Aug. 21, 1962 C. C. BROWN 3,050,128

WELL PACKER

Filed Aug. 15, 1960 3 Sheets-Sheet 1

Fig. 1

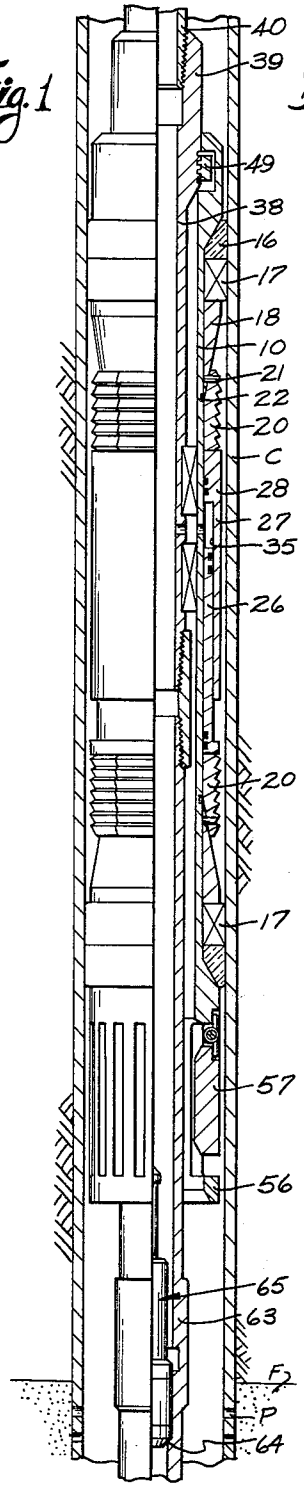


Fig. 2

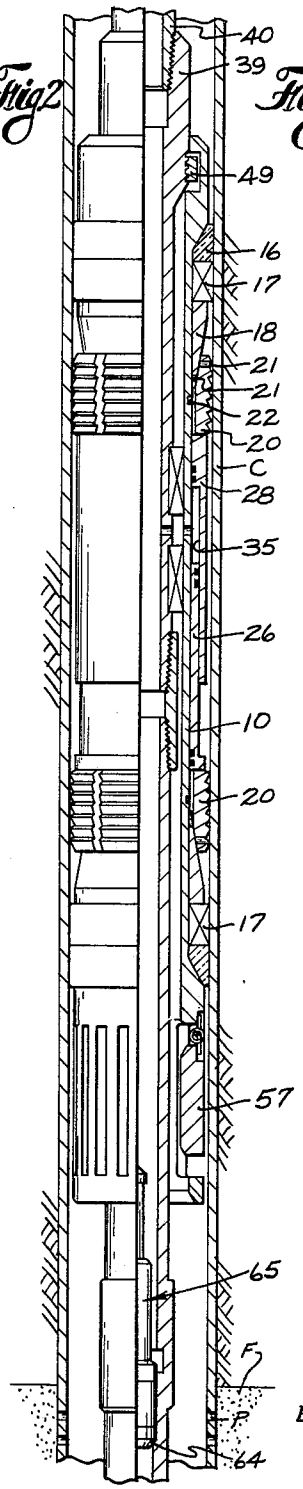
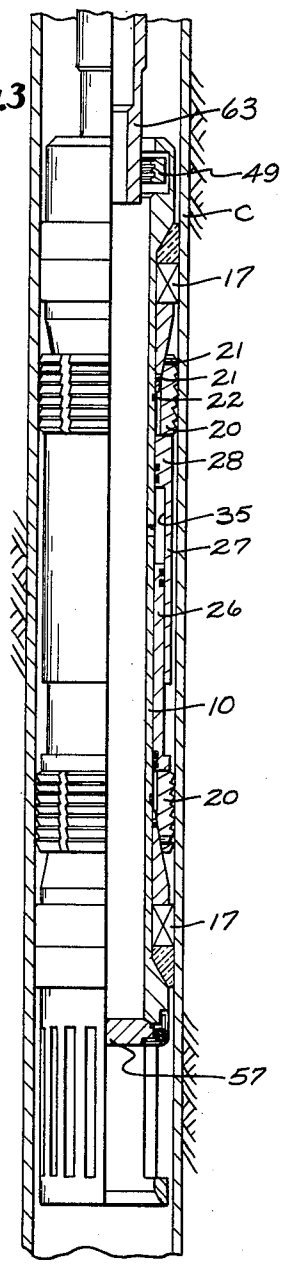


Fig. 3



CICERO C. BROWN
INVENTOR.

BY

ATTORNEYS

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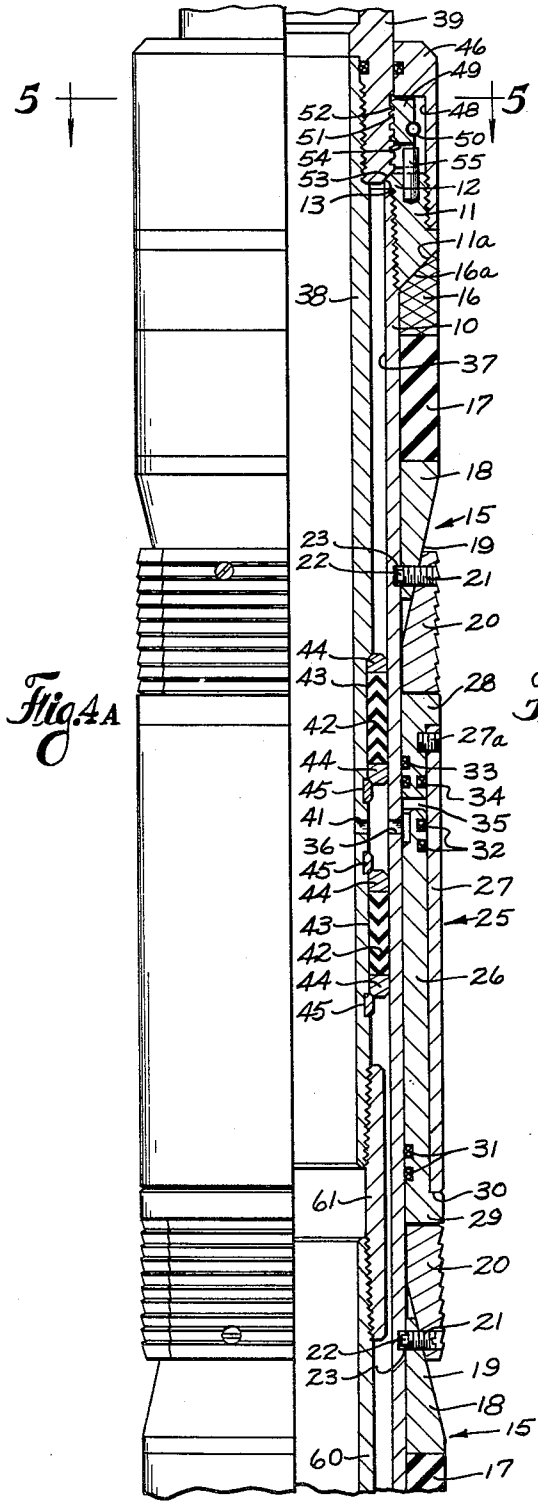


Fig. 4A

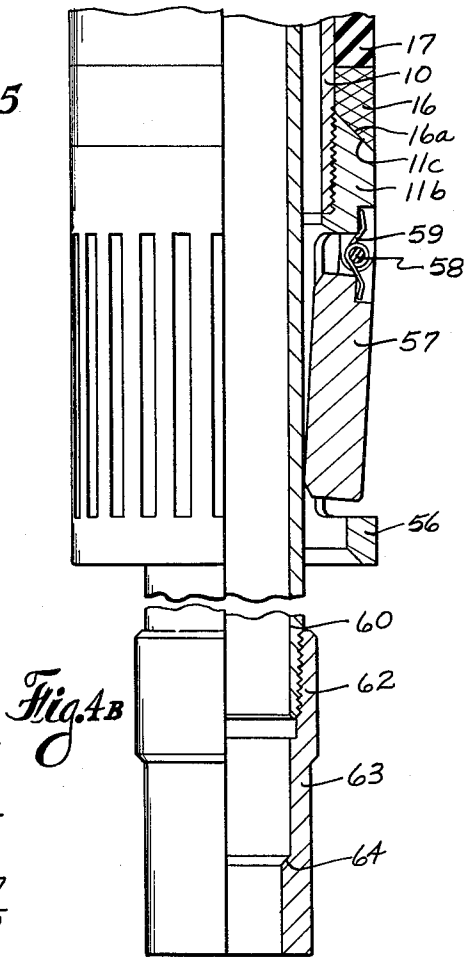


Fig. 4B

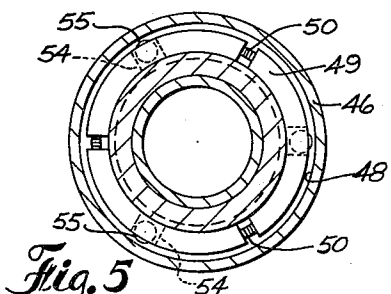


Fig. 5

CICERO C. BROWN
INVENTOR.

BY

ATTORNEYS

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Fig. 8

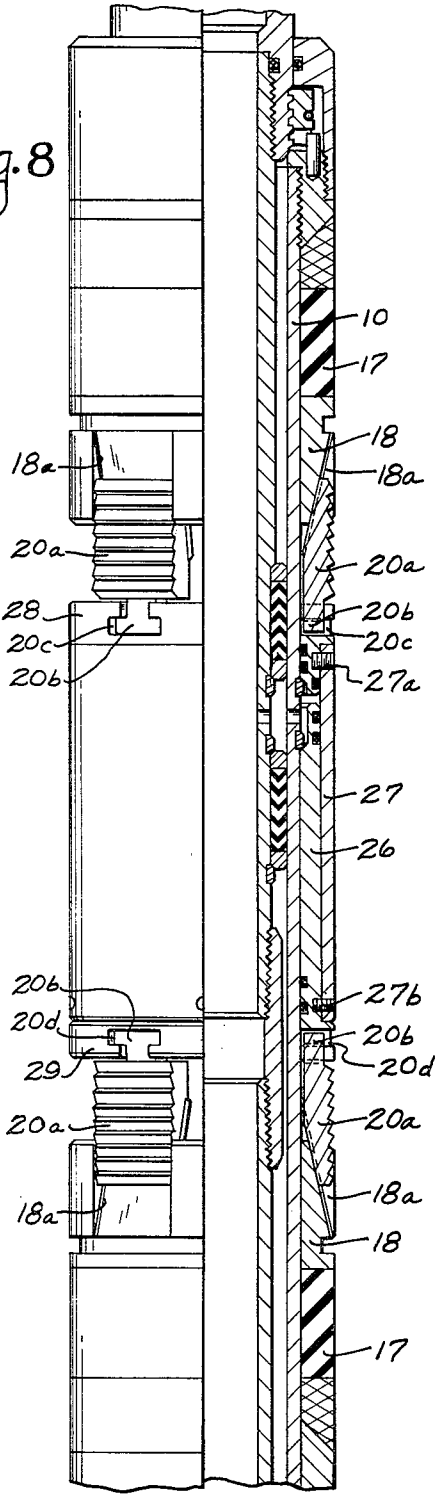
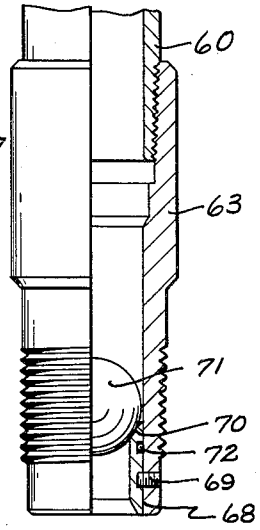


Fig. 7



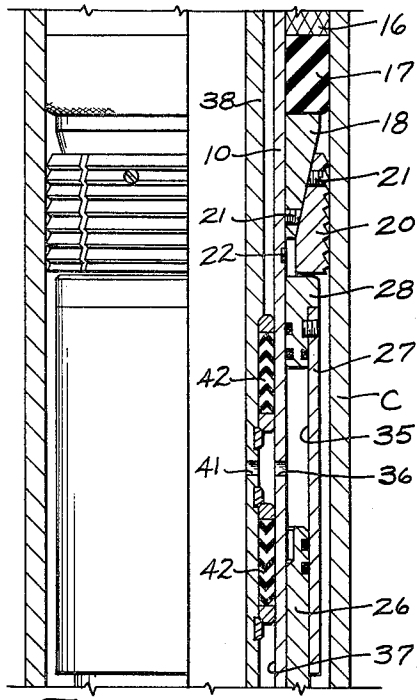


Fig. 6

CICERO C. BROWN
INVENTOR.

BY

ATTORNEYS

United States Patent Office 3,050,128 Patented Aug. 21, 1962

3,050,128

WELL PACKER

Cicero C. Brown, Houston, Tex., assignor to Brown Oil Tools, Inc., Houston, Tex., a corporation of Texas

Filed Aug. 15, 1960, Ser. No. 49,583
14 Claims. (Cl. 166—120)

This application is a continuation-in-part of my copending application, Serial No. 753,718, filed August 7, 1958, allowed November 3, 1960, now abandoned.

This invention relates to well packers, and particularly to well packers of the so-called "permanent-type drillable packers." These packers are designed, when once set in the well, to remain permanently, but are constructed of materials such that they may be drilled up in order to remove them.

More conventional types of packers of the general character described are designed to be run either on wire line setting strings or on tubing strings. In both cases, however, these conventional packers require that the setting strings and setting tools, whether a wire line or tubing string is employed, must be removed from the well before the string of production tubing is run into the well and connected to the packer. These more conventional types of packers, therefore, require a multiplicity of operations before the well is equipped for production, and in these operations, control of the well is not feasible or as complete as is desirable, particularly when high pressures are present in the formations penetrated by the well bore.

The present invention has for its principal object the provision of a permanent-type drillable packer which overcomes the major disadvantages of existing designs, such as are noted above, in that it may be run on the production tubing string itself, and before any circulation operations or manipulation operations to set the packer, may be placed in final position in the Christmas tree and thereby permit the blowout preventers to be removed. This permits maintaining the well under complete control throughout the subsequent operations of preparing the well for production and setting the packer; that is, the mud materials may be circulated out of the well and the face of the sand or other producing formation washed to the point at which it is ready to flow before the packer is even set. No setting tools are required to be removed and the entire setting operation is greatly simplified and conducted under secure well control conditions.

An important object of the present invention is to provide a form of packer of the type described in which the packer is set hydraulically, thereby minimizing the mechanical manipulations which are frequently troublesome in setting packers.

Another important object resides in the employment of a packer structure having oppositely acting anchor and seal assemblies operable to anchor the structure in the well casing against movement in either direction while sealing with the well casing, and employing a hydraulically-actuated piston and cylinder arrangement for setting the anchor and seal elements of the assemblies.

Still another object is the provision of a hydraulically-actuated packer structure of the type described, having a valve member for closing the bore of the packer structure upon withdrawal of the operating stem in order to prevent back-flow of pressure fluid from below the packer when the operating stem is out of the packer.

A more specific object is the provision of a ratchet-type releasable latch for releasably securing the operating stem in the packer body.

Other and more specific objects and advantages of this invention will become more readily apparent from the following detailed description when read in conjunction

with the accompanying drawing which illustrates a useful embodiment in accordance with this invention.

In the drawing:

FIGS. 1 and 2 are longitudinal, partly sectional, schematic views, showing the packer structure positioned in a well casing and illustrating two stages in the operation of the packer;

FIG. 3 is a view generally similar to FIG. 2, but showing the operating stem withdrawn and the back pressure valve in the closed position;

FIGS. 4A and 4B, together, constitute a longitudinal sectional view of the packer structure, showing the parts in the positions occupied while the packer is being run into the well and prior to setting thereof;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 4A;

FIG. 6 is a view of the upper portion of the packer structure illustrated in FIG. 4A, showing the positions of parts with the packer in the set position;

FIG. 7 is a fragmentary detail illustrating a modification of one element of the packer structure; and

FIG. 8 is a view similar to FIG. 4A illustrating a modification of the packer structure.

Referring to the drawing, and more particularly to FIGS. 4A and 4B, the packer structure comprises a generally tubular body **10** having its upper end threadedly received in an upper collar **11** provided with a lip **12** which extends inwardly over the upper end of body **10** and forms a short flush extension thereof. The upper end of the bore of lip **12** is chamfered to provide a seat **13**, for purposes to be described subsequently. The lower end of body **10** is threadedly received in a lower collar **11***b*. Collars **11** and **11***b* define external longitudinally spaced outwardly sloping shoulders **11***a* and **11***c*, respectively, about the exterior of body **10** against which are seated a pair of longitudinally spaced upper and lower anchor-and-seal assemblies of identical form, each designated generally by the numeral **15**. Each of these assemblies comprises the following successively arranged elements: a lead ring **16** positioned immediately adjacent each of the collars **11** and **11***b* and having an end face **16***a* complementary to and abutting related shoulders **11***a* and **11***c*; an annular resilient seal element **17** constructed of rubber or other flexible resilient composition material; an expander **18** having a conical surface **19** tapering inwardly toward body **10**; a set of wedge-shaped pipe-gripping slips **20** which are secured to the expander in longitudinally retracted position by means of a shear screw **21** which extends through registering openings in the adjacent tip portions of slips **20** and expander **18**. The inner faces of slips **20** have outwardly tapering surfaces complementing the taper of surface **19**. The inner end of shear screw **21** is reduced in diameter to form the end portion **22** which extends into a recess **23** provided in the exterior of body **10**.

End portions **22** of the shear screws **21** will be dimensioned to have substantially lesser breaking strength than the bodies of shear screws **21**. As an example of the relative strengths which will function satisfactorily for the purposes of this invention, portions **22** may be made to have a breaking strength of about 1000 lbs. per square inch, while the larger portions of the shear screws will be made to have a breaking strength of about 3000 lbs. per square inch. These values may, of course, be varied depending on the service conditions obtaining in each instance. By this arrangement, it will be seen that shear screw **21** secures the slips **20** to expander **18** against relative movement therebetween and also simultaneously secures both of these elements to body **10**, also against movement relative thereto, the slip expander being thereby initially held in retracted or non-setting position. It

will be seen that the upper and lower anchor and seal assemblies, expanders 18 tapering inwardly toward each other, are arranged to act in opposite directions, so that actuation of the assemblies will anchor the packer structure against movement in either direction when the structure has been set in a well casing, as will be subsequently described.

Positioned concentrically about the exterior of body 10, between the upper and lower anchor and seal assemblies 15, is an actuating assembly, designated generally by the numeral 25, which comprises a tubular cylinder 27 concentrically surrounding piston 26 and secured at its upper end by a shear pin 27*a* to an annular head 28 forming a closure for the upper end of the cylinder. Cylinder 27 is longitudinally slidable relative to piston 26. The latter is provided, at its lower end, with an annularly enlarged head 29 defining an upwardly facing annular shoulder 30 forming a limit stop for the lower end of cylinder 27. The lower end of head 29 abuts against the base of lower slips 20, while the upper end of head 28 similarly abuts against the base of upper slips 20. Piston 26 is provided with internal seals 31 to form a fluid-tight seal between the piston and the exterior of body 10 and is provided, near its upper end, with exterial seals 32 to seal between the exterior of the piston and cylinder 27. Head 28 of the cylinder is similarly provided with internal seals 33 for sealing between body 10 and head 28 and an external seal 34 for sealing between the head 28 and cylinder 27. In the fully telescoped position, illustrated in FIG. 4A, a space is provided between piston 26 and head 28 defining a piston chamber 35. One or more radial ports 36 are provided through the wall of body 10 communicating with chamber 35 for admission thereto of pressure fluid, as will be subsequently described.

Body 10 has an axial bore 37 into which extends a tubular operating stem or mandrel 38, the upper end of which is threadedly received in a coupling member 39 by which the stem may be secured to the lower end of a tubing string 40 (FIGS. 1 and 2). One or more radial openings 41 are provided in the wall of stem 38 at points which will be opposite ports 36 when the stem has been fully inserted in bore 37. Sets of packing 42—42 are mounted about the exterior of stem 38 at points above and below openings 41 and extend into fluid-tight sealing engagement with the wall of bore 37 of the packer body. Bore 37 is polished in order to provide a smooth surface for effectively sealing with packings 42 when the latter are inserted in bore 37. Packings 42 thus will form fluid-tight seals between stem 38 and body 10 at points above and below openings 41 and 36 so that fluid introduced into the bore of stem 38 will flow through openings 41 and 36 into chamber 35. Packings 42 are seated in annular recesses 43 provided in the exterior of stem 38 and are compressed between metal end rings 44 which are secured in place by snap rings 45 disposed about the stem.

A tubular cap 46 is threadedly secured about the upper end of upper collar 11 and has an internal annular recess 48 in which is mounted a split nut 49 composed of a plurality of complementary arcuate segments (FIGS. 4A and 5) embraced by a garter spring 50, which is designed to hold the nut segments in contracted position. The bore of nut 49 is provided with internal downwardly facing buttress threads 51 engageable with upwardly facing complementary buttress threads 52 formed on the exterior of coupling 39. The lower end of the latter forms an external shoulder 53 about the exterior of stem 38, which is engageable with seat 13 on upper collar 11 to limit inward movement of the stem into the bore of body 10, to thereby position packings 42—42 on opposite sides of ports 36. At its lower end, each of the segments of nut 49 is provided with a radial slot 54 which is adapted to receive the upper end of a guide pin 55 mounted in the upper collar 11. Pins 55 co-operate with slots 54 to prevent rotative movement of nut 49 while permitting radial movement of the nut segments in recess 48.

It will be recognized that the split nut 49 and its threads 51 co-operate with threads 52 on coupling 39 to form a ratchet-type releasable latch which becomes automatically engaged when stem 38 is moved downwardly through the bore of nut 49 a sufficient distance to move threads 52 into the bore of nut 49. The segmented character of nut 49 will allow the nut to expand against the resistance of spring 50 while the threads 52 slide through the nut across threads 51. The pressure of garter spring 50 will then cause the nut segments to contract and produce inter-meshing engagement between threads 51 and 52.

To release this latch, it is only necessary to rotate stem 38 in the appropriate direction to unscrew coupling 39 from nut 49 and thereby release the stem from the body.

Lower collar 11*b* has a longitudinally slotted tubular extension 56 which is commonly termed a "junk pusher" or scraper, by which mud or other detritus, present on the wall of the well casing in which the packer is run, will be scraped or pushed out of the way and the surfaces thereby cleaned in advance of the packer structure. Extension 56 has mounted therein a flapper valve 57 which is pivotally secured at one side to the wall of extension 56 by means of a pivot pin 58. A spring 59 is coiled about pivot pin 58 and its ends engaged with valve 57 and collar 11 so as to resiliently bias valve 57 toward the closed position across bore 37. Stem 38 has a tubular extension 60 secured to its lower end by means of a collar 61. The lower end of extension 60 is threadedly received in the threaded socket 62 of a nipple 63. The latter is provided, at a point below socket 62, with an internal shoulder 64 adapted to form a seat for a plugging element, as will be subsequently described.

The above described device is operated in the following manner: Operating stem 38 will be secured to tubing 40 and inserted into body 10, coupling 39 being latched into nut 49, as previously described. Extension 60 and nipple 63 will project below body 10 and will hold flapper valve 57 in its open position. The elements of the structure will be in the relative positions illustrated in FIGS. 4A and 4B wherein it will be seen that openings 41 and 36 are in communication with the bore of stem 38 and through this stem with the bore of tubing 40. With the structure thus mounted on the tubing string, the latter will be employed to lower the structure into a casing C (FIGS. 1 and 2) lining the well bore, and positioned therein, ordinarily at a point above perforations P which communicate with a producing formation F. When the packer structure is in the proper position, the tubing will be set in the well head (not shown) in the usual manner, and secured therein so that blowout preventers or other temporary elements of the Christmas tree may be removed and the tubing connections hooked up for a permanent operation. Circulation may then be conducted through the tubing in order to wash the face of the formation and to remove heavy mud and the like from the interior of the casing, all in accordance with conventional practice. Since the packer has not yet been set, clearance is provided between the packer structure and the casing for circulation of washing fluids.

When all such preliminary operations have been completed, a plug of any suitable and generally conventional form, designated generally by the numeral 65 (FIGS. 1 and 2), will be dropped through the bore of the tubing and caused to move downwardly therein into nipple 63 where it will be lodged on shoulders 64 in order to close off the bore of the operating stem. When plug 65 is in place, pumping of pressure fluid into the bore of the tubing and the operating stem will be conducted to build up fluid pressure interiorly of the stem. This fluid pressure will pass through openings 41 and 36 into chamber 35 to exert pressure between the opposed ends of piston 26 and cylinder head 28. This pressure will urge these

elements apart and against the adjacent ends of slips **20** and when the force thus exerted in opposite direction upon slips **20** exceeds the breaking strength of the smaller end sections **22** of the shear screws, these end sections will be sheared along the plane of the exterior surface of body **10** (FIG. 1), and the continued movement of piston **26** and cylinder head **28** will then urge slips **20** and expanders **18**, which still remain connected by the shear screws, in opposite directions producing longitudinal compression of sealing elements **17** and consequent radial expansion of the sealing elements into sealing engagement with the wall of casing C (FIG. 1). As the pressure in chamber **35** continues to be built up, producing further opposite movements of piston **26** and cylinder head **28**, the increased pressure thus exerted in opposite directions will shear the larger diameter portions of shear screws **21** along the plane of surfaces **19** causing movement of the slips **20** relative to expanders **18**, since further longitudinal movement of the latter will be resisted by the previously expanded sealing elements which will be compressed against casing C. This relative movement will carry slips **20** into wedging engagement between expanders **18** and the wall of casing C and will thereby anchor the slips to the casing. Also, this increased pressure, acting through the compressed sealing elements **17**, will compress lead rings **16** against collars **11** and **11***b* and radially expand them into engagement with the wall of casing C. (FIGS. 2 and 6), and these expanded lead rings will act as dams to prevent extrusion of the material composing sealing elements **17** through the annular space between the packer structure and the wall of casing C.

When the slips and seals have thus been set, by virtue of the fluid pressure exerted between piston **26** and cylinder head **28**, the pressure may be relieved from the interior of the operating stem, and the natural resilience of sealing elements **17** will tend to urge expanders **18** toward and into expansive engagement with slips **20**, thereby preventing release of the slips and effectively assuring permanent anchorage of the packer in the casing.

With the packer thus set in the casing, plug member **65** may be withdrawn from the nipple **63** and pulled out of the bore of the tubing string and operating stem, thus opening the well to production from formation F.

If, for any reason, it is desired to remove the tubing string, for example, to conduct operations in the well at a point above the packer, this can be readily accomplished by turning the string in the appropriate direction a sufficient number of rotations to unscrew coupling **39** from nut **49**, upward pull being contemporaneously applied to the tubing string. As soon as this unscrewing operation is completed the entire tubing string and operating stem may be withdrawn from the packer, and when the end of nipple **63** is raised above flapper valve **57**, the latter will swing across the bore of body **10** and close off the latter against any pressures from below the packer which might be in excess of any pressures in the casing above the packer.

When it is desired to run the tubing string back in the well, this can be accomplished by running the string and stem **38** back into the packer and as soon as packings **42** are inside bore **37**, fluid pressure may be applied through the bore of the string to force flapper valve **57** back to the open position, aided by the weight of the tubing string when the end of nipple **63** is brought into contact with valve **57**. The string is then moved downwardly until threads **52** again engage threads **51** of nut **49**.

As noted previously, once the packer has been set in the manner described, it is permanently set and can be removed only by drilling it out, or otherwise destroying it. For this reason all of the elements of the packer structure will be constructed of easily drillable or frangible materials suitable to render the packer structure easily destructible.

FIG. 7 illustrates a slight modification of the plugging device employed to allow pressure to be built up in the bore of the tubing string and operating stem. In this modification, a sleeve **68** is secured in the lower end of the bore of nipple **63** by means of a shear screw **69**. The upper end of sleeve **68** forms a seat **70** having a ball **71** which may be dropped through the bore of the tubing and the operating stem, as is well understood in this art. When the ball is seated on the end of sleeve **68** and fluid pressure of sufficient force is exerted in the bore of the operating string, shear screw **69** will be broken and ball **71** and shear pin **68** will be blown out of the end of nipple **63**, thus opening the bore of the tubing string for entrance of production fluid. It will be understood that shear screw **69** will have a breaking strength greater than that of shear screw **21**, for example, 3500 lbs. per square inch for the example given above, in order that the end of the operating string will remain closed while the anchor and seal asesmblies are being set. A packing **72** is arranged between sleeve **68** and the wall of nipple **63** to form a fluid-tight seal therebetween.

FIG. 8 illustrates a modification of the anchor assemblies of the packer structure, particularly with respect to the manner in which the upper and lower sets of slips are secured to the respective cylinder and piston heads and to the respective slip expanders. With the exceptions to be noted, all of the parts of this modification are identical with those of the previously described embodiment and are designated by the same numerals.

The base ends of the slips **20***a* are provided with T-heads **20***b* which are received in corresponding T-slots **20***c* and **20***d* provided in cylinder head **28** and piston head **29**, respectively. By this arrangement the slips are secured to the respective heads for longitudinal and radial movement in response to the longitudinal movements of the heads. The shear screws **21**, **22** employed in the previously described embodiment for connecting the slips to the respective expanders and body **10**, have been eliminated. Expanders **18** are provided with the inwardly tapered guide slots **18***a* for guiding the slips in their movement over the expanders while preventing relative rotation between the slips and the expanders. A shear screw **27***b* secures the lower end of cylinder **27** to piston **26** in the collapsed position.

This modification operates in substantially the same way as the previously described embodiment. When the assembly is run into the well the T-head connections between the slips and the cylinder heads, together with shear screws **27***a* and **27***b*, serve to hold the several parts in their retracted positions until the point is reached at which the packer is to be set. When the pressure is introduced into the cylinder, shear screw **27***b*, which is made considerably weaker than shear screw **27***a*, will break allowing the cylinder and piston to move in opposite directions so as to move the slips over the respective expanders. The latter will be moved longitudinally along body **10** by the slips and the expansion of the seal elements **17** and anchoring of the slips in the pipe wall will occur as previously described.

From the foregoing it will be seen that the present invention provides a novel setting arrangement for packer structures in which a pair of longitudinally spaced anchor-and-seal assemblies are actuated by operating means positioned between the assemblies and adapted to direct forces longitudinally from between the assemblies in opposite directions against the anchor and seal elements. The operating means in accordance with the illustrative embodiment is fluid pressure operated but other means may be employed for this purpose. One of the novel features of this invention is the arrangement by which the longitudinally directed forces are applied to the slip elements in a direction to urge them up over the expander elements. It will, therefore, be evident that the present invention may include modifications wherein the sealing elements are eliminated and only the anchor

elements and the force applying elements are employed. Such an arrangement will be found useful where it is desired merely to anchor one string of pipe to the other, an operation frequently required in the equipping and operation of wells.

It will be understood that various alterations and modifications may be made in the details of the illustrative embodiments within the scope of the appended claims, but without departing from the spirit of this invention.

What I claim and desire to secure by Letters Patent is:

1. A well packer, comprising, a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including anchor and seal elements radially projectible by longitudinal forces oppositely directed thereagainst from between the assemblies to anchor and seal said body to the well wall, fluid pressure-operated means including means movably positioned on the body between said assemblies to substantially simultaneously exert said oppositely directed longitudinal forces on the anchor elements of the respective assemblies to radially project said anchor and seal elements, means for supplying pressure fluid to said fluid pressure-operated means, and means initially securing said anchor and seal elements to the body in retracted position and releasable in response to the longitudinal force exerted on said assemblies by said fluid pressure-operated means.

2. A well packer, comprising, a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including anchor and seal elements radially projectible by longitudinal forces oppositely directed thereagainst from between the assemblies to anchor and seal said body to the well wall, fluid pressure-operated means including means comprising telescopically interconnected piston and cylinder elements slidably positioned on the body between said assemblies and operable by fluid pressure to substantially simultaneously exert said oppositely directed longitudinal forces on the anchor elements of the respective assemblies to radially project said anchor and seal elements, means for supplying pressure fluid between said piston and cylinder elements, and means initially securing said anchor and seal elements to the body in retracted position and releasable in response to the longitudinal force exerted on said assemblies by said fluid pressure-operated means.

3. A well packer, comprising, a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including anchor and seal elements radially expandible by longitudinal forces oppositely directed thereagainst from between the assemblies to anchor and seal said body to the well wall, fluid pressure-operated means including means comprising telescopically interconnected annular piston and cylinder elements slidably surrounding the body between said assemblies and operable by fluid pressure to substantially simultaneously exert said oppositely directed longitudinal forces on the anchor elements of the respective assemblies to radially project said anchor and seal elements, means including ports through the wall of the body for supplying pressure fluid from the interior of the body between said piston and cylinder elements, and means initially securing said anchor and seal elements to the body in retracted position and releasable in response to the longitudinal force exerted on said assemblies by said fluid pressure-operated means.

4. A well packer, comprising, a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including anchor and seal elements radially projectible by longitudinal forces oppositely directed between the assemblies to anchor and seal said body to the well wall, means comprising telescopically inter-connected oppositely movable annular piston and cylinder elements slidably positioned about the body between said assemblies and operatively engaged therewith whereby to substantially simultaneously exert said oppositely directed longitudinal forces on the respective adjacent assemblies in response to fluid pressure introduced between said piston and cylinder elements in order to radially project said anchor and seal elements, means for directing pressure fluid through the interior of said body between said piston and cylinder elements, and means initially securing said anchor and seal elements to the body in retracted positions and releasable in response to the longitudinal force exerted on said assemblies by said fluid pressure-operated means.

5. A well packer according to claim 4, wherein said means for directing pressure fluid between the piston and cylinder elements includes a tubular operating stem removably extending into the bore of the body, and means providing fluid communication between the interior of the stem and the interior of said cylinder element.

6. A well packer according to claim 4 wherein said securing means comprises shear pins.

7. A well packer according to claim 4 wherein said means for directing pressure fluid between the piston and cylinder elements includes passages through the wall of the body communicating with the interior said cylinder element, a tubular stem removably extending into the bore of the body, ports in said stem positioned to communicate with said passages, means sealing between the stem and the body above and below said ports and passages, and removable means closing the bore of said stem at a point below said ports.

8. A well packer, comprising, a tubular body insertable in a well bore, longitudinally spaced external abutment means mounted on the body, a pair of longitudinally spaced generally annular anchor-and-seal assemblies mounted about the exterior of the body in abutting relation to said abutment means, each of said assemblies including a conical tapered slip expander, an annular resilient seal element positioned between said abutment means and said expander, and a set of slips circumferentially surrounding the tapered portion of the slip expander, said slips and said seal elements being radially expandible in response to longitudinal movement of the slips toward the expanders to anchor and seal said body at longitudinally spaced points to the well wall, annular telescopically inter-connected piston and cylinder elements slidably disposed about the body between said assemblies, the piston and cylinder elements being operatively engaged with the slips of the respectively adjacent assemblies whereby to oppositely urge the slips toward their respective expanders in response to fluid pressure introduced between the piston and cylinder elements, means for directing pressure fluid through the interior of the body between the piston and cylinder elements, and means initially securing said slips to the respective expanders and to said body in relatively retracted positions, said last-mentioned means being releasable in response to the force of the fluid pressure exerted between the piston and cylinder elements.

9. In a well packer including a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including anchor and seal elements radially projectible by longitudinal forces oppositely directed between the assemblies to anchor and seal said body to the well wall, fluid pressure-actuated means including means slidably positioned about the body between said assemblies operable to substantially simultaneously exert said oppositely directed longitudinal forces on the anchor elements of the respective assemblies to radially project said acnhor and seal elements, and

means for supplying pressure fluid to said fluid pressure-actuated means.

10. In a well packer including a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including radially projectible anchor and seal elements, and co-operating expander means operable in response to longitudinal forces oppositely directed against said expander means from between the assemblies to radially expand said anchor and seal elements and thereby anchor and seal said body to the well wall, fluid pressure-operated means including means slidably positioned about the body between said assemblies operable to substantially simultaneously exert said oppositely directed longitudinal forces on the anchor elements of the respective assemblies to radially project said anchor and seal elements, means for supplying pressure fluid to said fluid pressure-actuated means, and means initially securing said anchor and seal elements to said expander means and said body in retracted positions, said securing means being releasable in response to the force exerted against said expander means by said fluid pressure-operated means.

11. An anchor device for use in a well, comprising, a tubular body insertable in a well bore, a pair of longitudinally spaced anchor assemblies mounted about the exterior of the body, releasable means initially securing said assemblies on the body against movement relative thereto, said assemblies including anchor elements radially projectible by longitudinal forces oppositely directed between the assemblies to anchor the body to the well wall, fluid pressure-actuated means including means movably positioned about the body between said assemblies operable to substantially simultaneously exert said oppositely directed longitudinal forces on said anchor elements of the respective assemblies to release the releasable means and radially project said anchor elements of both said assemblies into anchoring position, and means for supplying pressure fluid from within said body to said fluid pressure-actuated means.

12. An anchor device according to claim 11 wherein said anchor assemblies include conically tapered expanders tapering inwardly toward each other, and radially movable pipe-gripping slips circumferentially disposed about the inner ends of the expanders, said means positioned about said body being engaged with opposed ends of said slips to urge the slips longitudinally toward their respective expanders.

13. A well packer, comprising, a tubular body insertable in a well bore, a pair of longitudinally spaced anchor-and-seal assemblies mounted about the exterior of the body and secured against longitudinal movement relative thereto, said assemblies including anchor and seal elements radially projectible by longitudinal forces oppositely directed thereagainst from between the assemblies to anchor and seal said body to the well wall, fluid pressure-operated means including means comprising telescopically inter-connected piston and cylinder elements slidably positioned on the body between said assemblies and operable by fluid pressure to substantially simultaneously exert said oppositely directed longitudinal forces on the anchor elements of the respective assemblies to radially project said anchor and seal elements, means for supplying pressure fluid between said piston and cylinder elements, radially slidable connections between the anchor elements and the adjacent ends of the piston and cylinder elements, and means initially securing said piston and cylinder elements to each other in retracted position and releasable in response to the force of the fluid pressure exerted between the piston and cylinder elements.

14. A well packer, comprising, a tubular body insertable in a well bore, longitudinally spaced external abutment means mounted on the body, a pair of longitudinally spaced generally annular anchor-and-seal assemblies mounted about the exterior of the body in abutting relation to said abutment means, each of said assemblies including a conical tapered slip expander, an annular resilient seal element positioned between said abutment means and said expander, and a set of slips circumferentially surrounding the tapered portion of the slip expander, said slips and seal elements being radially expandible in response to longitudinal movement of the slips toward the expander to anchor and seal said body at longitudinally spaced points to the well wall, annular telescopically inter-connected piston and cylinder elements slidably disposed about the body between said assemblies, the piston and cylinder elements being operatively engaged with the slips of the respectively adjacent assemblies whereby to oppositely urge the slips toward their respective expanders in response to fluid pressure introduced between the piston and cylinder elements, means for directing pressure fluid through the interior of the body between the piston and cylinder elements, radially slidable connections between the anchor elements and the adjacent ends of the piston and cylinder elements, and means initially securing the piston and cylinder elements in their relatively retracted positions, said last-mentioned means being releasable in response to the force of the fluid pressure exerted between the piston and cylinder elements.

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