Feb. 3, 1959 R. C. BAKER 2,871,949

RELEASABLE CLUTCH DEVICE FOR WELL TOOLS

Filed Jan. 20, 1956 2 Sheets-Sheet 1

FIG. 1.

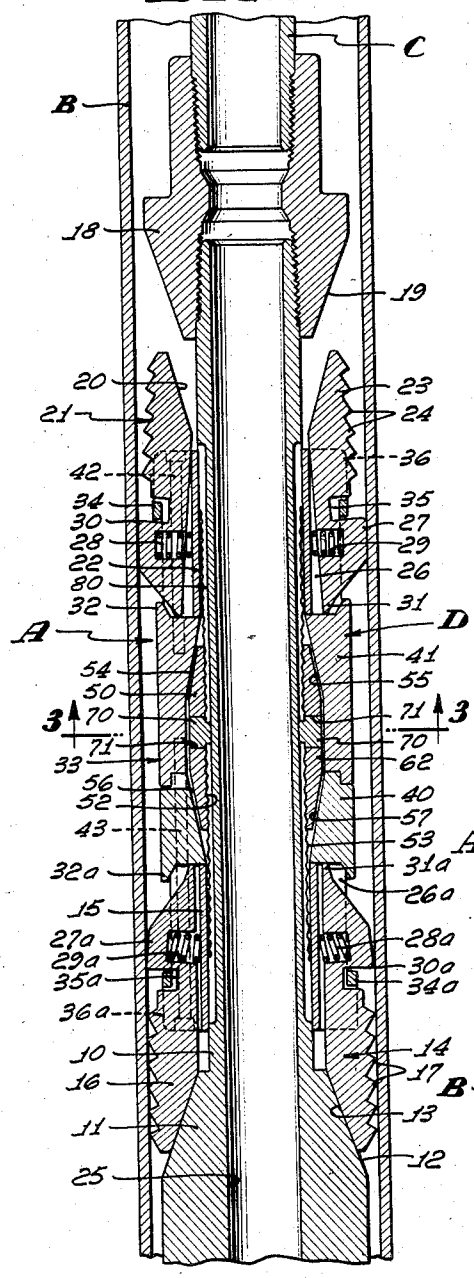


FIG. 2.

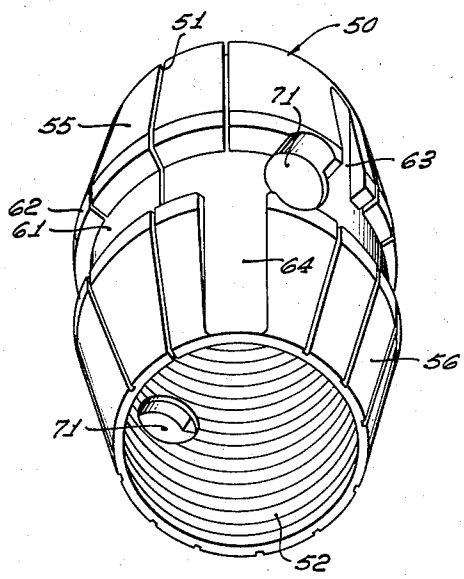
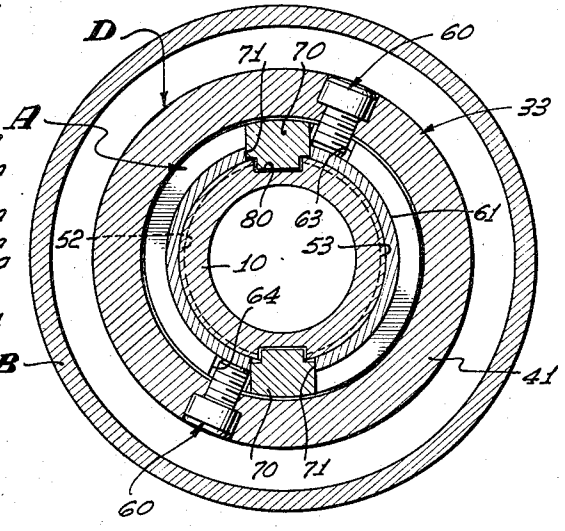


FIG. 3.



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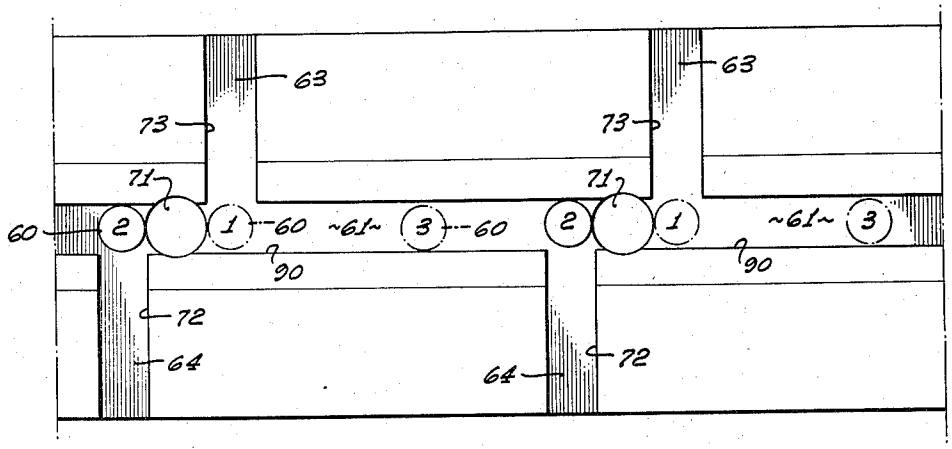


FIG. 4.

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United States Patent Office

2,871,949

Patented Feb. 3, 1959

2,871,949

RELEASABLE CLUTCH DEVICE FOR WELL TOOLS

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Application January 20, 1956, Serial No. 560,332

14 Claims. (Cl. 166—237)

The present invention relates to subsurface well tools, and more particularly to clutch apparatus for releasably securing parts of such tools together while in the well bore.

An object of the present invention is to provide a releasable clutch apparatus capable of controlling relative longitudinal movement between portions of a subsurface tool while the latter is disposed in a well bore, the clutch apparatus being capable of being held selectively in an ineffective position, in a position permitting relative longitudinal movement between parts of the tool in one direction but not in the other, or in a position permitting relative longitudinal movement between parts of the tool in the opposite direction but not in the other.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail, for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a longitudinal section through a well tool embodying the apparatus disposed in a well casing;

Fig. 2 is an isometric projection, on an enlarged scale, of a clutch or ratchet ring forming part of the clutch apparatus;

Fig. 3 is an enlarged cross-section taken along the line 3—3 on Fig. 1;

Fig. 4 is a diagrammatic view illustrating different operative positions of the clutch apparatus.

The apparatus disclosed in the drawings is a tubing anchor A, which is lowered in a string of well casing B by means of a tubular string of tubing or drill pipe C extending to the top of the hole. The ability of parts of the tubing anchor to be expanded outwardly into anchoring engagement with the well casing depends upon a clutch device D embodied in the apparatus.

The invention will be described with particular reference to the tubing anchor disclosed, but it is to be understood that such description is merely illustrative of the invention, in that the clutch device could be used for controlling the relative longitudinal movement between parts of other subsurface well tools.

As specifically shown, the well tool A includes a central body **10** having a lower expander **11** secured thereto, this expander having an outer expander surface **12** inclined in an upward and inward direction for coaction with companion tapered surfaces **13** on a plurality of lower circumferentially spaced slip members **14** that are carried within a lower slip sleeve **15** separate from and adapted to slide longitudinally with respect to the body of the tool. The lower slip members **14** have anchoring portions **16** provided with external wickers **17** adapted to grip the casing, the lower slips coacting with

the lower expander **11** to anchor the well tool to the casing against upward movement therewithin.

The upper end of the body **10** is threadedly secured to an upper expander **18** which has an expander surface **19** inclined in a downward and inward direction for coaction with companion tapered surfaces **20** on a plurality of circumferentially spaced upper slip members **21**, which are carried in an upper slip sleeve **22** slidably mounted on the body of the tool. The upper slip members have anchoring portions **23** provided with external wickers or teeth **24** adapted to dig into the wall of the well casing, the upper slips coacting with the upper expander **18** to prevent downward movement of the well tool within the well casing.

The upper expander **18** is threadedly attached to the lower end of the tubular string C, that extends to the top of the well bore. The apparatus is moved longitudinally within the well casing as a result of the longitudinal movement of the tubing string. If desired, the body **10** of the apparatus can be made tubular and have a fully open passage **25** therethrough of a diameter at least equal to the inside diameter of the tubular string C, in order that fluid can pass in either direction through the tubular string and the tubular body of the tool.

The upper slip members **21** are disposed in circumferentially spaced longitudinal slots **26** in the upper slip sleeve **22**. In addition to its anchoring portion **23**, each slip member **21** has a friction drag portion **27** below the anchoring portion adapted to frictionally engage the wall of the well casing B. The necessary friction between the drag portion **27** and the wall of the well casing is supplied by a helical spring **28** engaging the base of the slot **26** in the slip sleeve **22** containing the slip member, and also engaging the base of a socket **29** formed in the friction drag portion, the line of force or action of the spring **28** being below the upper or fulcrum end **30** of the friction drag portion **27**.

Outward movement of the slip members **21** under the action of their compression springs **28** is limited by engagement of the lower foot portions **31** of the slip members with an upwardly extending stop rim or flange **32** at the upper portion of a clutch sleeve **33** encompassing the body of the tool. Such outward movement is also limited by a coupling or stop ring **34** encompassing the slip members and disposed within external grooves **35** formed in the slip members **21** between their anchoring and drag portions **23**, **27**, the base of such grooves being engageable with the ring **34**. Joint longitudinal movement of the upper slip members **21** with the upper slip ring **22** is provided by the engagement of the coupling or stop ring **34** with an upper flange **36** extending outwardly from the upper slip sleeve **22**. Such flange will engage the coupling ring **34**, which will, in turn, engage the lower sides of the slip grooves **35**, to carry the slips **21** in a downward direction within the well casing B with the upper slip sleeve **22**. Joint upward movement of the slips **21** with the slip sleeve **22** will occur as a result of the engagement of the clutch sleeve **33** with the foot portions **31** of the slip members.

The lower set of slip members **14** and the lower slip sleeve **15** can be identical to the upper slip members **21** and upper slip sleeve **22**, the parts merely being reversely arranged with respect to the upper slip sleeve and upper slip members. Accordingly, the same reference numerals have been applied to the lower slip sleeve and lower slip members as the upper slip structure, with the suffix "*a*" added thereto. The lower slip sleeve **15** abuts the lower portion **40** of the clutch sleeve structure **33**, the upper end of this lower portion engaging the lower end of the upper clutch sleeve portion **41**. The upper slip sleeve **22** is secured to the upper clutch sleeve portion **41** by a plurality of longitudinally extending screws **42**,

whereas the lower slip sleeve 15, lower clutch sleeve portion 40, and upper clutch sleeve 41 are secured to one another and to the upper clutch sleeve portion by a plurality of longitudinally extending screws 43. By virtue of the assembled relation just described, the upper slip sleeve 22, upper and lower portions 41, 40 of the clutch sleeve structure 33, and the lower slip sleeve 15 are secured to one another for joint longitudinal movement relative to the body 10 of the tool and the upper and lower expanders 18, 11.

The upper and lower slip members 21, 14 may occupy an intermediate or neutral position with respect to the upper and lower expanders 18, 11, and may be held in this position by coupling or clutching the clutch sleeve structure 33 to the body 10 of the tool, so that the latter is prevented from moving longitudinally in both directions with respect to the parts surrounding it. With the clutch D in a coupling condition, the upper and lower slip members 21, 14 cannot be expanded outwardly against the well casing B as a result of longitudinal movement of the body of the tool and the upper and lower expanders. However, should the clutch be released, the tubular string C, body 10 and expanders 11, 18 can be moved in a downward direction, the friction drag portions 27, 27*a* on the upper and lower sets of slips resisting their downward movement by virtue of their frictional engagement with the well casing. As a result, the upper expander 18 can be moved downwardly into the upper slip members 21, whose casing anchoring portions 23 are normally disposed inwardly away from the casing wall by the action of the springs 28 on the drag block portions 27 holding the latter in lengthwise frictional engagement with the casing. When the upper expander 18 moves down within the anchoring portions 23 of the upper slips, it rocks the anchoring portions outwardly about the upper ends 30 of the drag block portions as a fulcrum bearing against the casing, and against the force of the compression springs 28, the upper expander 18 wedging within the upper anchoring portions 23 and expanding them outwardly until their wickers 24 embed in the casing, which will anchor the well tool against downward movement in the well casing. The friction drag and foot portions 27, 31 of the upper slips 21 merely rock inwardly about the fulcrums 30 as pivot points, to assume an inclined condition.

Instead of expanding the upper slip members 21 into anchoring engagement with the casing, the lower slip members 14 can be expanded outwardly by moving the tubular string C upwardly, which will move the body 10 and expanders 11, 18 in an upward direction, the lower expander 11 moving within the anchoring portions 16 of the lower slip members to rock such portions and their wickers 17 outwardly into firm engagement with the well casing, by virtue of the fulcruming of the lower ends 30*a* of the drag portions 27*a* on the wall of the well casing. The remainder of the drag portions and the foot portions 31*a* of the slip members move inwardly with respect to the well casing against the force of the helical springs 28*a*. The well tool A is thereby anchored to the well casing B against upward movement therewithin.

The ability of the body 10 and expanders 18, 11 to be moved longitudinally relative to the upper and lower slip members 21, 14 depends upon the condition of the clutch device D, of which the body 10 and the clutch sleeve or housing 33 surrounding it form parts. A ratchet ring 50 having a longitudinally extending split 51 completely therethrough encompasses the body of the tool and is disposed within the clutch housing. This clutch ring is inherently contractible, to cause its internal clutch teeth 52 to mesh with companion external clutch teeth 53 on the periphery of the tubular body 10. The companion clutch teeth may be formed as helical threads of generally V-shaped form, so that longitudinal movement of the body 10 tends to carry the ratchet ring 50 with it, although when the ratchet ring is prevented from moving longitudinally with the body, the tapered faces of the V-shaped teeth or threads 52, 53 will cam the ratchet ring 50 laterally outward of the body, permitting the body 10 to move longitudinally therethrough, as described hereinbelow.

The ratchet ring 50 is provided with an upper frusto-conical external surface 54 tapering in an upward and inward direction and adapted to coact with a companion internal upper tapered surface 55 on the clutch housing, in order to be wedged between the clutch sleeve 32 and body 10 of the tool, and couple these two members together for joint upward movement. Similarly, the ratchet ring 50 has a lower frusto-conical or tapered surface 56 inclined in a downward and inward direction for coaction with a companion lower internal surface 57 in the clutch housing. Downward movement of the ratchet ring 50 with respect to the clutch housing 33 will cause it to wedge between the lower cam surface 57 of the clutch housing and the body 10 of the tool, to couple the body and clutch housing together for joint downward movement. Assuming that the clutch ring 50 is held in an intermediate position out of wedging relation to both the upper and lower cam surfaces 55, 57 on the housing 33, a clearance space exists between the periphery of the clutch ring and the inner surfaces of the housing, which will permit the body thread 53 to act on the clutch ring threads 52 and expand the clutch or ratchet ring 50 outwardly, disengaging the body 10 therefrom, and allowing the body to move longitudinally therethrough, and also longitudinally with respect to the clutch housing 33.

The ability of the clutch ring 50 to move longitudinally with respect to the clutch housing 33 depends upon the relative location of one or more clutch screws 60 fitting within a slotted or grooved arrangement in the exterior of the ratchet ring 50. Actually, a pair of diametrically opposed clutch screws 60 is secured to the clutch housing 33, each screw being transversely arranged and threaded in the clutch housing and extending into a slot structure provided in the exterior of the ratchet ring. This slot structure includes a transverse or horizontal slot portion 61 disposed in an intermediate cylindrical part 62 of the ratchet ring between its upper and lower tapered surfaces 52, 56. The transverse slot or groove portion 61 merges at one end into an upper slot or groove 63 of the ratchet ring, and at its other end into a lower slot or groove 64 in the ratchet ring. Inasmuch as a pair of clutch screws 60 are employed, the transverse, upper and lower slot arrangement 61, 63, 64 described above extends only part way around the ratchet ring 50, there being a similar diametrically opposed arrangement of upper, transverse and lower slots in the ring 50.

When the clutch screws 60 are disposed in the transverse slot portions 61 the ratchet ring 50 is prevented from moving longitudinally in either direction with respect to the clutch sleeve or housing 33. Assuming that the ratchet ring has been turned so as to place the clutch screws 60 at one end of the transverse slots 61 and in alignment with the upper slots 63, then the clutch screws will prevent upward movement of the ratchet ring 50 with respect to the clutch housing, but will permit downward movement of the ratchet ring relative to the clutch housing 33, allowing the lower tapered surfaces 56, 57 to coengage and effecting a coupling of the body 10 with respect to the clutch housing 33 against relative downward movement. Such downward movement of the ratchet ring 50 with respect to the clutch housing 33 is permitting by virtue of the fact that the upper slots 63 then move downwardly along and receive the clutch screws 60.

Assuming that the ratchet ring 50 is turned in the opposite direction, so as to locate the clutch screws 60 at the other end of the transverse slot 61 and in alignment with the lower longitudinal slots 64, then the screws will pre-

vent downward movement of the ratchet ring **50** with respect to the clutch housing **33**, but will permit its upward movement with respect to the clutch housing and effect a wedging action by the upper tapered surfaces **54**, **55** on the ratchet ring and keep its teeth **52** fully meshed and coupled to the tool body teeth **53**. Such upward movement of the ratchet ring **50** within the housing **33** is permitted by the entry of the clutch screws **60** in the lowest longitudinal slots **64**.

When the clutch screws **60** are in alignment with the upper longitudinal slots **63**, the clutch ring **50** is prevented from moving upwardly of the clutch housing **33**, or to an upper clutching position. Accordingly, upward movement of the body **10** will cause the body teeth **53** to cam the ring **50** out of engagement with the body, allowing the body to ratchet freely in an upward direction with respect to the clutch sleeve or housing **33**, and causing the lower expander **11** to be wedged within the lower slip members **14** and anchor the latter firmly against the well casing B. Similarly, when the clutch screws **60** are disposed in alignment with the lower longitudinal slots **64**, the ratchet ring **50** cannot move downwardly with respect to the clutch housing **33** to a lower wedging position. Instead, downward movement of the body will now cause its thread or ratchet teeth **53** to expand the ratchet ring **50** out of engagement with the body, allowing the body to move downwardly within the clutch structure and with respect to the slip members **21** until the upper expander **18** expands the upper slip members outwardly into anchoring engagement with the wall of the well casing B.

Assuming that the clutch screws **60** are in an intermediate position between the upper and lower slots **63**, **64**, or in the transverse slot portions **61** only, then the ratchet ring **50** is prevented from moving in both longitudinal directions with respect to the clutch sleeve **33**, the body **10** of the tool thereby being permitted to ratchet or move in both longitudinal directions within the ratchet ring **50** and with respect to the upper and lower slip members **21**, **14**.

The clutch screws are definitely located in alignment with the upper longitudinal slots **63** or the lower longitudinal slots **64** by locating and drive pins or keys **70** which are disposed in diametrically opposite holes **71** in the ratchet ring, and extending into the transverse slots **61** between the upper and lower slots **63**, **64**. As disclosed most clearly in Figs. 2 and 4, each locating pin **70** is disposed adjacent one side of one of the slots, such as the right wall **72** of a lower slot **64**, as depicted in Fig. 4, this pin also being disposed adjacent the other wall **73** of the upper slot. Accordingly, when a clutch screw **60** engages one side of one of the locating pins **70**, it will be in alignment with one of the longitudinal slots, such as an upper slot **63**, and when it engages the other side of the diametrically opposite pin **70**, it will be disposed in alignment with the other slot, such as the lower slot **64**.

The locating pins **70** can also be caused to serve a double purpose, and that is to effect a positive rotatable driving connection between the body **10** of the tool and the ratchet ring **50**. Accordingly, each locating pin **70** extends inwardly into a longitudinal slot or keyway **80** in the body of the tool, so that turning of the tool body **10** in either direction will cause the ratchet ring **50** to turn positively therewith. The keyway **80** and locating pin portion extending thereinto need not be used, if desired, reliance then being placed upon the frictional engagement between the ratchet ring **50** and the body **10** to cause the ring **50** to turn with the body. However, it is preferred to provide a positive driving connection which causes the ring **50** to turn with the body, but which will still permit the body **10** to move longitudinally with respect to the ring **50** when longitudinal movement of the latter is prevented by the clutch screw and slot arrangement.

In the operation of the specific apparatus disclosed in the drawings, it is run in the well casing with the ratchet

ring **50** turned to the left, so that the locating pins **70** engage the clutch pins or screws **60**, the latter being in alignment with the upper slots **63** (position 1 in Fig. 4). Downward movement of the body **10** will, therefore, carry the clutch ring **50** downwardly with it, since the clutch screws **60** cannot interfere with such movement, shifting relatively upward into the upper slots **63**, the ring **50** being shifted downwardly, to be wedged into the lower portion of the clutch housing **33**, and thereby effectively couple the body **10** and clutch housing **33** together against relative downward movement. Of course, when such clutching action occurs, the slips **21**, **14** have preferably been located in their intermediate position between the upper and lower expanders **18**, **11**, in which their drag portions **27**, **27***a* are in full frictional engagement with the wall of the well casing and their anchoring portions **23**, **16** are tilted inwardly away from the wall of the wall casing B.

The apparatus is run in the well casing in the condition just described until the point is reached at which it is to be anchored to the casing. If the lower set of slips **14** is to be expanded, to anchor the tool A to the casing B against upward movement therewithin, it is merely necessary to move the tubing string C, and the expanders **18**, **11** and body **10** of the tool, in an upward direction, which action will be permitted by the engagement of the clutch screws **60** with the lower walls **90** of the transverse slots **61**, the clutch screws **60** merely moving from the upper slots **63** into engagement with the lower walls **90** just described. Thereafter, upward movement of the body **10** will not be accompanied by upward movement of the ratchet ring **50**, which will be held in a neutral position, the body teeth **53** then camming the ratchet ring **50** outwardly, so that the body **10** ratchets upwardly therethrough until the lower expander **11** expands the lower slips **14** into anchoring engagement with the well casing.

If it is desired to anchor the upper slips **21** in engagement with the well casing, the tubular string C and body **10** of the tool need merely to be turned, so as to turn the ratchet ring **50** relative to the clutch housing **33** and the clutch screws **60**, the latter moving from the No. 1 position diagrammatically illustrated in Fig. 4, along the transverse slots **61**, into engagement with the other locating pins **70**, which places them in alignment with the lower vertical or longitudinal slots **64** (position 2 in Fig. 4). The tubular string C, expanders **18**, **11** and body **10** of the tool can now be lowered, the clutch screws **60** preventing downward shifting of the ratchet ring **50** into wedging relation with the lower cam surface **57**. The body **10** will then ratchet freely through the ring **50** until the upper expander **18** has expanded the upper slip members **21** outwardly into anchoring engagement with the wall of the well casing B.

With the clutch screws or pins **60** in the No. 2 position just described, the taking of an upward pull on the tubular string C and the body **10** of the tool will then move the ratchet ring **50** upwardly within the housing **33** and wedge the latter within the upper cam surface **55** on the housing, to couple the body **10** of the tool to the clutch housing **33** against relative upward movement. Accordingly, the lower expander **11** could not then be moved upwardly sufficiently to expand the lower slips **14** into anchoring engagement with the casing wall. With the parts in such position, that is, with the clutch screws **60** in the No. 2 position, the entire apparatus can be elevated in the well casing and removed to the top of the hole.

If desired, the body **10** of the tool and the ratchet ring **50** can be turned, to place the clutch screws **60** in an intermediate position in the transverse slots **61**, such as the No. 3 position disclosed in Fig. 4. When in this position, the ratchet ring **50** is held in its neutral position, and cannot clutch the body **10** to the housing **33** for both directions of longitudinal movement of the body. Accordingly, the body **10** can be shifted freely in either longitudinal directions, ratcheting freely through the ring

50, to place the upper expander 18 behind the upper sets of slips 21 and anchor the latter into engagement with the well casing, or, to place the lower expander 11 upwardly into the lower slip members 14 and expand the latter into anchoring engagement with the wall of the well casing.

During the time that the apparatus is in the well casing, the clutch D can be manipulated to permit the tool A to be lowered to a different position within the well casing B, or to be elevated to a different position in the well casing. Whenever the tool is to be lowered in the well casing, the body 10 of the tool is first shifted so that the slip members 21, 14 occupy an intermediate position with respect to the upper and lower expanders 18, 11, in which their anchoring portions 23, 16 will be tilted inwardly out of engagement with the wall of the well casing. If the tool is to be lowered, then the tubular string C and body 10 of the tool are rotated in the proper direction, so as to place the clutch screws 60 in the No. 1 position, wherein downward movement of the body 10 will shift the ratchet ring 50 downwardly with it into engagement with the lower clutch surface 57 of the housing 33. On the other hand, if the apparatus is to be elevated in the well casing, assurance is had that the slips 21, 14 are in their intermediate position between the upper and lower expanders 18, 11; whereupon the body 10 of the tool is rotated in the proper direction to place the clutch screws 60 in their No. 2 position (disclosed in Fig. 4), wherein upward movement of the body 10 will carry the ratchet ring 50 upwardly with it and wedge it against the upper tapered surface 55 of the clutch housing 33, thereby precluding relative longitudinal movement between the body and expanders, on the one hand, and the upper and lower slip members, on the other hand.

It is, accordingly, apparent that a clutch structure has been provided which can be controlled so as to allow free ratcheting of the body 10 of the tool with respect to the clutch housing 33 in both directions (No. 3 position), which can be conditioned such that the ratchet ring 50 is effective to clutch the body 10 of the tool to the clutch housing 33 against relative downward movement, while permitting free upward ratcheting of the body within the ratchet ring 50 (No. 1 position), or which can be conditioned so that the ratchet ring 50 couples the body 10 of the tool to the clutch housing 33 against relative upward movement with respect thereto, while permitting free downward ratcheting of the body 10 within the ratchet ring 50 (No. 2 position). The location of the clutch screws 60 in appropriate alignment with the upper longitudinal slots 63 or the lower longitudinal slots 64 is positively determined by their engagement with the locating pins 70 extending into the transverse slot portions 61, these pins also functioning to effect a positive drive connection between the body 10 of the tool and ratchet ring 50.

The inventor claims:

1. In a well tool adapted for operation in a well bore: a body member connectible to a running-in string for moving the tool within the well bore; a clutch housing member surrounding said body member; an expansible and contractible clutch ring between said members; said ring and one of said members having coengageable tapered surfaces for holding said ring in clutching engagement with the other of said members upon longitudinal movement in one direction of said ring relative to said one member; said ring and said one member having other coengageable tapered surfaces for holding said ring in clutching engagement with the other of said members upon longitudinal movement in the opposite direction of said ring relative to said one member; and coengageable means on said one member and ring adapted to be located in one relative position for preventing upward movement of said ring relative to said one member while permitting relative downward movement of said ring relative to said one member, adapted to be located in another relative position for preventing downward movement of said ring relative to said one member while permitting relative upward movement of said ring relative to said one member.

2. In a well tool adapted for operation in a well bore: a body member connectible to a running-in string for moving the tool within the well bore; a clutch housing member surrounding said body member; an expansible and contractible clutch ring between said members; said clutch ring and one of said members having coengageable tapered clutch teeth; said clutch ring and the other of said members having coengageable tapered surfaces for shifting said ring laterally toward said one member upon longitudinal movement in one direction of said ring relative to said other member to hold said clutch teeth coengaged; said ring and said other member having other coengageable tapered surfaces for shifting said ring laterally toward said one member upon longitudinal movement in the other direction of said ring relative to said other member to hold said clutch teeth coengaged; and coengageable means on said one member and ring adapted to be located in one relative position for preventing upward movement of said ring relative to said other member while permitting relative downward movement of said ring relative to said other member, and adapted to be located in another relative position or for preventing downward movement of said ring relative to said other member while permitting relative upward movement of said ring relative to said other member.

3. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable tapered surfaces for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said ring and housing having other coengageable surfaces for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; and coengageable means on said housing and ring adapted to be located in one relative position for preventing upward movement of said ring relative to said housing while permitting relative downward movement of said ring with respect to said housing, and adapted to be located in another relative position for preventing downward movement of said ring relative to said housing while permitting relative upward movement of said ring with respect to said housing.

4. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and body having coengageable tapered clutch teeth; said clutch teeth and housing having coengageable tapered surfaces for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said ring and housing having other coengageable tapered surfaces for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; and coengageable means on said housing and ring adapted to be located in one relative position for preventing upward movement of said ring relative to said housing while permitting relative downward movement of said ring relative to said housing and adapted to be located in another relative position for preventing downward movement of said ring relative to said housing while permitting relative upward movement of said ring with respect to said housing.

5. In a well tool adapted for operation in a well bore: a body member connectible to a running-in string for

moving the tool within the well bore; a clutch housing member surrounding said body member; an expansible and contractible clutch ring between said members; said ring and one of said members having coengageable tapered surfaces for holding said ring in clutching engagement with the other of said members upon longitudinal movement in one direction of said ring relative to said one member; said ring and said one member having other coengageable tapered surfaces for holding said ring in clutching engagement with the other of said members upon longitudinal movement in the opposite direction of said ring relative to said one member; said ring and said one member having a companion pin and slot structure including a transverse portion merging into an upwardly directed longitudinal portion and also into a downwardly directed longitudinal portion; said ring being rotatable by said other member to selectively place said pin in alignment with said upwardly directed longitudinal slot or in alignment with said downwardly directed longitudinal slot.

6. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable tapered surfaces for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said ring and housing having other coengageable surfaces for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said ring having a transverse slot merging into an upwardly directed longitudinal slot and also into a downwardly directed longitudinal slot; a pin on said housing receivable in said transverse upwardly directed and downwardly directed slots; said ring being rotatable with said body to selectively locate said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot.

7. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable tapered surfaces for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said ring and housing having other coengageable surfaces for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said ring having a transverse slot merging into an upwardly directed longitudinal slot and also into a downwardly directed longitudinal slot; a pin on said housing receivable in said transverse, upwardly directed and downwardly directed slots; and locating means on said ring engageable with said pin to selectively position said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot.

8. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable tapered surfaces for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said ring and housing having other coengageable surfaces for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said ring having a transverse slot merging into an upwardly directed longitudinal slot and also into a downwardly directed longitudinal slot; a pin on said housing receivable in said transverse, upwardly directed and downwardly directed slots; said ring being rotatable with said body to selectively locate said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot; and means providing a positive rotation transmitting driving connection between said body and ring while permitting said body to move longitudinally with respect to said ring.

9. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable tapered surfaces for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said ring and housing having other coengageable surfaces for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said ring having a transverse slot merging into an upwardly directed longitudinal slot and also into a downwardly directed longitudinal slot; a pin on said housing receivable in said transverse, upwardly directed and downwardly directed slots; and locating means on said ring engageable with said pin to selectively position said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot; said means providing a rotation transmitting driving connection between said body and said ring which permits longitudinal movement of said body with respect to said ring.

10. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; and expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable upper surfaces tapering in an upward and inward direction for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said clutch ring and housing having coengageable lower tapered surfaces inclined in a downward and inward direction for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said housing having a transverse pin; said ring having a transverse slot merging at one end into an upwardly directed slot and at its other end into a downwardly directed slot, all of said slots being adapted to receive said pin; said ring being rotatable by said body to selectively locate said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot.

11. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable upper surfaces tapering in an upward and inward direction for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said clutch ring and housing having coengageable lower tapered surfaces inclined in a downward and inward direction for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said housing having a transverse pin; said ring having a transverse slot merging at one end into an upwardly directed slot and at its other end into a downwardly directed slot, all of said slots being adapted to receive said pin; said ring being rotatable by said body to selectively locate said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot; and means providing a positive rotation transmitting driving connection between said body and ring while permitting longitudinal movement in both directions of said body with respect to said ring.

12. In a well tool adapted for operation in a well bore;

a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; an expansible and contractible clutch ring between said body and housing; said clutch ring and housing having coengageable upper surfaces tapering in an upward and inward direction for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said clutch ring and housing having coengageable lower tapered surfaces inclined in a downward and inward direction for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said housing having a transverse pin; said ring having a transverse slot merging at one end into an upwardly directed slot and at its other end into a downwardly directed slot, all of said slots being adapted to receive said pin; said ring being rotatable by said body; and locating means on said ring engageable with said pin to selectively position said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot.

13. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; a split, inherently contractile clutch ring between said body and housing; said clutch ring and housing having coengageable upper surfaces tapering in an upward and inward direction for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said clutch ring and housing having coengageable lower tapered surfaces inclined in a downward and inward direction for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said housing having a transverse pin; said ring having a transverse slot merging at one end into an upwardly directed slot and at its other end into a downwardly directed slot, all of said slots being adapted to receive said pin; said ring being rotatable by said body to selectively locate said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot.

14. In a well tool adapted for operation in a well bore: a body connectible to a running-in string for moving the tool within the well bore; a clutch housing surrounding said body; a split, inherently contractile clutch ring between said body and housing; said clutch ring and housing having coengageable upper surfaces tapering in an upward and inward direction for holding said ring in clutching engagement with said body upon upward movement of said ring relative to said housing; said clutch ring and housing having coengageable lower tapered surfaces inclined in a downward and inward direction for holding said ring in clutching engagement with said body upon downward movement of said ring relative to said housing; said housing having a transverse pin; said ring having a transverse slot merging at one end into an upwardly directed slot and at its other end into a downwardly directed slot, all of said slots being adapted to receive said pin; said ring being rotatable by said body; locating means on said ring engaging with said pin to selectively locate said pin in alignment with said upwardly directed slot or in alignment with said downwardly directed slot; said body having a longitudinal slot therein receiving said locating means to provide a positive driving connection between said body and ring while permitting longitudinal movement of said body in both directions with respect to said ring.

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