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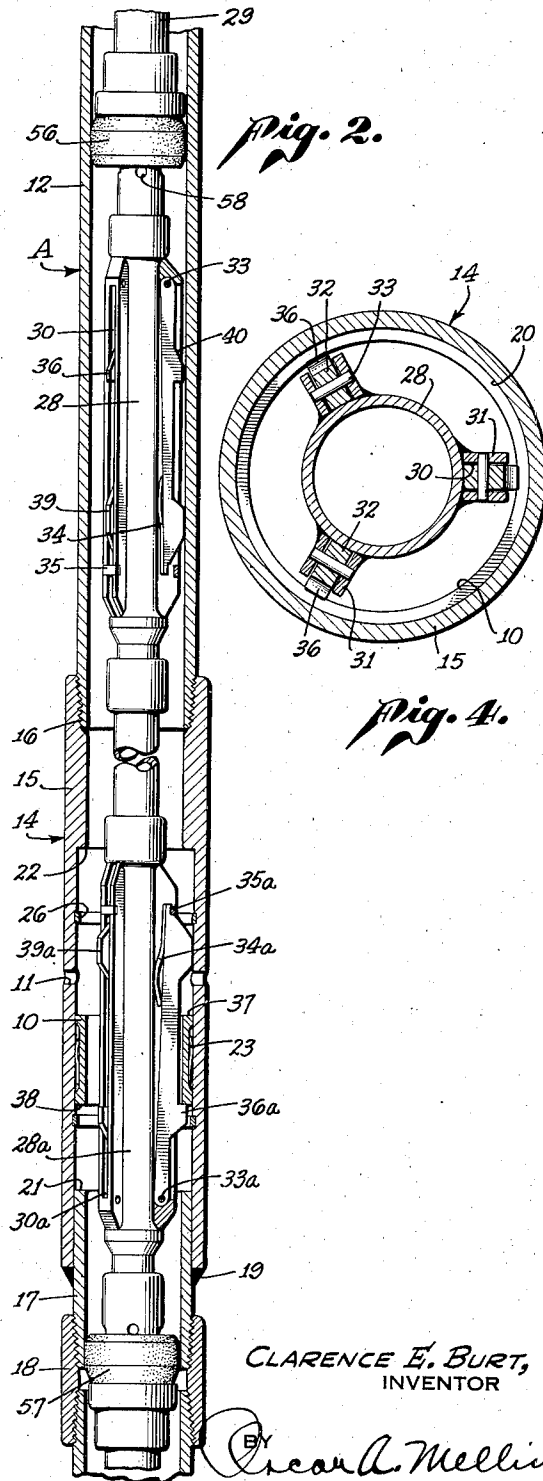
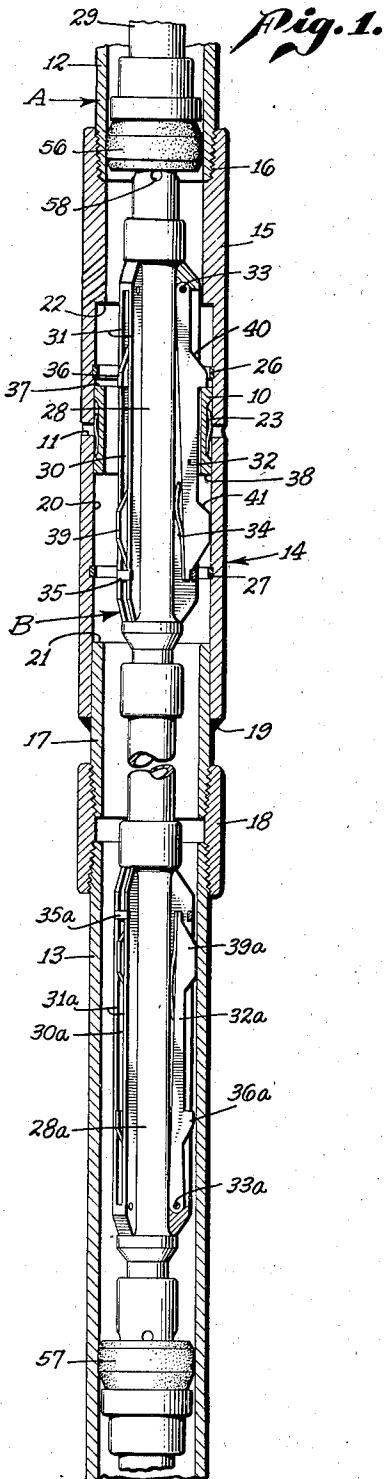
C. E. BURT

2,380,022

FLOW CONTROL APPARATUS

Filed June 23, 1941

2 Sheets-Sheet 1



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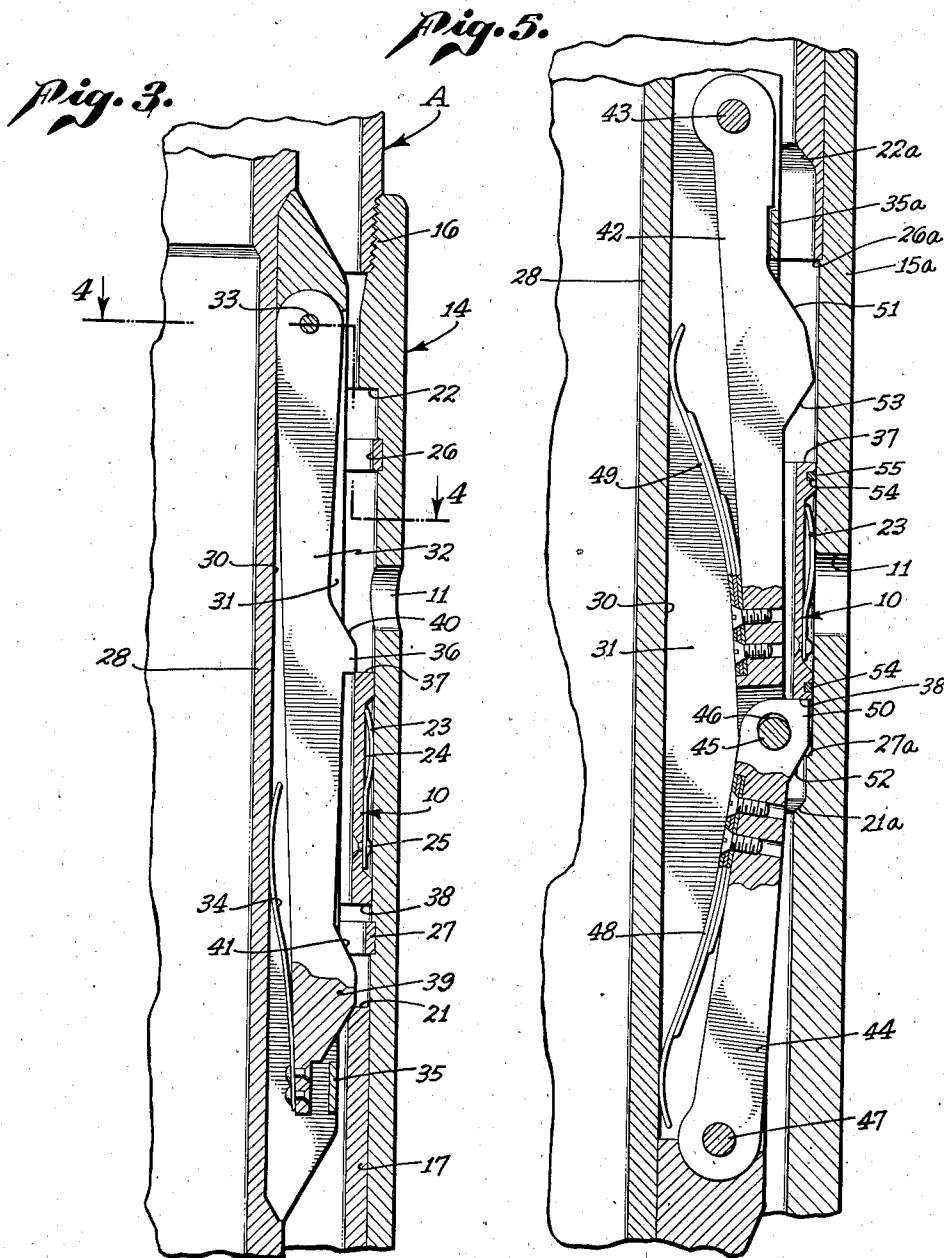
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FLOW CONTROL APPARATUS

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2 Sheets-Sheet 2



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2,380,022

FLOW CONTROL APPARATUS

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Application June 23, 1941, Serial No. 399,292

20 Claims. (Cl. 166—1)

This invention relates to flow control apparatus, and more particularly to apparatus designed for operation and use in well bores.

Various valve devices have heretofore been employed in conduits positioned within well bores for the purpose of controlling the passage of fluids between their interiors and exteriors. More specifically, lateral ports in the conduit string have been closed by a sleeve or similar valve member, which has been moved to open position by a device lowered or pumped down the conduit. Upon reaching the location of the ports, the device latches or otherwise becomes coupled to the sleeve to shift it to a position in which the lateral ports are open. These prior art arrangements have inherent limitations. Although capable of opening the ports, they are unable to effect their closing, necessitating the employment of a separate device to perform this latter action. Moreover, these prior devices are only effective upon a single valve member and are unable to function upon a plurality of valve members adapted to close ports at separated locations along the conduit string.

It is an object of the present invention to overcome the above noted disadvantages and limitations of the prior art devices by providing a single control member for both opening and closing the valve member controlling the ports in a conduit string. In this connection, the invention also contemplates an apparatus in which a valve member may be provided in the conduit and moved to open or closed position with respect to its ports by a mechanism that is releasable from the valve for movement in either longitudinal direction within the conduit.

It is a further object of the invention to provide an apparatus embodying mechanism for controlling valve regulated ports in a conduit, in which the mechanism is capable of acting on the valve for either opening or closing the ports upon moving in one direction, and of being released from the valve upon a continuation of its motion in the same direction.

Still a further object of the invention is to provide a single manipulative mechanism for controlling a plurality of longitudinally spaced valve members positioned in a conduit string, the mechanism being releasable from cooperation with each valve member in order to permit its movement within the conduit string into operative engagement with another valve member.

This invention has other objects that will become apparent from a consideration of the embodiments shown in the drawings accompanying

and forming part of the present specification. These forms will now be described in detail to illustrate the general principles of the invention, but it is to be understood that such detailed description is not to be taken in a limited sense, since the scope of the invention is best defined by the claims appended hereto.

Referring to the drawings:

Figure 1 is a longitudinal view of one form of apparatus, with several elements omitted for purposes of clarity;

Figure 2 is a view similar to Figure 1, with parts of the apparatus disclosed in another operative position;

Figure 3 is a fragmentary longitudinal section of part of the apparatus shown in Figure 1, with parts disclosed in still another operative position;

Figure 4 is a cross-section taken along the line 4—4 in Figure 3; and

Figure 5 is a fragmentary longitudinal section of another form of the invention.

In its general aspects, the invention contemplates an apparatus embodying a sleeve 10 or similar valve for controlling lateral ports 11 in a casing, liner, production, or other conduit string A positioned within a well bore. A valve moving mechanism B is adapted to be sent down the conduit string for the purpose of shifting the valve 10 to a desired position with respect to the conduit ports 11. Upon effecting the desired valve movement, the motive mechanism is releasable (preferably automatically) from the valve to permit translation of the former within the conduit A in either an upward or downward direction. The releasing feature of the mechanism enables it to be operable upon a plurality of spaced valve members within a single conduit string. Moreover, the mechanism is so designed as to allow selective movement of the valve to open and closed positions.

As disclosed in the drawings, the conduit A consists of the usual liner, casing or production tubing sections 12, 13 suitably attached together, and embodying a collar 14 adapted to connect these sections together in spaced relation. This collar consists of a tubular body member 15 having a threaded upper end 16 for attachment to an upper conduit section 12, and a lower male end 17 for attachment to a coupling 18 secured to a lower conduit section 13. For convenience of manufacture, the male end 17 of the body is received within the remainder of the body, and is suitably integrated thereto, as by the use of welding material 19.

A circumferential recess 20 is formed in the collar between the upper end or shoulder 21 of the male body portion and a shoulder 22 provided near the upper end of the body, for the purpose of slidably receiving the sleeve valve member 10 adapted to be positioned over the lateral ports 11 in the collar body 15 to prevent passage of fluids therethrough, or to be positioned clear of these ports to permit fluid flow between the interior and exterior of the conduit string. Resistance to inadvertent movement of the sleeve valve 10 and its normal retention in any given position is provided for and assured by friction leaf spring elements 23 received within an external circumferential recess 24 in the sleeve. One end of each element 23 is attached to the sleeve by a rivet or screw 25, and its bowed portion engages the inner surface of the body to create resistance to movement of the sleeve. To guard against undue inadvertent sleeve movement, stop rings 26, 27 are provided on opposite sides of the lateral ports 11 to positively limit the extent of travel of the sleeve.

As shown in Figures 1, 2 and 3, the stops 26, 27 are arranged so as to permit movement of the sleeve valve 10 to open position in a downward direction, and to closed position in an upward direction. This movement of the sleeve is obtained by a mechanism B embodying a mandrel body 28 adapted for attachment to a tubular string 29 or a wire line for lowering into position with respect to the valve. The mechanism consists of a plurality of circumferentially spaced longitudinally extending slots 30 formed by pairs of spaced, parallel plates 31 extending from and welded or otherwise secured to the body 28. A latch 32 is received within each slot, with one end pivotally mounted on a hinge pin 33 secured to the guide plates 31. Each latch is moved laterally on its pivot 33 in an outward direction by a spring 34 bearing against the bottom of the slot 30 and suitably secured to the free end of the latch, the extent of this movement being limited by engagement of the latch 32 with a stop 35 fixed to the guide members 31 and extending across the slot or groove 30. It is apparent that the latch 32 may be forced inwardly against the action of the leaf spring 34 whenever required.

Each latch 32 is equipped with a dog or lug 36 engageable with an end 37 or 38 of the valve sleeve 10 in order to couple the shifting mechanism B to the sleeve for movement therewith in a particular direction. Each latch also carries a cam member 39 adapted to engage a cam actuating shoulder 21 or 22 formed on the collar body for the purpose of moving the latch inwardly against the action of its spring 34, to free its dog or lug 36 from engagement with the valve sleeve.

As illustrated in Figure 1, the valve sleeve 10 is in closed position across the lateral ports 11 and the dog 36 has just engaged the upper end 37 of the sleeve. Downward movement of the mandrel 28 will shift the sleeve to the open position disclosed in Figure 3. But in moving towards this position, the inclined cam 39 at the lower end of the latch will engage the cam actuating shoulder 21, and due to the inward and downward inclination of this cam, the latch 32 will be forced inwardly against the force of the spring 34 upon continued downward movement of the mandrel to move the clutching dog or lug 36 out of engagement with the sleeve valve. In Figure 3, the latch is pictured as on the verge of becoming completely disconnected or uncoupled

from the valve sleeve 10, which will permit longitudinal downward movement of the shifting mechanism B without any further effect upon the sleeve. As was pointed out above, the friction springs 23 prevent inadvertent movement of the sleeve valve from the position in which it has been moved positively by the latch dog 36, but as a precautionary measure, the lower stop ring 27 may be provided to definitely limit the extent of this downward movement.

In the event that it is desired to move the valve sleeve 10 to closed position over its ports 11, the shifting mechanism B may include a second set of latches 32a. As disclosed in the drawings, these are similar to the first-mentioned set in all structural details, the only difference residing in their facing in an opposite direction; so that upon upward movement of the mandrel 28 (see Figure 2), their upwardly facing clutch dogs or lugs 36a will engage the lower end 38 of the sleeve 10 to carry it upwardly into position across the valve ports 11. After having been moved to this position, continued upward movement of the mandrel causes engagement of the inwardly and upwardly inclined cam surfaces 39a on the lower latches 32a with the cam actuating shoulder 22 formed on the body 15 at the upper end of the recess 20, to force the latches inwardly against the action of their leaf springs 34a, and in so doing, move the clutching dogs 36a inwardly out of engagement with the sleeve, effecting an automatic freeing of the shifting mechanism B from the sleeve 10 to allow its continued and unrestrained movement in an upward direction. Although the friction springs 23 ordinarily hold the sleeve valve in the position to which it has been shifted by the mandrel, its inadvertent movement in an upward direction is positively limited by the upper stop ring 26.

It is to be noted that the trailing or rear faces 40, 41 of the clutching dog and cam on each latch are inclined inwardly in the direction of the latch hinges 33 to produce an inward forcing of the latches upon engagement of these trailing faces with the sleeve valve 10 or the cam actuating shoulders 21 or 22. This action is the same as occurs upon engagement of the leading cam face 39 or 39a with the sleeve or shoulder upon movement of one of the sets of latches in a forward or sleeve shifting direction. As a result, the sleeve 10 will not be moved until engaged by the leading faces of the dogs 36, 36a. To take an actual occurrence, upon moving downwardly past the sleeve valve 10, the lower set of latches 32a merely ride over the inner surface of the sleeve due to the inclination of their rear dog and cam faces 40, 41. Similarly, the inclined leading cam faces 39 on the upper latches 32 have no effect upon the sleeve, merely engaging its upper end 37 to be forced inwardly thereby for riding along the inner surface of the sleeve.

The dog 36 and cam 39 of each latch 32 are separated by a greater distance than the length of the valve sleeve 10 to permit reception of the sleeve therebetween after the cam has completed passage along its inner surface. The spring 34 can therefore force the dog 36 outwardly into position for engaging the end 37 of the sleeve. As was described above, continued downward movement of the shifting mechanism B then moves the sleeve to open position and effects automatic release of the dog 36 from the sleeve 10.

During upward movement of the shifting mechanism B, the rear inclined faces on the upper set of latch dogs 36 and cams 39 insure riding of

the latches 32 over the sleeve valve 10 without effecting its movement. A continuation of this upward movement causes complete riding of the lower latch cams 39a over the sleeve and clutching engagement of the lower latch dogs 36a with the bottom end 38 of the sleeve to cause longitudinal sliding of the latter back to closed position across the lateral ports 11. After this action has occurred, further upward movement of the mandrel 28 engages the cams 39a with the cam actuating shoulder 22 to effect release of the dogs 36a from the sleeve, allowing free movement of the shifting mechanism B within the conduit, and its withdrawal to the surface of the bore, if desired.

A second form of shifting mechanism is disclosed in Figure 5, in which the general relationship of members is the same as heretofore mentioned, but in which a different specific embodiment of latches is employed. Each latch device consists of a link 42 having one end mounted on a hinge pin 43, and its other end articulated to a latch lever 44 by means of a pin 45 fixed to the link and forming a lost motion connection with a slot 46 provided in the free end of the latch lever. The latch lever 44 is mounted on a hinge pin 47 secured between the guide plates 31, the latch lever and link both being forced outwardly by the bowed springs 48, 49 secured thereto and bearing against the bottom of the slot 30. The latch lever 44 has a clutch dog or lug 50 extending outwardly from its free end for engagement with the sleeve valve 10. The link 42 is provided with a cam 51 adapted to engage the cam actuating shoulder 22a on the collar body 15a for the purpose of moving the clutch dog 50 inwardly out of engagement with the valve sleeve 10 against the actions of the bowed springs 48, 49. The extent of outward movement of the latch lever 44 and its cooperable link 42 is limited by a stop 35a extending across the guide plate slot 30 and engageable with the outer surface of the link. As in the other form of the invention, the distance between the cam 51 and the clutch dog or lug 50 is greater than the length of the sleeve to permit reception of the latter therebetween and engagement of the dog 50 with the end of the sleeve 10.

The trailing faces 52, 53 of the dog 50 and cam 51 are suitably inclined (as in the other form of the invention) so that upon their engagement with the end 37 of the sleeve they will merely force the latch lever 44 and link 42 inwardly against the efforts of the bowed springs 48, 49, without producing movement of the sleeve.

Referring to Figure 5, the sleeve valve 10 is disclosed as positioned across the lateral ports 11. If desired, suitable piston rings 54 or other seals may be provided in ring grooves 55 in the sleeve to prevent fluid leakage around the sleeve and through the ports. If these seals 54 are employed (they can be of the split metallic type or be made of rubber or other non-metallic packing material), they can supply sufficient frictional effort against the inner face of the collar body 15a to preclude inadvertent movement of the sleeve valve 10, thereby obviating the need for the bowed leaf springs 23 heretofore mentioned.

Upon upward movement of the shifting mechanism, the clutch dogs 50 engage the lower end 38 of the sleeve valve 10, causing its upward shifting with the mechanism to a position in which the ports 11 are open to the passage of fluids. Continuation of this upward movement engages the inclined cam surfaces 51 with the cam actuating shoulder 22a provided on the collar body, to force

the guide link 42 inwardly against the action of its spring 49, and through the pin and slot connection 45, 46, correspondingly move the latch lever 44 and its projecting dog 50 inwardly out of contact with the end 38 of the sleeve, automatically freeing the mechanism from the sleeve and permitting its withdrawal to the surface of the bore or to a new location within the conduit string.

While only one set of latches has been disclosed in Figure 5, it is to be understood that the sleeve valve 10 can also be moved in the opposite direction through the provision of an oppositely facing second set of latches, as in the other form of invention. The cam actuating shoulder 21a below the ports will effect release of this second set of latches, while stops 26a, 27a can be provided on opposite sides of the ports to positively limit the extent of travel of the valve sleeve.

Although the form of invention shown in Figures 1 to 4, inclusive, involves the movement of the valve sleeve 10 to open position upon downward movement of the mandrel, it is apparent that a reverse operation can occur merely by locating the lateral ports 11 closer to the lower stop ring 27 (as in Figure 5). Downward movement of the shifting mechanism B would thereby slide the sleeve 10 to a closed position, whereas upward movement would effect its opening.

The upper and lower sets of latches 32, 32a can also be interchanged. That is, the lower set 32a would face in the same direction as illustrated, but be positioned above the upper set 32. If the latches were arranged in this manner, it would be possible to shift the sleeve valve 10 in both longitudinal directions, as described, and in addition, after the valve has been returned to its upper position, it could be moved again to its lower position by lowering the mechanism once more, without, however, moving the upper set of latches 32a downwardly past the sleeve. With this arrangement of the latch sets, and with the lateral ports 11 positioned so that downward movement of the sleeve closes the ports (as in Figure 5), the ports can be closed upon downward movement of the mandrel, opened upon upward movement of the mandrel, and closed again upon downward movement of the mandrel, after which the mandrel can be elevated, leaving the sleeve in closed position.

The shifting mechanism B is employable for controlling either a single valve in a conduit string or a plurality of valves located therein at longitudinally separated points. Due to the fact that the latches 32, 32a or 44 engage the sleeve 10 to move it in a given direction and are then automatically released upon progressing in this same direction, the mechanism may continue this direction of movement within the conduit string free from restraint or stoppage. For example, after shifting the valve to open position, as described in connection with Figure 1, the mechanism becomes released from the sleeve and can be lowered for operation upon a second valve sleeve positioned at some point in the tubing below the one disclosed, acting in the same manner to move this valve to a desired position. After moving this second valve sleeve, the mechanism is released for continuation of its movement in the same direction to shift any number of valve members that might be provided in the conduit string. Upon the return trip, all of these valve members would be shifted in the opposite direction.

The apparatus described has many uses in well bores, including the control of oil flow from pro-

ducing zones into production tubing, and the cementing of casing or liner strings. In connection with the single stage, multiple stage, or series cementing of the latter strings, ports 11 may be opened at any selected station through which cement slurry is to be deposited behind the casing or liner. In Figures 1 and 2, the operative mechanism is disclosed as forming part of a perforation cementer, its body 28 forming part of the spacer tubing between the opposed swab cups 56, 57 of this type of tool, which can be of any known design. This modified perforation cementer is lowered on a tubing string 29 to the desired position in the well bore, and cement ejected from the tool outlets 58 between the opposed cups for passage through the lateral ports 11 into the annular space between the casing or liner and the wall of the well bore.

As disclosed in Figure 1, upon lowering of the control mandrel 28, the upper set of latches 32 shifts the sleeve 10 to open the ports 11 and allow cement slurry to be forced therethrough, after which elevation of the tubing string 29 and mandrel 28 causes the lower set of latches 32a to positively move the sleeve 10 to a position closing the ports 11, in order to prevent return flow of the slurry back into the casing.

If a plurality of cementing stations are provided in the casing string, a mandrel equipped with the latches moves all of the valve sleeves to open position upon moving downwardly through the casing. After arriving at the lowermost cementing station, the cement slurry is deposited through the open ports at this particular location, after which elevation of the tubing string and mandrel would move the valve sleeve to closed position. The mandrel is then elevated and positioned with the opposed swab cups 56, 57 on opposite sides of the next higher cementing station, and cement slurry pumped through the open ports at this particular point. The elevation of the mandrel then causes the lower set of latches 32a to move the valve sleeve to closed position. It is apparent that this action can occur in an upward sequence at as many stations as are provided in the casing or liner string, the cement being deposited under pressure if necessary through each station and the particular valve then closed to prevent its return flow into the casing.

When employed in a casing or liner string, it is preferred that the inside diameter of the string be unrestricted to enable use of the perforation cementer and similar tools which have a sliding fit with the wall of the casing. The control mechanism and sleeve valve apparatus lend themselves readily to the achieving of this objective, since the sleeve valve 10 can have an inside diameter no less than that of the casing sections 12, 13 by being placed in the recessed portion 20 of the collar body 15, the ends of this recess provide the actuating abutments 21, 22 for the latch or link cams 39, 39a, 51.

From the foregoing description it is apparent that an apparatus has been provided that is capable of controlling one or more valve members in a conduit string by means of a mechanism adapted to be moved therethrough in either or both longitudinal directions. Movement of the valve members both to open and closed positions is effected positively by the control device, which is releasable from the valve after its shifting has been effected, to permit movement of the control mechanism without restraint to a new location for the performance of another operation,

or to allow its complete withdrawal from the well bore.

I claim:

1. An apparatus including a ported conduit adapted to be positioned in a well bore, valve means for controlling the flow of fluids through the port of said conduit, a device comprising instrumentalities movable laterally of said conduit to engage said valve means for shifting it with respect to said port upon movement of said device in one direction within said conduit, and means fixed with respect to said conduit and engageable with said instrumentalities upon continuation of the movement of said device in said one direction for moving said instrumentalities laterally of said conduit to disengage said instrumentalities from said valve means.

2. An apparatus including a ported conduit adapted to be positioned in a well bore, valve means for controlling the flow of fluids through the port of said conduit, a device comprising instrumentalities movable laterally of said conduit to engage said valve means for shifting it with respect to said port upon movement of said device in one direction within said conduit, means engageable with said instrumentalities upon continuation of the movement of said device in said one direction for moving said instrumentalities laterally of said conduit to disengage said instrumentalities from said valve means, and means for holding said valve means in the position to which it has been shifted after disengagement of said instrumentalities therefrom.

3. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve for controlling the flow of fluids through the port of said conduit, a device engageable with said sleeve valve to shift it with respect to said port upon movement of said device in one direction within said conduit, and means fixed with respect to said conduit and engageable with said device for disengaging it from said sleeve valve upon continuation of its movement in said one direction.

4. An apparatus including a ported conduit adapted to be positioned in a well bore, valve means for controlling the flow of fluid through the port of said conduit, a device engageable with said valve means to shift it with respect to said port upon movement of said device in one direction within said conduit, said device comprising means engageable with means on said conduit for disengaging the device from said valve means upon continuation of its movement in said one direction.

5. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through the port of said conduit, a device engageable with said sleeve valve to shift it longitudinally of said port upon movement of said device in one direction within said conduit, said device comprising means engageable with means on said conduit for disengaging the device from said sleeve valve upon continuation of its movement in said one direction.

6. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through the port of said conduit, a device adapted to be coupled to said sleeve valve for shifting it with respect to said port upon longitudinal movement of said device in one direction within said conduit, and means fixed with respect to said conduit and engageable with said

device upon continuation of its movement in said one direction for uncoupling it from said sleeve valve.

7. An apparatus including a ported conduit adapted to be positioned in a well bore, valve means within said conduit for controlling the flow of fluids through the port of said conduit, a device engageable with said valve means for shifting it with respect to said port upon longitudinal movement of said device in one direction within said conduit, and means fixed with respect to said conduit and engageable with said device upon continuation of its movement in said one direction to positively release it from said valve means.

8. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through the port of said conduit, a device engageable with said sleeve valve for positively sliding it within said conduit to both closed and open positions with respect to said port, and means on said device and conduit engageable with one another for releasing said device from engagement with said sleeve valve.

9. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through its port, a device movable longitudinally through said conduit in one direction for engaging and shifting said valve from closed to open position, said device being movable longitudinally through said conduit in the other direction for engaging and shifting said sleeve valve from open to closed position, said device comprising means engageable with means on said conduit for releasing said device from said sleeve valve in response to longitudinal movement of said device in said conduit.

10. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through its port, a device engageable with said sleeve valve to shift it relatively to said port, cam means on said device, and actuating means on said conduit engageable with said cam means for disengaging said device from said sleeve valve.

11. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through its port, latching means engageable with said sleeve valve to shift it relatively to said port, said latching means comprising cam instrumentalities, and actuating means fixed with respect to said conduit and engageable with said cam instrumentalities for disengaging said latching means from said sleeve valve.

12. An apparatus including a ported conduit adapted to be positioned in a well bore, valve means for controlling the flow of fluids through the port of said conduit, latching means movable through said conduit and engageable with said valve means to shift it relatively to said port, said latching means comprising cam instrumentalities, and actuating means on said conduit engageable with said cam instrumentalities upon movement of said latching means within said conduit for disengaging said latching means from said valve means.

13. An apparatus including a ported conduit adapted to be positioned in a well bore, valve means for controlling the flow of fluids through the port of said conduit, a device movable through said conduit for shifting said valve means rela-

tively to said port, said device comprising a latch and cam means connected therewith, said latch being engageable with said valve means to shift the same, and actuating means on said conduit engageable with said cam means upon movement of said device within said conduit for disengaging said latch from said valve means after said latch has shifted said valve means.

14. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through its port, a device movable through said conduit for shifting said sleeve valve relatively to said port, said device comprising a latch adapted to be coupled to said sleeve valve upon longitudinal movement of said device in one direction within said conduit, actuating means on said conduit, and cam means connected to said latch and engageable with said actuating means for effecting release of said latch from said sleeve valve in response to a continuation of movement of said device in said one direction.

15. An apparatus including a ported tubular member adapted to form part of a conduit positioned in a well bore, a sleeve valve received within a circumferential recess in said tubular member for controlling the flow of fluids through its port, a device movable through said tubular member for shifting said sleeve valve within said recess, said device comprising a latch adapted to be coupled to said sleeve valve upon longitudinal movement of said device in one direction within said conduit, and cam means connected to said latch and engageable with a portion of said tubular member which defines an end of said recess for releasing said latch from said sleeve valve in response to a continuation of movement of said device in said one direction.

16. An apparatus including a ported conduit adapted to be positioned in a well bore, a sleeve valve within said conduit for controlling the flow of fluids through its port, a device movable through said conduit for shifting said sleeve valve to open and closed positions with respect to said port, said device comprising supporting means, a latch on said supporting means adapted to be coupled to said sleeve valve for moving it longitudinally in one direction within said conduit, an oppositely directed latch on said supporting means adapted to be coupled to said sleeve valve for moving it in the opposite direction within said conduit, actuating means on said conduit, and cam means connected to each of said latches and engageable with said actuating means for automatically releasing one of said latches from said sleeve valve in response to continuation of movement of said device in one of said directions and the other of said latches from said sleeve valve in response to continuation of movement of said device in the other of said directions.

17. An apparatus including a ported tubular member adapted to form part of a conduit positioned in a well bore, valve means within said member for controlling the flow of fluids through its port, actuating means on said tubular member, a device movable through said tubular member for shifting said valve means with respect to said port, said device comprising a body, a latch pivoted on said body and adapted to be coupled to said valve means, and a cam on said latch engageable with said actuating means for uncoupling said latch from said valve means.

18. An apparatus including a ported tubular member adapted to form part of a conduit positioned in a well bore, valve means within said

member for controlling the flow of fluids through its port, actuating means on said tubular member, a device movable through said tubular member for shifting said valve means with respect to said port, said device comprising a body, a latch pivoted on said body and adapted to be coupled to said valve means, a link pivoted on said body and connected to said latch, and a cam on said link engageable with said actuating means for uncoupling said latch from said valve means.

19. An apparatus including a ported tubular member adapted to form part of a conduit positioned in a well bore, a sleeve valve received within a circumferential recess in said tubular member for controlling the flow of fluids through its port, a device movable within said tubular member for shifting said sleeve valve longitudinally within said recess, said device comprising a body, a latch pivoted on said body and adapted to en-

gage said sleeve valve, and a cam on said latch engageable with a portion of said tubular member which defines an end of said recess for uncoupling said latch from said sleeve valve.

20. An apparatus including a ported tubular member adapted to form part of a conduit positioned in a well bore, a sleeve valve received within a circumferential recess in said tubular member for controlling the flow of fluids through its port, a device movable within said tubular member for shifting said sleeve valve longitudinally within said recess, said device comprising a body, a latch pivoted on said body and adapted to engage said sleeve valve, a link hinged on said body and connected to said latch, and a cam on said link engageable with a portion of said tubular member which defines an end of said recess for uncoupling said latch from said sleeve valve.

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