June 13, 1961 M. B. CONRAD 2,988,149

SUBSURFACE WELL TOOL CONTROL APPARATUS

Original Filed April 21, 1958 2 Sheets-Sheet 1

FIG. 1.

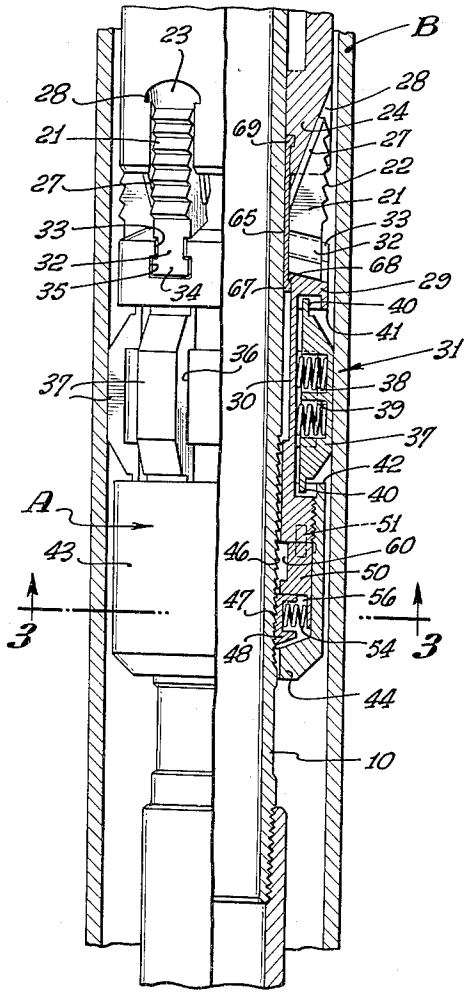
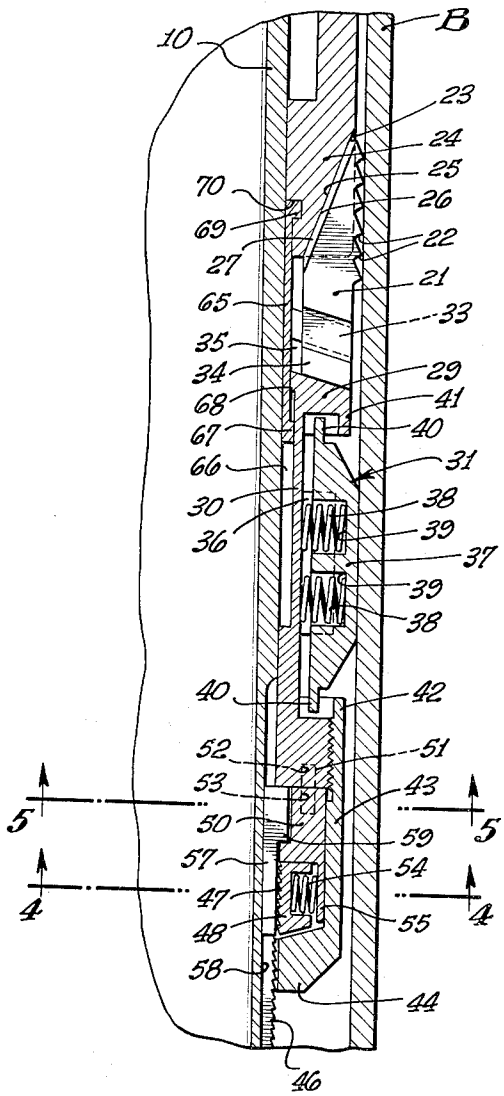


FIG. 2.



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SUBSURFACE WELL TOOL CONTROL APPARATUS

Original Filed April 21, 1958 2 Sheets-Sheet 2

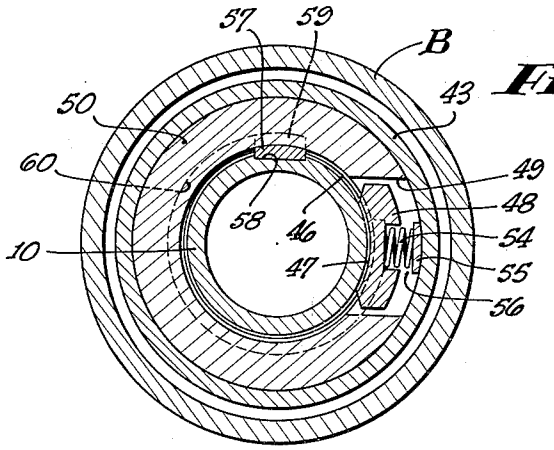

FIG. 3.

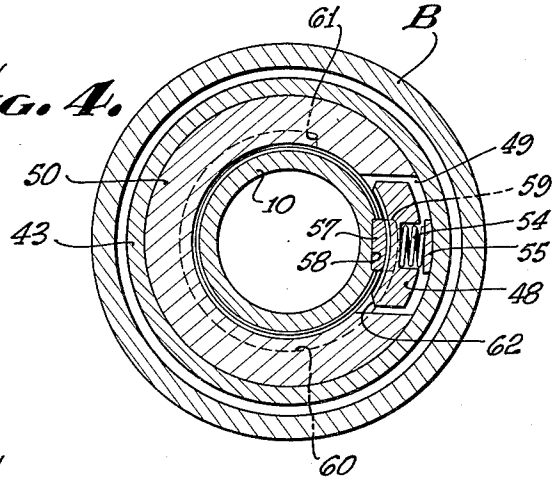

FIG. 4.

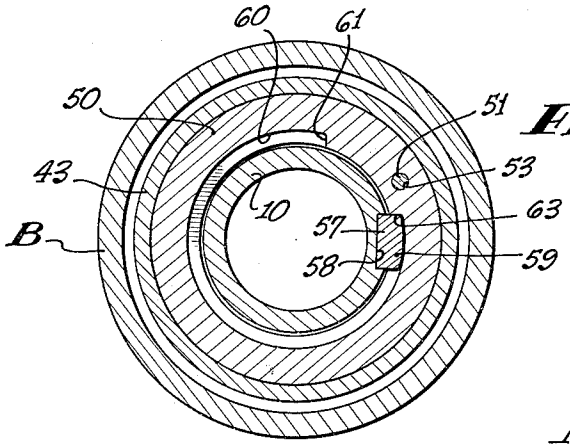

FIG. 5.

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2,988,149

SUBSURFACE WELL TOOL CONTROL APPARATUS

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Original application Apr. 21, 1958, Ser. No. 729,971. Divided and this application June 2, 1958, Ser. No. 739,088

20 Claims. (Cl. 166—237)

The present invention relates to subsurface well bore equipment, and more particularly to control or clutch apparatus for determining the operation of the equipment in the well bore.

The present application is a division of my application for "Retrievable Double Grip Well Packer," Serial No. 729,971, filed April 21, 1958.

An object of the invention is to provide a well tool adapted for operation in a well bore and embodying an improved clutch or latch device for coupling parts of the tool together, or for permitting relative movement between the parts when the clutch or latch device is released.

Another object of the invention is to provide a clutch or latch device for controlling relative longitudinal movement between parts of a subsurface well tool, the clutch device being adapted to secure the parts together for joint movement at a multiplicity of longitudinal positions that the parts occupy with respect to each other.

A further object of the invention is to provide a clutch or latch device for selectively controlling relative longitudinal movement between parts of a subsurface well tool, and embodying a clutch element shiftable laterally from its clutching position by a cam device which also functions as a locator for positively positioning itself out of engagement with the clutch element or in clutch releasing engagement therewith.

An additional object of the invention is to provide a clutch or latch device for selectively controlling relative movement between parts of a subsurface well tool, which is relatively simple in construction, comparatively economical to manufacture, and which possesses a high load carrying capacity.

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 combined longitudinal section and side elevational view of a portion of a well apparatus disposed in a well casing, with the control apparatus in engaged relation;

FIG. 2 is an enlarged fragmentary longitudinal section through the apparatus with the control apparatus in uncoupled position;

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

FIG. 4 is a cross-section taken along the line 4—4 on FIG. 2;

FIG. 5 is a cross-section taken along the line 5—5 on FIG. 1.

The control mechanism A is disclosed in the drawings as constituting part of a well packer or anchor, fully shown and described in the above-identified parent case. Only the anchor portion of the apparatus is disclosed herein, which is adapted to be set against the well casing B as a result of downward movement of the central or main tubular body 10 of the apparatus with respect to the parts surrounding it. As described in the parent application, the tubular body is connectible to a tubular string (not shown), such as tubing or drill pipe extending through the well casing to the top of the well bore. It is through manipulation of this tubular string and the body 10 of the tool that the control mechanism or clutch apparatus A is selectively placed in a clutching or an unclutching position.

The portion of the tool illustrated is adapted to anchor it against downward movement in the well casing. It includes a lower set of circumferentially spaced slips 21 having external wickers or teeth 22 facing in a downward direction to resist downward movement of the tool in the well casing B when engaged therewith. The slips 21 are received in longitudinal slots 23 in a lower expander 24, the slips having inner expander surfaces 25 tapering in a downward and inward direction and engaging companion tapered surfaces 26 in the lower expander and forming the base portions of the slots 23. The slips 21 are slidably splined to the lower expander 24, as by having opposed tongues 27 extending outwardly from the sides of each slip which are received within companion grooves 28 in the expander in the sides of each slot 23, the tongues 27 and grooves 28 being inclined in a downward and inward direction. Thus, downward movement of the lower expander 24 with respect to the lower slips 21, which will occur when the control mechanism A is released, and in response to downward movement of the body 10 of the tool, will expand the slips 21 outwardly into engagement with the well casing B, whereas relative upward movement of the lower expander with respect to the slips 21, in response to upward movement of the body 10 of the tool, will cause the sides of the grooves 28 to engage the tongues 27 and pull the slips 21 inwardly to their initial retracted position.

As explained in the above-identified parent application, the expander 24 is movable longitudinally with the body 10 of the tool by parts (not shown) connected to the expander and body and surrounding the latter. Such parts are not essential to an understanding of the present invention.

The lower slips 21 are movable jointly in longitudinal directions by slidably coupling them to a slip ring portion 29 of the drag body 30 of a drag device 31 which encircles the body 10 of the tool. The lower portions of the slips 21 are constituted as heads 32 slidable in radial slots 33 in the slip ring portion 29, the heads having outwardly directed tongues 34 slidably mounted in companion side grooves 35 in the slip ring portion 29. The lower slip tongues 34 and slip ring grooves 35 are preferably inclined slightly in a downward and outward direction, which will facilitate movement of the slips 21 toward and from engagement with the wall of the well casing B.

Movement of the slips 21 within the well casing is resisted by the drag device 31, which includes the aforementioned body 30, that has circumferentially spaced longitudinal slots 36 therein, in which radially movable drag blocks 37 are slidably received, these drag blocks being urged outwardly into frictional engagement with the wall of the well casing B by helical compression springs 38 disposed in sockets 39 in each drag block and engaging the base of the drag block body grooves 36. Outward movement of the drag blocks 37 under the influence of the springs 38, as when the tool is out of the well casing B, is limited by engagement of the upper and lower terminal portions 40 of each drag block with an upper flange 41 depending from the slip ring portion 29 and by the upper end 42 of a clutch housing 43 threadedly secured on the lower portion of the drag body 30, the lower por-

tion of the clutch housing 43 having an inwardly directed flange 44.

The slips 21 are expanded outwardly against the well casing B whenever the body or mandrel 10 of the tool is permitted to lower relative to the drag body 30, such lowering movement being transferred through portions of the tool surrounding the body and above the lower expander (which are disclosed in the aforesaid parent application). The lowering movement of the body 10 relative to the drag body 30 and slips 21 is prevented by the clutch or latch mechanism A, of which the clutch housing 43 forms a part.

The clutch mechanism includes a plurality of clutch or ratchet teeth 46 formed on the periphery of the body or mandrel 10 of the tool, these teeth facing in a downward direction and being engageable with companion upwardly facing clutch teeth 47 on a dog or clutch element 48 disposed in a radial slot 49 provided in a sleeve or ring 50 disposed within the clutch housing 43. The sleeve or ring 50 is prevented from turning with respect to the clutch housing 43 and the drag body 30 by a longitudinal pin 51 extending into a bore 52 in the drag body and into an aligned bore 53 in the clutch sleeve 50.

The dog 48 is urged inwardly, so that its teeth 47 mesh with the body teeth 46, by a helical compression spring 54 bearing against the dog 48, with its outer end bearing against a finger or spring seat 55 that may be integral with the clutch sleeve 50. When the dog 48 is engaged with the body ratchet or clutch teeth 46, a space 56 exists between the outer end of the dog and the spring seat 55 to permit the dog to be shifted in a lateral outward direction to disengage the ratchet or clutch teeth 46, 47 from one another. Such disengagement occurs under the action of a cam member in the form of a key 57 disposed in a longitudinal keyway 58 in the body 10, this key having an upper, outer portion 59 movable within an arcuate cavity or recess 60 in the clutch sleeve 50.

The mandrel or body 10 is adapted to turn the key 57 with it relative to the clutch sleeve 50 and the clutch dog 48 between a position in which the outer key portion 59 engages one stop shoulder 61 at the end of the arcuate cavity 60, wherein the dog 48 can be shifted by the spring 54 into engagement with the ratchet teeth 46, and a second position in which the key 57 will engage the tapered end 62 of the dog and cam the latter outwardly to disengage its teeth 47 from the body teeth 46, the key coming to rest against another stop shoulder 63 in the sleeve, at the end of the arcuate recess or cavity 60, fully across the dog 48 to hold the latter out of clutching engagement with the body teeth 46. As disclosed in the drawings by way of example, the body or mandrel 10 must rotate the key 57 about 270 degrees from its position of engagement against one stop 61 to its position of engagement against the other stop 63. Thus, if the key engages one of the stops 61, so that the clutch dog 48 can be coupled to the body 10 of the tool, then rotation of the mandrel 10 within the drag device 31 and clutch housing sleeve 50 of about 270 degrees is required for the key 57 to engage and cam the dog 48 out of its clutching relation to the body 10 of the tool, and to hold the dog in such disengaged position. The body 10 of the tool is rotated in a right-hand direction, to shift the dog 48 from clutching engagement with the body teeth 46, and is rotated in a left-hand direction to enable the dog to reengage the body clutch teeth. Such relative movement can occur since the drag device 31 is resisting or preventing rotation of the clutch mechanism A surrounding the body 10 of the tool.

Although the dog 48 must be cammed by the key 57 out of clutching engagement with the body 10 of the tool, in order to lower the body 10 relative to the clutch member 43 surrounding it, the body 10 can be shifted upwardly relative to the clutch member 43, surrounding it merely by taking an upward pull thereon, in view of the one-way or ratcheting action of the body teeth 46 upon the companion teeth 47 of the clutch dog 48.

With the clutch dog 48 engaged, downward movement of the body 10 of the tool will carry the drag device 31 and the lower slips 21 downwardly with it. Such downward movement is also transferred to the lower expander 24 through a segmental retaining or pulling sleeve 65 disposed within the slips 21, the lower end of the sleeve being movable within an annular space 66 between the body or mandrel 10 and the upper portion of the drag body 30, the lower part of the sleeve having an outwardly directed flange 67 adapted to engage a downwardly facing shoulder 68 on the slip portion 29 of the apparatus. The upper portion of the retaining sleeve 65 is disposed within the lower portion of the expander 24 having an outwardly directed flange 69 disposed within an internal groove 70 in the lower expander. It is evident that the downward movement of the drag body 30 will exert a pull through the retaining sleeve 65 on the lower expander 24, pulling the latter downwardly with it.

In the absence of the retaining or pulling sleeve 65, the slips 21, when disposed in their innermost position, would also exert a downward pull on the lower expander 24 through the inclined tongue 27 and groove 28 interconnection.

In the use of the apparatus illustrated in the drawings, the parts will originally occupy the position shown in FIGS. 1 and 3, in which the lower control mechanism and clutch A is engaged, the ratchet teeth 46 on the body extending to a substantial extent above the clutch dog 48. With the clutch A engaged, downward movement between the body 10, the portions of the apparatus (not shown) above the expander 24, the expander 24, and the lower slips 21 cannot occur, so that all of the parts are movable downwardly through the well casing B as a unit. Such lowering movement continues until the location is reached in the well casing at which the tool is to be anchored therein. The tubular string (not shown) is turned to the right to release the clutch A, such turning motion being transmitted through the body 10 connected thereto, which rotates the key 57 into engagement with the dog 48, camming the latter radially outward from engagement with the clutch teeth 46 and holding it in such position, the parts then being in the relative condition illustrated in FIGS. 2, 4 and 5. The body 10 of the tool can now be lowered, but in view of the release of the dog element 48 therefrom, such lowering action will not carry the outer clutch members surrounding the body 10, drag device 31, slips 21, pulling sleeve 65, lower expander 24, and the parts (not shown) thereabove downwardly with it. The drag device 31 resists downward movement of such outer parts, the body 10 moving downwardly until it engages and shifts the parts (not shown) above the expander, shifting such parts downwardly, as well as the expander 24 in a downward direction. Since the drag device 31 is resisting downward movement of the lower slips 21, downward movement of the lower expander 24 and the pulling sleeve 65 connected thereto will occur within and with respect to the lower slips 21, urging the latter radially outward into anchoring engagement with the wall of the well casing B, as shown in FIG. 2. The apparatus is now anchored against downward movement in the well casing, the body 10 having been shifted downwardly through the released clutch element or dog 48, with its ratchet teeth 46 still disposed on both sides of the dog 48.

In the event it is desired to release the apparatus from the well casing B, an upward pull is taken on the tubular string (not shown) and the mandrel 10 of the tool, the mandrel moving upwardly without any resistance from the clutch mechanism A, since the body ratchet teeth 46 merely ratchet freely through the clutch dog 48 in an upward direction, even if the cam or key 57 is not in a position to retain the clutch dog 48 out of clutching engagement with the body teeth 46. The

upward movement of the body 10 occurs relative to the clutch mechanism A and the slips 21 since the drag device 31 is resisting or preventing upward movement of such parts by frictionally engaging the wall of the well casing. As the body 10 moves upwardly, it will engage the parts (not shown) above the expander 24, moving them upwardly and then shifting the expander 24 upwardly relative to the slips 21, which will be returned to their retracted position because of the inclined tongue and groove interconnection 27, 28. Upward movement of the lower expander 24 relative to the drag device 31 can occur until the lower flange 67 of the pulling sleeve 65 again engages the shoulder 68 of the slip ring portion 29 of the drag device, whereupon the entire drag device 31 and clutch A is moved upwardly with the body 10 of the tool. The entire apparatus can be elevated in the well casing B and removed entirely therefrom, if desired.

In the event the apparatus is to be lowered in the well casing B from its prior setting point, the tubular string (not shown) and the body 10 of the tool are rotated to the left, to be assured that the cam or key 57 has been removed from the clutch dog 48 and has been placed again in engagement with the stop 61 at the end of the cavity 60. Such engagement of the key 57 with the stop 61 will cause the clutch A to be reengaged. Downward movement of the body 10 of the tool will now result in pulling of all of the mechanism surrounding the body, and which is in a retracted position, down the casing with it without effecting setting of any of the parts. In the event the tool is again to be anchored to the well casing at the new location, the tubing string (not shown) and body 10 of the tool are again rotated to the right and within the drag device 31 and the clutch mechanism A surrounding the body 10 of the tool and the key 57, until the cam or key 57 again engages the stop shoulder 63, in which position the cam has shifted the clutch dog 48 outwardly to disengage its ratchet teeth 47 from the body ratchet 46 and to hold the clutch dog in such position. The body 10 of the tool can again be lowered, sliding downwardly along the key 57, which fits in the elongate groove 58, in order to shift the expander 24 downwardly within the slips 21 and force the latter radially outward into anchoring engagement with the well casing B.

The clutch A can be engaged or released for a plurality of longitudinal positions of the body 10 with respect to the dog 48. Rotation of the body 10 and the key 57, to remove the latter from engagement with the dog 48, will cause the spring 54 to engage the ratchet teeth 47 of the clutch dog with the body ratchet teeth 46, coupling the body 10 to the outer clutch members, enabling all parts to be moved downwardly together. The clutch A can be released at any time merely by rotating the body 10 of the tool in the proper direction to reengage the key or cam 57 with the clutch dog 48 and shift it outwardly to an unclutched position, the key or cam 57 retaining the dog in such unclutched position, as positively determined by engagement of the key portion 59 with the stop shoulder 63.

The clutch mechanism A is comparatively simple, possessing relatively few parts, and being capable of positively and selectively allowing the clutch to engage, or releasing the clutch to permit relative longitudinal movement between the body and the parts surrounding it.

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 member slidable longitudinally on said body member; one of said members having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means slidable longitudinally on said one member and operable in response to relative movement between said members to engage the face of said element confronting said one member and shift said clutch element laterally from clutching engagement with the teeth on said one member to uncouple said members from each other.

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 member slidable longitudinally on said body member; one of said members having a plurality of one-way ratchet teeth extending longitudinally therealong; a clutch dog movable generally radially on the other of said members and having companion one-way ratchet teeth adapted to mesh with said other ratchet teeth to couple said members for longitudinal movement together; and cam means slidable longitudinally on said one member and operable in response to relative movement between said members to engage and shift said clutch dog generally radially from clutching engagement with the teeth on said one member to uncouple said members from each other.

3. 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 member slidable longitudinally on said body member; one of said members having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; cam means slidable longitudinally on said one member and operable in response to relative movement between said members to engage the face of said element confronting said one member and shift said clutch element laterally from clutching engagement with the teeth on said one member to uncouple said members from each other; and locating means for selectively positioning said cam means out of engagement with said clutch element or in engagement with said face of said clutch element to hold said element from engagement with the teeth on said one member.

4. 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 member slidable longitudinally on said body member; one of said members having a plurality of one-way ratchet teeth extending longitudinally therealong; a clutch dog movable generally radially on the other of said members and having companion one-way ratchet teeth adapted to mesh with said other ratchet teeth to couple said members for longitudinal movement together; cam means slidable longitudinally on said one member and operable in response to relative movement between said members to engage and shift said clutch dog generally radially from clutching engagement with the teeth on said one member to uncouple said members from each other; and locating means for selectively positioning said cam means out of engagement with said clutch dog or in engagement with said clutch dog to hold said dog from engagement with the teeth on said one member.

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 member slidable longitudinally on said body member; one of said members having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means on said one member operable in response to relative movement between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said one mem-

ber to uncouple said members from each other; said cam means engaging said other member for selectively locating said cam means out of engagement with said clutch element or in engagement with the teeth of said clutch element to hold said element from engagement with the teeth on said one member.

6. 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 member slidable longitudinally on said body member; one of said members having a plurality of one-way ratchet teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having companion one-way ratchet teeth adapted to mesh with said other ratchet teeth to couple said members for longitudinal movement together; and cam means on said one member operable in response to relative movement between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said one member to uncouple said members from each other; said cam means engaging said other member for selectively locating said cam means out of engagement with said clutch element or in engagement with the teeth of said clutch element to hold said element from engagement with the teeth on said one member.

7. 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 member slidable longitudinally on said body member; one of said members having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means slidably keyed to said one member and rotatable therewith relative to said clutch element upon relative rotation between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said one member to uncouple said members from each other.

8. 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 member slidable longitudinally on said body member; one of said members having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; one of said members having a longitudinal groove; and a key slidable relatively in said groove and rotatable with said one member relative to said clutch element upon relative rotation between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said one member to uncouple said members from each other.

9. 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 member slidable longitudinally on said body member; one of said members having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on the other of said members and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; one of said members having a longitudinal groove; a key slidable relatively in said groove and rotatable with said one member relative to said clutch element upon relative rotation between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said one member to uncouple said members from each other; and means on said other member engageable by said key for selectively locating said key out of engagement with said clutch element or in engagement with said clutch element to hold said element from engagement with the teeth on said one member.

10. 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 member slidable longitudinally on said body member; one of said members having a plurality of one-way ratchet teeth extending longitudinally therealong; a clutch dog movable generally radially on the other of said members and having companion one-way ratchet teeth adapted to mesh with said other ratchet teeth to couple said members for longitudinal movement together; one of said members having a longitudinal groove; a key slidable relatively in said groove and rotatable with said one member relative to said clutch dog upon relative rotation between said members to engage and shift said clutch dog generally radially from clutching engagement with the teeth on said one member to uncouple said members from each other; and means on said other member engageable by said key for selectively locating said key out of engagement with said clutch dog or in engagement with said clutch dog to hold said dog from engagement with the teeth on said one member.

11. 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 member slidable longitudinally on said body member; one of said members having a longitudinal groove; a clutch element movable laterally on the other of said members into and out of clutching engagement with said one member to couple said members for longitudinal movement together; and a key slidable relatively in said groove and rotatable with said one member relative to said clutch element upon relative rotation between said members to engage and be disposed between said clutch element and said one member to shift said clutch element laterally from clutching engagement with said one member and to hold said clutch element from clutching engagement with said one member.

12. 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 member slidable longitudinally on said body member; one of said members having a longitudinal groove; a clutch element movable laterally on the other of said members into and out of clutching engagement with said one member to couple said members for longitudinal movement together; a key slidable relatively in said groove and responsive to relative rotation between said members to engage and be disposed between the face of said clutch element confronting said one member and said one member to shift said clutch element laterally from clutching engagement with said one member and to hold said clutch element from clutching engagement with said one member; and means on said other member engageable by said key for selectively locating said key out of engagement with said clutch element or in engagement with said clutch element to hold said element from clutching engagement with said one member.

13. 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 member slidable longitudinally on said body member; said body member having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on said clutch member and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means slidable longitudinally on said body member and rotatable with said body member relative to said clutch element upon relative movement between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said body member to uncouple said members from each other.

14. 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 member

slidable longitudinally on said body member; said body member having a plurality of one-way ratchet clutch teeth extending longitudinally therealong; a clutch dog movable generally radially on said clutch member and having one-way ratchet teeth companion to and adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means slidable longitudinally on said body member and rotatable with said body member relative to said dog upon relative rotation between said members to engage and shift said clutch dog generally radially from clutching engagement with the teeth on said body member to uncouple said members from each other.

15. 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 member slidable longitudinally on said body member; said body member having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on said clutch member and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; cam means slidable longitudinally on said body member and operable in response to relative movement between said members to engage the face of said element confronting said body member and shift said clutch element laterally from clutching engagement with the teeth on said body member to uncouple said members from each other; and locating means for selectively positioning said cam means out of engagement with said clutch element or in engagement with said face of said clutch element to hold said element from engagement with the teeth on said body member.

16. 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 member slidable longitudinally on said body member; said body member having a plurality of one-way ratchet clutch teeth extending longitudinally therealong; a clutch dog movable generally radially on said clutch member and having one-way ratchet teeth companion to and adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; cam means slidable longitudinally on said body member and rotatable with said body member relative to said dog upon relative rotation between said members to engage the face of said dog confronting said body member and shift said clutch dog generally radially from clutching engagement with the teeth on said body member to uncouple said members from each other; and locating means for selectively positioning said cam means out of engagement with said clutch dog or in engagement with said face of said clutch dog to hold said dog from engagement with the teeth on said body member.

17. 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 member slidable longitudinally on said body member; said body member having a plurality of one-way ratchet clutch teeth extending longitudinally therealong; a clutch dog movable generally radially on said clutch member and having one-way ratchet teeth companion to and adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means on said body member rotatable with said body member relative to said dog upon relative rotation between said members to engage the face of said dog confronting said body member and shift said clutch dog generally radially from clutching engagement with the teeth on said body member to uncouple said members from each other; said cam means engaging said clutch member for selectively locating said cam means out of engagement with said clutch dog or in engagement with said face of said clutch dog to hold said dog from engagement with the teeth on said body member.

18. 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 member slidable longitudinally on said body member; said body member having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on said clutch member and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; and cam means slidably keyed to said body member and rotatable therewith relative to said clutch element upon relative rotation between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said body member to uncouple said members from each other.

19. 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 member slidable longitudinally on said body member; said body member having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on said clutch member and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; said body member having a longitudinal groove; and a key slidable relatively in said groove and rotatable with said body member relative to said clutch element upon relative rotation between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said body member to uncouple said members from each other.

20. 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 member slidable longitudinally on said body member; said body member having a plurality of clutch teeth extending longitudinally therealong; a clutch element movable laterally on said clutch member and having clutch teeth adapted to mesh with said other clutch teeth to couple said members for longitudinal movement together; said body member having a longitudinal groove; a key slidable relatively in said groove and rotatable with said body member relative to said clutch element upon relative rotation between said members to engage and shift said clutch element laterally from clutching engagement with the teeth on said body member to uncouple said members from each other; and means on said clutch member engageable by said key for selectively locating said key out of engagement with said clutch element to hold said element from engagement with the teeth on said body member.

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