Sept. 28, 1965 J. T. ROARK 3,208,788

WELL TOOLS

Filed Aug. 19, 1963 2 Sheets-Sheet 1

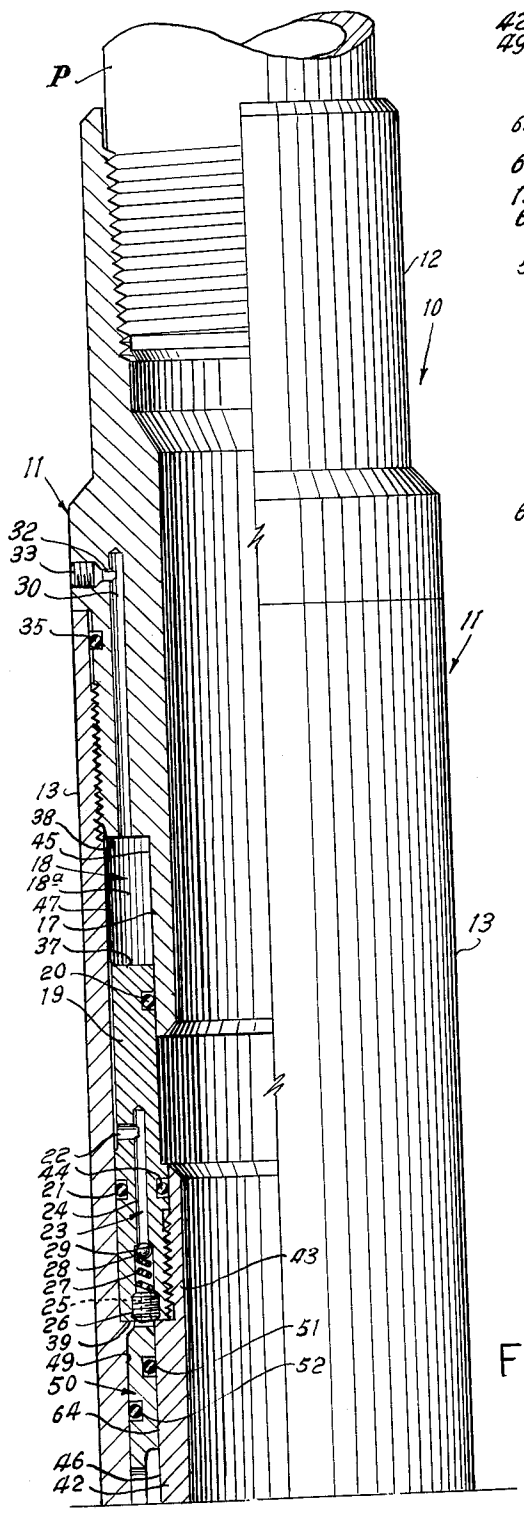


Fig. 1

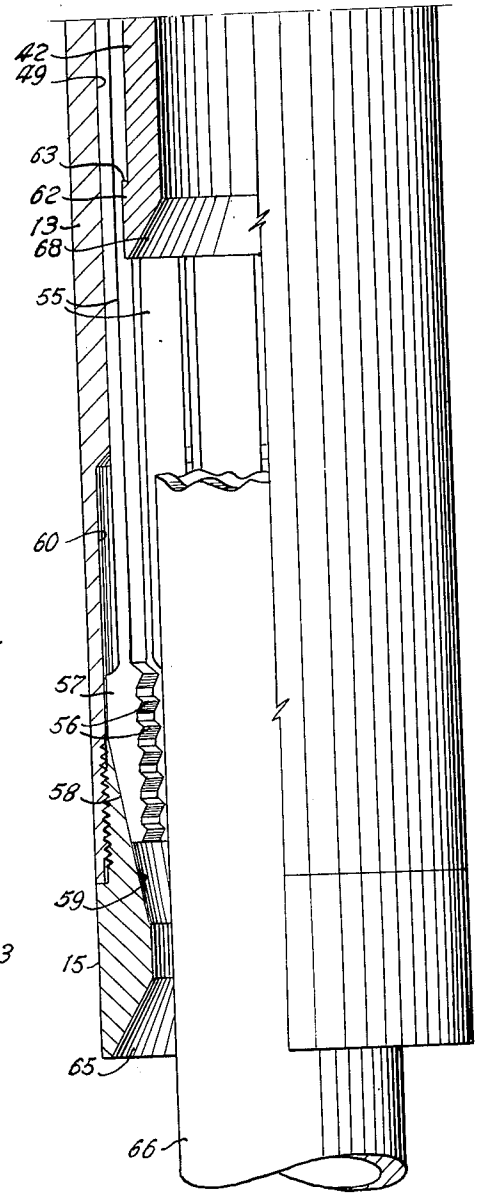


Fig. 2

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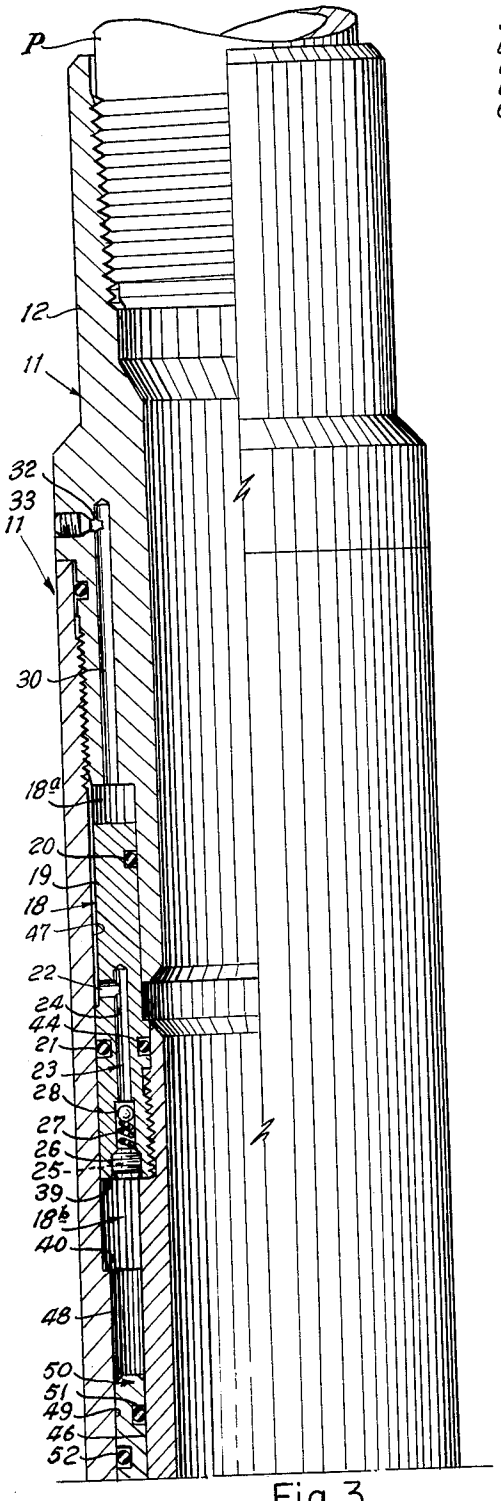


Fig. 3

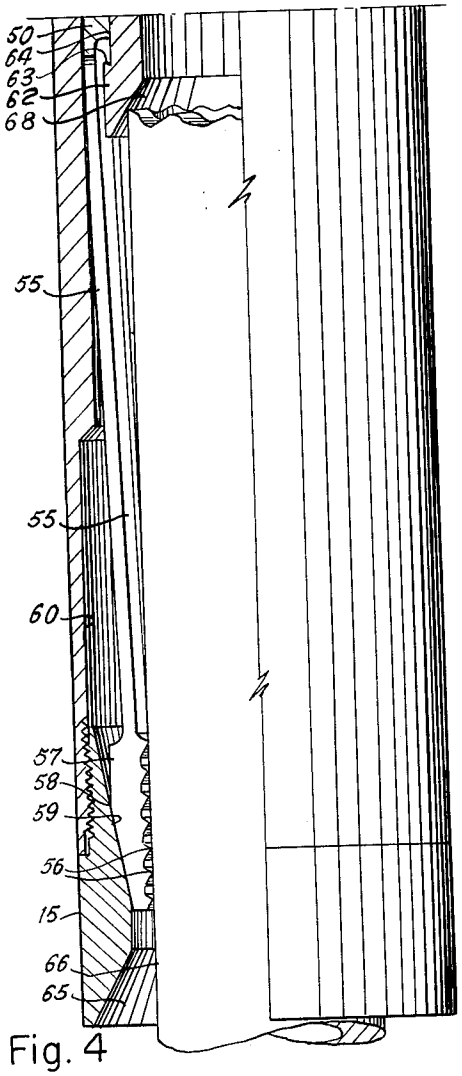


Fig. 4

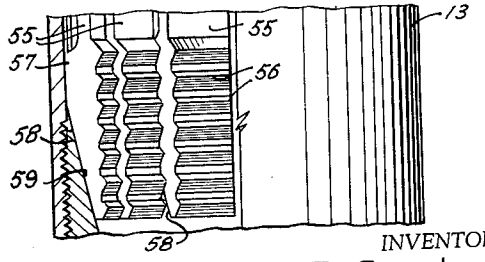


Fig. 5

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3,208,788

WELL TOOLS

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This invention relates to well tools and more particularly to a tool for retrieving objects, such as tubing and the like from a well.

An object of this invention is to provide a new and improved well tool which is lowerable in a well to engage and grip an object in the well for removing the object upwardly from the well.

Another object is to provide a retrieving tool having gripping means for engaging an object, such as the upper end of a tubing in a well, which gripping means are forced into gripping engagement with the object upon downward movement of the retrieving tool relative to the tubing after the engagement of the retrieving tool therewith and which are also forced and held in gripping engagement with the tubing upon an upward force thereafter being applied to the retrieving tool.

Still another object is to provide a retrieving tool lowerable into the well by means of a string of pipe and operable to grip and hold the object which is to be retrieved from the well without the necessity of imparting any rotational movement to the string of pipe by which the retrieving tool is lowered into the well.

A further object is to provide a retrieving tool having hydraulically operated gripping means for engaging and holding an object to be retrieved from a well.

A still further object is to provide a retrieving tool having pump means and an operator piston movable by fluid pumped by the pump means for moving the gripping means into gripping engagement with an object.

A still further object is to provide a retrieving tool having pump means for operating the operator piston which causes power fluid to be applied to the operable piston upon downward movement of the retrieving tool relative to the pump piston upon the engagement of the pump piston with an object to be retrieved.

Another object is to provide a retrieving tool having a pair of telescoped pistons, one of which is provided with a gripping means movable inwardly to engage an object telescoped into the lower end of the retrieving tool and the other having means engageable with the upper end of the object whereby downward movement of the retrieving tool relative to the pump piston causes the pump piston to supply fluid under pressure to the operator piston and causes downward movement of the operator piston and engagement of the gripping means thereof with the object to be retrieved.

Additional objects and advantages of the invention will be readily apparent from the reading of the following description of a device constructed in accordance with the invention, and reference to the accompanying drawings thereof, wherein:

FIGURE 1 is a vertical partly sectional view of the upper portions of the retrieving tool showing it connected to the lower end of a string of pipe by means of which it is lowered into the well and showing the pump and operator pistons in their normal positions;

FIGURE 2 is a view similar to FIGURE 1, being a continuation thereof, and showing the lower portions of the well tool telescoped over the upper end of a tubing which is to be retrieved from the well;

FIGURE 3 is a vertical partly sectional view showing the pistons in their operative positions during the removal of the string of tubing from the well;

FIGURE 4 is a view similar to FIGURE 3, being a continuation thereof, showing the lower portions of the well tool with the gripping means thereof in gripping engagement with the tubing being removed from the well; and

FIGURE 5 is a fragmentary vertical partly sectional view showing the gripping means of the retrieving tool.

Referring now particularly to the drawings, the retrieving tool **10** embodying the invention includes a tubular body or mandrel **11** whose top section **12** is threadable on the lower end of string of pipe by means of which the retrieving tool is lowered into the well. The mandrel has an intermediate tubular or barrel section **13** whose upper end portion is threaded on the bottom portion of the top section, and a cam or bottom section **15** whose upper end portion is threaded into the lower end portion of the barrel section.

The top mandrel section has an internal annular dependent portion **17** of decreased external diameter which forms with the barrel section an upper piston chamber **18** in which is slidable the annular pump piston **19**. The pump piston has an O-ring **20** received in a suitable internal annular recess thereof which seals between the piston and the dependent portion **17** of the top mandrel section and an O-ring **21** disposed in suitable external annular recess thereof which seals between the barrel mandrel section and the piston pump below a lateral portion **22** of a bypass flow passage **23** of the pump piston. The longitudinal portion **24** of the flow passage **23** opens downwardly through the orifice **25** of a spring retainer **26** threaded in the lower end of the longitudinal portion. The spring **27** disposed in the longitudinal portion of the flow passage biases a ball check valve **28** against an annular seat **29** of the piston, its lower end bearing against the retainer and its upper end against the ball check valve.

The ball check valve at all times prevents upward flow of liquid through the bypass flow passage **23**, and prevents downward flow therethrough until the pressure within the upper chamber **18** above the pump piston has increased to a value sufficiently great to overcome the force exerted by the spring **27** on the ball valve.

Liquid, such as oil, is introducible into the top portion **18***a* of the upper chamber **18** above the pump piston through an inlet passage **30** of the top mandrel section whose upper lateral portion **32** is closable by a suitable plug **33**. An O-ring **35** disposed in an external annular recess of the top mandrel section seals between the barrel mandrel section and the top mandrel section so that when the plug **33** closes the inlet passage **30**, liquid can escape from the upper chamber above the pump piston only through the bypass flow passage **23** of the pump piston.

Upward movement of the pump piston in the upper chamber is limited by the engagement of its top annular end surface **37** with the annular downwardly facing annular stop shoulder **38** of the top mandrel section while its downward movement in the upper chamber is limited by the engagement of its annular bottom end surface **39** with the internal annular shoulder **40** of the barrel mandrel section which defines the lower end of the upper piston chamber.

The pump piston **19** includes a dependent sleeve **42** whose reduced upper end portion **43** is threaded in the lower end portion of the pump piston. An O-ring **44** disposed in an annular external recess of the pump piston seals between the piston and the sleeve **42**. The external surface **45** of the dependent portion **17** is of a smaller diameter than the external surface **46** of the pump piston sleeve **42** so that the width of bottom portion **18***b* of the upper chamber below the lower end of the pump piston defined by the external surface **46** and the internal sur-

face 47 of the barrel mandrel section, as pump piston moves upwardly in the chamber 18, is smaller than the width of the top portion 18*a* above the O-rings 20 and 21 of the pump piston. The volume of liquid displaced from above the pump piston as it moves upwardly thus is greater than the volume of lower portion 18*b* of the chamber and the liquid thus pumped by the pump piston is therefore forced into the upper end of a lower annular piston chamber 48. The lower piston chamber 48 has a width smaller than that of the lower portion 18*b* of the upper chamber 18 being defined by the external surface 46 of the sleeve 42 and the internal surface 49 of the barrel mandrel section below the shoulder 40 thereof which is of smaller diameter than the internal surface 47 defining the upper chamber.

The operator piston 50 is slidably disposed in the lower chamber and has O-rings 51 and 52 disposed in suitable internal and external recesses thereof which engage the surfaces 49 and 46 of the barrel mandrel section and the sleeve 42, respectively. The operator piston has a plurality of dependent resilient collet fingers 55 whose lower ends are provided with inner serrations or teeth 56 and with external bosses 57. The bosses have outer cam surfaces inclined downwardly and inwardly which are engageable with the internal downwardly and inwardly extending or beveled cam surface 59 of the bottom mandrel section 15. The external bosses of the collet fingers are receivable in the lower enlarged internal portion 60 of the bore or passage of the barrel mandrel section 13 above the bottom mandrel section which permits the collet fingers to assume their inherent inoperative outer positions illustrated in FIGURES 2 and 5.

The pump piston sleeve 42 has an external annular flange 62 which provides an upwardly facing external shoulder 63 engageable with the downwardly facing internal annular shoulder 64 of the operator piston to limit downward movement of the operator piston relative thereto. The bottom mandrel section 15 has an upwardly and inwardly inclined cam or beveled surface 65 which is engageable with the upper end of the object, such as the tubing 66, which is to be removed from the well.

In use, when an object is to be retrieved or removed from a well, for example the tubing 66 whose upper end portion may have broken off, the operator piston 50 of the retrieving tool is moved to its uppermost position in the mandrel wherein its annular top end surface engages the annular bottom end surface of the pump piston 19 so that the external bosses 57 of the collet fingers are in the enlarged portion 60 of the bore of the barrel mandrel section and the collet fingers are in their outer inoperative positions in the mandrel illustrated in FIGURES 2 and 5. An incompressible fluid, such as oil, is then introduced into the top portion 18*a* of the upper pump piston chamber 18 through the inlet passage of the mandrel to fill the upper chamber portion 18*a* above the pump piston 19 which is then in its lowermost position in the mandrel. The plug 33 is then threaded in the enlarged portion of the lateral portion 32 of the inlet passage and closes the inlet passage.

The check valve 28 now prevents flow of the oil from the upper chamber portion 18*a* through the bypass flow passage 23 to the lower chamber portion 18*b* due to the force exerted thereon by the spring 27 and the operator piston is held against downward movement in the mandrel since any downward movement thereof tends to create a vacuum in the lower chamber portion 18*b*. In addition, the collet fingers 55 tend to hold the operator piston in the upper position illustrated in FIGURE 1 due to the engagement of the cam surfaces 58 thereof with the cam surface 59 of the mandrel and the resilient force with which the collet fingers resist inward flexing or movement. The operator piston is thus held in its uppermost position against any accidental downward movement in the mandrel and the collet fingers remain in their outer inoperative positions during lowering of the retrieving tool into the well.

The retrieving tool is then lowered into the well on a string of pipe until the lower end of the mandrel telescopes over the upper end of the object which is to be retrieved, such as the upper end of the tubing 66. The cam surface or shoulder 65 of the bottom mandrel section guides the downward movement of the mandrel over the upper end of the tubing.

As the retrieving tool telescopes over the upper end portion of the tubing and the collet fingers move downwardly thereabout, their teeth or serrations 56 do not engage the outer surface of the tubing since the lower ends of the collet fingers are now in their outer inoperative positions. The retrieving tool is moved downwardly over the upper end portion of the tubing until the top end surface of the tubing engages the bottom surface 68 of the pump piston sleeve 42 which is beveled inwardly and upwardly to help center the retrieving tool on the tubing as it is lowered thereon. Once the pump piston sleeve engages the upper end of the tubing further downward movement of the pump piston is arrested.

A downward force then imposed on the mandrel 11 of the retrieving tool by means of the string of pipe then causes further downward movement of the mandrel relative to the pump piston and over the upper end portion of the tubing and the incompressible liquid in the upper portion 18*a* of the pump piston chamber 18 is forced or pumped downwardly through the bypass flow passage 23 into the lower portion 18*b* and thence into the upper end of the operator piston chamber 48, the check valve 28 moving downwardly against the resistance of the spring 27 and from its sealing engagement with the seat 29 to permit such flow of fluid in the chamber 18 past the piston 19. Since the rate of decrease of volume of the upper portion 18*a* of the chamber is greater than the rate of increase of the volume of the lower portion 18*b*, the liquid thus pumped into the upper end of the operator piston chamber moves the operator piston downwardly in the mandrel.

Downward movement of the operator piston in the mandrel causes the lower ends of the collet fingers to be moved inwardly due to the camming engagement of their cam surfaces 58 with the cam surface 59 of the mandrel cam section 15 and the teeth or serrations 56 of the collet fingers to engage and dig into the external surfaces of the tubing.

When further downward movement of the retrieving tool is arrested as the lower ends of the collet fingers reach the limit of their inward movement after their teeth have dug into the tubing, an upward force is imparted to the string of pipe at the surface of the well and the upward force applied thereby to the mandrel will tend to move the mandrel cam surface 59 upwardly relative to the cam surface 58 of the collet fingers and thus will tend to move the lower ends of the collet fingers inwardly and, at the same time, will tend to move the collet fingers, and therefore the tubing 62 held thereby, upwardly with the mandrel. It will be apparent that the greater the force necessary to move the tubing upwardly, the greater will be the force with which the serrations or teeth of the collet fingers are held in gripping engagement with the tubing so that the tubing will be thus held against downward movement relative to the mandrel and will be raised with the retrieving tool as the string of pipe is raised upwardly to the surface.

It will be apparent that once the operator piston 50 is moved downwardly and the collet teeth have engaged the tubing, the retrieving tool cannot be disengaged from the tubing since the incompressible liquid in the lower chamber 48 above the operator piston and in the lower portion 18*b* of the upper chamber 18 below the operator piston 19, cannot flow back into the upper portion 18*a* of the upper chamber due to the check valve 28 which prevents upward flow of fluid through the bypass flow passage 23.

When the retrieving tool and the tubing so engaged thereby is removed from the well at the surface, the retrieving tool can be easily disengaged from the tubing by unscrewing the mandrel sections from one another.

It will now be seen that a new and improved retrieving tool has been illustrated and described which has gripping means which inherently tend to remain in outer inoperative positions and which are movable into gripping engagement with an object to be removed from a well by a hydraulic means which includes the pump and operator pistons **19** and **50**.

It will further be seen that the mandrel and the gripping means have coengageable means, such as the cam surfaces **58** and **59**, which cause the gripper means to move inwardly to grip an object disposed therebetween upon relative longitudinal movement of the operator gripping means and the mandrel.

It will further be seen that the new and improved retrieving tool does not require any rotary movement of the means, such as the string of pipe, by which it is lowered into the well to cause the engagement of its gripping means with the object to be retrieved and that the force with which the gripping means engage and hold the object increases as the force with which such object resists removal from the well.

It will further be seen that the retrieving tool including a hydraulically activated gripping means movable in a tubular mandrel for engaging an object receivable in the mandrel and a pump means in the mandrel for supplying liquid under pressure to move the gripping means relative to the mandrel and into engagement with the object, the pump means being engageable with such object whereby the movement of the mandrel relative to the pump means then causes the pump means to supply liquid under pressure to the gripping means.

It will be further seen that while the bypass flow passage **23** connecting the upper and lower portions **18***a* and **18***b* of the pump piston chamber is provided in the pump piston for compactness and ease of manufacture, it may be provided in the barrel mandrel section or by an external conduit connecting upper and lower ends of the pump piston chamber.

The foregoing description of the invention is explanatory only, and changes in the details of the construction illustrated may be made by those skilled in the art, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed and desired to be secured by Letters Patent is:

1. A retrieving tool including: a tubular member; hydraulically actuated gripping means movable in said tubular member for engaging an object receivable in said tubular member; and pump means carried by said tubular member for supplying fluid under pressure to said gripping means to move said gripping means relative to said tubular member and into engagement with said object in said tubular member, said pump means being engageable with a surface in said tubular member to limit movement of said pump means relative to said tubular member, whereby movement of said tubular member relative to the object and to said pump means after said pump means has been engaged by said surface causes liquid under pressure to be supplied to said gripping means to move said gripping means into gripping engagement with the object.

2. A retrieving tool including: a tubular member having a pair of piston chambers; a pump piston in one of said chambers and an operator piston in the other of said chambers; gripping means operatively connected to said operator piston, said gripping means and said tubular member having co-engageable means for moving said gripping means from an inoperative position to an operative gripping position upon relative movement between said tubular member and said operator piston; and means engageable with an object to be retrieved by said retrieving tool for holding said pump piston against movement while said tubular member is moved relative to the object, said retrieving tool having passage means permitting flow of fluid from said one chamber into said other chamber for moving said operator piston relative to said tubular member upon relative longitudinal movement between said pump piston and said tubular member.

3. A retrieving tool including: a tubular member having a pair of piston chambers; a pump piston in one of said chambers and an operator piston in the other of said chambers; gripping means operatively connected with said operator piston, said gripping means and said tubular member having co-engageable means for moving said gripping means from an inoperative position to an operative gripping position upon relative movement between said tubular member and said operator piston; and means engageable with an object to be retrieved by said retrieving tool for holding said pump piston against movement while said tubular member is moved relative to the object, said retrieving tool having passage means permitting flow of fluid from said one chamber into said other chamber for moving said operator piston relative to said tubular member upon relative longitudinal movement between said pump piston and said tubular member; and valve means preventing flow of fluid from said other chamber into said one chamber.

4. A retrieving tool including: a tubular member having a longitudinal passage therethrough and a pair of longitudinally extending piston chambers; a pump piston in one of said chambers for pumping fluid from said one of said chambers into the other of said chambers upon longitudinal movement in one direction of said pump piston in said one of said chambers; an operator piston in the other of said chambers and movable longitudinally of said tubular member in a second direction opposite said one direction by fluid pumped into said other of said chambers by said pump piston; and gripping means in said tubular member operatively connected with said operator piston, said gripping means and said tubular member having co-engageable means for moving said gripping means from an inoperative position to an operative gripping position upon relative movement between said tubular member and said operator piston, said pump piston having means engageable with an object to be retrieved by said retrieving tool for holding said pump piston against movement while said tubular member is moved in said second direction.

5. A retrieving tool including: a tubular member having a longitudinal passage therethrough and a pair of longitudinally extending piston chambers; a pump piston in one of said chambers for pumping fluid from said one of said chambers into the other of said chambers upon longitudinal movement in one direction of said pump piston in said one of said chambers; an operator piston in the other of said chambers movable longitudinally of said tubular member in a second direction opposite said one direction by fluid pumped into said other of said chambers by said pump piston; gripping means operatively connected with said operator piston, said gripping means and said tubular member having co-engageable means for moving said gripping means from inoperative position to an operative gripping position on relative movement between said tubular member and said operator piston, said pump piston having means engageable with an object to be retrieved by said retrieving tool for holding said pump piston against movement while said tubular member is moved in said second direction, said well tool having passage means permitting flow of fluid pumped from said one chamber by said pump piston into said other chamber; and check valve means for preventing flow of fluid through said passage from said other chamber into said one chamber.

6. A retrieving tool including: a tubular mandrel having means providing an annular first piston chamber; an annular pump piston longitudinally movable in said cham-

ber and having means providing with said mandrel a second annular chamber having fluid communication with said first piston chamber; an annular operator piston longitudinally movable in said second chamber; gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object in said mandrel upon longitudinal movement of said operator piston relative to said mandrel, said tool having passage means for transmitting fluid from said first chamber to said second chamber in response to movement of said pump piston for moving said operator piston longitudinally to move said gripping means to engaging position.

7. A retrieving tool including: a tubular mandrel having upper and lower ends and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said tool having passage means for transmitting fluid from the upper end of said upper chamber to the upper end of said lower chamber in response to movement of said pump piston for moving said operator piston downwardly, said pump piston having means engageable with a surface of said object in said mandrel for limiting downward movement of said pump piston while said mandrel is moved downwardly.

8. A retrieving tool including: a tubular mandrel having upper and lower ends having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; and gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said tool having passage means for transmitting fluid from the upper end of said upper chamber to the upper end of said lower chamber for moving said operator piston downwardly, said pump piston having means engageable with a surface of said object received in the lower end portion of said mandrel, whereby downward movement of said mandrel relative to said object moves said piston relatively upwardly in said upper chamber to force fluid from said upper chamber to said lower chamber; said tool having valve means preventing flow of fluid from said lower chamber into said upper portion of said upper chamber through said passage means.

9. A retrieving tool including: a tubular mandrel adapted to be operated with its longitudinal axis disposed vertically and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; and gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said tool having passage means for transmitting fluid from the upper end of said upper chamber to the upper end of said lower chamber in response to movement of said pump piston in said upper chamber for moving said operator piston downwardly to move said gripping means to engaging position, said gripping means comprising a plurality of collet members extending downwardly from said operator piston, said co-engageable means comprising an internal downwardly and inwardly beveled cam surface of said mandrel and downwardly and inwardly inclined outer cam surfaces of said collet members whereby when said collet members are in engagement with said object received in the lower end of said mandrel an upward force imparted to said mandrel tends to move said collet members inwardly and into engagement with the object.

10. A retrieving tool including: a tubular mandrel adapted for operation with its longitudinal axis in a vertical plane and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; and gripping means disposed in said mandrel and operatively connected to said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said pump piston having a bypass flow passage communicating the upper end portion of said upper piston chamber above said pump piston with the lower end portion of said piston chamber for conducting fluid from said upper chamber to said lower chamber in response to relative upward movement of said pump piston in said upper chamber for moving said operator piston downwardly.

11. A retrieving tool including: a tubular mandrel adapted to be operated with its longitudinal axis disposed vertically and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; gripping means disposed in said mandrel and operatively connected with said operator piston, for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said pump piston having a bypass flow passage communicating the upper end portion of said upper piston chamber above said pump piston with the lower end portion of said piston chamber for conducting fluid from said upper chamber to said lower chamber in response to upward movement of said pump piston in said upper piston chamber for moving said operator piston downwardly in said lower chamber; and valve means for preventing flow of fluids from said lower chamber into said upper end portion of said upper chamber through said bypass flow passage.

12. A retrieving tool including: a tubular mandrel adapted to be operated with its longitudinal axis disposed vertically and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said upper chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said

upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; and gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said pump piston having a bypass flow passage communicating the upper end portion of said upper piston chamber above said pump piston with the lower end portion of said piston chamber for conducting fluid from said upper chamber to said lower chamber in response to upward movement of said pump piston in said upper piston chamber for moving said operator piston downwardly in said lower chamber, said pump piston having means engageable with a surface of said object received in the lower end portion of said mandrel for limiting downward movement of said pump piston relative to said object while said mandrel is moved downwardly.

13. A retrieving tool including: a tubular mandrel adapted to be operated with its longitudinal axis disposed vertically and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said upper chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally movable in said lower chamber; and gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said pump piston having a bypass flow passage communicating the upper end portion of said upper piston chamber above said pump piston with the lower end portion of said piston chamber for conducting fluid from said upper chamber to said lower chamber in response to upward movement of said pump piston in said upper piston chamber for moving said operator piston downwardly in said lower chamber, said tool having valve means for preventing flow of fluid from said lower chamber into said upper portion of said upper chamber through said passage means.

14. A retrieving tool including: a tubular mandrel adapted to be operated with its longitudinal axis disposed vertically and having means providing an annular upper piston chamber; an annular pump piston longitudinally movable in said upper chamber and having means providing with said mandrel a lower annular chamber whose upper end is in communication with the lower end of said upper piston chamber; an annular operator piston longitudinally moveable in said lower chamber; gripping means disposed in said mandrel and operatively connected with said operator piston for engaging an object extending upwardly into said mandrel, said gripping means and said mandrel having co-engageable means for moving said gripping means inwardly to engage said object received in said mandrel upon downward movement of said operator piston relative to said mandrel, said pump piston having a bypass flow passage communicating the upper end portion of said upper piston chamber above said pump piston with the lower end portion of said piston chamber for conducting fluid from said upper chamber to said lower chamber in response to upward movement of said pump piston in said upper piston chamber for moving said operator piston downwardly in said lower chamber to move said gripping means to engaging position; and valve means for preventing flow of fluids from said lower chamber into said upper chamber through said bypass flow passage.

References Cited by the Examiner

UNITED STATES PATENTS

1,757,363	5/30	Fischbach	294—86.15
1,795,322	3/31	Triplett	294—86.3 X

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