Oct. 27, 1964 C. C. BROWN 3,154,146

METHODS OF AND APPARATUS FOR HANDLING MULTIPLE PIPE STRINGS AND WELL PACKERS

Filed Jan. 9, 1961 3 Sheets-Sheet 1

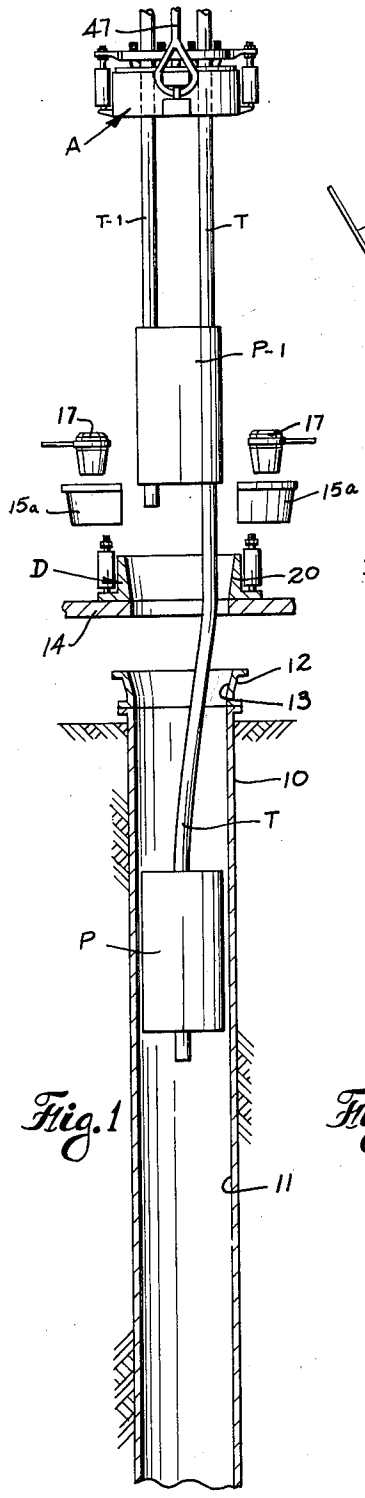


Fig. 1

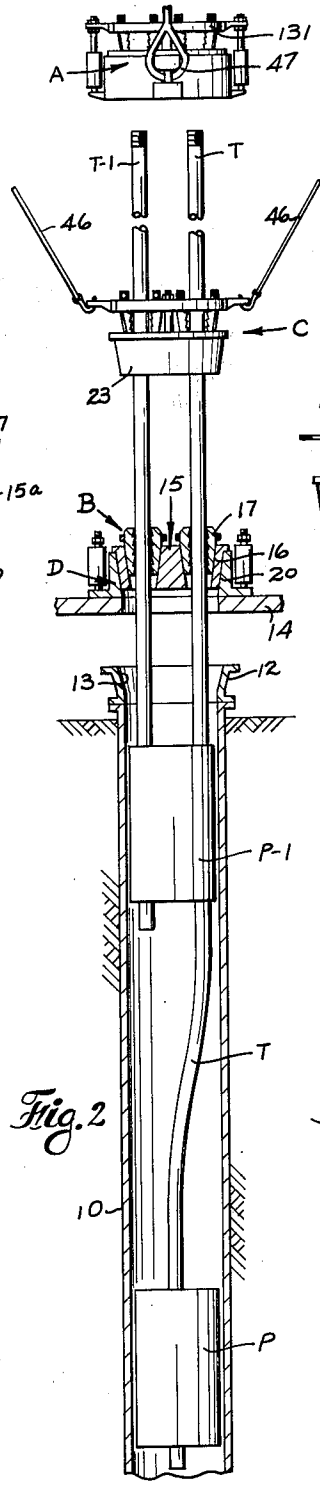


Fig. 2

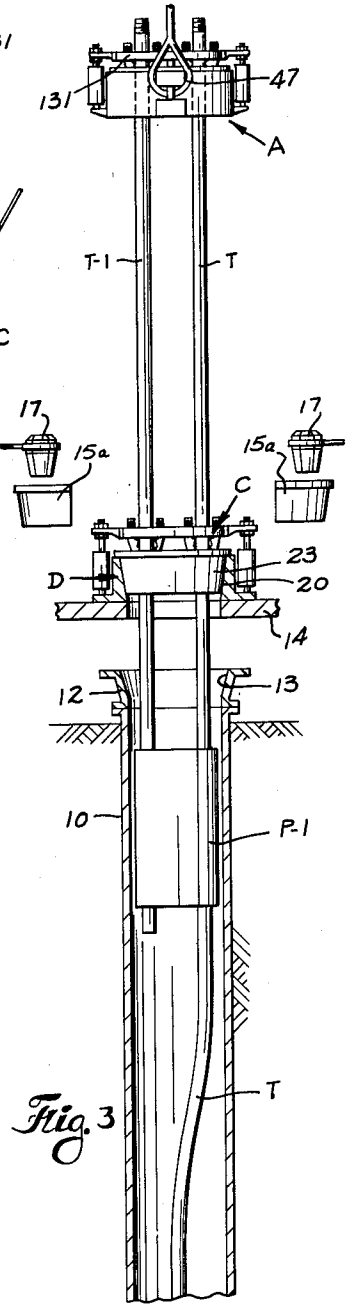


Fig. 3

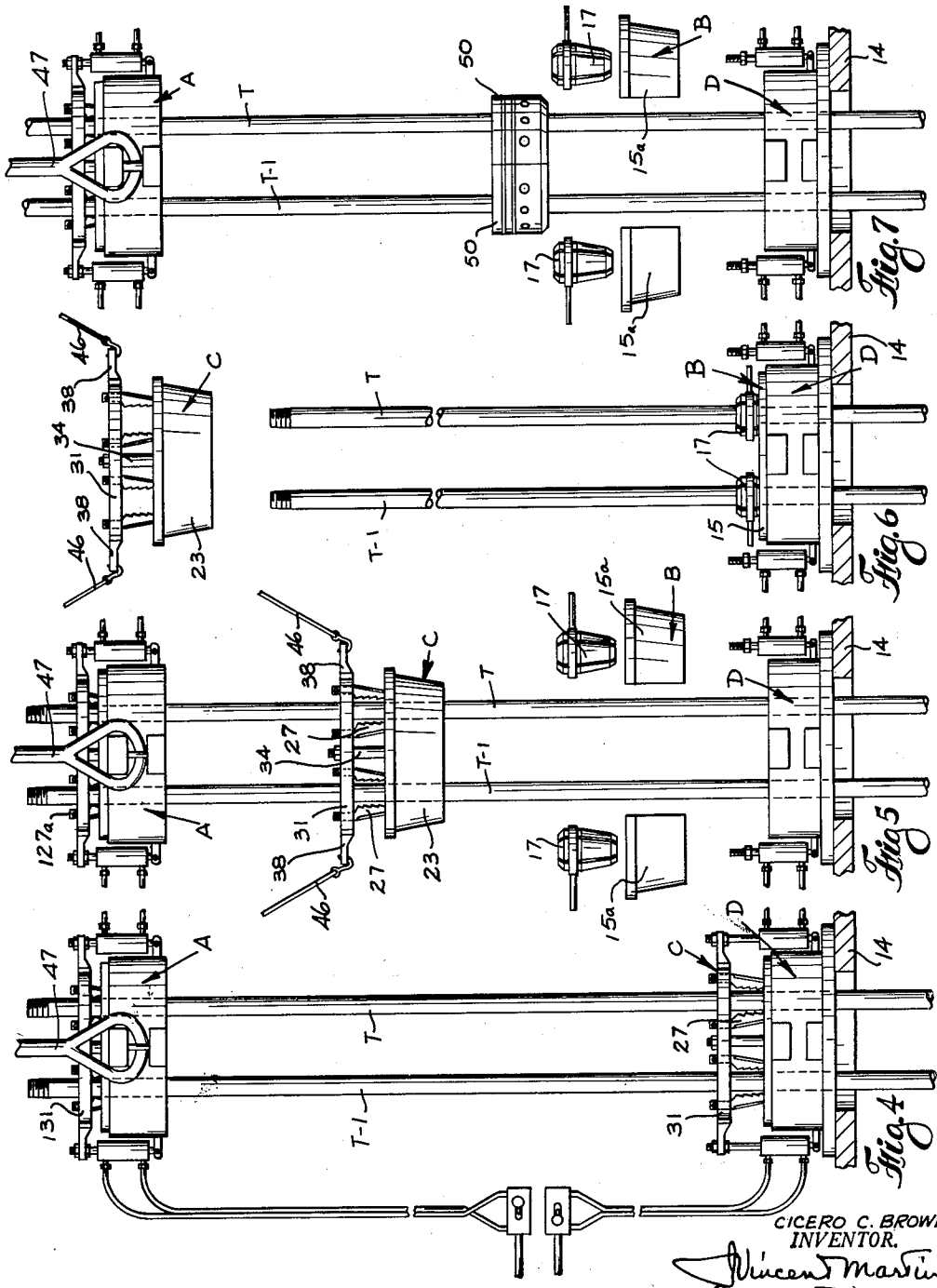
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Filed Jan. 9, 1961 3 Sheets-Sheet 2



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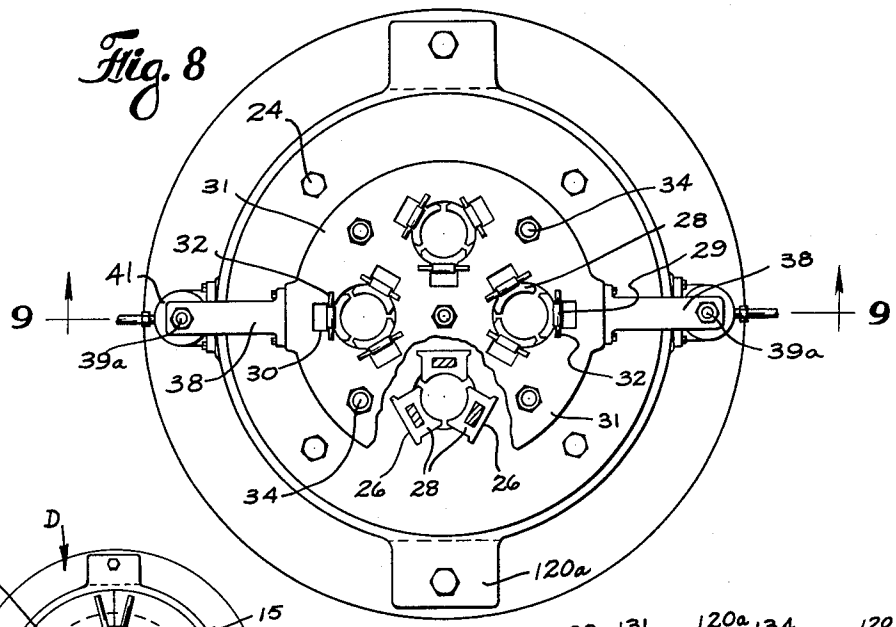
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METHODS OF AND APPARATUS FOR HANDLING MULTIPLE PIPE STRINGS AND WELL PACKERS

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Fig. 8



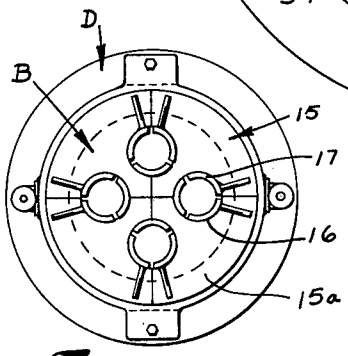


Fig. 11

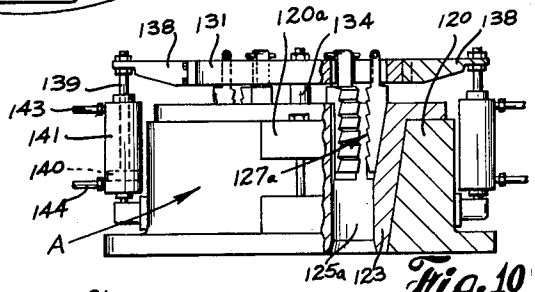


Fig. 10

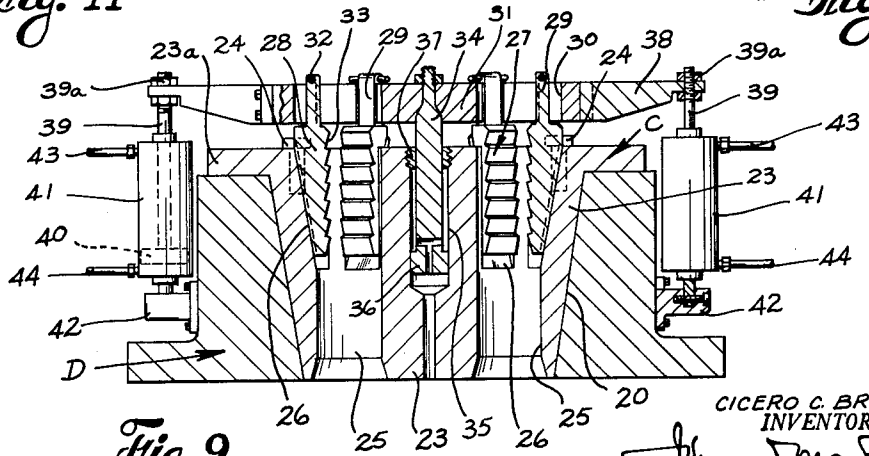


Fig. 9

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3,154,146

METHODS OF AND APPARATUS FOR HANDLING MULTIPLE PIPE STRINGS AND WELL PACKERS

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Filed Jan. 9, 1961, Ser. No. 81,463
12 Claims. (Cl. 166—48)

This invention relates to new and useful improvements in methods of and apparatus for handling multiple pipe strings and well packers as the same are run into and removed from a well bore.

The present invention is an improvement on my co-pending application Serial No. 854,870 filed Nov. 23, 1959, entitled "Methods of and Apparatus for Running Multiple Pipe Strings and Well Packers in Well Bores." Such co-pending application discloses the use of a power-operated elevator device capable of simultaneously handling a plurality of pipe strings and a power-operated spider device also capable of handling a plurality of pipe strings; by alternately supporting the pipe strings in said elevator device (during lowering or raising) and in said spider device (during the connection of additional pipe stands) relatively rapid, simultaneous running-in or removal of the pipe strings may be accomplished. However, the prior method involves use of the power-operated spider device throughout the entire running-in and removing operations.

When well packers are run on the pipe strings, it is essential that the bore through the spider device be full-opening which means that where the same spider device is used throughout the entire operation, its slip bowl must be sectional or made in segments; this permits said bowl to be removed from around the multiple strings to provide the necessary full open bore. Such a sectional spider device is illustrated in said prior application and allows removal of its bowl to permit lowering of the packers but since the spider device is power-operated and includes the plurality of slip-bowl sections, experience has shown that considerable time and effort is required to dis-assemble and then re-assemble the operating connections each time that said sectional bowl must be removed to allow passage of the well packer or packers. Of course, after the well packers, which are usually nearer the lower end of the pipe strings, have moved into the well, there is no necessity for further removal of the sectional slip bowl and the operation with the power-operated spider of my co-pending application proceeds satisfactorily; it is only in connection with the running of the packers that disadvantage of lost time and effort occurs.

It is, therefore, one object of this invention to provide an improved method of running and removing multiple pipe strings and well packers which overcomes the foregoing shortcomings of my prior method.

An important object of the invention is to provide an improved method of running multiple pipe strings and well packers within a well bore wherein the multiple pipe strings are handled by the combination of a power-operated elevator device and a manually manipulated spider device having a sectional bowl during the time that the well packers are being run or removed, whereby the full opening bore through the spider device, which full opening is necessary to allow passage of the packers, may be quickly made available as required; the remainder of the pipe strings, which is the greater portion thereof, being handled by a combination of power-operated elevators and a power-operated spider device. The improved method resulting in materially reducing the time and effort involved in simultaneously running multiple strings and well packers within a well bore.

Another object is to provide an apparatus for handling

multiple pipe strings having well packers mounted thereon which includes an annular supporting body adapted to be mounted at the upper end of the well bore into which said strings are to be lowered and which is constructed to receive and support a manually-manipulated spider assembly or to receive and support a power-operated spider assembly, whereby the spider assemblies may be selectively employed as desired during the running into and removal from the well bore of the pipe strings and well packers to thereby facilitate the pipe handling operations.

A further object is to provide an improved pipe-supporting or spider assembly for simultaneously supporting a plurality of well pipes which includes an annular or non-sectional slip bowl having a gripping slip unit connected therewith to form a unitary assembly, with the connection between the parts being such that the slip unit may undergo limited movement relative to the bowl and thereby cause the gripping slips to co-act with said bowl to be moved to gripping or non-gripping position relative to a well pipe. The slip bowl being releasably supported within a spider supporting body and the gripping slip unit being releasably attached to an operating power source whereby the slip unit may be power operated and controlled from a remote point; detachment of the bowl from the body and detachment of the slip unit from the power source permitting removal of the slip bowl and slip unit from the body to facilitate interchange of these parts with a manually operated slip unit and slip bowl assembly which is also insertable within the same supporting body.

The construction designed to carry out the invention will be hereinafter described, together with other features thereof.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown, and wherein:

FIGURES 1 through 7, inclusive, are schematic views illustrating the method of handling multiple pipe strings having a plurality of spaced well packers thereon and showing the manner in which said strings and packers are run into a well bore which is traversed by a plurality of producing zones;

FIGURE 8 is a plan view of the power-operated spider assembly which is employed in carrying out the improved method;

FIGURE 9 is a transverse vertical sectional view taken on the line 9—9 of FIGURE 8;

FIGURE 10 is a view, partly in section and partly in elevation, of the power-operated elevator device which is employed for handling the multiple pipe strings as they are run into or removed from the well; and

FIGURE 11 is a plan view of the manually-operated spider assembly which is employed at the well head during the time that the well packers are being moved into or are being removed from the well.

In the drawings, the numeral **10** designates a well bore which has the usual well casing extending throughout the length thereof. The well bore traverses one or more well producing formations (not shown) and said formations communicate with the interior of the well casing whereby flow from said formations may enter said casing. A tubing head **12** having the usual supporting seat **13** is mounted at the upper end of the casing above the ground level but below the derrick floor **14**.

In producing well fluids from several formations through the same well bore **10**, it is necessary to dispose well packers within the well casing to separate the various producing zones and to lower multiple tubing strings so that the fluids from each zone may be separately pro-

duced. The present method and apparatus relate to the running in and the removal from the bore of a plurality of well packers and a plurality of pipe strings.

For the purpose of handling the multiple strings of pipe in accordance with the present invention, the apparatus includes a power-operated elevator device generally indicated at A, which will be more clearly described hereinafter, is employed. In addition, a manually-manipulated pipe supporting or spider assembly generally indicated at B and a power-operated spider assembly indicated at C are employed. The spider assemblies B and C may be selectively and interchangeably employed with an annular spider body D which is mounted at the upper end of the well bore. As will be explained, the power-operated elevator device A is used in combination with the manually-manipulated spider assembly B during a portion of the time that the strings and well packers are being run. The power-operated elevator device A is used in combination with the power-operated spider assembly C during the remainder of the time. By employing the different combinations, that is power-operated elevator and manually-operated spider assembly at one time and the power-operated elevator and power-operated spider assembly at another time, the overall time and effort involved in running or removing the pipe string is materially reduced.

The manually operable pipe supporting or spider assembly B includes a sectional slip bowl **15**, the segments **15***a* of which are divided in the manner shown in FIGURE 11. Adjacent segments are formed with complementary recesses which form slip receiving openings **16** into which gripping slip units **17** may be inserted. The sectional slip bowl **15** is insertable within the bore of the spider body D and is supported upon an inclined seat **20** formed in said bore. The spider assembly B is adapted to support a plurality of pipe strings and it is evident that the slips **17** and the segments **15***a* may be placed around or removed from the multiple pipe strings which may be extending therethrough. The specific construction of the segments may be as shown in the co-pending application of E. C. Chamblee, Serial No. 787,-511, filed January 19, 1959.

The power-operated pipe supporting or spider assembly C is illustrated in FIGURES 8 and 9 and is insertable within the annular spider body D to be supported on the internal seating surface **20**. The spider body D, as schematically illustrated in FIGURES 1 to 3, may be supported on the derrick floor **14**, it being usual practice to support the body on the rotary table (not shown). The smallest diameter portion of the opening or bore through the body is as large as the diameter of the bore of the well casing **11** so as to provide a full opening through said body for the passage of well packers or other tools.

The spider assembly C comprises an annular, non-sectional slip bowl **23** which seats upon the inclined seating surface **20** of the body which is formed with an externai annular flange **23***a* overlying the upper end of said body; suitable bolts **24** detachably connect the bowl to the body. The bowl has a plurality of vertical openings **25**, one for each pipe string which is adapted to extend therethrough and each opening has an inclined slip actuating surface **26** at its upper portion. Four of the openings **25** are illustrated in FIGURES 8 and 9 but it is evident that the number of such openings within the slip bowl **23** may vary in accordance with the particular number of pipe strings to be supported.

Each opening **25** of the bowl **23** is arranged to receive a set of gripping slips generally indicated at **27**; each set of slips includes a trio of gripping slips **28**, each of which has an upwardly extending projection **29**. Each projection extends through a recess **30** formed in a generally circular-shaped lifting plate **31** which overlies the slip bowl **23** and a transverse pin **32** extending through each projection suspends each slip from the upper surface of the lifting plate **31**. Each slip **28** is formed with the

usual gripping teeth **33** on its inner surface while its outer inclined surface co-acts with the inclined surface **26** within the bore **25** of the bowl to move the slips radially as said slips are raised or lowered with respect to said inclined surface. The usual dove-tail engagement between the slips and the inclined surfaces on which they are slideable may be employed to properly guide said slips in their movement. The gripping slips and the lifting plate from which they are suspended form a gripping slip unit which co-acts with the bowl.

When the lifting plate **31** is raised and lowered with respect to the bowl **23**, each set **27** of gripping slips is moved longitudinally within its respective bore **25** and by reason of the co-acting surfaces between each opening and each slip, the slips **28** of each set undergo a lateral or radial movement. When the plate **31** is raised with respect to the bowl, the various sets of slips are also raised to move their slips radially outwardly and thereby assume a nongripping position with respect to the pipe extending through the particular bore **25**. When the plate **31** is lowered, the gripping slips are moved downwardly of the bowl **23** and inwardly with respect to the axis of the bore **25** with the result that the gripping teeth **33** of said slip members are engaged with the well pipe.

For guiding the vertical movement of the lifting plate **31** which controls the position of the slips with respect to the bowl **23** and also for connecting the gripping slip unit to the bowl, a plurality of plungers **34** have their upper ends secured to the lifting plate while their lower portions are slideable within vertical bores **35** in said bowl. The lower end of each plunger is enlarged to form a stop-shoulder **36** which will engage a stop-ring **37** threaded into the upper end of each bore **35** to thereby limit the upward movement of the lifting plate **31** relative to the bowl. Thus, the lifting plate **31** is attached to the bowl **23** in such manner that after the lifting plate has been raised to its upper limit relative to the bowl, further raising thereof will apply an upward lifting force to the bowl **23**. This arrangement permits the gripping slip unit and the bowl to be handled as a unitary structure. When the fastening bolts **24** which secure the bowl **23** to the body D are removed, the lifting ring may be utilized to remove the bowl **23** from said body; in such case, the bowl **23** will be suspended from the lifting plate **31** by the plungers **34**.

For effecting the raising and lowering of the lifting plate **31** with respect to the bowl **23** when the latter is secured within the body D, said lifting plate is formed with diametrically opposed support arms **38** which extend outwardly from the periphery of said plate. The outer end of each arm **38** is releasably secured by fastening nuts **39***a* to the upper end of the piston rod **39** of a piston **40** which is movable within a cylinder **41**. Each cylinder is preferably mounted upon a bracket **42** secured to the side of the body D and suitable pressure lines **43** and **44** conduct pressure to and from opposite sides of the piston within said cylinder.

By observing FIGURE 9, it will be evident that when pressure is applied through the lines **44** of the cylinders **41**, the pistons **40** are moved upwardly to raise the lifting plate **31** and thereby raise the sets **27** of gripping slips **28** within their respective bores of the bowl **23**. The introduction of pressure through the line **43** and release of pressure through lines **44** will effect a downward movement of the lifting plate to move the slips downwardly into pipe gripping position.

The power-operated elevator device A is illustrated in FIGURE 10 and is preferably constructed in accordance with the disclosure in my co-pending application Serial No. 832,283, filed August 7, 1959 and now abandoned. The construction of the device A is substantially the same as that of the spider assembly C and includes an annular body **120** which is provided with external supporting lugs **120***a* for receiving a suitable cable or line which suspends said device. A slip bowl **123** is secured within the body

120 and a plurality of sets 127*a* of gripping slips are movable within the upper portion of bores 125*a* formed in the bowl. A lifting ring 131 overlies the slip bowl and has the slip sets 127*a* suspended therefrom in the same manner as the sets 27 of slips are suspended from the lifting ring 31 of said spider assembly C. The lifting plate 131 is formed with the diametrically opposed supporting arms 138 which have connection with the upper ends of piston rods 139 of pistons 140. The pistons 140 are movable within cylinders 141 which are supplied with pressure fluid through pressure lines 143 and 144.

The power-operated elevator device A functions to support multiple pipe strings which extend through the bores 125*a*. When the lifting plate 131 is in a raised position, each set 127*a* of gripping slips is in the upper portion of its bore and is in non-gripping relationship to the pipe extending therethrough. Upon application of pressure to the top of the piston 140 of each cylinder 141, the lifting plate 131 is moved downwardly with respect to the bowl 123 to move the gripping slips into pipe gripping position. The movement of the lifting ring 131 with respect to the bowl is guided by a plurality of guide plungers 134 which are similar in construction and mounting to the plungers 34 of the spider assembly C.

In running and removing multiple strings and well packers, the power elevator device A is employed either in combination with the manually manipulated spider assembly B or in combination with the power-operated spider assembly C, and in FIGURES 1 through 7, the manipulative steps of the method, which are carried out to run a plurality of pipe strings and well packers into the bore 10, is shown.

Referring to FIGURE 1, a first tubing string T is illustrated as having its lower portion extending downwardly within the well bore with a first packer P mounted thereon. A second packer P1 is mounted on said first tubing string and the lower end of a second tubing string T1 extends through said second packer. During lowering of that portion of string T below the second packer, the manually-operated slip assembly B and the power-operated elevator device A were employed. When the second packer and the lower portion of the second string are connected as illustrated in FIGURE 1, the manually-operated slip units 17 and the sectional slip bowl 15 have been removed from the annular body D and both strings are suspended from the elevator device A.

The elevator device A is then employed to lower the second packer into the well with additional stands of tubing being added to strings T and T1; during this time, the elevator device A is used in combination with the manually-operated slip assembly B. When the packers and strings reach the position of FIGURE 2, the manually operated assembly B supports the strings and the elevator device A may be disconnected and removed.

Assuming packer P1 to be the last packer to be placed in the well, the power-operated slip assembly C is then placed in position in the manner shown in FIGURE 2. Such positioning is accomplished while the strings are supported by the assembly B and after the elevator device A has been disconnected. Suitable cables 46 are attached to the bowl and slip unit C and the latter is lowered over the upwardly projecting stands of the tubing strings as illustrated in FIGURE 2. Thereafter, as shown in FIGURE 3, the power-operated elevator device A is passed over the upper ends of the tubings T and T1 and the lifting ring 131 thereof is operated to engage the two pipe strings. The slips and bowl of the manually-operated unit B are then removed and the slips and bowl of assembly C are lowered into position within the body D as shown in FIGURE 3. The bolts 24 (FIGURE 9) then secure the bowl 23 of assembly C in position and the support arms 38 of the lifting plate 31 are thereafter connected to the upper ends of the piston rods 39 by means of the fastening nuts 39*a*; at this time the pistons 40 are in a position maintaining the slips 28 of the assembly C in a raised position out of engagement with the pipe strings.

The power elevator device A is then lowered to lower the pipe strings T and T1 downwardly until the elevator is in close proximity to the spider assembly C. At this point, the pistons 40 of the assembly C are actuated to lower the lifting plate 31 and engage the slips 28 of assembly C with the pipe strings T and T1 whereby said strings are supported from said assembly. Thereafter, the elevator device is removed and additional pipe stands may be connected to the strings T and T1 in the usual manner after which the elevator device is reconnected to the strings to again support the pipe strings. The slips 28 of the spider assembly C are then released and the additional stands are lowered into the well by means of the elevator device A. The operation is repeated and by using the elevator device A and the spider assembly C in the well-known manner, the strings T and T1 may be lowered to final position within the well bore.

It is noted that in FIGURES 1 to 3 only two well packers P and P1 have been illustrated but in many instances additional well packers and additional strings are run. In such case the operation would be the same as heretofore described except that the manually-operated spider assembly B would not be removed and replaced by the power-operated spider assembly C until the last or uppermost packer has been passed into the well bore. Normally, the well packers are nearer the lower ends of the pipe strings and while the packers are being run, a saving in time and effort is effected by employing the manually-operated spider assembly B instead of the power-operated assembly C. This is true because the power-operated assembly requires disconnection of its lifting plate and removal of its bowl each time that it is desired to remove the bowl 23 from the body D in order to provide the full opening through the body. However, after all packers are in the well, the continued running of the pipe string does not require removal of the bowl 23 and therefore the operation is considerably speeded up by the use of the power-operated assembly C.

Upon reaching the final position of the tubing strings T and T1 within the well bore, it is necessary to remove the pipe supporting or spider assembly C and to land the tubing strings within the usual tubing head 12. This operation is illustrated in FIGURES 4 through 7. Referring to FIGURE 4 and assuming that the tubing strings are in substantially final position within the well bore, the elevator device A is supporting said strings and the lifting plate 31 of the spider assembly C has been actuated to disengage the slips 28. At this time the bolts 24 which secure the slip bowl 23 to the body D are removed and the fastening nuts 39*a* also removed, following which the cables 46 are reconnected with the support arms 38 of the lifting plate 31. With the pipe strings supported by the elevator A, the cables 46 lift the slip bowl 23 and its associated parts to the position shown in FIGURE 5.

The segmental slip bowl 15 of the manually operable spider assembly B is then inserted within the body D and the slips 17 are placed about each of the pipes T and T1 to support said pipes. It is then possible to remove the elevator device from the tubing strings and to lift the slip bowl and associated parts of the spider assembly C upwardly from the ends of said strings. This position of the parts is illustrated in FIGURE 6.

After removal of the elements of the assembly C, suitable hangers 50 (FIGURE 7) are connected to the upper ends of the tubing strings T and T1 and additional stands of tubing are added. The elevator device A is then reconnected with the upper ends of these additional stands so that the elevator device again supports the pipe strings. It is then possible to remove the segmental slip bowl 15 and slips 17 of the manually operated assembly B and thereafter the elevator device A

may be employed in the usual manner to lower the hangers 50 onto the seat 13 of the usual tubing head 13. This suspends the tubing strings from the tubing head in the usual manner and thereafter the usual control equipment (not shown) may be mounted at the upper end of the wall.

By employing a combination of the elevator device A with the manually-operated spider assembly B at certain times and employing said elevator device in conjunction with the power-operated spider assembly C at other times, the well packers and pipe strings may be lowered into the well bore with a minimum effort and in a minimum time. The power-operated spider assembly C is employed throughout the running time of the major portion of the pipe strings because at this time there is no need for a full opening bore through the body D. The manually-operated assembly B is used so long as need for a full opening bore is present but as soon as the uppermost packer has passed into the well bore, such manually-operated assembly is replaced by the assembly C which, of course, may be controlled from a remote point and which may be operated more rapidly. It is noted that the annular spider body D is common to both the manually-manipulated assembly B and the power-operated assembly C with the body being constructed to receive either the segmental bowl of assembly B or the annular bowl of assembly C. Thus the assemblies B and C may be selectively interchanged within the main spider body D. The detailed use and sequence of steps in running multiple pipe strings is illustrated in FIGURES 1 through 7, and has been heretofore described. It is to be understood that removal of the pipe strings and well packers will be effected by the same apparatus with the steps being carried out in reverse order.

The particular construction of the power-operated spider assembly C includes the connection between the gripping slip unit comprising the gripping slips and lifting plate and the bowl 23; such connection permits limited movement of the lifting plate and slips with respect to the bowl to permit the slips to be moved to gripping or non-gripping position. The vertical plungers 34 which form this connection are so arranged that when the lifting plate reaches the upper limit of its movement with respect to the bowl, any subsequent lifting of the plate will result in raising the slip bowl 23 from the body. Thus the bowl 23 and the slip unit which includes the lifting plate form a unitary structure which may be handled as a single device.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

What I claim is:

1. An apparatus for handling multiple pipe strings having a plurality of well packers thereon including, an annular spider body mounted at the upper end of the well bore, a first pipe-supporting assembly having a segmental bowl insertable within the body and also having a plurality of openings through which a plurality of pipe strings may extend, gripping slips supported in each opening of the bowl, and engageable with the pipe string extending through said opening, said slips and segmental bowl being manually removable from the body to provide a full-open bore through the body, a power-operated elevator having means for simultaneously supporting a plurality of pipe strings whereby said pipe strings and well packers thereon may be simultaneously lowered or raised through the spider body by means of said elevator, and a second pipe-supporting assembly having an annular bowl formed with a plurality of openings through which pipe strings may extend, said bowl being insertable within the spider body in place of the segmental bowl, said assembly having power-operated slips supported in each opening in the bowl and engageable with a plurality of pipe strings extending through the openings, whereby said second pipe-supporting assembly may be utilized in combination with the elevator to lower or raise said strings.

2. An apparatus for handling multiple pipe strings having a plurality of well packers thereon including, an annular body mounted at the upper end of a well casing and having a bore therethrough which is at least as large as the bore of said casing, a first spider assembly comprising a sectional slip bowl insertable within the body and having a plurality of openings therein through which a plurality of pipe strings may extend, said spider assembly also including pipe-gripping slips insertable in each opening and engageable with the pipe string extending therethrough to support the same, said sectional bowl and slips being manually removable from said body to provide a full-opening bore through the body, an elevator device having a plurality of openings therein through which pipe strings may extend, remotely-operated slip means in each opening for engaging the pipe string extending therethrough, whereby the elevator may simultaneously support a plurality of pipe strings and lower or raise said strings and the packers thereon within the well bore, a second spider assembly comprising an annular bowl which is insertable within said spider body in place of the manually manipulated sectional bowl of the first spider assembly, said annular bowl having a plurality of openings therein, and a remotely operated slip means in each opening of said annular bowl for engaging the pipe string extending through each opening whereby all of said strings may be simultaneously supported by said second spider assembly.

3. An apparatus as set forth in claim 2, wherein the elevator includes a pressure-actuated piston, and means for connecting said piston to the slip means of said elevator to move the slip means to gripping or nongripping position with respect to the pipe strings.

4. An apparatus as set forth in claim 2 wherein the second spider assembly includes a lifting plate which overlies the annular bowl, means for suspending the slip means of said second spider assembly from said lifting plate, and pressure-actuated means connected to the lifting plate for raising and lowering the same to thereby raise and lower the slip means relative to the annular bowl to move the slip means to gripping or nongripping position with respect to the pipe.

5. As a subcombination in a pipe handling apparatus, a spider assembly including, a body mountable at the upper end of a well bore, an annular slip bowl supported within the body and removably attached thereto, said bowl having a plurality of openings through which pipe strings extend, each opening having an inclined annular surface therein, a slip assembly insertable in each opening and coacting with the inclined surface, whereby the position of the slip assembly relative to said surface determines the engagement or nonengagement of the slip assembly with the pipe string, a common lifting plate from which the slip assemblies are suspended, and power-operated means connected with the lifting plate to raise and lower said plate to thereby control the position of the slip assemblies.

6. The subcombination set forth in claim 5, together with quickly releasable connecting means secured to the power-operated means and also attached to the lifting plate and forming the connection therebetween, whereby disconnection of said lifting plate from said power-operated means is accomplished by release of the connecting means.

7. The subcombination set forth in claim 5, wherein the power-operated means comprises a stationary cylinder and a pressure-actuated piston movable therein, and a releasable connection between the piston and the lifting plate.

8. The subcombination set forth in claim 5, together with plungers extending between the lifting plate and the annular bowl to connect these parts together while allowing limited movement of the plate relative to the bowl.

9. The method of handling a plurality of pipe strings having a plurality of well packers mounted thereon by means of a power-operated elevator, a power-operated spider assembly and a manually manipulated spider assembly, said method including,

lowering said pipe strings having said well packers thereon into a well bore by said power-operated elevator,

supporting said pipe strings during the addition of each additional pipe stand by said manually manipulated spider assembly,

alternating lowering and supporting said pipe strings until such time as the well packers are disposed within the well bore,

thereafter further lowering said pipe strings and said well packers in said well bore by said power-operated elevator,

supporting said pipe strings and said well packers during the addition of pipe stands after the well packers are in the well bore by said power-operated spider assembly,

and continuing the alternate lowering and supporting of said pipe strings and said well packers by said power-operated elevator and said power-operated spider to locate said pipe strings and said well packers in final position in said well bore.

10. The method of handling a plurality of pipe strings having a plurality of well packers mounted thereon by means of a power-operated elevator, a power-operated spider assembly and a manually manipulated spider assembly, said method including,

mounting the manually manipulated spider assembly at the upper end of a well bore,

suspending said power-operated elevator from a lowering line,

supporting the pipe strings by said manually manipulated spider assembly while additional pipe stands are being connected in the pipe strings,

engaging said pipe strings with said power-operated elevator,

releasing the support for said pipe strings by said manually manipulated spider assembly,

lowering said elevator and said pipe strings by lowering said lowering line,

continuing alternately supporting said well pipes by said manually manipulated spider assembly and lowering said pipes suspended from said elevator until the well packers are within the well bore,

then removing the manually manipulated spider assembly from the upper end of the well bore,

mounting the power-operated spider assembly at the upper end of the well bore,

and thereafter alternately supporting said pipe strings with said power-operated spider assembly while additional pipe stands are being connected in the pipe strings and lowering said pipe strings and well packers suspended from said elevator until the pipe strings and well packers have been lowered to substantially final position within the well bore.

11. The method as set forth in claim 10, together with the step of removing the power-operated spider assembly from the upper end of the well bore,

landing the plurality of pipe strings in final position suspended from a well head,

and connecting well head control equipment in position at the well head to control flow through said pipe strings.

12. The method as set forth in claim 10, wherein

the pipe strings and well packers are removed from the well bore by reversing the manipulative steps, whereby the pipe strings and well packers are raised by alternately raising the power-operated elevator with the pipe strings and well packers suspended therefrom and supporting the well pipes by the power-operated spider assembly while stands of pipe are being removed form the pipe strings until the packers reach the upper end of the well bore

and thereafter raising the pipe strings and well packers by alternately raising the power-operated elevator with the pipe strings and well packers suspended therefrom and supporting the pipes, strings and well packers with said manually manipulated spider assembly while pipe stands are being removed from the pipe strings.

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