

May 26, 1953

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2,639,773

PACKING MEANS FOR WELLS

Filed March 16, 1949

4 Sheets-Sheet 1

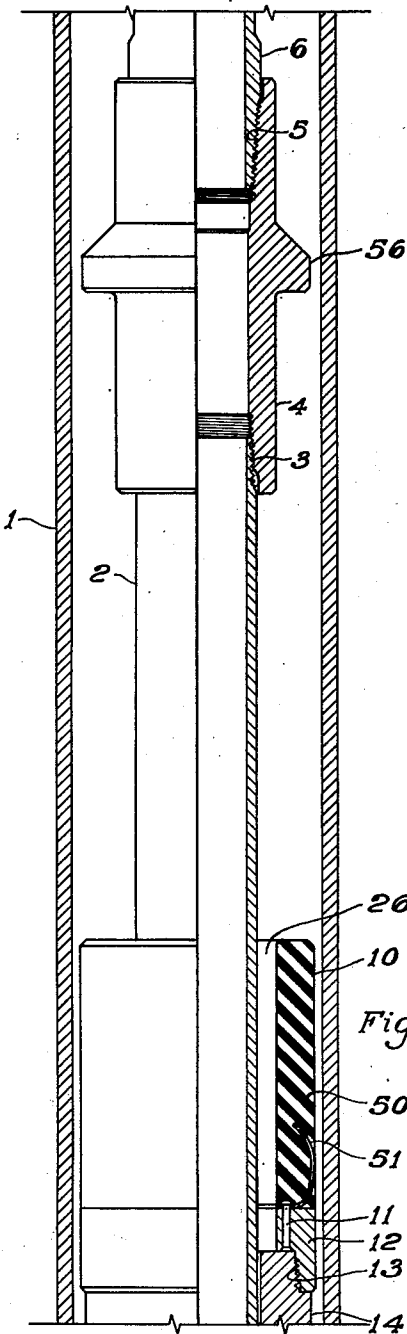


Fig. 1

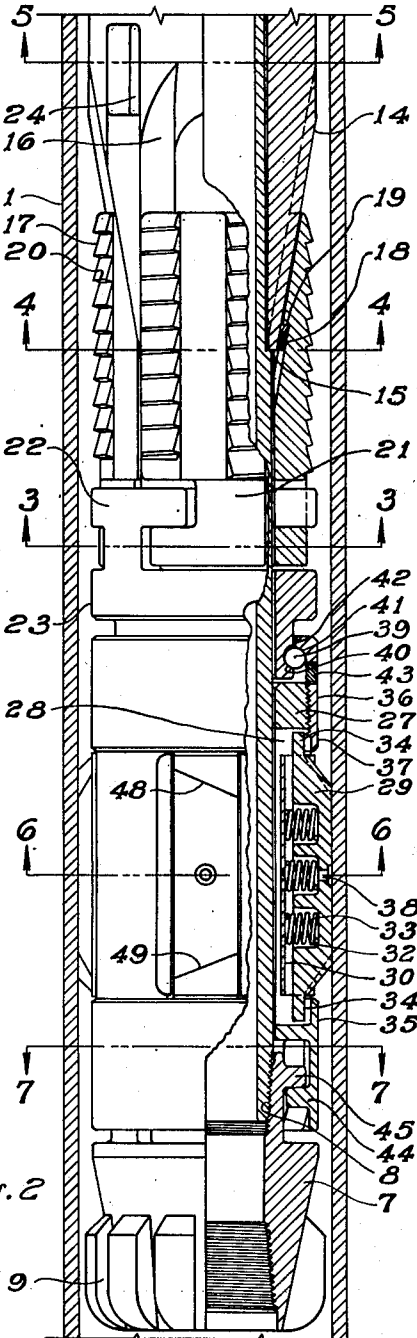


Fig. 2

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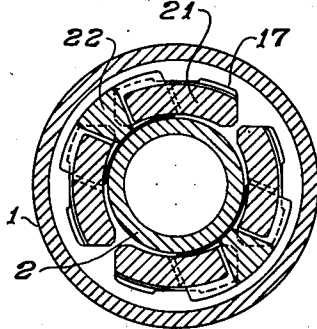


Fig. 3

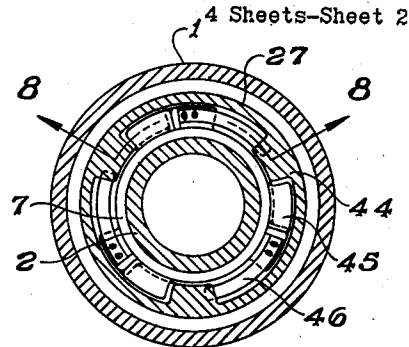


Fig. 7

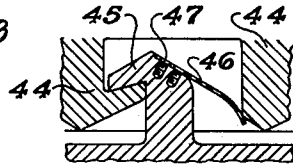


Fig. 8

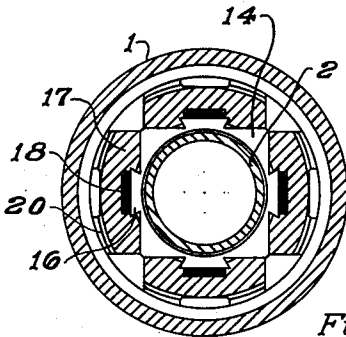


Fig. 4

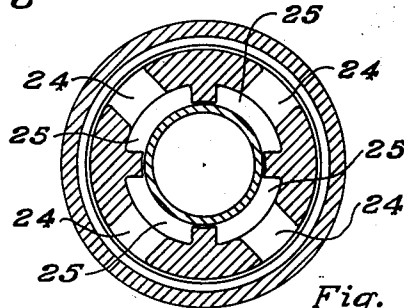


Fig. 5

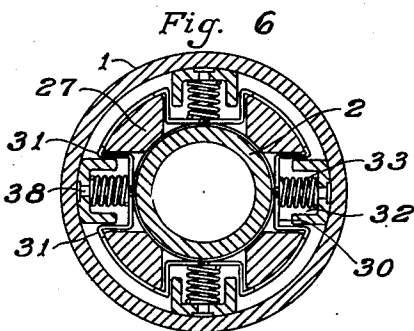


Fig. 6

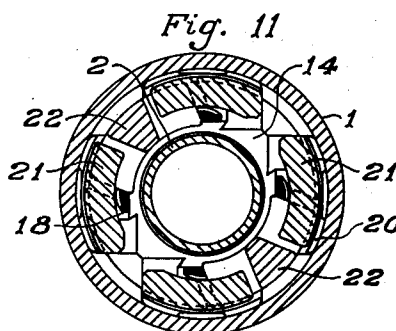


Fig. 11

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4 Sheets-Sheet 3

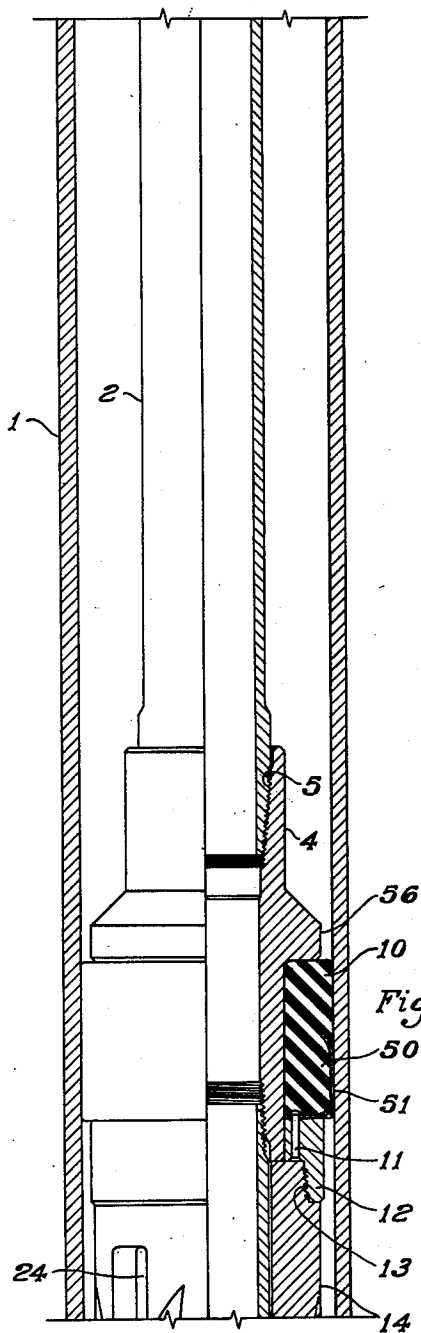
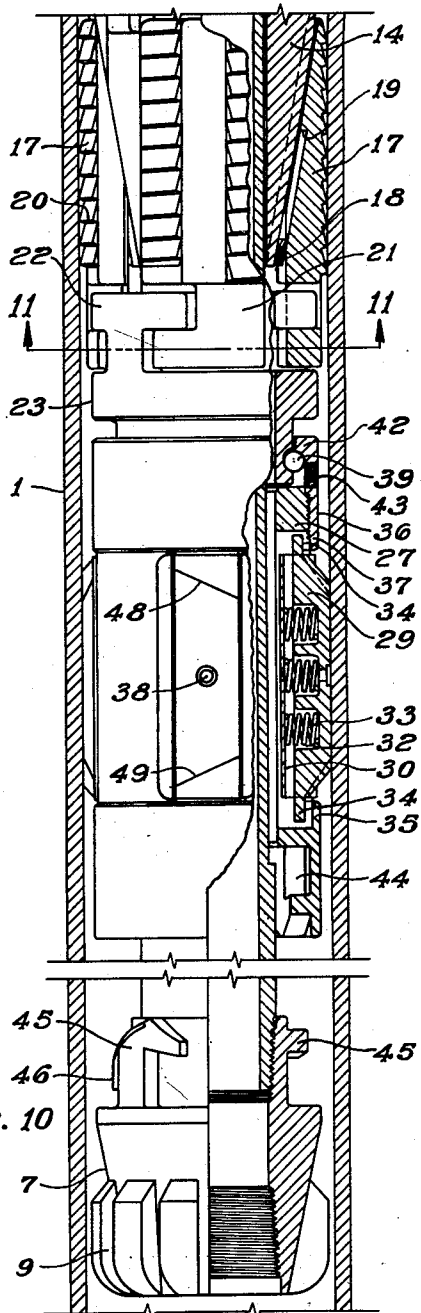


Fig. 9

Fig. 10



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4 Sheets-Sheet 4

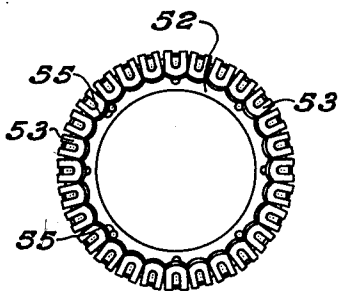


Fig. 12

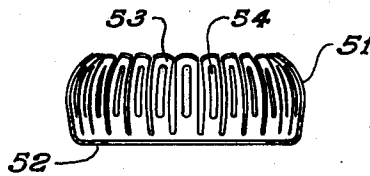


Fig. 13

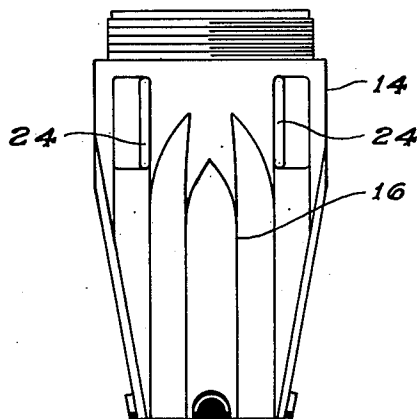


Fig. 14

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UNITED STATES PATENT OFFICE

2,639,773

PACKING MEANS FOR WELLS

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Application March 16, 1949, Serial No. 81,797

10 Claims. (Cl. 166—12)

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This invention relates to a well packer, and more particularly to an improved packer of the so-called hook wall casing type having a novel setting mechanism whereby inadvertent unlatching is reduced to a minimum, and dovetailed slips designed to be readily assembled and dis-

assembled. Although various designs of hook wall casing packers are known and used in oil field practice, in substantially all of these packers the setting mechanism consists of a pin or stud adapted to move in a J-slot or L-slot and is operated merely by partial rotation of the mandrel together with some vertical movement thereof. It is a recognized fact that packers employing such a setting mechanism are quite susceptible to inadvertent unlatching during the running and pulling of the packer.

Other setting mechanisms have been developed and employed with hook wall casing packers but none of them have operated entirely satisfactorily for various reasons.

Moreover, in substantially all of these packers heretofore known the slips are secured on the packer by means of some type of connecting link. Therefore, in assembling the packer it is necessary to attach each of the plurality of slips to a separate connecting link by means of a pin or bolt, or other similar device. It is obvious that such construction has the definite disadvantage in the time involved in assembling and disassembling the slips.

Accordingly, one object of the invention is to provide an improved hook wall casing packer which obviates the above difficulties.

Another object is to provide such a packer having a novel setting mechanism whereby premature setting by inadvertent unlatching is reduced to a minimum.

Another object is to provide such a packer having dovetailed slips designed to be assembled and disassembled readily without employment of connecting links and pins and by merely moving the slip retainer ring laterally out of engagement with the slips which then may be moved longitudinally out of engagement with the dovetailed surfaces of the slip cone, the assembling and disassembling of the slips being possible only when the mandrel is removed from the packer.

Another object is to provide such a packer including a novel setting mechanism, the operation of which requires rotation of the mandrel only in a right-hand direction.

A further object of the invention is to provide a novel setting mechanism for such a packer in-

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cluding pairs of cooperating hooks formed at circumferentially spaced intervals, respectively, on the sleeve carrying the friction blocks and on the bottom guide member, and a spring element for continuously urging such hooks into latched relationship during running and pulling of the packer thereby to prevent inadvertent setting of the latter.

A further object is to provide a novel setting mechanism for such a packer including pairs of cooperating hooks formed at circumferentially spaced intervals, respectively, on the sleeve carrying the friction blocks and on the bottom guide member, and a spring element associated with each pair of hooks for continuously urging such hooks into latched relationship during running and pulling of the packer.

A still further object is to provide such a packer having friction blocks formed in a manner such that surface irregularities on the casing encountered during running and pulling operations, and the flow of fluid in the casing past the friction blocks, tend to rotate the sleeve carrying the friction blocks in a direction as to maintain the setting mechanism in a latched condition.

A further object is to provide an improved resilient packing element including a reinforcing member for effectively preventing extrusion of the resilient body member between the casing and the packer under high pressures and for rigidly securing the resilient body member to the retainer ring.

A still further object is to provide a packer including novel friction block assembly whereby the friction blocks and associated springs may be readily replaced as a unit.

Other objects and features of this invention will be apparent from the description and drawings which follow.

Broadly, the improved hook wall casing packer, subject of this invention, includes the usual packing element, packing element expander attached to the mandrel, dovetailed slips for maintaining the packing element at a fixed position in the casing, and a sleeve disposed about the mandrel and carrying friction blocks for engaging the casing wall. In addition, this packer includes a bottom guide member connected to one end of the mandrel. The setting mechanism consists of pairs of cooperating hooks formed at circumferentially spaced intervals on said sleeve and bottom guide member, and a spring element for continuously urging such hooks into latched relationship during the running and pulling of the packer. To further insure that the packer will

not become set prematurely the ends of each of the friction blocks are beveled in a manner such that surface irregularities on the inner wall of the casing and flow of fluid in the latter tend to rotate the sleeve carrying the friction blocks in a direction to maintain the hooks in latched condition both during the running and pulling of the packer.

Another novel feature of the packer is in the design of the dovetailed slips, whereby they may be readily and easily assembled and disassembled. Each of the slips is provided with a dependent L-shaped extension, which extensions are adapted to engage complementary, arcuate T-shaped elements formed on a slip retainer ring disposed about the mandrel by lateral movement of the retainer ring when the slips are in their expanded positions and when the mandrel is removed from the packer. The presence of the mandrel within the packer prevents inadvertent disassembling of the slips.

The invention may be better understood by referring to the attached drawings in which—

Figure 1 is an elevational view, partially in section, showing the upper portion of a packer constructed in accordance with the invention, with the various elements in their relative positions prior to setting of the packer.

Figure 2 is an elevational view, partially in section, of the lower portion of the packer with the various elements in their relative positions prior to setting of the packer.

Figure 3 is a cross-sectional view taken along the line 3—3 of Figure 2.

Figure 4 is a cross-sectional view taken along the line 4—4 of Figure 2.

Figure 5 is a cross-sectional view taken along the line 5—5 of Figure 2.

Figure 6 is a cross-sectional view taken along the line 6—6 of Figure 2.

Figure 7 is a cross-sectional view taken along the line 7—7 of Figure 2.

Figure 8 is a partial development taken along the line 8—8 of Figure 7.

Figure 9 is an elevational view, partially in section, showing the upper portion of the packer of Figures 1 and 2 with the various elements in their relative positions after setting of the packer.

Figure 10 is an elevational view, partially in section, showing the lower portion of the packer of Figures 1 and 2 with the various elements in their relative positions after setting of the packer.

Figure 11 is a cross-sectional view taken along the line 11—11 of Figure 10.

Figure 12 is a plan view showing the reinforcing member of the resilient packing element.

Figure 13 is an elevational view showing the reinforcing member.

Figure 14 is an elevational view showing the slip cone removed from packer and including the stops for limiting the upward displacement of the slip cone.

Referring to the drawings, and in particular at this time to Figures 1, 2, 9, and 10, a packer constructed in accordance with this invention is shown positioned within a well casing generally denoted by numeral 1. The packer includes mandrel 2 to one end of which is threaded, as at 3, or otherwise secured, packing element expander 4 threaded in turn, as at 5, to tubing string 6 by means of which the packer is lowered to the desired position in the casing. To the other end of mandrel 2 bottom guide member 7 is threadably connected, by means of right-

hand threads 8, or other suitable means, such, for example, as welding, guide member 7 being larger than all other parts of the packer to prevent substantially damage to the operating parts of the packer by restrictions present on the inner wall of the casing, and having relatively narrow slots 9 extending longitudinally on the surface thereof to allow flow of fluid past the guide member as the packer is lowered and raised in the casing.

A cylindrical packing element 10 of rubber, or other suitable resilient material, which element will be described more fully hereinafter, is connected by rivets 11 or screws, or other means, to retainer ring 12 threaded, as at 13, to slip cone 14 disposed about mandrel 2, packing element 10 and retainer ring 12 preferably being of substantially the same internal and external diameter. The internal diameter of packing element 10 is such as to permit expander 4 upon movement of mandrel 2 relative to packing element 10 to pass thereto and to force it into sealing engagement with the casing wall, as described below.

Normally, the tapered end of slip cone 14 abuts shoulder 15 formed by turning down the upper portion of mandrel 2, as shown. Formed externally on slip cone 14 is a series of dovetailed guide surfaces 16 along which slips 17 are adapted to ride or move in the usual manner. Welded or otherwise secured to slip cone 14 at the lower end of each of the guide surfaces 16 is a stop 18, as shown in Figures 2, 10, and 14, for engaging a recovery shoulder, such as shoulder 19, formed on the associated slip and for limiting the upward movement of the slip cone. The slips 17 are provided with the usual teeth 20.

The lower ends of slips 17 terminate in L-shaped extensions 21 for engaging complementary, arcuate T-shaped members 22 formed on slip retainer ring 23 and for preventing substantially longitudinal movement of the slips relative to ring 23. It is readily seen that the slips are permitted free radial movement into and out of engagement with the casing wall under the force of slip cone 14. With mandrel 2 removed from the packer the slips may be assembled and brought into engagement with slip retainer ring 23, prior to running the packer in the well, by first longitudinally moving the slips downwardly into engagement with dovetailed guide surfaces 16 and then moving the slip retainer ring laterally in a manner to bring the T-shaped members 22 into engagement with L-shaped extensions 21. The mandrel is then inserted in position within the packer. It is to be understood that the slips cannot be disengaged without removal of the mandrel from the packer, since the slips are prevented by contact of T-shaped members 22 with the lower end of the slip cone from being moved upwardly on guide surfaces 16 a distance sufficient to allow disengagement thereof and since the slip retainer ring is prevented substantially by the mandrel from being moved laterally to disengage T-shaped members 22 from the L-shaped extensions of slips 17. When the packer is being run or pulled the various elements are in the relative positions shown in Figures 1 and 2, as above stated, and the slips are in a retracted position with the L-shaped extensions 21 adjacent mandrel 2, as shown in Figure 3 of the drawings. As the slips are forced outwardly by slip cone 14 during the setting operations, in a manner below described, the L-shaped extensions 21 also move

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outwardly, taking the position shown in Figure 11 when the slips are firmly set in the casing wall.

It should be pointed out that slip cone 14 is provided with a plurality of circumferentially disposed openings 24, as shown in Figures 2, 5, and 14, and also with vertically extending grooves 25 (Figure 5) formed in the inner wall thereof to provide a fluid flow path through the packer when it is being run into or pulled from the well. Each of the grooves communicates at one of its ends with one of the openings 24 and at its other end with the annular space 26 between packing element 10 and mandrel 2. It is seen that as the packer is lowered into the casing fluid present therein may flow through openings 24 into grooves 25 and thence upwardly into the casing above packing element 10. Obviously, as the packer is withdrawn from the well the fluid in the casing follows the same path past the packer but flow is in the opposite direction. This fluid flow path through the packer is blocked by expander 4 when the packer is set since, as described hereinafter, the packer is set by manipulation of mandrel 2 so as to move expander 4 into packing element 9 causing the latter to be compressed into sealing engagement with the casing wall.

A sleeve 27 is disposed about mandrel 2 below slip retainer ring 23, the sleeve having formed therein a series of openings 28 in which are mounted friction blocks 29. Referring to Figure 6, each friction block is housed in a channel-shaped holder 30 which, in turn, fits snugly in one of the openings in sleeve 27 and which is provided with shoulders 31 along the open side to bear on sleeve 27 and to maintain the holder in position in the associated opening. Further, each friction block has formed therein inside sockets 32 in which are located coil springs 33 whose inner ends bear against holders 30 and normally hold the outer ends of the friction blocks projected beyond sleeve 27 for the purpose of holding the sleeve at a selected place in the casing when it is desired to set the packer. The friction blocks 29 have their ends reduced, forming shoulders, such as shoulders 34 (Figures 2 and 10), which limit their outward movement by contact of shoulders 34 with lips 35 of sleeve 27 and coupling 36 threaded, as shown, to sleeve 27, the lower end 37 of which overhangs the openings 28. Screws, not shown, inserted in suitable holes 38 provided in friction blocks 29 may be employed for holding the latter in retracted position during assembling of the packer, which screws are removed prior to running the packer in the casing.

Sleeve 27 is rotatably connected to slip retainer ring 23 through coupling 36 by means of ball bearings, such as bearing 39, which ride on bearing races 40 and 41, respectively, formed, as shown in Figures 2 and 10, on the lower end of slip retainer ring 23 and at the upper end of coupling 36 which terminates in an internal lip 42 to prevent disengagement of ring 23 and coupling 36. Thus it is seen while sleeve 27 is connected to ring 23 the sleeve is free to rotate relative to the ring and, consequently, to slips 17 and packing element 10. When the packer is assembled, bearings 39 are inserted through a suitable opening in coupling 36 which is thereafter closed by means of plug 43.

It is one purpose of this invention to provide a novel setting mechanism for the packer whereby premature setting by inadvertent unlatching is reduced to a minimum. Referring to Figures 2, 7, 8, and 10, to this end sleeve 27 is terminated at its lower end in preferably three internally

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formed, downwardly extending hooks 44. It is to be understood that the number of hooks may be varied as desired without departing from the scope of this invention. A like number of similar

hooks 45 extending upwardly are formed exteriorly on the upper end of bottom guide member 7, each of which is adapted to engage one of the hooks 44 to form pairs of cooperating hooks at circumferentially spaced intervals about the lower end of the packer. The hooks are arranged in a manner such that they may be unlatched merely by partial right-hand rotation of the mandrel as sleeve 27 is held against rotation by the force of friction blocks 29 against the casing wall.

For the purpose of preventing premature unlatching of the packer there is provided resilient spring means for continuously urging rotation of sleeve 27 in a direction so as to keep the cooperating pairs of hooks in latched relationship. In the preferred embodiment of the invention shown in the drawings and particularly in Figures 2, 7, 8, and 10, a plurality of leaf springs 46 are employed to continuously apply force to the hooks 44 in a manner so as to keep the cooperating pairs of hooks in latched relationship during the running and pulling of the packer in the well, each of the leaf springs being affixed at one of its ends by any suitable means, such, for example, as by bolts 47 to one of the hooks 45 on bottom guide member 7 and bearing at its other end, when the hooks are in latched relationship, against the depending hook of the next succeeding pair of hooks. The force of springs 46 is sufficient to prevent substantially premature setting of the packer by inadvertent rotation of mandrel 2 when the packer is being run into or pulled from the well. Thus, if mandrel 2 is inadvertently rotated while the packer is being run or pulled, leaf springs 46 will impart corresponding motion to sleeve 27 against the force of friction blocks 29 on the casing wall, thereby preventing the unlatching of hooks 44 and 45. It is to be understood that other means may be provided for imparting such corresponding motion to sleeve 27 to prevent unlatching of hooks 44 and 45 without departing from the scope of this invention. Interference with the rotation of slips 17 and packing element 10 about mandrel 2 by surface irregularities on the casing wall, or from any other cause, has no effect on the rotation of sleeve 27 since the latter is rotatably connected to slip retainer ring 23 by means of ball bearings, as above described. However, when the packer is held stationary in the casing right-hand rotation of tubing 6 and, therefore, mandrel 2 will result in the unlatching of the hooks, notwithstanding the force of leaf springs 46. Similarly, unlatching of the packer may be brought about while it is being moved at a relatively low rate vertically in the casing by sufficient right-hand rotation of mandrel 2.

To further insure against unlatching of the packer while it is being moved along the casing and particularly by surface irregularities on the casing wall and flow of fluid past the packer, the ends of each of the friction blocks 29 are provided with beveled surfaces, such as surfaces 48 and 49, as shown in Figures 2 and 10, formed in a manner such that the force of such surface irregularities and fluid flow on the friction blocks 29 will tend to rotate sleeve 27 in a direction as to maintain the packer in latched condition. Thus it is seen that beveled surfaces 48 formed at the upper end of each of the friction blocks 29 extend downwardly and to the right whereas

beveled surfaces 49 formed at the lower end of each of the friction blocks extend upwardly and to the right. When the packer is being lowered into the well surface irregularities on the casing wall and fluid within the casing act on the lower ends of the friction blocks and due to beveled surfaces 49 tend to rotate the friction blocks 29 and, consequently, sleeve 27 in a right-hand direction, thereby tending to maintain the cooperating pairs of hooks in latched relationship. On the other hand, when the packer is pulled from the well the surface irregularities and fluid within the casing act on the upper ends of the friction blocks in a manner so as to urge rotation of the friction blocks and, consequently, sleeve 27 in a right-hand direction, again tending to maintain the cooperating pairs of hooks in latched relationship.

The packer, as shown in Figures 9 and 10, is identical with that shown in Figures 1 and 2, with the exception that the various components are in their relative positions following the setting of the packer.

Novel packing element 10 consists of a cylindrical body member 50 of rubber, or other suitable resilient material, and reinforcing member 51 for effectively preventing extrusion of the resilient body member between the casing and the packer under high pressures and for rigidly securing the resilient body member to the retainer ring. Referring to Figures 12 and 13, reinforcing member 51, which may be stamped from sheet metal, includes a base 52 having an axial opening for receiving mandrel 2 and a plurality of upwardly extending fingers 53 preferably of arcuate shape and extending inwardly at their free ends, each of the fingers being substantially in contact with adjacent like members when the packing element is not under compression. The fingers are provided with longitudinal slots 54 to assist in securing to the reinforcing member 51 the cylindrical body member 50 which is molded about fingers 53, the lower end of body member 50 abutting base 52. Prior to molding of the body member about fingers 53 it is preferable to secure reinforcing member 51 to retainer ring 12 by means of rivets disposed in suitable openings 55 formed in base 52. The reinforcing member effectively prevents extrusion of the resilient body member under high pressures and also provides a means for securing the body member to the retainer ring 12, thereby preventing substantially the tearing away of body member 50 as the packer is moved along the casing. It is obvious that when the resilient body member is compressed into sealing engagement with the casing fingers 53 will move outwardly at their free ends but will continue to secure the body member to the retainer ring.

Packing element expander 4 is adapted to pass into packing element 10 to cause the latter to be expanded into initial engagement with the casing wall. Shoulder 56 is formed externally about expander 4 to bear against the free end of packing element 10 and under sufficient force from tubing 6 to compress it into final sealing engagement with the casing wall.

In operation, after the packer has been assembled, as shown in Figures 1 and 2, it is lowered to the desired position within casing 1 by means of tubing string 6. As the packer moves downwardly fluid below the packer flows through openings 24 into grooves 25 and thence passes upwardly between packing element 10 and mandrel 2 into the casing above the packer. Surface

irregularities on the casing wall and fluid within the casing act on beveled surfaces 49 to urge sleeve 27 to rotate in a direction as to maintain the hooks in latched relationship. When the packer reaches the desired position tubing string 6 is rotated in a right-hand direction causing corresponding rotation of mandrel 2 thereby to unlatch hooks 44 and 45. The tubing string is then lowered an additional amount permitting slip cone 14 to move downwardly into slips 17 setting the latter firmly in the casing wall thereby preventing movement of packing element 10 and sleeve 27 longitudinally in the casing. Lowering of tubing 6 is continued until expander 4 moves into packing element 10 causing the latter to be compressed into sealing engagement with the casing wall. When it is desired to remove the packer it is only necessary to pull tubing 6 whereby expander 4 is withdrawn from packing element 10 and slip cone 14 is removed from the slips by the force of shoulder 15 acting on the lower end of the slip cone, thereby allowing packing element 10 and sleeve 27 to move upwardly with the mandrel when hooks 45 once again are brought into a position to engage hooks 44. Since at this time sleeve 27 begins to move upwardly in the casing the force of leaf springs 46 is sufficient to cause sleeve 27 to rotate, thereby relatching the hooks. As the packer is withdrawn from the casing surface irregularities and fluid contained therein act on beveled surfaces 48 to urge rotation of sleeve 27 in a direction so as to maintain the hooks in latched relationship thereby preventing inadvertent setting of the packer.

While in the foregoing there has been shown and described the preferred embodiment of this invention, it is to be understood that minor changes in the details of construction, combination, and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

I claim:

1. A packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, a sleeve provided about the mandrel and with which is associated the other of said members, pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, spring means for continuously urging said hook means into latched relationship during the running and pulling of the packer, means on the sleeve for frictionally engaging the casing wall, a slip retainer ring disposed about the mandrel and connected to the sleeve, said ring having formed thereon a series of T-shaped members, a plurality of slips for engaging the casing wall to prevent longitudinal movement of the sleeve therein, an L-shaped extension formed at the end of each of said slips to engage said T-shaped members thereby preventing longitudinal movement of said slips relative to said ring, and bearing means for rotatably connecting said ring to the sleeve, said spring means consisting of a spring element secured to each of the hook means provided on the mandrel and bearing against adjacent hook means.

2. A packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, a sleeve provided about the mandrel and with which is associated the other of said members, pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, spring means for continuously urging said hook means into latched relationship during the running and pulling of the packer, means on the sleeve for frictionally engaging the casing wall, a slip retainer ring disposed about the mandrel and connected to the sleeve, said ring having formed thereon a series of T-shaped members, a plurality of slips for engaging the casing wall to prevent longitudinal movement of the sleeve therein, an L-shaped extension formed at the end of each of said slips to engage said T-shaped members thereby preventing longitudinal movement of said slips relative to said ring, and bearing means for rotatably connecting said ring to the sleeve, said spring means consisting of a spring element secured to each of the hook means provided on the mandrel and bearing against adjacent hook means, and said friction engaging means having their ends beveled in a manner such that surface irregularities on the casing wall encountered by the packer during the running and pulling thereof tend to rotate the sleeve in a direction as to maintain said pairs of hook means in latched relationship.

3. In a packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, and a sleeve provided about the mandrel and with which is associated the other of said members, a setting mechanism comprising pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, and spring means operatively engaging each of the hook means when said pairs of hook means are in latched relationship to urge said hook means to remain in latched relationship during running and pulling of the packer.

4. In a packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, and a sleeve provided about the mandrel and with which is associated the other of said members, a setting mechanism comprising pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, and spring means operatively engaging each of the hook means when

said pairs of hook means are in latched relationship to urge said hook means to remain in latched relationship during running and pulling of the packer, said spring means consisting of a plurality of spring elements secured to the hook means on one of said mandrel and said sleeve and adapted to bear against the other hook means when said pairs of hook means are in latched relationship.

5. In a packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, and a sleeve provided about the mandrel and with which is associated the other of said members, a setting mechanism comprising pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, and spring means operatively engaging each of the hook means when said pairs of hook means are in latched relationship to urge said hook means to remain in latched relationship during running and pulling of the packer, said spring means consisting of a spring element secured to each of the hook means provided on the mandrel and bearing against adjacent hook means on the sleeve when said pairs of hook means are in latched relationship.

6. In a packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members and a sleeve provided about the mandrel and with which is associated the other of said members, the combination of a slip retainer ring disposed about the mandrel and rotatably connected to said sleeve, said ring having formed thereon a series of T-shaped members, a plurality of slips for engaging the casing wall to prevent longitudinal movement of said sleeve therein, and an L-shaped extension formed at the end of each of said slips to engage said T-shaped members thereby preventing longitudinal movement of said slips relative to said ring, and friction reducing bearing means interposed between said ring and said sleeve.

7. In a packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, and a sleeve provided about the mandrel and with which is associated the other of said members, a setting mechanism comprising pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, and means on said sleeve for frictionally engaging the casing wall, said frictionally engaging means each having their upper and lower ends, respectively, inclined from the horizontal, said upper ends being inclined downwardly in the direction opposite to the open sides of the hook means provided on the sleeve, and said lower ends being inclined upwardly in the direction opposite to the open side of the hook

means provided on the sleeve, whereby surface irregularities on the casing wall encountered by the packer during the running and pulling thereof tend to rotate said sleeve in a direction to maintain said pairs of hook means in latched relationship.

8. In a packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, and a sleeve provided about the mandrel and with which is associated the other of said members, a setting mechanism comprising pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, spring means operatively engaging each of the hook means when said pairs of hook means are in latched relationship to urge said hook means to remain in latched relationship during running and pulling of the packer, and means on said sleeve for frictionally engaging the casing wall, said frictionally engaging means each having their upper and lower ends, respectively, inclined from the horizontal, said upper ends being inclined downwardly in the direction opposite to the open sides of the hook means provided on the sleeve and said lower ends being inclined upwardly in the direction opposite to the open side of the hook means provided on the sleeve, whereby surface irregularities on the casing wall encountered by the packer during the running and pulling thereof tend to rotate said sleeve in a direction to maintain said pairs of hook means in latched relationship.

9. A packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, a sleeve provided about the mandrel and with which is associated the other of said members, pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, spring means operatively engaging each of the hook means when said pairs of hook means are in latched relationship to urge said hook means to remain in latched relationship during running and pulling of the packer, a slip retainer ring disposed about the mandrel and rotatably connected to the sleeve, said ring having formed thereon a series of T-shaped members, a plurality of slips for engaging the casing wall to prevent longitudinal movement of the sleeve therein, and an L-shaped extension formed at

the end of each of said slips to engage said T-shaped members thereby preventing longitudinal movement of said slips relative to said ring.

10. A packer for a well including a packing element member, an expander member, a mandrel with which is associated one of said members, a sleeve provided about the mandrel and with which is associated the other of said members, pairs of cooperating hook means provided at circumferentially spaced intervals, respectively, on the mandrel and the sleeve for maintaining the packing element member and the expander member in spaced apart relationship and for permitting the expander member to be brought into contact with the packing element member to compress the latter into sealing engagement with the casing wall upon rotatable movement of the mandrel relative to the sleeve, spring means operatively engaging each of the hook means when said pairs of hook means are in latched relationship to urge said hook means to remain in latched relationship during running and pulling of the packer, a slip retainer ring disposed about the mandrel and rotatably connected to the sleeve, said ring having formed thereon a series of T-shaped members, a plurality of slips for engaging the casing wall to prevent longitudinal movement of the sleeve therein, and an L-shaped extension formed at the end of each of said slips to engage said T-shaped members thereby preventing longitudinal movement of said slips relative to said ring, and means on said sleeve for frictionally engaging the casing wall, said frictionally engaging means each having their upper and lower ends, respectively, inclined from the horizontal, said upper ends being inclined downwardly in the direction opposite to the open sides of the hook means provided on the sleeve and said lower ends being inclined upwardly in the direction opposite to the open side of the hook means provided on the sleeve, whereby surface irregularities on the casing wall encountered by the packer during the running and pulling thereof tend to rotate said sleeve in a direction to maintain said pairs of hook means in latched relationship.

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