as is illustrated in Figure 5 of the drawings, which includes a slidable ring 125^a upon the rod 130, and this slidable ring 125^a is prevented from sliding off the rod by means of an annular extension 126^a at the lower end of said rod 130. Between the slidable ring 125^a and an annular flange 135 about midway between the ends of said rod 130, a compression spring 137 is placed, which normally tends to urge the slidable ring 125^a downwardly to the retaining portion 126^a. The parts remain in this position until the packer is placed as above described, and when it is desired to remove the tool J, the same is pressed downwardly into the packer device, so that the projection 126^a passes the radial projecting pins 26 of the tube B, but so that the slidable ring 125^a anchors on said pins 26, tending to further compress and give further compressive force to the spring 137. The force of this spring 137 counteracts the force of the spring 131, and the plunger rod 130 is forced upwardly until the flange 135 abuts against the lower end of the reduced shank 112, as is illustrated in Figure 5 of the drawings. Thus, the movement of the body 110 downwardly into the packer device permits the pin 120 to ride upwardly in the slot 121, so that the jaws 115 and 116 may be contracted out of engagement with the grooves or projections of the opening 58^a, as is illustrated in Figure 5 of the drawings. Upon upward elevation or pull upon the tool J, it can readily be seen that the spring 137 will act to force the rod 130 upwardly, to keep the jaws 115 and 116 always contracted, until the jaws 115 and 116 clear the opening

58^a, and the tool J can be bodily withdrawn, leaving the packer mechanism A in expanded position in the well.

When the packer is to be released, the tool J as illustrated in Figure 6 is lowered, without ring 125^a and spring 137, so that jaws 115 and 116 may lock in the opening of head F, and permit the said head F to be lifted for releasing the packer.

Referring to the device for sealing or mudding off wells, the packer is used in much the same manner as above described, as to the placement of the same within the well. However, the anchor H is replaced by a special type of anchor K, especially adapted for mudding off, or sealing the well or portion of the well below the packer. This special anchor K consists of a coupling 150, detachably connected at its upper end to the screw threaded socket 45 in the lower end of the packer cap E. The coupling 150 therein provides a valve seat 151, facing downwardly, and the coupling 150 is hollow, providing a valve compartment 152 below the valve seat 151, and a lower screw threaded socket 153 for detachably receiving the anchor tube 154, which has a passageway 155 therein and which is transversely perforate at 156 to permit the pumping of the mud or cementitious material into the well below the packer. A ball valve 158 is preferably placed in the valve compartment 153, operated by means of a spiral compression spring 160^a which seats upon the top of the tube 154 and acts to normally seat the valve 158, to prevent the return flow of the pump material into the plunger barrel 160 which is detachably mounted in the upper end of the coupling 150, and extends upwardly thru the passageway 23 of the packer supporting tube B, as is illustrated in Figure 3 of the drawings. This plunger barrel 160 provides a passageway 161 therein within which a plunger 162 operates; the plunger 162 being detachably connected at 163 in a screw threaded socket provided inwardly of the lower end of the shank 112 of the tool body 110, as is illustrated in Figure 3 of the drawings.

The action of the plunger 162 in its reciprocation in the passageway 161 is to force the cementing material downwardly thru the valve structure and into the well thru the perforations 156. During its reciprocation the plunger 162 rides out of the upper end of the barrel 160, in order to permit the ingress of the cementing material into the passageway of the plunger barrel. Upon the upward movement of the plunger 162 the same "draws a vacuum," so to speak, in the plunger barrel, due to the closing of the check valve 158, and since the plunger barrel 160 is comparatively short, such drawing of a vacuum is not objectionable to the functioning of the device.

From the foregoing description of this invention it is apparent that a novel packer for wells has been provided, which is novel in so far as the mechanical means and gas expanding means is concerned, and in so far as details of the "mudding off" construction is concerned, as providing a pump for a packer mechanism by which the well may be sealed to produce any of the well known sealing operations necessary in connection with oil well operations.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of this invention or the scope of the claims.

I claim:

1. In a packer mechanism the combination of a support, a hollow cylindrical shaped flexible packer member receiving the support therethrough, a cap fixed at one end of the packer member and to said support, a cap on the opposite end of said packer member slidable on the support, said support adjacent said slidable cap extending from said slidable cap, a series of jaws arranged about the extending end of said support above the slidable cap and providing outer surfaces convergent from the upper end of the support towards said packer member, a second series of radially movable jaws disposed about the first mentioned series of jaws and having convergent faces in abutment with the convergent faces of said first mentioned series of jaws, and means movably connected with said first and second mentioned series of jaws to radially expand or contract the same with respect to the support to regulate the expanded relation and positioning of the packer member on said support.

2. In a packer mechanism the combination of a support, a hollow cylindrical shaped flexible packer member receiving the support therethrough, a cap fixed at one end of the packer member and to said support, a cap on the opposite end of said packer member slidable on the support, said support adjacent said slidable cap extending from said slidable cap, a series of jaws arranged about the extending end of said support adjacent the slidable cap and providing outer surfaces convergent from the upper end of the support towards said packer member, a second series of jaws disposed about the first mentioned series of jaws and having convergent faces in abutment with the convergent faces of said first mentioned series of jaws, a cylindrical shaped compressing head having the lower end thereof provided with inwardly extending projections, said jaws of the second mentioned jaw construction being recessed to receive said projections, and said compressing head being movable along said jaw constructions whereby to place the projections thereof into said re-

cesses or out of said recesses to hold the jaws clamped upon the support or released upon the support.

3. In a packer mechanism a support, a bottom cap fixed to the support, a flexible tubular shaped packer member connected in said fixed cap, a cap for the opposite end of the packer member slidable along said support, said support at said slidable cap extending therethrough and outwardly therefrom and being annularly grooved, an annular series of wedge shaped jaws immediately about said grooved end of the support, a second annular series of jaws in sliding wedge abutment with said first mentioned jaws, a compressing head about said jaws and movable with respect thereto and to the support, spring means operating against the first mentioned series of jaws to tend to force the same towards the packer member, and means included in the construction of the second mentioned series of jaws and said compressing head whereby upon movement of the latter the first and second mentioned jaws may be relatively moved into or out of engaging and releasing relation with respect to the grooved support.

4. In a packer mechanism the combination of a support, a flexible packer member, means connecting the packer member at one end to the support, a cap at the opposite end of the packer member slidable along the support, said support extending beyond said slidable cap and having an outwardly flaring end thereon, interfitting wedge shaped jaw constructions each of a plurality of sections disposed about said support between the flaring end thereof and top of said packer member, a base ring upon which said jaws rest disposed between the jaws and the sliding cap of said packer member, a tubular compressing head receiving the jaws therein and providing a lower recess and having an inwardly extending projection, said jaws being recessed to receive said projection when the compressing head is moved upwardly from the packer member whereby the jaws may be released from engagement with said support, and spring means normally acting against said interfitting jaws tending to force the same towards said packer ring.

5. In a packer device for oil wells the combination of a tubular support normally open, valve means associated with the tubular support to permit gas to pass therethrough, an expansible packer member carried on the tubular support upwardly of said valve means, means sealing the connection between the support and the packer member adjacent the upper end of the latter, and means for permitting the inflow of gas from pressure within the well between the packer member and the support at a point

upwardly of said valve when the latter is closed as by contact with a well bottom.

6. A packer member comprising a tubular support, a cap fixed on said tubular support, a cap slidable on the tubular support upwardly of said first mentioned cap, an expansible packer member of hollow cylindrical formation about the support between the fixed and slidable caps in slightly spaced relation from the support, valve means associated with said tubular support to permit the venting of gases upwardly through the tubular support until the valve means is closed by abutment with a part of the well, said fixed cap of the support having lateral ducts extending therethrough and entering the space between the support and packer member for the carrying of gas pressure from the well into the space between said support and packer member, and means sealing the space between the support and packer member adjacent the upper end of said packer member.

7. In a tool for placing and removing well packers comprising a supporting body, a plunger rod in the supporting body, a spring normally forcing the plunger rod outwardly from the end of the supporting body, a shank rigid with the supporting body thru which said rod extends, jaw means expansibly carried on said shank cooperatively formed therewith to cause expansion and contraction of the jaws as the latter are moved along the shank, a pin associated with said jaw means and connected with said rod whereby the same will be moved upon movement of the rod to move the jaws over said shank to cause their expansion or contraction.

8. A tool for placing and removing well packers comprising a supporting body, a plunger rod in the supporting body, a spring normally forcing the plunger rod outwardly from the end of the supporting body, a reduced shank rigid with the supporting body and thru which said rod extends, jaw means expansibly carried on said shank, a pin associated with said jaw means and with said rod whereby the same will be moved upon movement of the rod to move the jaws over said reduced shank to cause their expansion or contraction, said rod at its outer end having a slidable abutment thereon and a rigid abutment thereon adjacent said reduced shank, and compression spring means between the sliding abutment and rigid abutment.

9. In a well packer the combination of a tubular support having a passageway therethrough, a packer member about the support, means sealing the upper end of the packer member at its connection with the support, said packer member being of expansible material and connected upon the support so as to permit of its spaced expansion with respect to the support, the lower end of the

packer member having means with ducts laterally therethrough opening outwardly from the tubular support thru which gas or fluid may pass to the space between the tubular support and packer member for expanding the latter upon the tubular support, and valve means to prevent flow of gas or fluid through the passageway of the tubular support at a predetermined time.

10 10. In a packer for wells the combination of a tube, a hollow cylindrical shaped expandible packer member on the tube in spaced relation therewith, means sealing the upper end of the packer member about the
15 tube to seal said space at its upper end, and means for permitting the inflow of well gases into the space between the packer member and tube from a location exteriorly of the tube and below the packer member where-
20 by to cause the latter to radially expand.

11. In a well packer the combination of a tube, a compressible packer member surrounding the tube, means securing the lower end of the packer member upon the tube,
25 the upper end of the packer member being movable with respect to the tube, clamping jaw means supported by the upper movable upper end of the packer member for engaging the tube, and means relatively movable

towards and away from the packer member and having a cam action on the clamping jaw means for releasing or clamping the same with respect to the tube for holding the packer member in an extended or compressed relation upon said tube.

35 12. In a packer mechanism for wells the combination of a supporting tube, a compressible packer member receiving the tube therethrough, means securing the lower end of the compressible packer member on the
40 tube, the upper end of the compressible packer member being movable longitudinally of the tube, clamping jaws supported by the upper end of the packer member and operating along said tube to clamp thereagainst,
45 a sleeve relatively movable longitudinally along the tube with respect to said packer member and receiving the clamping jaws therein so that the said clamping jaws are disposed between said sleeve and the tube,
50 and cam means formed on the sleeve and the clamping jaws to force the said clamping jaws against the tube or release the same with respect to the tube upon longitudinal
55 movement of the sleeve relative along the tube.

JAMES K. PUTNAM.