

Aug. 10, 1965

D. V. CHENOWETH
 RELEASABLE FLUID CONTROL APPARATUS FOR
 RETRIEVING SUBSURFACE WELL DEVICES

3,199,906

Filed July 5, 1963

2 Sheets-Sheet 1

FIG. 1.

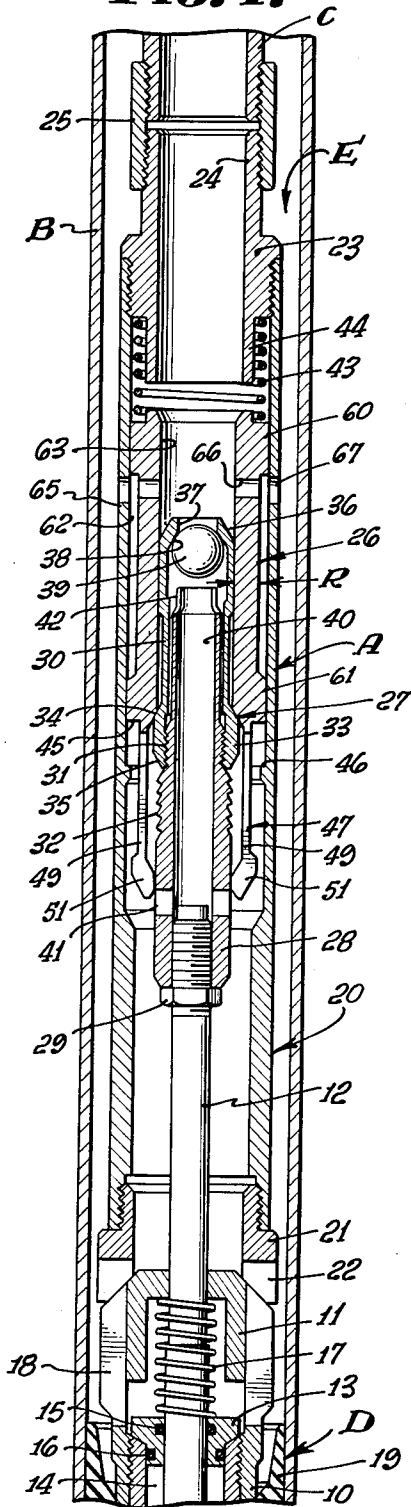
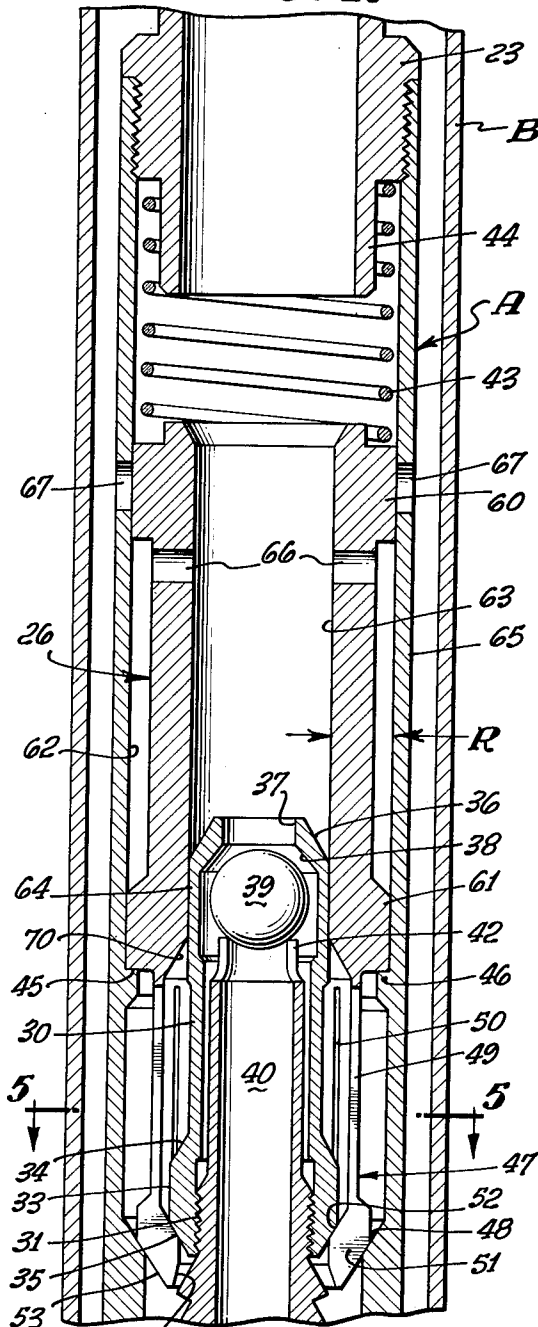


FIG. 2.



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2 Sheets-Sheet 2

FIG. 3.

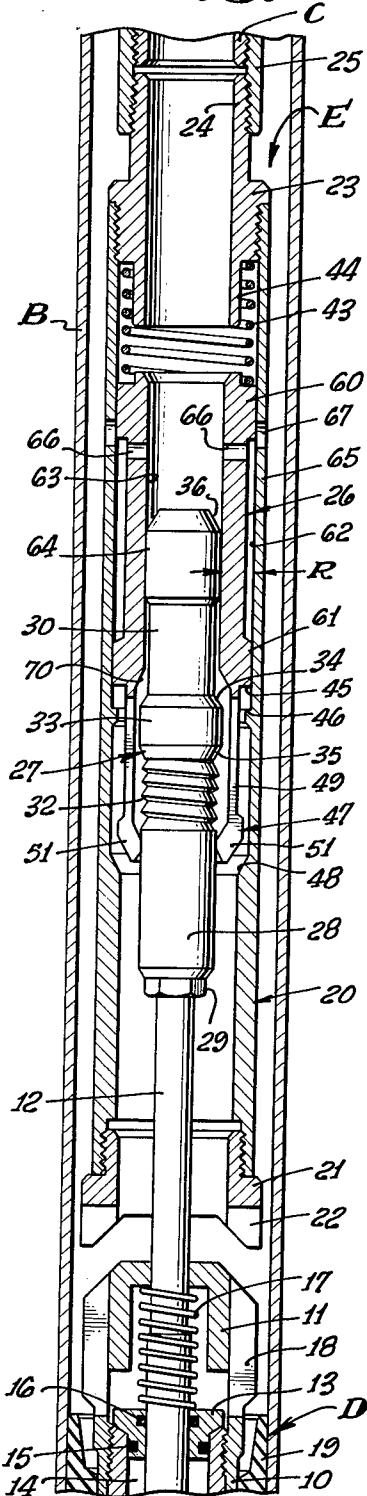


FIG. 4.

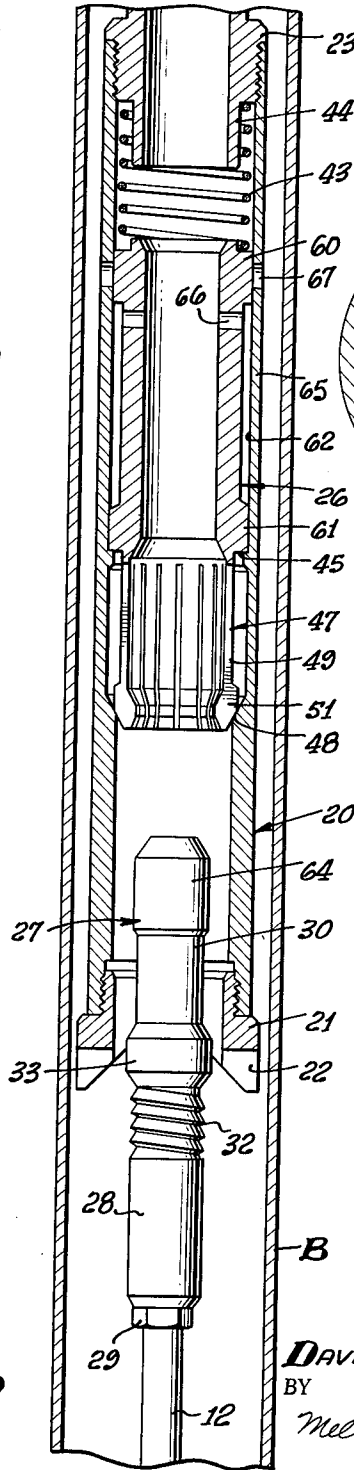


FIG. 5.

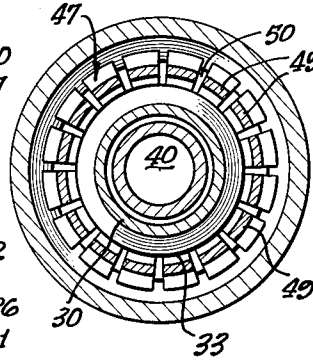
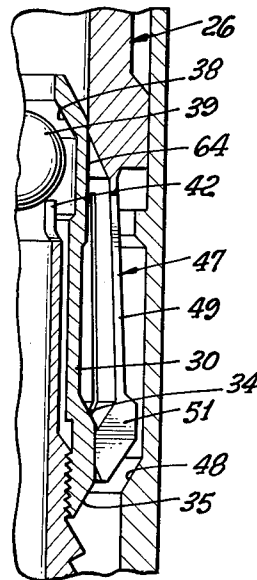


FIG. 6.



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RELEASABLE FLUID CONTROL APPARATUS FOR RETRIEVING SUBSURFACE WELL DEVICES

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16 Claims. (Cl. 294—36.15)

The present invention relates to subsurface well bore apparatus, and more particularly to apparatus useful in retrieving a device from a well bore.

An object of the invention is to provide an improved apparatus adapted to be coupled to a device and moved longitudinally in a well bore on a running-in string, the apparatus being readily releasable from the device without the necessity for rotating the running-in string.

Another object of the invention is to provide apparatus connectible to a running-in string for lowering and elevating a device in the well bore, and capable of being released from the device without the necessity for rotating the running-in string.

A further object of the invention is to provide apparatus connectible to a running-in string and movable into coupling relation to a device in the well bore without the need for rotating the running-in string, enabling the device to be shifted longitudinally in the well bore, the apparatus being releasable from the device without rotation of the running-in string. In a more limited sense, release of the apparatus from the device is effected by fluid pressure. More specifically, the pressure is imposed on the fluid in the well bore externally of the running-in string.

Yet another object of the invention is to provide apparatus connectible to a tubular running-in string for lowering and elevating a device in the well bore, the apparatus being releasable hydraulically from the device, in which fluid in the well bore is allowed to fill the tubular string readily during lowering of the apparatus and device in the well bore, and is also allowed to drain readily from the tubular string during elevation of the apparatus and device in the well bore.

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 an apparatus embodying the invention disposed in a well casing, operatively connected to another device and positioned for lowering the latter in the well casing;

FIG. 2 is an enlarged longitudinal section of the apparatus disclosed in FIG. 1, in condition for elevating the device in the well casing;

FIG. 3 is a view similar to FIG. 1 illustrating the apparatus partially elevated relative to the device;

FIG. 4 is a view similar to FIG. 1 illustrating the apparatus uncoupled or released from the device;

FIG. 5 is a cross-section taken along the line 5—5 on FIG. 2;

FIG. 6 is a fragmentary longitudinal section showing the movement of the latch portion of the apparatus to a releasing position with respect to the device.

The apparatus A illustrated in the drawings is a running-in and retrieving tool adapted to be lowered in a well casing B, or similar conduit string, disposed in a

well bore on a tubular string C. It is adapted to be releasably connected to another device D in the well bore or casing, such as a retrievable bridge plug of the type illustrated and described in U.S. Patent No. 2,998,072.

The retrievable bridge plug D includes a tubular body 10 having an upper valve cage 11 secured thereto, there being a control rod or bar 12 extending into the body for controlling the setting of the plug, the bar passing through a valve head 13 adapted to engage the upper end of the body 10 to close its passage 14 against downward flow of fluid therethrough, suitable seals 15, 16 being provided between the valve head and the bridge plug body and between the valve head and the control rod or bar to prevent leakage of fluid therebetween. A helical compression spring 17 surrounds the control rod 12, its upper end bearing against the valve cage 11, which has slots or ports 18 therethrough, and its lower end engaging the valve head 13 to urge the latter downwardly into engagement with the bridge plug body 10. As disclosed in the drawings, a suitable packing cup 19 is mounted on the bridge plug body for sealing engagement with the wall of the well casing B.

As described in the above patent, the control rod or bar 12 is adapted to occupy selected longitudinal positions within the bridge plug body 10 for the purpose of preventing anchoring of the bridge plug in the well casing against upward or downward movement therewithin, and also to permit such anchoring. The bridge plug D is prevented from being set in the well casing when the control rod or bar occupies a downward position within the bridge plug body 10, and it also prevents the bridge plug from setting in the well casing when the control rod or bar 12 occupies an upper position within the body. When the control rod or bar occupies an intermediate or neutral position, setting of the bridge plug can occur.

The running-in and retrieving apparatus A will either shift the control rod or bar 12 to its lower position in running the bridge plug D in the well casing, to its upper position in elevating the bridge plug in the well casing, or it can occupy a neutral position permitting setting of the bridge plug. It is also releasable from the bridge plug and can be elevated with respect thereto. In fact, it can be removed completely from the well casing, if desired, leaving the bridge plug D in its set condition within the casing.

As disclosed, the apparatus A includes an outer tubular body or housing 20 having a lower body shoe 21 threadedly attached thereto, which is adapted to engage the upper end of the bridge plug body valve cage 11. This shoe has transverse slots 22 extending through its lower portion to permit fluid to pass between the interior and the exterior of the body or housing. The upper end of the housing or body 20 is constituted as a sub 23 having an upper threaded pin 24 adapted to be threadedly secured to the tubular string C extending to the top of the well casing, as to a coupling 25. Mounted within the housing is a mechanically and hydraulically actuatable latch sleeve 26 adapted to engage a control rod body structure 27 for the purpose of shifting the control rod 12 to its downward position within the plug body 10, with the shoe 21 engaging the upper end of the valve cage 11, and which is adapted to be coupled to the body structure 27 to elevate the control rod or bar 12 within the bridge plug body 10 and to also elevate the bridge plug in the well casing B. The body structure 27 includes a lower tubular body section 28 threadedly attached to the upper end of the control rod or bar 12, disconnection between the lower body section and control rod being prevented by a suitable lock or jam nut 29 threaded on the rod and tightened against the lower end of the body section. The lower body section 28 projects upwardly within an upper body section 30, the two parts being threadedly secured to-

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gether, preferably by a left-hand threaded connection 31, which will permit disconnection between the two sections under emergency release conditions, as described hereinbelow. Immediately below the upper body section 30, the lower body section has fishing threads or teeth 32, or the like, formed on its periphery and engageable by a fishing tool (not shown).

The upper body section 30 has a lower control head 33 thereon possessing an upper tapered shoulder 34 inclined in an upward and inward direction, and a lower tapered shoulder 35 inclined in a downward and inward direction. The upper section 30 terminates in an upper tapered guide portion 36 having a central inlet 37 surrounded by a downwardly facing valve seat 38 adapted to be engaged by a valve element 39, in the form of a ball, to close the central inlet against upward passage of fluid, the ball 39 being movable downwardly away from its companion seat 38 to permit downward flow of fluid through the central inlet 37 and around the ball, passing through a central body structure passage 40 and discharging through lower lateral body ports 41 to the exterior of the body 28. Downward movement of the ball valve element 39 within the upper body section is limited by its engagement with valve stop fingers 42 constituting the upper end of the lower body section 28.

The latch sleeve 26 is shiftable longitudinally within the outer housing 20 and along the body structure 27, being urged in a downward direction by a helical compression spring 43, the upper end of which surrounds a depending housing skirt 44 and bears against the sub 23, the lower end of the spring bearing against the upper end of the sleeve 26. The downward extent of movement of the sleeve 26 within the housing 20 is limited by engagement of a lower shoulder 45 on the sleeve with an inwardly directed stop shoulder 46 on the housing. When such shoulders are coengaged, a plurality of latch fingers or feet 47, constituting the lower end of the latch sleeve 26, engage a downwardly tapering holding surface 48 in the housing, which will urge the fingers 47 inwardly and dispose them under the lower tapered shoulder 35 of the control head 33, thereby coupling the housing 20 to the body structure 27 and the control rod or bar 12 through the agency of the intervening fingers. These fingers constitute the lower terminal portions of a plurality of longitudinally extending spring-like latch arms 49, forming the lower portion of the latch sleeve, the latch arms 49 and fingers 47 resulting from circumferentially spaced, longitudinal slots 50 cut through the lower portion of the sleeve and extending downwardly through the latch fingers 47.

The latch fingers 47 have inwardly projecting portions 51 provided with upper surfaces 52 tapering in a downward direction to engage the companion lower tapered shoulder 35 on the control head 33, and also outer, lower surfaces 53 tapering downwardly and inwardly for engagement with the companion holding surface 48 of the outer body or housing 20. The fingers 47 also have lower tapered surfaces 54 below the upper surfaces 52, which incline in a downward and outward direction, for engagement with the upper guide 36 and the upper tapered shoulder 34 which will shift or cam the fingers outwardly so that they can clear the guide and control head and be disposed below the latter. The fingers 47 normally occupy an inward position with a minimum internal diameter less than the external diameter of the control head 33, but they are adapted to be expanded laterally outwardly within the body or housing 20 to a sufficient extent as to clear the control head.

The latch sleeve 26 is hydraulically actuatable and may be deemed to be an annular piston member having upper and lower portions 60, 61 slidable along the inner wall 62 of the housing above its stop shoulder 46. The inner surface or wall 63 of the latch sleeve is also slidable along the upper valve head portion 64 of the control rod body structure 27. Slidable fits are provided to avoid the ne-

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cessity for using seal rings, or the like, to prevent substantial leaking between the latch sleeve 26 and inner wall 62 of the housing 20, and between the latch sleeve and the upper body head 64. In effect, the latch sleeve or annular piston 26 is movable longitudinally within an annular cylinder space R between the inner wall 62 of the upper cylindrical portion 63 of the housing and the exterior of the upper head 64 when the latch sleeve is disposed over the control rod body structure 27.

When the latch sleeve 26 is in its upper position within the housing 20, a plurality of side ports 66 extending through the wall of the latch sleeve below its upper portion 60 is communicable with companion ports 67 extending through the housing cylinder 65, so as to permit fluid passage between the exterior of the housing 20 and the interior of the sleeve 26, and, therefore, to the interior of the tubular string C (FIG. 1). The spring 43, under some circumstances, can shift the latch sleeve 26 downwardly to substantially close the housing ports 67, as when the lower sleeve shoulder 45 engages the housing stop shoulder 46, such as illustrated in FIG. 2. The fluid in the annulus E surrounding the tubular string C can be subjected to pressure, which fluid pressure will pass through the lower shoe slots 22 to the interior of the housing 20 and act upwardly on the latch sleeve 26, tending to shift it upwardly within the housing against the force of the spring 43, the area over which the fluid pressure is acting in an upward direction over the latch sleeve or annular piston 61 being the annular area R between the periphery of the upper body head 64 and the inner wall 62 of the cylinder portion 63 of the housing.

In the use of the apparatus A, it can be coupled to the bridge plug device D and this combination lowered in the well casing B on the tubular string C. Since the bridge plug D resists downward movement through the casing and must be forced therewithin, a downwardly facing tapered shoulder 70 on the sleeve above the latch arms 49 engages the upper tapered shoulder 34 of the body structure 27 and urges the control rod 12 downwardly within the bridge plug body, which will prevent the bridge plug from setting, as described in U.S. Patent 2,998,072 (FIG. 1). At this time, the shoe 21 of the outer housing engages the upper end of the valve cage 11, the latch sleeve compressing the spring 43 and placing the sleeve ports 66 in communication with the housing ports 67. As the apparatus A and bridge plug device D are lowered through the fluid in the well casing, such fluid can pass through the ports 67, 66 to the interior of the sleeve 26, flowing upwardly through the housing sub 23 into the tubular string C. Any fluid tending to pass upwardly through the shoe slots 22 to the interior of the housing and through the body ports 41 into the central passage 40 and up through the central inlet 37 into the tubular string is prevented from doing so by the upward engagement of the valve element 39 with its companion valve seat 38.

After the bridge plug has been lowered to its desired setting point in the well casing, the running-in and retrieving apparatus A is releasable from the bridge plug. Such releasing action occurs as a result of applying pressure to the fluid in the tubing-casing annulus E, which fluid pressure will pass through the lower slots 22 and act upwardly over the area R of the latch sleeve 26, the valve element 39 engaging its seat 38 to close the passage 40. The tubular string C and housing 20 are elevated slowly, the fluid pressure acting upwardly on the latch sleeve or annular piston member 61, shifting the sleeve upwardly within the housing, or maintaining it in an upper position with the latch fingers or feet 47 elevated above the holding surface 48 on the housing, such as disclosed in FIG. 3. Elevation of the housing 20 continues with pressure applied to the tubing-casing annulus E, the sleeve 26 moving upwardly with the housing and its fingers 47 engaging the lower tapered shoulder 35 of the body head 33 and being cammed outwardly thereby until the fingers ride past the head, such as disclosed in FIG. 6, whereupon the

fingers can inherently spring laterally inwardly to their initial retracted position.

The apparatus A has now been released from the bridge plug device D and can be elevated in the well casing. When the latch sleeve rides off the upper body head 27, the fluid in the tubing-casing annulus E can then pass through the valve sleeve 26 and act on the upper side of the latter, so that there is no pressure differential acting on the sleeve, the spring 43 re-expanding and shifting the sleeve to a downward position in which the fingers 47 engage the holding surface 48 and are shifted inwardly, the downward travel of the latch sleeve being limited by engagement of its shoulder 45 with the stop shoulder 46 of the housing, the parts then being in the position illustrated in FIG. 4.

In the event it is desired to retrieve the bridge plug device from the well casing, or to elevate it within the well casing, the apparatus A is lowered on the tubular string C in the well casing B, the housing shoe 21 and the main portion of the housing passing downwardly over the body structure 27, the lower inner tapered surfaces 54 of the fingers 47 engaging the upper tapered shoulder 34 of the body head, the sleeve momentarily being held stationary, and the housing shifting downwardly so as to elevate the fingers relatively above the holding surface 48, the upward movement of the sleeve within the housing further compressing the upper spring 43. The fingers 47 are then disposed in the enlarged diameter portion of the housing and can be expanded outwardly by the upper tapered head shoulder 34 and will ride past the head 33, the spring re-expanding and shifting the latch sleeve 26 downwardly in the housing to place the finger surfaces 53 into engagement with the holding surface 48 and the fingers in their retracted position below the control head 33.

The tubular string C and housing 20 can now be moved upwardly, the latch sleeve 26 moving upwardly therewith until the upper, inner tapered surfaces 52 of the fingers engage the lower tapered shoulder 35 of the control head (FIG. 2). However, such control head surface cannot cam the fingers outwardly because of the fact that the retaining surface 48 of the housing engages the fingers and precludes their outward expansion. Accordingly, upward movement of the tubular string C and housing 20 will be transmitted through the fingers 47 to the control head 33 and through the body structure 27 to the control rod or bar 12, the latter being shifted upwardly within the bridge plug body 10 to a position that will prevent setting of the plug D in the well casing, the entire bridge plug being elevated in the well casing to another setting location, or, if desired, for removal to the top of the well bore. During such elevating movement, the housing ports 67 may be closed, such as illustrated in FIG. 2, but the fluid in the tubular string C can still drain therefrom since the ball valve element 39 will move downwardly away from the valve seat 38, the liquid draining through the central inlet 37 and around the ball valve element into the central body passage 40, discharging through the body ports 41 to the interior of the housing 20, and then dropping out of the lower end of the housing into the well casing B.

With the apparatus A in its coupled condition to the well device D, the latter can not only be elevated in the well casing to a new location, but it can be lowered in the well casing to a different location, merely by shifting the tubular string C downwardly, which will place the parts in the position illustrated in FIG. 1, the control rod or bar 12 being shifted downwardly in the bridge plug body 10 to prevent setting of the bridge plug in the well casing. If at any time the apparatus is to be released from the bridge plug, it is merely necessary to move the tubular string C downwardly to a slight extent, which will correspondingly shift the housing 20 downwardly to insure that the holding surface 48 is disposed below the fingers 47. The fluid in the tubing-casing annulus E can then be subjected to pressure, the fluid pressure acting upwardly on the latch sleeve 26, since the ball valve ele-

ment 39 will engage its seat 38 to prevent passage of the fluid through the body structure 27 to the interior of the tubular string C, and will tend to retain the latch sleeve in its upward position within the housing while the apparatus is being elevated relative to the control rod or bar 12 of the bridge plug device D and its body structure 27. The fingers will remain above the holding surface 48 while moving past the control head 33, the lower tapered surface 35 of the latter expanding the fingers 47 outwardly within the housing, the fingers riding upwardly past the head to a position thereabove, whereupon they spring inwardly. When the latch sleeve 26 moves out of sealing relation to the periphery of the valve body 64, the pressure in the tubing-casing annulus E will drop, inasmuch as the fluid can then flow upwardly through the housing 20 and through the sleeve 26 into the tubular string C, thereby advising the operator that the apparatus A has been released from the bridge plug device D.

With the apparatus described, it is evident that it is capable of lowering another device in the well bore, or of retrieving the device from the well bore. It is capable of being released from the device, whenever desired, simply by the application of pressure to the fluid in the tubing-casing annulus E. Retrieving can occur without the necessity for rotating the tubular string C. All that need be done is to elevate the tubular string while applying pressure to the fluid in the tubing-casing annulus, which will hold the latch sleeve 26 upwardly in the housing to space its latch fingers 47 above the holding surface 48 and allow the fingers to expand outwardly in moving past the control head 33. Downward movement of the apparatus A and its coupling to the lower device or tool D can occur without the necessity for rotating the tubular string, since the latch fingers will merely snap over the control head 33. The coupling of the apparatus to the device, so that the latter can be elevated in the well casing, occurs merely as a result of moving the tubular string C and housing 20 upwardly without application of pressure to the tubing-casing annulus E, the holding surface 48 retaining the fingers 47 under the lower tapered shoulder 35 of the control head. During lowering of the apparatus in the well casing, the fluid can readily enter the ports 67, 66 and automatically fill the tubular string C. Similarly, during elevation of the apparatus in the well casing, the ball valve element 39 moves downwardly away from its seat 38 to allow the fluid in the tubular string C to drain through the control rod body structure 27 into the well casing B below the apparatus A.

I claim:

1. In combination: a device adapted to be disposed in a well bore and having a downwardly facing shoulder; a member adapted to be connected to a running-in string for movement in the well bore and to be disposed over the device; latch means carried by and movable longitudinally of said member and movable inherently inwardly to a position under said shoulder to be engaged therewith; said member having shifting means engaging said latch means when said latch means moves in one direction longitudinally of said member to hold said latch means laterally inwardly under said shoulder and in coupling relation to the device; and fluid operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said latch means in the opposite direction longitudinally of said member away from said shifting means to allow said latch means to be shifted by said shoulder laterally outwardly to uncoupled relation from the device.

2. In combination: a device adapted to be disposed in a well bore and having a downwardly facing shoulder; a member adapted to be connected to a running-in string for movement in the well bore and to be disposed over the device; a latch sleeve slidable longitudinally in said member and having laterally movable latch elements movable inherently inwardly to a position under said shoulder to be engaged therewith; said member having a surface

thereon for engaging and holding said elements laterally inwardly under said shoulder in coupling relation to the device upon longitudinal movement of said latch sleeve in one direction in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve in the opposite longitudinal direction in said member away from said surface to prevent engagement of said elements by said surface and permit said elements to be shifted by said shoulder laterally outwardly to uncoupled relation with respect to the device.

3. In apparatus for retrieving a device from a well bore: a member adapted to be connected to a tubular running-in string for movement in the well bore and to be disposed over the device; a latch sleeve slidable longitudinally in said member and having laterally movable latch elements adapted to be coupled to the device; said member having means thereon for shifting said elements laterally inwardly toward a position to be coupled to the device upon longitudinal movement of said sleeve in one direction in said member; means for moving said sleeve in the opposite longitudinal direction in said member to allow said elements to shift laterally outwardly of the device to a position uncoupled from the device; said sleeve being engageable with the device to shift the device downwardly in the well bore in response to downward movement of the tubular running-in string; said sleeve and member having communicating fluid passage means allowing fluid to flow from the exterior of said member to the interior of said sleeve and into the tubular running-in string during lowering of the apparatus in the well bore.

4. In combination: a device adapted to be disposed in a well bore and having a downwardly facing shoulder; a member adapted to be connected to a running-in string for movement in the well bore and to be disposed over the device; a latch sleeve slidable longitudinally in said member and having laterally movable latch elements movable inherently inwardly to a position under said shoulder to be engaged therewith; said member having a surface thereon for engaging and holding said elements laterally inwardly under said shoulder in a position to be coupled to the device upon downward movement of said latch sleeve in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve upwardly in said member away from said surface to prevent engagement of said elements by said surface and permit said elements to be shifted by said shoulder laterally outwardly to a position uncoupled from the device.

5. In apparatus for retrieving a device from a well bore: a member adapted to be connected to a tubular running-in string for movement in the well bore and to be disposed over the device; a latch sleeve slidable longitudinally in said member and having laterally movable latch elements adapted to be coupled to the device; said member having a surface thereon for engaging and shifting said elements laterally inwardly toward a position to be coupled to the device upon downward movement of said latch sleeve in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve upwardly in said member to prevent engagement of said elements by said surface and permit lateral outward shifting of said elements to a position uncoupled from the device; said sleeve being engageable with the device and occupying an upper position in said member to shift the device downwardly in the well bore in response to downward movement of the tubular running-in string; said sleeve and member having communicating ports when said sleeve is in said upper position through which fluid can flow from the exterior of said member to the interior of said sleeve and into the tubular string during lowering of the apparatus in the well bore.

6. In apparatus for retrieving a device from a well bore: a member adapted to be connected to a running-in string for movement in the well bore and to be disposed over the device; a latch sleeve slidable longitudinally in said member and having laterally movable latch elements adapted to be coupled to the device; said member having a surface thereon for engaging and shifting said elements laterally inwardly toward a position to be coupled to the device upon downward movement of said latch sleeve in said member; spring means engaging said sleeve for shifting said sleeve downwardly in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve upwardly in said member against the force of said spring means to prevent engagement of said elements by said surface and permit longitudinal outward shifting of said elements to a position uncoupled from the device; said sleeve having means thereon engageable with the device to move the device downwardly in the well bore upon downward movement of the running-in string and the member in the well bore.

7. In combination: a device adapted to be disposed in a well bore; a member adapted to be connected to a running-in string to be lowered in the well bore and to be disposed over the device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and device, said sleeve having laterally movable elements adapted to be coupled to said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon longitudinal movement of said sleeve in one direction in said member; said sleeve having fluid pressure operated means responsive to fluid pressure in said annular cylinder space for moving said sleeve longitudinally in the opposite direction in said member to prevent engagement of said elements by said surface and to permit lateral outward shifting of said elements to a position uncoupled from said device.

8. In combination: a device adapted to be disposed in a well bore; a member adapted to be connected to a running-in string to be lowered in the well bore and to be disposed over the device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and device, said sleeve having laterally movable elements adapted to be coupled to said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon longitudinal movement of said sleeve in one direction in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member and in said annular cylinder space for moving said sleeve in the opposite longitudinal direction in said member to prevent engagement of said elements by said surface and permit lateral outward shifting of said elements to a position uncoupled from said device.

9. In combination: a device adapted to be disposed in a well bore; a member adapted to be connected to a running-in string to be lowered in the well bore and to be disposed over the device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and device, said sleeve having laterally movable elements adapted to be coupled to said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon downward movement of said sleeve in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member and in said annular cylinder space for moving said sleeve upwardly in said member to prevent engagement of said elements by said

surface and permit lateral outward shifting of said elements to a position uncoupled from said device.

10. In combination: a device adapted to be disposed in a well bore; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over the device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and device, said sleeve having laterally movable elements adapted to be coupled to said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon longitudinal movement of said sleeve in one direction in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in well bore externally of said member for moving said sleeve in the opposite longitudinal direction in said member to prevent engagement of said elements by said surface and permit lateral outward shifting of said elements to a position uncoupled from said device; said sleeve being engageable with the device and occupying an upper position in said member to shift the device downwardly in the well bore in response to downward movement of the tubular running-in string; said sleeve and member having communicating ports when said sleeve is in said upper position through which fluid can flow from the exterior of said member to the interior of said sleeve and into the tubular string during lowering of the apparatus in the well bore.

11. In combination: a device adapted to be disposed in a well bore and having a passage therein in its upper portion; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over said upper portion of said device; latch means carried by and movable longitudinally of said member and adapted to be coupled to said upper portion of said device; said member having shifting means engaging said latch means when said latch means moves in one direction longitudinally of said member to shift said latch means laterally inwardly toward coupled relation to said device; means for moving said latch means longitudinally of said member in the opposite direction to allow said latch means to shift laterally outwardly from coupled relation to said device; and valve means in said upper portion of said device controlling the flow of fluid through said passage.

12. In combination: a device adapted to be disposed in a well bore and having a passage therein in its upper portion; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over said upper portion of said device; latch means carried by and movable longitudinally of said member and adapted to be coupled to said upper portion of said device; said member having shifting means engaging said latch means when said latch means moves in one direction longitudinally of said member to shift said latch means laterally inwardly toward coupled relation to said device; fluid pressure means responsive to the pressure of the fluid in the well bore externally of said member for moving said latch means longitudinally of said member in the opposite direction to allow said latch means to shift laterally outwardly from coupled relation to said device; and valve means in said upper portion of said body shifted to closed position by said external fluid pressure and adapted to open to allow fluid to pass downwardly from the tubular string through said passage.

13. In combination: a device adapted to be disposed in a well bore and having a passage therein in its upper portion; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over the device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and upper portion of said device, said sleeve

having laterally movable elements adapted to be coupled to said upper portion of said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon longitudinal movement of said sleeve in one direction in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve in the opposite longitudinal direction in said cylinder space and along said device and member to prevent engagement of said elements by said surface and to permit lateral outward shifting of said elements to a position uncoupled from the upper portion of said device; and valve means in said upper portion of said device shifted to closed position by said external fluid pressure and adapted to open to allow fluid to pass downwardly from the tubular string through said passage.

14. In combination: a device adapted to be disposed in a well bore and having a passage therein in its upper portion; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over the device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and upper portion of said device, said sleeve having laterally movable elements adapted to be coupled to said upper portion of said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon longitudinal movement of said sleeve in one direction in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve in the opposite longitudinal direction in said cylinder space and along said device and member to prevent engagement of said elements by said surface and to permit lateral outward shifting of said elements to a position uncoupled from the upper portion of said device; valve means in said upper portion of said device shifted to closed position by said external fluid pressure and adapted to open to allow fluid to pass downwardly from the tubular string through said passage; said sleeve being engageable with said upper portion of said device and occupying an upper position in said member to shift said device downwardly in the well bore in response to downward movement of the tubular running-in string; said sleeve and member having communicating ports when said sleeve is in said upper position through which fluid can flow from the exterior of said member to the interior of said sleeve and into the tubular string during lowering of the apparatus in the well bore.

15. In combination: a device adapted to be disposed in a well bore and having a passage therein in its upper portion; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over said upper portion of said device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and device, said sleeve having laterally movable elements adapted to be coupled to said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon downward movement of said sleeve in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving said sleeve upwardly in said member to prevent engagement of said elements by said surface and permit lateral outward shifting of said elements to a position uncoupled from the upper portion of said device; valve means in said upper portion of said device shiftable upwardly to closed position by said external fluid pressure and shiftable downwardly to open position to allow fluid to pass downwardly from the tubular

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string through said passage; said sleeve being engageable with said device and occupying an upper position in said member to shift said device downwardly in the well bore in response to downward movement of the tubular running-in string; said sleeve and member having communicating ports when said sleeve is in said upper position through which fluid can flow from the exterior of said member to the interior of said sleeve and into the tubular string during lowering of the apparatus in the well bore.

16. In combination: a device adapted to be disposed in a well bore and having a passage therein in its upper portion; a member adapted to be connected to a tubular running-in string to be lowered in the well bore and to be disposed over said upper portion of said device to provide an annular cylinder space therewith; a latch sleeve in said cylinder space carried by said member and slidable longitudinally along said member and device, said sleeve having laterally movable elements adapted to be coupled to said device; said member having a surface thereon for engaging and shifting said elements laterally inwardly to coupled relation to said device upon downward movement of said sleeve in said member; spring means engaging said sleeve for shifting said sleeve downwardly in said member; said sleeve having fluid pressure operated means responsive to the pressure of the fluid in the well bore externally of said member for moving

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said sleeve upwardly in said member against the force of said spring means to prevent engagement of said elements by said surface and permit lateral outward shifting of said elements to a position uncoupled from the upper portion of said device; valve means in said upper portion of said device shiftable upwardly to closed position by said external fluid pressure and shiftable downwardly to open position to allow fluid to pass downwardly from the tubular string through said passage; said sleeve being engageable with said device and occupying an upper position in said member to shift said device downwardly in the well bore in response to downward movement of the tubular running-in string; said sleeve and member having communicating ports when said sleeve is in said upper position through which fluid can flow from the exterior of said member to the interior of said sleeve and into the tubular string during lowering of the apparatus in the well bore.

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