Jan. 29, 1963 C. C. BROWN 3,075,584

WELL TOOLS AND MANIPULATING DEVICES THEREFOR

Filed Feb. 12, 1959 4 Sheets-Sheet 1

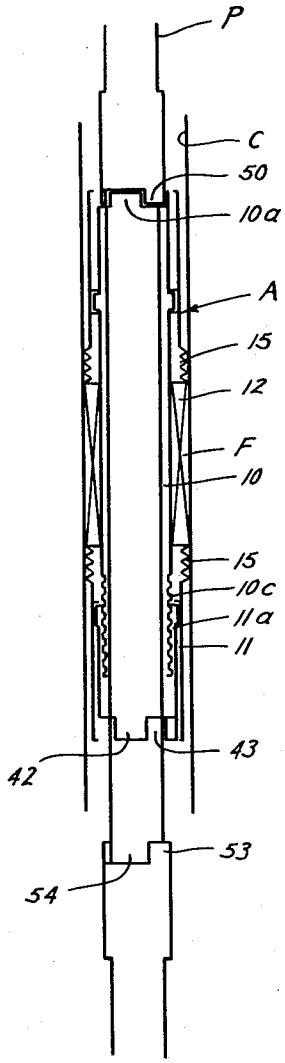


Fig. 1

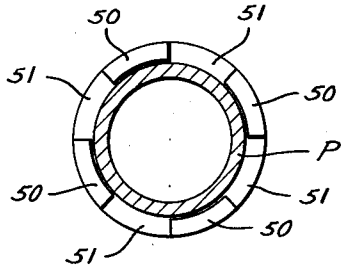


Fig. 3

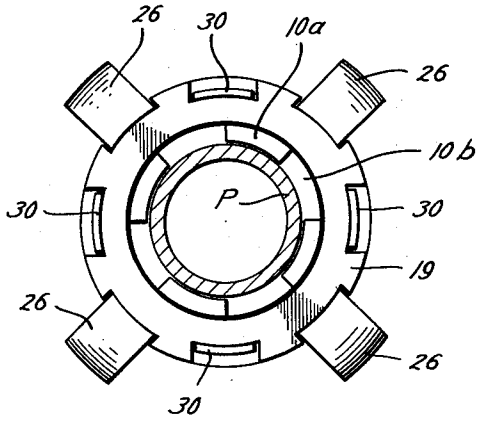


Fig. 4

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WELL TOOLS AND MANIPULATING DEVICES THEREFOR

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Fig. 2

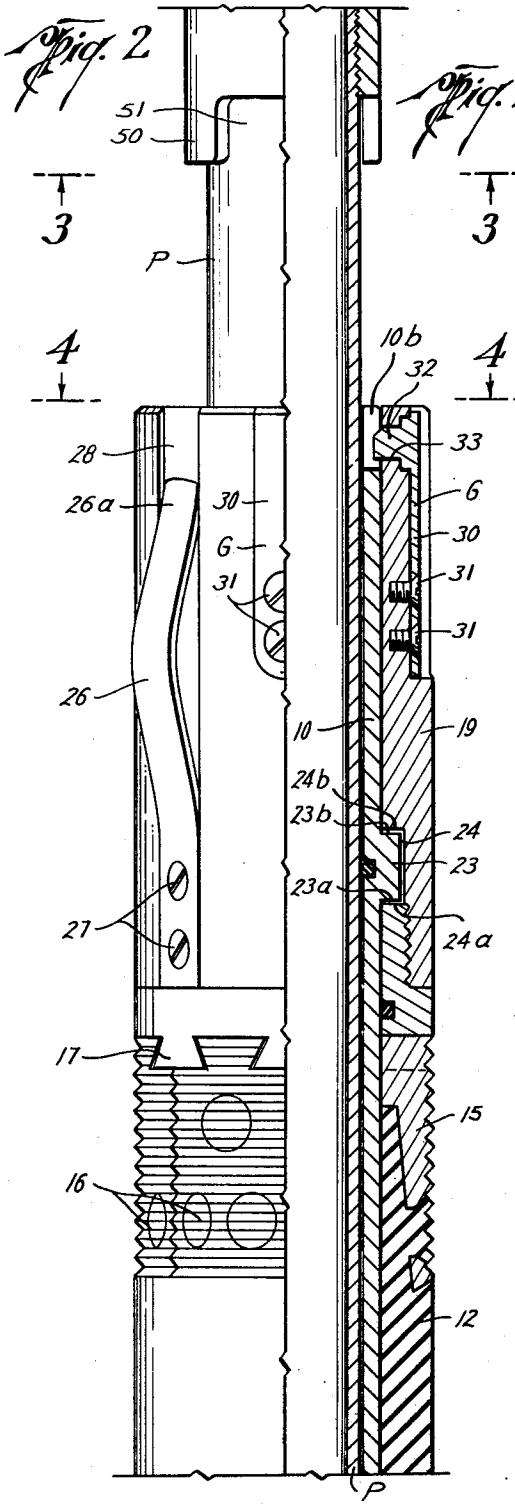
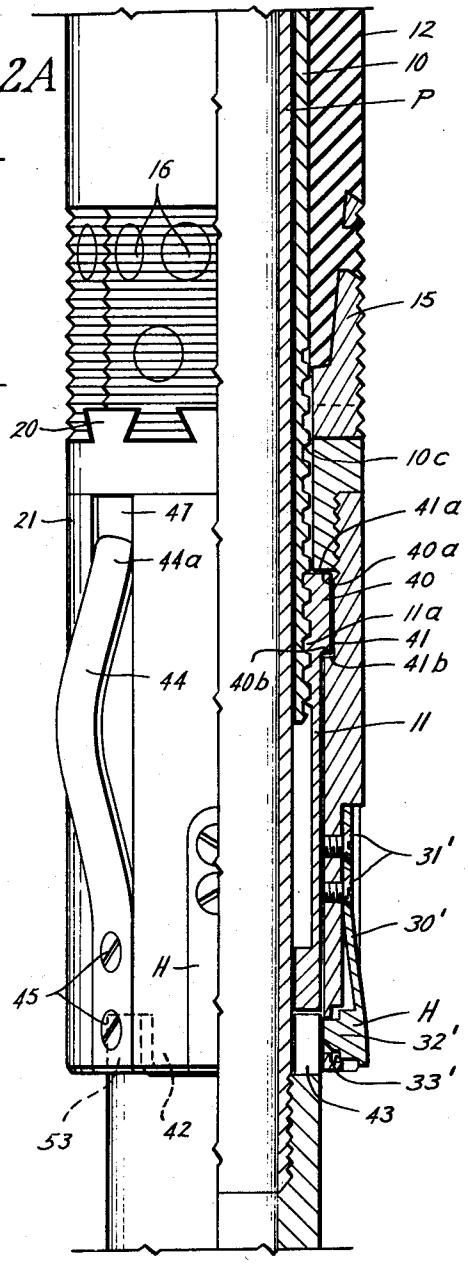


Fig. 2A



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WELL TOOLS AND MANIPULATING DEVICES THEREFOR

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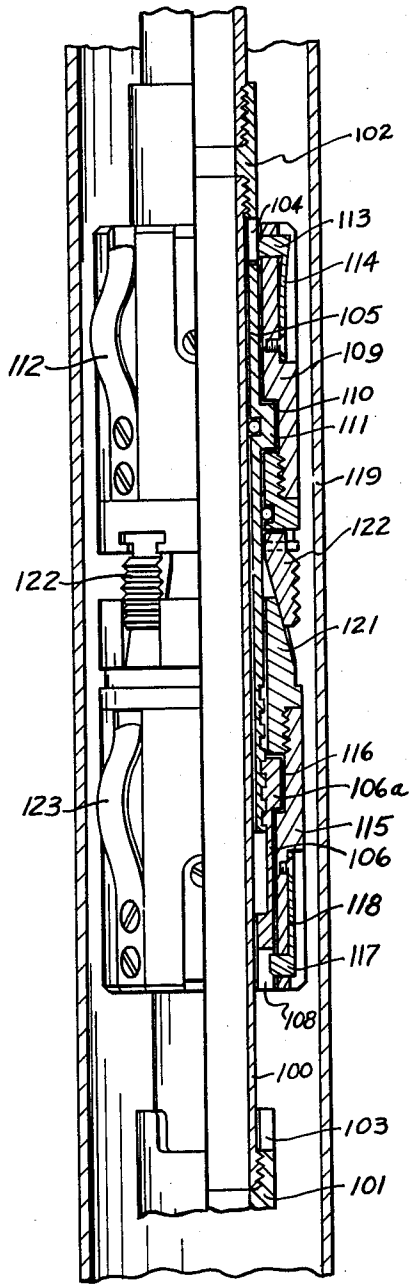


Fig. 5

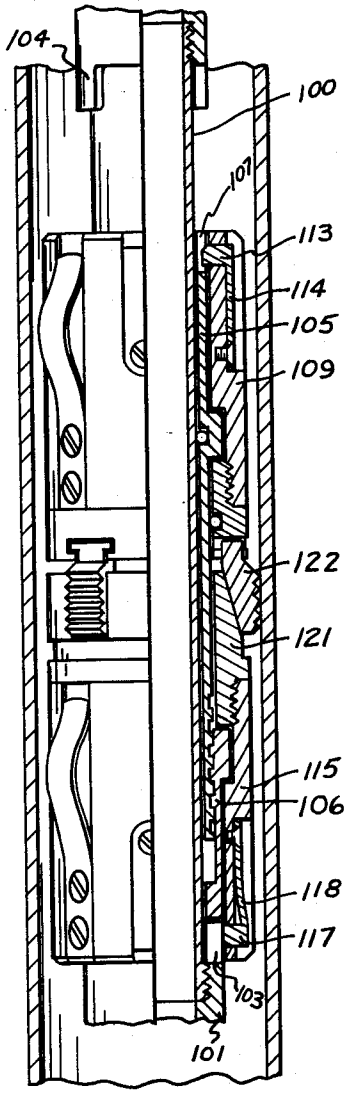


Fig. 6

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WELL TOOLS AND MANIPULATING DEVICES THEREFOR

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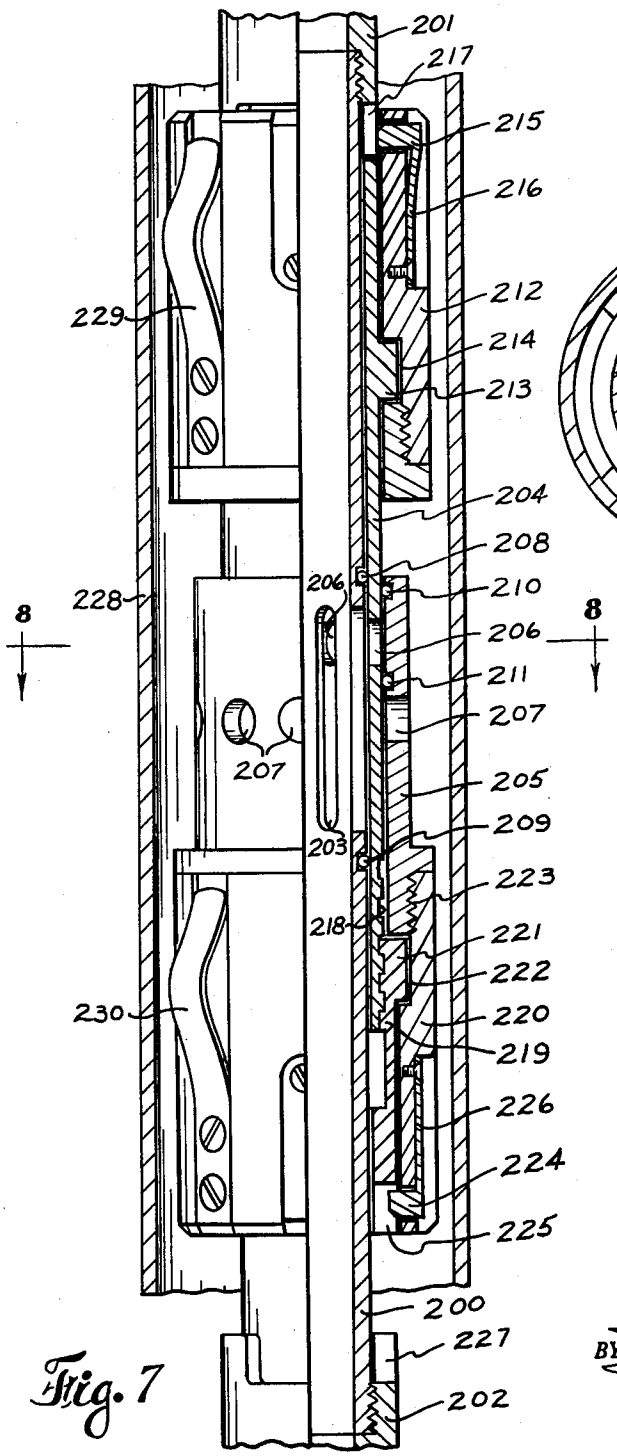


Fig. 7

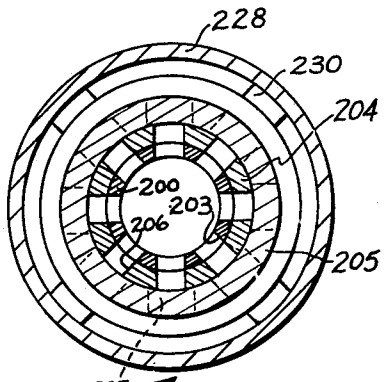


Fig. 8

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United States Patent Office 3,075,584 Patented Jan. 29, 1963

3,075,584

WELL TOOLS AND MANIPULATING DEVICES THEREFOR

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Filed Feb. 12, 1959, Ser. No. 792,922
11 Claims. (Cl. 166—134)

This invention relates to well tools.

As is well known, support pipe or tubing for well tools is ordinarily formed of sections or links of pipe which are threaded together with right-hand threads. It is, therefore, very desirable that well tools which are manipulated by rotation of the support pipe be manipulated entirely by a right-hand or clockwise rotation of said support pipe to prevent uncoupling of the sections or links of said support pipe. For instance, a packer may be set and unset by rotating the supporting pipe, a valve may be opened or closed by rotation of the supporting pipe, it may be desirable to anchor any one of a number of different types of devices at a particular point in the well, or it may be desirable to merely anchor the pipe at a particular point in the well. Other situations in which the support pipe is rotated to accomplish various objects will readily occur to those skilled in the art.

It is an object of this invention to provide a device for moving two parts toward and away from each other by a right-hand or clockwise rotation of the support pipe.

Another object is to provide a device for use with any type of well tool which is provided with two alternative positions, such device changing the well tool between its two alternative positions with right-hand rotation of the support pipe.

Another object of this invention is to provide an improved well packer which is adapted to be manipulated entirely by a right-hand or clockwise rotation, whereby the uncoupling or unthreading of the sections of the pipe supporting the packer is avoided.

An important object of this invention is to provide an improved well packer having means for setting same into contact with a well casing or pipe by a rotation of the support pipe for the packer in one direction, and means for releasing the packer from said contact by a rotation of the support pipe in the same direction, the direction of rotation for setting and releasing the packer being that direction which tends to tighten the threaded connections of the sections of the support pipe.

Another object of this invention is to provide an improved well packer having means for setting same into contact with a well casing or pipe by a right-hand rotation of the support pipe for the packer where said support is formed of a plurality of sections or lengths which are coupled together by right-hand threads, and means for releasing the packer from said contact by a right-hand rotation of the support pipe, whereby uncoupling or unthreading of the sections or lengths of the support pipe is avoided.

Still another object of this invention is to provide an improved well packer having a packing assembly including anchoring means which is adapted to be set into contact with a well casing by an endwise compressive force applied by a rotation of the support pipe in a direction tending to couple together the threaded sections of the support pipe for the packer; said packing assembly being releasable from said contact by a rotation of the support pipe in the same direction as for the setting of the packer, whereby uncoupling of the sections of the support pipe is prevented during the manipulation of the packer for the setting and release thereof.

Another object of this device is to provide an anchor for anchoring any desired tool, or for merely anchoring

the well pipe in a well and for releasing said anchor by rotation of the support pipe in the same direction.

Another object is to provide an improved valve for controlling flow of fluid into and out of a support pipe in which the valve may be opened and closed by right-hand rotation of the support pipe.

The construction designed to carry out the invention will be hereinafter described together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein examples of the invention are shown, and wherein:

FIGURE 1 is a schematic illustration, partly in elevation and partly in section, of the well packer of this invention in its set position in a well casing.

FIGURES 2 and 2A are views, partly in elevation and partly in section, illustrating the details of the well packer of this invention, with FIGURE 2 illustrating the upper portion thereof and FIGURE 2A illustrating the lower portion thereof.

FIGURE 3 is a horizontal sectional view taken on line 3—3 of FIGURE 2;

FIGURE 4 is a horizontal sectional view taken on line 4—4 of FIGURE 2;

FIGURE 5 is a view partly in elevation and partly in section of an anchoring device constructed in accordance with this invention in its unset position;

FIGURE 6 is a view similar to FIGURE 5 showing the anchor in set position;

FIGURE 7 is a view partly in elevation and partly in cross-section illustrating a valve constructed in accordance with this invention; and

FIGURE 8 is a view along the line 8—8 of FIGURE 7.

In the drawings, the letter A designates generally the well packer of this invention which is adapted to be lowered into a well casing or pipe C on a lowering or support pipe P, which extends to the surface of the well. The well packer A includes a packing assembly F which is adapted to be set or radially expanded into contact with the inside surface of the well casing or pipe C upon the application of an endwise compressive force thereto. The endwise compressive longitudinal force for setting the packing assembly F is applied by moving an annular actuating member or sleeve 10 and a nut 11 threaded thereto toward each other by the rotation of the support pipe P, as will be explained in detail hereinafter. The packing assembly F is elongated longitudinally to retract same radially from contact with the well casing C by a longitudinal movement of the sleeve 10 and nut 11 away from each other, as will be explained, so that a positive setting and releasing mechanism is provided for the packer A of this invention. The packer A is so constructed that the support pipe P is rotated in the same direction for setting the packing assembly F as for releasing same. Ordinarily, the sections or lengths of pipe which form the support pipe P are coupled or threaded together with right-hand threads, so that it is important that the manipulation or actuation of the well packer be by a right-hand rotation or clockwise as viewed from above in FIGURE 1, so that there will be no tendency to uncouple the sections of the support pipe P during such manipulation. Thus, with this packer, the packing assembly F can be set and released by a right-hand or clockwise rotation.

The details of the packer A of this invention are shown in FIGURES 2 and 2A, wherein the packing assembly F is shown as including an annular resilient or elastic sealing element 12 which is formed of rubber or any other equivalent material, and to which are attached gripping

slips 15. The slips 15 are formed in arcuate segments which have a plurality of spaced openings 16 in which the rubber or other material of the sealing element 12 is molded to firmly anchor the gripping slips 15 to the sealing element 12.

As can be seen in FIGURES 2 and 2A, the segmental gripping slips 15 are formed at the upper and lower ends of the sealing element 12 and are identical except that the upper slips 15 are provided with a tongue and groove connection 17 at their upper ends to a cylinder 19, while the lower slips 15 are provided with a similar tongue and groove connection 20 by a cylinder 21 at their lower ends. These tongue and groove connections 17 and 20, of course, permit radial movement of the slips 15 for the setting of same into contact with the inside surface of the well casing C when the endwise compressive force is applied to the packing assembly F.

The packing assembly F is connected to the actuating sleeve 10 by an annular flange 23 which extends radially outwardly into an internal annular recess 24 in the cylinder 19. The flange 23 and the recess 24 not only provide a swivel connection which permits rotation of the sleeve 10 relative to the cylinder 19 and the rest of the packing assembly F, but it also provides an abutment means for transmitting the longitudinal movement of the sleeve 10 to the upper end of the packing assembly F. Thus, when the sleeve 10 is moved downwardly the lower radial surface 23*a* is in contact with the lower wall 24*a* of the recess 24, while upon an upward movement of the sleeve 10, the upper radial surface 23*b* is in contact with the upper wall 24*b* of the recess 24.

On the external surface of the cylinder 19, friction springs 26 are secured by rivets or screws 27. Such friction springs 26 have their upper ends 26*a* free to slide within longitudinal external grooves 28, so that such friction springs 26 firmly engage the inside surface of the well casing C at all times to provide a resistance to longitudinal and rotational movement of the cylinder 19 and the parts attached thereto. Near the upper end of the cylinder 19, latching members G are mounted in circumferentially spaced relationship between the friction springs 26. Each of the latching members G includes a flat leaf spring 30 which is firmly held at its lower end by screws 31 or similar securing means. The upper end of the leaf spring 30 of each latching member G has an inwardly-extending latching prong 32 which extends through a radial opening 33 in the cylinder 19.

The upper end of the sleeve 10 is provided with longitudinally extending lugs 10*a* with longitudinal recesses 10*b* therebetween (FIG. 4) and the prongs 32 on the latching members G are of such length that they extend into the recesses 10*b* when they are radially aligned (FIG. 2). When the prongs 32 are in the recesses 10*b*, the sleeve 10 is prevented from rotating relative to the cylinder 19 and the portions of the packing assembly F attached thereto.

The sleeve 10 has relatively coarse external threads 10*c* on its lower end which are in threaded engagement with corresponding internal threads 11*a* near the upper end of the annular nut 11. The threads 11*a* and 10*c* are right-hand threads so that upon a right-hand or clockwise rotation of the sleeve 10, the sleeve 10 and the nut 11 are moved toward each other. The nut 11 has a swivel connection with the cylinder 21 by means of a radial external annular flange 40 which fits within an annular recess 41 in the internal surface of the cylinder 21. Longitudinal movement of the nut 11 is transmitted to the lower end of the packing assembly by contact of the upper surface 40*a* with the upper wall 41*a* of the recess 41 during the upward movement of the nut 11 relative to the sleeve 10. Downward movement of the nut 11 relative to the sleeve 10 is also transmitted to the lower end of the packing assembly F by the contact of the lower radial surface 40*b* with the lower wall 41*b* of the recess 41. The lower end of the annular nut 11 is provided with longitudinally-extending lugs 42 and recesses 43 therebetween which are substantially identical with the lugs 10*a* and recesses 10, respectively, on the sleeve 10.

The lower cylinder 21 has friction springs 44 which are substantially identical with friction springs 26 on the upper cylinder 19 and which are secured thereto by screws or rivets 45, leaving the upper end 44*a* free to slide in the longitudinal groove 47, whereby the friction springs 44 resiliently contact the inside surface of the well casing C in the same manner as the friction springs 26. Latching members H are circumferentially disposed between the friction springs 44 on the lower external surface of the cylinder 21. These latching members H are identical with the latching members G except that they are inverted so that the leaf spring 30′ of each latching member H has its upper end secured to the cylinder 21 by screws or similar fastening means 31′. The latching prong 32′ is at the lower end of each latching member H and fits through a radial opening 33′ in the lower end of the cylinder 21. The prongs 32′ are of such length that they extend into the recesses 43 when circumferentially aligned therewith, so as to prevent rotation of the nut 11 relative to the cylinder 21.

The support pipe P extends through the well packer A and is slidable or movable longitudinally with respect thereto within limits. Means are provided on the support pipe P above the well packer A for co-action with the packer to effect a rotation of the sleeve 10 and a consequent setting or radial expansion of the packing assembly F into contact with the well casing C. This means includes downwardly-extending longitudinal lugs 50 which have corresponding longitudinal recesses 51 therebetween. These lugs 50 are of such width and depth or length that they fit within the recesses 10*b* at the upper end of the sleeve 10. At the same time, the lugs 10*a* on the sleeve 10 fit within the recesses 51 so that there is a complete interfitting of the lugs 50 with the lugs 10*a* whereby any rotation of the support pipe P is transmitted to the sleeve 10. When the lugs 50 are lowered with respect to the sleeve 10 and enter into the recesses 10*b*, the prongs 32 of the latching members G are forced radially outwardly from their latching position (FIG. 2) so that they do not interfere with the rotation of the sleeve 10 when the lugs 50 and the lugs 10*a* are interfitting or interengaging.

Below the well packer A, the support pipe P has upwardly-extending longitudinal lugs 53 and corresponding recesses 54 which are similarly constructed to the lugs 50 and recesses 51 except that they are inverted. The lugs 53 fit into the recesses 43 and the lugs 42 on the lower cylinder 21 fit within the recesses 54 so that when the support pipe P is raised from the lower position (FIG. 1) to the raised position (FIG. 2*a*), the latching members H are forced radially outwardly to unlatch or disengage the latching members H from the annular nut 11, whereby rotation of the support pipe P is transmitted to the annular nut 11 through the interengagement of the lugs 42 and 53. When the rotation is in a right-hand or clockwise direction, as viewed from above the packer, the nut 11 is caused to move downwardly or away from the sleeve 10. It will be apparent that the lugs 50 and 53 on the support pipe P must be spaced longitudinally from each other a greater distance than the over-all length of the well packer A so that the lugs 50 can be engaged while the lugs 53 are disengaged and also so that the lugs 53 can be engaged while the lugs 50 are disengaged.

In the operation of the well packer of this invention, the packer A is slidably mounted on the support pipe P and is lowered on such support pipe P. The friction springs 26 and 44 engage the well casing during the lowering of the well packer into the casing so that the packer tends to ride up the support pipe P and, in effect, the packer A is pushed downwardly into the casing by the support pipe P. When the packer A has been lowered

to a predetermined position in the casing C, the packer is set or expanded radially into contact with the well casing C by a right-hand rotation of the support pipe P. Initially, the lugs 50 on the support pipe will interengage with the lugs 10*a* on the sleeve 10, if such has not already occurred during the lowering operation, and thereafter the rotation of the support pipe P is transmitted directly to the sleeve 10. Since the threads 10*c* and 11*a* are relatively coarse, the annular nut 11 ordinarily will not rotate when the sleeve 10 is rotated, but to be certain that the nut 11 does not rotate, the latching members H are spring-biased into the recesses 43 of the nut 11. As the sleeve 10 is rotated in a right-hand direction (assuming the threads 10*c* and 11*a* are right-hand threads), the sleeve 10 and nut 11 are moved toward each other. During such movement of the sleeve 10 longitudinally with respect to the nut 11, a downward force is applied to the upper end of the packing assembly F by the contact of the lower radial surface 23*a* with the inwardly-extending radial shoulder or wall 24*a* and an upwardly-directed force is applied to the lower end of the packing assembly F by the contact of the upper radial surface 40*a* with the upper wall 41*a*, whereby opposing forces are applied to the packing assembly F which tend to compress same and therefore to radially expand the sealing element 12 and the gripping slips 15 radially outwardly into engagement with the casing C. After the complete expansion of the sealing element 12 and gripping slips 15 has been effected through the rotation of the support pipe P, the usual well operations are carried out.

Thereafter, when it is desired to release the packer A from the contact with the well casing C, the support pipe P is raised relative to the packer and the lugs 53 on the support pipe P are brought into interfitting relationship with the lugs 42 on the lower end of the packer. When the lugs 53 are brought into such interfitting engagement with the lugs 42, the lugs 50 have moved upwardly above the lugs 10*a* and the latching members G are moved to their latching position (FIG. 2) so as to prevent rotation of the sleeve 10. Similarly, the latching members H have been moved out of latching position (FIG. 2A) so that the nut 11 can be rotated relative to the cylinder 21 and the sleeve 10. The support pipe is again rotated in the right-hand or clockwise direction which causes the nut 11 to move downwardly or away from the sleeve 10. Such longitudinal movement of the nut 11 with respect to the sleeve 10 applies a downward force to the lower end of the packing assembly F through the contact of the radial surface 40*b* with the walls 41*b* and an upward force through the contact of the upper radial surface 23*b* with the upper wall 24*b*, whereby an elongating force is applied to the packing assembly F to return same to its normal undistorted or unexpanded position (FIGS. 2 and 2A). The packer can then be removed from the well casing C by raising the support pipe P therein.

Reference is now made to FIGURES 5 and 6 in which this invention is shown in combination with an anchor. The anchor may be used to fix any desired device to the wall of the casing by attaching it to the anchoring device. It is also to be noted that the pipe can only move vertically in a limited range and, therefore, attaching a device to the pipe, either above or below the anchor, would effectively fix such device in the well. It is pointed out that, if desired, such an anchor might be fixed in the well to support all or a portion of the weight of the tubing. Other uses of the anchor will be apparent to those skilled in the art.

A pipe or section of tubing 100 is made up in the well string between couplings 101 and 102. Each of these couplings has lugs such as shown at 103 and 104. These lugs function as clutch parts in the manner heretofore explained. Positioned about the pipe 100 in both rotative and slidable relationship therewith is a sleeve 105 having threaded thereon a nut 106. The sleeve has lug parts 107 which cooperate with lugs 104 on the coupling 102 to impart rotation to the sleeve. In like manner, the nut has lug parts 108 to cooperate with lugs 103 on the coupling 101 to impart rotation to the nut. As hereinbefore explained, right-hand rotation of the pipe while the upper clutch parts are in engagement will rotate the sleeve in a clockwise direction, and right-hand rotation of the pipe while the lower clutch parts are in engagement will rotate the nut in a clockwise direction. Of course, the engagement of the upper and lower clutch parts is alternative, and when one clutch assembly is engaging the other is disengaged to permit relative rotation between the nut and the sleeve.

In order to hold the nut and sleeve against rotation when the other of these two parts is being rotated by the pipe, a drag means is provided. Referring first to the drag means for the sleeve, an upper cylinder 109 is rotatably positioned on the sleeve by the engagement of the circumferential slot 110 within cylinder 109 with the circumferentially extending flange 111 on the exterior of sleeve 105.

In order to prevent rotation of cylinder 109, a plurality of friction springs 112 are carried thereby to engage with the wall of the casing pipe.

The sleeve and cylinder 109 are releasably latched together by a latch prong 113 which is carried by a leaf spring 114 and extends into the space between adjacent lugs 107 on the sleeve. Leaf spring 114 is carried by the cylinder 109 and, therefore, the sleeve and cylinder are latched together when the latching prong 113 is in position between lugs 107.

Means are provided for resisting rotation of nut 106, and are generally similar to the means for resisting rotation of the sleeve. A lower cylinder 115 is rotatably mounted on the exterior of nut 106 and is held against longitudinal movement therealong by an annular enlargement 106*a* on the nut which is received within an annular groove 116 in cylinder 115.

Latch means to selectively prevent relative rotation between the nut and lower cylinder is provided by a latching prong 117 which cooperates with lugs 108 on the nut. The latching prongs are carried by leaf springs 118 which are in turn secured to the lower cylinder.

A slip assembly for latching the device in position in the well casing 119 is provided by a slip expander 121 and a plurality of slips 122. The slip expander 121 is carried by the lower cylinder 115 and the slips are carried by the upper cylinder 109.

In operation, the device is run into the well with the parts in the position shown in FIGURE 5. When the device has reached a desired elevation, the upper clutch parts are engaged. Of course, the friction springs will tend to cause the device to ride high on the pipe 100, but if the last manipulation of the pipe was not a downward movement, then downward movement of the pipe will engage the upper clutch assembly and disengage the lower clutch assembly. When engaged, the upper latch parts are released to permit rotation of the sleeve relative to the upper friction means. As the lower clutch parts are disengaged, the lower cylinder is latched to the nut and the lower friction springs 123 will resist rotation of the nut. As shown in FIGURE 6, continued rotation moves the nut upwardly along the sleeve and forces the slip expander 121 behind the slips 122 to set the slip assembly against the casing. At this time the weight of the string may be partially supported on the slip assembly, if desired, or the anchoring device may be relied upon to position other devices above or below the anchoring device at a particular elevation in the well.

Referring now to FIGURES 7 and 8, the invention is shown in combination with a valve, and permits opening and closing the valve with right-hand rotation of the pipe. In this instance, the well pipe has a section 200 which is interposed between the upper and lower collars 201 and 202. The pipe section 200 has a plurality of

elongate flow passages 203 for conducting fluid between the interior of the pipe and the valve surrounding the pipe. As the valve and pipe move longitudinally relative to each other, the passageways 203 should be elongate so as to always be in direct communication with the flow-way through the valve to be hereinafter described.

The valve surrounds pipe 200 and includes an inner sleeve 204 and an outer sleeve 205. These sleeves have formed therein passageways 206 and 207, respectively. When these passagesways are aligned, they provide for flow of fluid between the interior and exterior of pipe 200. When they are not in alignment, the valve is closed and the interior and exterior of pipe 200 are effectively isolated.

Suitable seals may be provided between the pipe and two sleeves to confine flow of fluid. In the illustrated embodiment, O-rings 208 and 209 seal between the pipe and inner sleeve 204. It will be noted that these seals control flow of fluid between the pipe and inner sleeve at any relative position of these two parts. O-rings 210 and 211 provide a seal between the inner and outer sleeves, and, when the holes 206 and 207 are mis-aligned, prevent flow of fluid through the valve.

The inner sleeve 204 is provided with friction means in the form of an upper cylinder 212 which is rotatably positioned thereon and held against longitudinal movement by a flange 213 on the inner sleeve cooperating with a groove 214 in the upper cylinder. The upper cylinder 212 is identical with the upper cylinders heretofore described and has latching prongs 215 carried by leaf springs 216 which cooperate with the inner cylinder to provent relative rotation therebetween and which may be moved into a disengaged position by the lugs 217 on the upper collar 201.

The lower end of the inner sleeve is provided with threads 218 which cooperate with threads on nut 219. The lower cylinder 220 surrounds nut 219 and is rotatable thereto. The lower cylinder is held against longitudinal movement relative to the nut by a flange 221 on the nut interfitting in a groove 222 on the lower cylinder. The lower cylinder carries the outer sleeve and these two parts may be secured together as by the threaded engagement 223. Thus, with movement of the nut 219 along the inner sleeve 204, the two sleeve members move relative to each other to open and close the valve.

The lower cylinder 220 is provided with a plurality of latching prongs 224 which cooperate with slots 225 in the nut to hold the nut and lower cylinder against relative rotation. These latching prongs are carried by leaf springs 226 and are moved to an out-of-the-way position by lugs 227 carried on collar 202.

Suitable means are provided to frictionally engage the wall of the casing 228. Preferably, two friction means are provided, one for each of the upper and lower cylinders 220 and 212. This friction means may take the form of leaf springs 229 on the exterior of upper cylinder 212 and leaf springs 230 on the lower cylinder 220. These springs are formed with loop sections for drag engagement with the wall of casing 228.

In operation, the tool is run into the hole with the valve member in either open or closed position. Usually it will be preferred to run the pipe with the valve closed to conduct various operations in the well. When it is desired to open the valve, the lugs of the upper collar 201 are engaged with the inner sleeve 204. This engagement releases the latch means provided by latching prong 215. The lower latching means is still in engagement and, therefore, the lower springs 230 will resist rotation of nut 219. Right-hand rotation of the pipe will move the outer sleeve 205 upwardly along the sleeve 204 to align the ports 206 and 207 and open the valve. In like manner, engagement of the lower lugs 227 with the slotted lower section of nut 219 and right-hand rotation of the pipe will move the inner and outer sleeves 204 and 205 to the position shown in the drawings to again close the valve.

From the foregoing description it is believed evident that an improved device has been provided which is capable of being operated in two directions by the rotation of the support pipe in the same direction for both operations, whereby the usual right-hand couplings between the sections of the support pipe are always moved in a direction tending to tighten such couplings. Although the invention has been described in connection with right-hand rotation, it will be appreciated that by making the threads left-hand threads, the operation could be effected by rotation in a left-hand or counter-clockwise direction. Ordinarily, this would not be desirable because drill pipe or support pipe is ordinarily threaded in a right-hand direction, but it is to be understood that this invention includes such an arrangement, which may be desirable should the support pipe be joined by left-hand threads.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

This application is a continuation in part of my co-pending application Serial No. 390,386, filed November 5, 1953, and now abandoned, for Well Packers.

What is claimed is:

1. A well device adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means on said pipe for supporting said sleeve and nut, first friction means having elements for engaging the wall of the well casing to resist rotation and means associated with said friction means and engageable with the nut for resisting rotation of the nut, second friction means having elements for engaging the wall of the well casing to resist rotation and means associated with said second friction means and engageable with the sleeve for resisting rotation of the sleeve, first selectively engaging clutch means carried by the sleeve and support pipe at one end of the device and engaged when the sleeve and pipe are in a first relative position and disengaged when the sleeve and pipe are in a second relative position, and second selectively engaging clutch means carried by the nut and support pipe at the other end of the device and engaged when the sleeve and pipe are in said second relative position and disengaged when the sleeve and pipe are in said first relative position, each such clutch means consisting of a clutch member and a coengaging clutch member, said members of the first and second clutch means carried by the nut and sleeve spaced apart whereby said first and second clutch means are alternately engageable and disengageable to alternately impart rotation to the sleeve and nut by unidirectional rotation of the pipe.

2. A well device adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said pipe, first friction means having elements for engaging the wall of the well casing to resist rotation of said first friction means, first latch means for preventing relative rotation between the sleeve and first friction means, second friction means rotatable relative to the nut and having elements for engaging the wall of a well casing to resist rotation of the second friction means, second latch means for preventing relative rotation between the nut, and second friction means, first selectively engaging clutch means carried by the sleeve and support pipe engaged when the sleeve and pipe are in a first relative position and disengaged when the sleeve and pipe are in a second relative position, said first clutch means when engaging unlatching said first latch means, and second selectively engaging clutch means carried by the nut and support pipe engaged when the sleeve and pipe are in said second relative position and disengaged when the sleeve and pipe are in said first relative position, said second clutch means

when engaging unlatching said second latch means, said second clutch means carried by the nut spaced from the first clutch means carried by the sleeve, said first and second clutch means being alternately engageable and disengageable to alternately impart rotation to the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to move the nut along the sleeve in opposite directions.

3. The device of claim 2, together with an operable unit having one part mounted on the sleeve and another part mounted on the nut, said unit may be operated to move its parts relative to each other on a change of the relative position of the sleeve with respect to the nut.

4. A well packer adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said pipe, said sleeve and nut having confronting abutment surfaces, an elastic packing element surrounding said sleeve and extending between said abutments, first friction means having elements for engaging the wall of a well casing to resist rotation of said means and means engageable with the nut for resisting relative rotation of the nut, second friction means having elements for engaging the wall of a well casing to resist rotation of said means and means engageable with the sleeve and resisting relative rotation of the sleeve, first selectively engaging clutch means carried by the sleeve and support pipe on one side of the packing element, and second selectively engaging clutch means carried by the nut and support pipe on the other side of the packing element, said second clutch means carried by the nut spaced from the first clutch means carried by the sleeve so that when one of said first and second clutch means is engaged, the other of said first and second clutch means is disengaged, said first and second clutch means being alternately engageable and disengageable to alternately impart rotation to the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to set and unset said packing element.

5. A well packer adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said support pipe, said sleeve and nut having confronting abutment surfaces, an elastic packing element surrounding said sleeve and extending between said abutments, first friction means rotatable relative to the nut and having elements for engaging the wall of a well casing to resist rotation of the first friction means, first latch means for preventing relative rotation between the nut and first friction means, second friction means rotatable relative to the sleeve and having elements for engaging the wall of a well casing to resist rotation of the second friction means, second latch means for preventing relative rotation between the sleeve and second friction means, first selectively engaging clutch means carried by the nut and support pipe on one side of the packing element and when engaged unlatching said first latch means, and second selectively engaging clutch means carried by the sleeve and support pipe on the other side of the packing element and when engaged unlatching said second latch means, said second clutch means carried by the sleeve spaced from the first clutch means carried by the nut so that when one of said first and second clutch means is engaged, the other of said first and second clutch means is disengaged, said first and second clutch means being alternately engageable and releasable to alternately impart rotation to the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to set and unset said packing element.

6. A well device adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said pipe, a slip assembly for anchoring said device in a well having a slip expander and slips, said slip expander carried by one of said sleeve and nut, said slips carried by the other of said sleeve and nut, friction means having elements for engaging the wall of the well casing to resist rotation and means engageable with the nut and means engageable with the sleeve, first selectively engaging clutch means carried by the sleeve and support pipe, and second selectively engaging clutch means carried by the nut and support pipe, said second clutch means carried by the nut spaced from the first clutch means carried by the sleeve so that when one of said first and second clutch means is engaged, the other of said first and second clutch means is disengaged, said first and second clutch means being alternately engageable and disengageable with vertical movement of the pipe to alternately impart rotation to the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to longitudinally change the position of the nut and the sleeve with respect to each other to thereby positively set or release the expander or slips.

7. A well device adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said pipe, a slip assembly for anchoring said device in a well having a slip expander and slips, said slip expander carried by one of said sleeve and nut, said slips carried by the other of said sleeve and nut, first friction means rotatable relative to the nut and having elements for engaging the wall of a well casing to resist rotation of the first friction means, first latch means for preventing relative rotation between the nut and first friction means, second friction means rotatable relative to the sleeve and having elements for engaging the wall of a well casing to resist rotation of the second friction means, second latch means for preventing relative rotation between the sleeve and second friction means, first selectively engaging clutch means carried by the nut and support pipe on one side of the slip assembly and when engaged unlatching said first latch means, and second selectively engaging clutch means carried by the sleeve and support pipe on the other side of the slip assembly and when engaged unlatching said second latch means, said second clutch means carried by the sleeve spaced from the first clutch means carried by the nut so that when one of said first and second clutch means is engaged, the other of said first and second clutch means is disengaged, said first and second clutch means being alternately engageable and releasable to alternately impart rotation to the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to set and unset said slip assembly.

8. A well device adapted to be lowered into a well casing comprising, a support pipe having a port in its side wall, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said pipe, valve means controlling flow through said port and operated between open and closed positions by relative movement of said sleeve and nut, friction means having elements for engaging the wall of the well casing to resist rotation of said means and means associated with said friction means engageable with the nut and means associated with said friction means engageable with the sleeve, first selectively engaging clutch means carried by the sleeve and support pipe, and second selectively engaging clutch means carried by the nut and support pipe, said second clutch means carried by the nut spaced from the first clutch means carried by the sleeve so that when one of said first and second clutch means is engaged, the other of said first and second clutch means is disengaged, said first and second clutch means being alternately engageable and disengageable with vertical movement of the pipe to alternately impart rotation to

the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to move the nut along the sleeve in opposite directions.

9. A well device adapted to be lowered into a well casing comprising, a support pipe having a port in its side wall, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means for supporting said sleeve and nut on said pipe, valve means controlling flow through said port and operated between open and closed positions by relative movement of said sleeve and nut first friction means rotatable relative to the nut and having elements for engaging the wall of a well casing to resist rotation of the first friction means, first latch means for preventing relative rotation between the nut and first friction means, second friction means rotatable relative to the sleeve and having elements for engaging the wall of a well casing to resist rotation of the second friction means, second latch means for preventing relative rotation between the sleeve and second friction means, first selectively engaging clutch means carried by the nut and support pipe on one end of the device and when engaged unlatching said first latch means, and second selectively engaging clutch means carried by the sleeve and support pipe on the other end of the device and when engaged unlatching said second latch means, said second clutch means carried by the sleeve spaced from the first clutch means carried by the nut so that when one of said first and second clutch means is engaged, the other of said first and second clutch means is disengaged, said first and second clutch means being alternately engageable and releasable to alternately impart rotation to the sleeve and nut in the same rotative direction with rotation of the pipe in said direction to open and close said valve means.

10. A well tool comprising, a support pipe, a sleeve, a nut threaded on said sleeve, upper and lower clutch means on the support pipe, said sleeve and nut being rotatably and slidably confined between said clutch means, said upper and lower clutch means being separated a distance from each other greater than the length of said sleeve and nut, first frictional means connected with the sleeve for frictional engagement with the wall of the well casing to resist rotation of said sleeve inside the well casing, second frictional means connected with the nut for frictional engagement with the wall of the well casing to resist rotation of said nut inside the well casing, an operable unit having one part mounted on the sleeve and another part on said nut, whereby said unit may be operated to move its parts relative to each other on a change of the relative position of the sleeve with respect to the nut, clutch means on said sleeve, clutch means on said nut, one of said clutch means on the support pipe engageable with the clutch means on the nut, the other of said clutch means on the support pipe engageable with the clutch means on the sleeve, said clutch means engageable alternately and selectively upon the support pipe being shifted axially, whereby the nut can be rotated while the sleeve remains stationary, or the sleeve can be rotated while the nut remains stationary.

11. A well device adapted to be lowered into a well casing comprising, a support pipe, a sleeve rotatably and slidably mounted on the support pipe, a nut threaded on the sleeve, means on said pipe for supporting said sleeve and nut, friction means having elements for engaging the wall of the well casing to resist rotation of said friction means, first latch means secured to one of said friction means and said nut and engaging the other of said friction means and said nut for preventing relative rotation between the nut and friction means, second latch means secured to one of said friction means and said sleeve and engaging the other of said friction means and said sleeve for preventing relative rotation between the sleeve and friction means, first selectively engageable clutch means carried by the nut and support pipe and engaged when said sleeve and pipe are in a first relative position and disengaged when the sleeve and pipe are in a second relative position, said first clutch means when engaged unlatching said first latch means, and second selectively engaging clutch means carried by the sleeve and support pipe and engaged when the sleeve and pipe are in said second relative position and disengaged when the sleeve and pipe are in said first relative position, said second clutch means when engaged unlatching said second latch means, said second clutch means carried by the sleeve spaced from said first clutch means carried by the nut whereby when said first and second clutch means are alternately engaged and released with vertical movement of the pipe alternate rotation of the sleeve and nut in the same rotative direction will result from rotation of the pipe in said rotative direction to positively screw or unscrew the nut and sleeve with respect to each other.

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