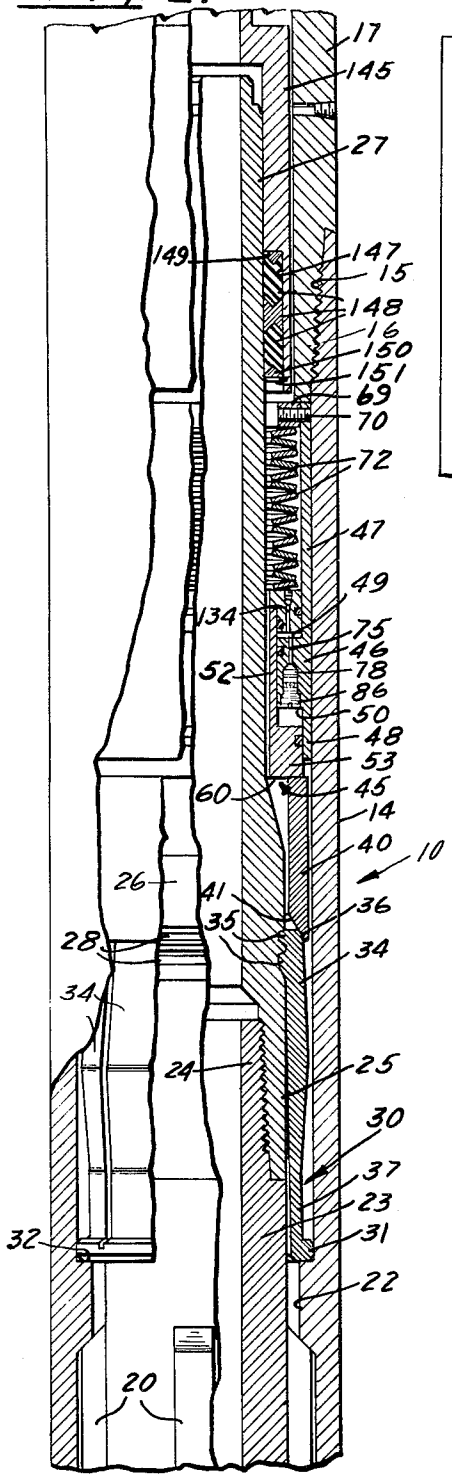
March 8, 1966 N. F. HAZEN ETAL 3,239,017

HYDRAULIC TRIP CONTROL

Filed Nov. 16, 1962 2 Sheets-Sheet 1

Fig. 2.



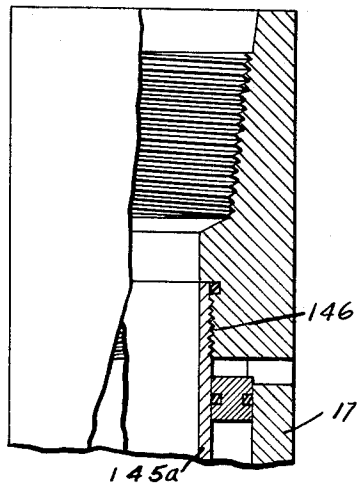


Fig. 2A.

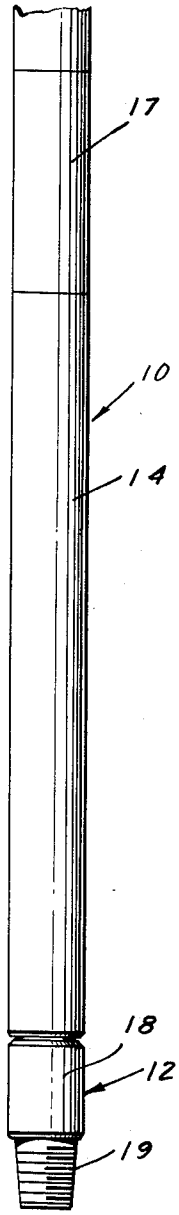


Fig. 1.

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HYDRAULIC TRIP CONTROL

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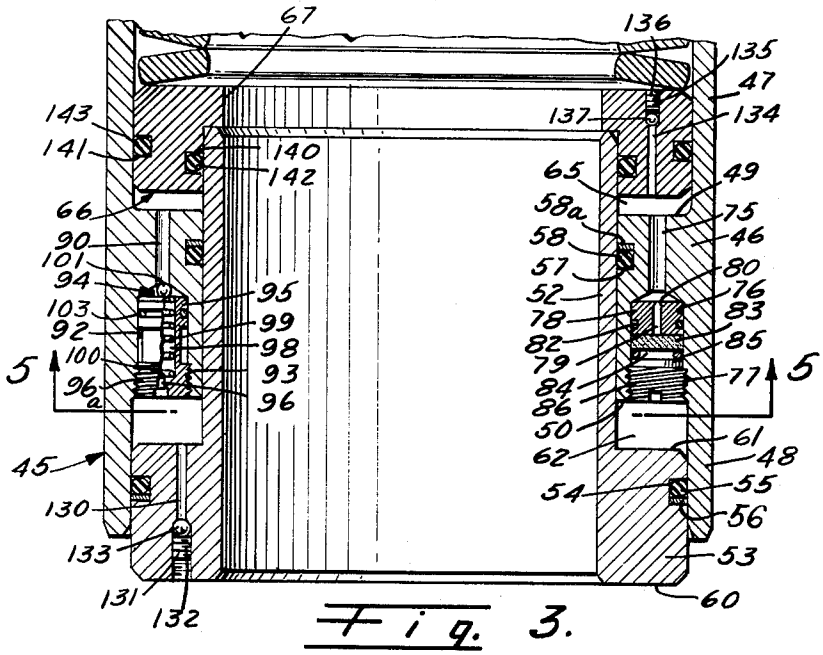


Fig. 3.

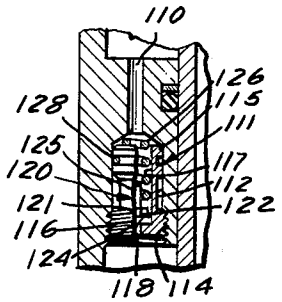
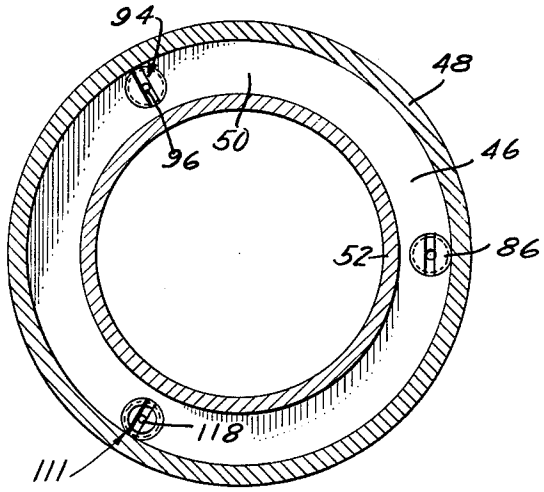


Fig. 4.

Fig. 5.



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3,239,017

HYDRAULIC TRIP CONTROL

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Filed Nov. 16, 1962, Ser. No. 238,111
8 Claims. (Cl. 175—296)

This invention relates generally to well drilling equipment and relates more particularly to hydraulic trip release means for jars.

While the invention has particular utility in connection with oil well drilling equipment and the like, and is herein shown and described in connection therewith, it is to be understood that its utility is not confined thereto.

In the drilling of oil wells, the drilling string, or a portion thereof, may become jammed or stuck so that it cannot readily be pulled or raised. Under such circumstances a jar device may be used above the stuck portion of the string to jar it loose.

There are various types of jars known in the industry. Among these are mechanical jars and jars that are hydraulic in character, each type having certain disadvantages.

Some mechanical jars, for example, must be pre-set for a predetermined jarring force before being lowered into the well. More particularly, should the device be set for 20 tons, for example, only that force will be applied. If a different force is desired it is necessary to raise the jar device to the surface and re-set it for such different jarring force. Such procedure takes considerable time and work, which substantially increases the cost of drilling operations.

Other mechanical jars may be adjusted in the hole but considerable manipulation thereof is required to make such adjustments and the steps of such manipulaton not only are time consuming but, under some conditions, as where there is a crooked hole, may be very difficult to carry out properly.

In hydraulic jars changes in the oil viscosity greatly affects the operation thereof. As is well known, the temperatures in wells varies considerably and should the device be used in a well having a relatively high temperature, the oil in the jar becomes so thin that the device may fail to jar properly. Other difficulties may be encountered with such jars. For example, the bleed passage or passages may become blocked or clogged, causing failure of the device or mechanism. In such case it would also be necessary to raise the jar to the surface and replace or repair same before fishing operations could be continued.

It is therefore an object of the present invention to provide a mechanism which will operate as a hydraulic jar or a mechanical jar.

It is another object of the present invention to provide a mechanism of this character having hydraulic means for converting the device from hydraulic actuation to mechanical operation.

It is still another object of the invention to provide apparatus of this character that may be embodied in various types of equipment, such as rotary jars, bumper safety joints, jar safety joints, and the like.

It is a still further object of the invention to provide apparatus of this character comprising a compact unit.

It is another object of the invention to provide a device of this character that is reliable and effective in operation.

It is still another object of the invention to provide a device of this character that is simple in construction and operation.

It is a further object of the invention to provide a device of this character that is relatively inexpensive to manufacture.

It is a still further object of the invention to provide a device of this character that is relatively easy to install, remove and/or service.

The characteristics and advantages of the invention are further sufficiently referred to in connection with the following detailed description of the accompanying drawings, which represent one embodiment. After considering this example skilled persons will understand that variations may be made without departing from the principles disclosed and we contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

Referring to the drawings, which are for illustrative purposes only:

FIG. 1 is a side elevation of a jar device embodying the present invention;

FIG. 2 is an enlarged fragmentary view, partly in longitudinal section, showing the interior construction of the device;

FIG. 2–A is an enlarged fragmentary view, partially in longitudinal section, of the upper end of the mechanism shown in FIG. 2;

FIG. 3 is an enlarged longitudinal sectional view of the release mechanism per se showing the fluid orifice and the check valve of the trip control;

FIG. 4 is an enlarged fragmentary view of a portion of the trip control means showing the emergency relief valve; and

FIG. 5 is a sectional view taken on line 5—5 of FIG. 3.

Referring more particularly to the drawings, there is shown a fishing tool embodying the present invention, said tool comprising a barrel unit, indicated generally at **10**, and a mandrel, indicated generally at **12**. The barrel unit comprises a tubular barrel **14** internally threaded at the upper end, as at **15**, for threadable reception of the lower externally threaded pin **16** of a top sub **17**.

The mandrel **12** is of known construction and is provided with a passage therethrough. There is a base **18** at the lower end having a depending, externally threaded pin **19** whereby the tool may be attached in the well known manner to a tool, pipe or the like. The mandrel includes a reduced diameter portion **20** above the base **18** which is slidably disposed within the lower end of the barrel **14**, said barrel having an annular internal flange **22** just above the part **20** of the mandrel when the tool is in the fully telescoped position. The part **20** of the mandrel may be provided with slots for reception of keys on the interior of the barrel so that the device may be used as a safety release joint. This portion of the construction is known, being embodied in jar safety joints manufactured by the Shaffer Tool Works. Details of this portion of the tool are not shown as they do not enter into the present invention. These details are illustrated on pages 4800–4802 of the 1957 General Catalog of Shaffer Tool Works. This is merely by way of example, as these jars are shown in the General Catalog of the Shaffer Tool Works for other years.

Extending axially upwardly of the portion **20** of the mandrel there is a second reduced diameter part **23** extending operably upwardly through the opening defined by the internal flange **22** of the barrel. The part **23** is provided at its upper end with an externally threaded portion **24** for threadable reception of the internally threaded lower end **25** of a trip mandrel **26** which has substantially the same external diameter as the external diameter of the portion **23**. The trip mandrel **26** is tubular and from the upper end thereof there extends a reduced diameter upper end portion **27** which may be

secured to the trip mandrel in any suitable manner. For example, the two parts may be integral or they may be separate parts having a threaded connection or they may be welded or otherwise connected together.

Intermediate its ends the trip mandrel **26** is provided with a pair of longitudinally spaced external annular grooves **28** which have diverging side walls, said grooves being of known character. Disposed on said trip mandrel **26** and adapted to have longitudinal movement relative thereto, is a trip spring, indicated generally at **30**. This spring is of known character and includes an annular base **31** adapted to engage a shoulder **32** at the upper end of the internal flange **22**, said shoulder being normal to the axis of the tool. Extending upwardly from the base **31** are a plurality of annularly spaced spring elements or fingers **34**, each of said fingers having a pair of internal flanges **35** adjacent the free ends thereof, the sides of said flanges **35** corresponding to the angular inclination of the side walls of the grooves **28**. The upper ends of said fingers **34** are also provided with external cam faces **36** which are inclined downwardly and outwardly relative to the axis of the trip mandrel. The external diameter of the spring **30** is smaller than the internal diameter of the adjacent portion of the barrel **14** and the lower end portions **37** of said fingers are of reduced thickness so that when said fingers are sprung outwardly at the upper ends the primary spring action will occur at said end portions **37**, there being sufficient space between the outer sides of said fingers and the inner surface of the adjacent portion of the barrel to permit sufficient outward movement of the upper ends of said fingers so that the flanges **35** will move outwardly of the grooves **28** under conditions that will be described hereinafter.

Slidably disposed on the portion of the trip mandrel above the grooves **28** is a trip ring **40**. The lower end of said trip ring is provided with on internal cam surface **41** which is inclined downwardly and outwardly with respect to the axis of said ring and which abuts against the cam faces **36** of the fingers **34**, the inclination of said cam surface corresponding to the inclination of the cam faces **36**. The upper end of said trip ring extends above the upper end of the trip mandrel **26** and disposed on said upper end of the trip ring is a hydraulic trip control unit, indicated generally at **45**.

The unit **45** comprises a tubular outer body **46** having oppositely extending annular flanges **47** and **48** at the upper and lower ends respectively of said outer body **46**. At the upper end of the body **46** and extending inwardly of the flange **47** there is an upwardly facing shoulder **49**. At the opposite end of the body **46** and extending inwardly of the flange **48** there is a downwardly facing shoulder **50**.

The unit **45** also includes an inner body **52** which is provided at its lower end with an outwardly extending flange **53** of substantial length. The inner body **52** is disposed within the outer body **46** and is adapted to have relative longitudinal movement therewith. The flange **53** is provided with an external groove **54**, FIG. 3, for reception of a sealing element **55** which provides a seal with the inner surface of the flange **48**, there being a back-up ring **56** within said groove **54** and beneath said sealing element **55**. Sealing element **55** may be of any siutable character but is shown as an O-ring and has the necessary characteristics to resist the action of oil or other material with which it comes into contact.

Adjacent the upper end of the outer body **46** there is an internal annular groove or recess **57** in which is disposed an O-ring **58** of suitable characteristics to provide a seal with the inner surface of the inner body **52**, said O-ring being backed by a ring **58***a* in groove or recess **57**.

The lower end **60** of the flange **53** rests on the upper end of the trip ring **40**, upper end of flange **53** providing a shoulder **61** in spaced relation to the shoulder **50** of the outer body thereby defining an annular fluid chamber **62**.

The upper end of the inner body **52** extends upwardly of the shoulder **49** of the outer body and said upper end of the inner body is spaced inwardly of the flange **47** of said outer body thereby providing a chamber **65** which is closed at the upper end by a collar, indicated generally at **66**, operably disposed between the flange **47** and the inner body **52**. The lower end of the collar **66** is normally spaced upwardly somewhat from the shoulder **49**, there being an inwardly extending annular flange **67** adjacent the upper end of said collar which overlies and rests upon the upper end of the inner body **52** and limits downward movement of said collar.

Flange **47** extends longitudinally upwardly and adjacent the upper end there is an annular member or ring **69** disposed within said flange **47** and secured therein by set screws **70**, or the like. Ring **69** is spaced upwardly from the collar **66** and disposed between said ring and collar is spring means comprising a plurality of annular disc springs **72** of well known character which are adapted to react between said ring and the top of collar **66**.

The outer body **46** of the unit **45** is provided with a bleed-off connection between the chamber **62** and the chamber **65**, said bleed-off connection being shown in FIGS. 2 and 3. This connection includes a passage **75** in the outer body **46**, said passage extending from the lower end thereof upwardly and at the lower end there is a counterbore **76**, the lower end of which is threaded as at **77**. Within the upper end of the counterbore **76** there is a plug **78** having a longitudinally extending bore **79** therethrough terminating at the upper end in a calibrated orifice **80** of predetermined size. Plug **78** is provided with an annular external groove in which is disposed a sealing element **82** to provide a suitable seal between said plug and the interior wall of the counterbore **76**. Beneath the plug **78** is a filter element **83** through which fluid passing from the chamber **62** to the chamber **65** must pass. Beneath the disc filter **83** is an annular sealing ring **84** which is engaged with the upper end portion **85** of a threaded securing plug **86** screwed into the threaded portion **77** of the counterbore, said securing plug **86** operably retaining the orifice plug **78**, filter **83** and ring **84** in position. The ring or seal **84** is somewhat resilient so that the plug **78** and filter **83** are resiliently held in position in the counterbore.

The outer body **46** also has a bore **90** which comprises a fluid return passage and the lower end of said return passage communicates with a counterbore **92** having a threaded portion **93** adjacent the lower end thereof. A check valve, indicated generally at **94**, is disposed in said counterbore **92**. Said check valve comprises a tubular body **95** with a threaded end **96***a* which is threadably received within the threaded portion **93** of the counterbore **92**. The body **95** has an upwardly extending passage **96** which communicates with a spring chamber **98** within said body **95**. Within the spring chamber **98** is disposed a spring **99** which has its lower end resting on a shoulder **100** of the body at the lower end of said spring chamber **98**. The spring's upper end engages a valve member **101** shown as a ball and urges same into closing engagement with a valve seat at the lower end of the bore **90**. A seal **103** is disposed in an external annular groove in the body **95** to thereby provide a seal between said valve body and the wall of the counterbore **92**.

Emergency release means is also provided and comprises an emergency release valve, best shown in FIG. 4. This emergency release valve controls fluidflow through a passage **110** in the outer body **46**, said emergency release valve being indicated generally at **111**. Passage or bore **110** has its lower end connected with an en-

larged passage or counterbore **112** having a threaded lower end portion **114**. Valve **111** comprises a body **115** received in the counterbore and extending upwardly from a lower threaded end portion **116** threadably received in the threaded portion **114** of the counterbore. Body **115** has a relatively large fluid passage **117** therein which is open at its upper end. There is an inlet passage **118** at the lower end of the body which communicates with the passage **117**, said inlet passage **118** being of smaller diameter than said passage **117** and being controlled by a valve, indicated generally at **120**. Valve **120** includes a base or body **121** having its sides relieved, as at **122**, to permit fluid to flow past said body when the valve is open. Depending from the body or base **121** is a conical valve tip **124** which normally seats at the upper end of the inlet passage **118** to prevent fluid flow therethrough. Valve **120** has an upstanding valve stem **125** and there is a spring **126** disposed in the bore or passage **117**, said spring having its lower end portion disposed about the stem **125** and engaging the upper end of the base or body **121**. The upper end of spring **126** engages the upper end of the passage or counterbore **112**, said spring maintaining the valve **120** in the closed position with a predetermined force so that said valve **120** will open under a predetermined fluid pressure in the inlet **118**. Body **115** is provided with an annular external groove in which is disposed a sealing element **128** of any suitable well known character, such as an O-ring, thereby providing a seal between the body **115** and the adjacent wall of the counterbore **112**.

An air vent is provided for the chamber **62** and includes a bore **130** in the flange **53**, said bore terminating at its under side in an internally threaded counterbore **131** in which is disposed an externally threaded plug **132** which holds a ball **133** in a seated position at the lower end of said passage **130** to thereby seal said passage. A similar vent is provided for the chamber **65** and includes a passage or bore **134** in the collar **66**, said bore **134** terminating at its upper end in an internally threaded counterbore **135** in which is disposed an externally threaded plug **136** which holds a ball or ball valve **137** in seated position at the upper end of the bore **134** to thereby seal said passage against the flow of fluid therethrough.

It is to be noted that collar **66** has an internal annular groove **140** and an external annular groove **141**. Suitable sealing elements **142** and **143** are disposed in said grooves **140** and **141** and provide a seal between said collar and the outer side of the inner body **52**, and the inner side of the flange **47**.

Secured in the top sub is a top sub sleeve **145** having an upper end portion **145***a* externally threaded for threadable reception in an internally threaded part **146** of said top sub. The tubular sleeve **145** has an internal diameter a little greater than the external diameter of the part **27** which extends into said sleeve. Depending from said sleeve is an annular flange **147** providing an internal recess in which is disposed packing means **148**. The upper end of the packing means abuts against a shoulder **149** of the top sub sleeve **145** while the lower end is engaged by an adapter ring **150** held in position by a snap ring **151**. When the unit **45** is operably disposed in the mechanism the upper side of the ring **69** abuts against the lower end of the pin **16** of the top sub **17** while the lower end **60** of the flange **53** abuts the upper end of the trip ring **40**.

It will be noted that the spring means or springs **72** urge the collar **66** downwardly and since the flange **67** engages the upper end of the inner body **52** said inner body is urged downwardly. The spring elements **72** also urge the ring **69** upwardly thereby causing the outer body **46** to be urged upwardly. As a result chamber **62** is at its maximum size and is filled with fluid while the chamber **65** is at its minimum size. It is to be understood, of course, that chamber **65** is also filled to capacity with fluid and the interconnecting passages and parts are also filled with fluid. The fluid is incompressible and, hence, is a liquid of any suitable character, such as oil or the like.

To operate the device as a jar after a fish has been engaged, pull is applied to the drill string which applies a corresponding pull to the barrel **14**. The force of the upward pull will determine the force of the jarring blow provided by the present tool and must be at least a minimum for said tool. When the upward pull is applied to the string and barrel **14**, upward pressure is applied to the tripping spring **30** through the shoulder of the flange **22**. This pressure is also applied to the trip ring **40** and to the flange **53** of the inner body **52**. This force is, of course, resisted by the assembly of springs **72** or the spring means above the control device **45** which exerts downward pressure on the collar **53** and upward pressure on the outer body **46**. The spring means or springs **72** are adapted to provide the minimum jarring force for which the tool is designed. For example, if this tool has a range of 15 to 40 tons the springs **72** will be for 15 tons.

Pressure on the flange **53** applies pressure to the fluid in chamber **62** which is forced upwardly through the passage **79** and orifice **80** into the chamber **65**. As the chamber **62** is reduced in size with expulsion of fluid into the chamber **65**, the latter expands accordingly to accommodate the inflow of said fluid. After a predetermined transfer of fluid the trip ring will move upwardly and trip spring fingers **34** will be forced out of the grooves **28** so that the barrel will be lifted upwardly with a sudden movement and cause the knocker head, not shown, on the inside of the barrel to strike the knocker head, not shown on the mandrel with a powerful blow. These knocker head parts are, of course, well known in the art. Jar mechanisms having such knocker heads or the like are found in jar mechanisms such as manufactured by Shaffer Tool Works of Brea, California.

The force of the blow of the jar device is determined by the lifting force applied to the string and barrel **14**. When the lifting force is relieved, the parts return to the position shown in FIG. 2, the fluid in the chamber **65** flowing back to the chamber **62** with relative rapidity due to the fact that it returns through the passage **90** which is relatively large and through the check valve **94** which also has large passageways therein. It is to be noted that when the lifting forces is applied to the string and barrel **14** to force fluid from the chamber **62** into the chamber **65**, the check valve **94** is closed and is urged in the closing direction by fluid pressure in said chamber **62**.

Should the hydraulic control unit **45** become inoperative from any cause such as, for example, plugging of the orifice **80** by foreign material, the tool still may be operated as a jar by a pull upwardly on the string and barrel **14** with a predetermined force which will produce a hydraulic pressure in the chamber **62** sufficient to force the emergency release valve **120** open so that fluid in chamber **62** will flow therethrough and into the chamber **65**, the device then operating as hereinabove described when the fluid or liquid flows from the chamber **62** into the chamber **65** by way of the orifice **80**.

After the jar has been effected and the lifting force relieved on the string and barrel **14** fluid or liquid will return to the chamber **62** from the chamber **65** by way of the check valve **94** as above described.

When the parts of the device have returned to their normal position the jar may be again operated to effect jarring action by again applying lifting force to the string and barrel sufficient to effect opening of the emergency relief valve **111** without removing the jar device from the well. It will be understood, of course, that the lifting force on the string and barrel **14** required to open the emergency relief valve **111** is substantially greater than the lifting force normally applied when the bleed from the chamber **62** to the chamber **65** is through the orifice **80**.

The invention and its attendant advantages will be understood from the foregoing descrpition and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangement hereinbefore described being merely by way of example and we do not wish to be restricted to the specific form shown or uses mentioned except as defined in the accompanying claims, wherein various portions have been separated for clarity of reading and not for emphasis.

We claim:

1. In a jar mechanism:

(A) a tubular mandrel unit including a tubular trip mandrel having at least one external annular groove therein;

(B) a barrel unit including a tubular barrel telescopically receiving the upper portion of the mandrel unit;

(C) a top sub secured to the upper end of the barrel;

(D) a tubular trip spring on the mandrel unit and operably connected to the barrel so as to be raised upwardly thereby and including a plurality of spring fingers each having means releasably received in said groove, said fingers also having a cam face at the respective upper ends thereof;

(E) a trip ring on the trip mandrel, said ring having an annular cam face at the lower end engageable with the cam surfaces of said fingers;

(F) a tubular hydraulic trip release device above said trip ring, said device including an outer body and an inner body disposed on said trip ring, said bodies being longitudinally movable relative to each other,

(a) one of said bodies being provided with a bleed passage extending from the lower to the upper end and including a calibrated bleed orifice,

(b) a second passage extending from the upper to the lower end,

(c) a check valve operably disposed for controlling said second passage to permit flow of fluid downwardly but preventing reverse flow through said second passage, and

(d) a third passage between the upper and lower ends of said one body,

(e) and an emergency pressure responsive relief valve controlling fluid flow through said third passage, said relief valve being openable under predetermined maximum fluid pressure to permit fluid flow upwardly through said third passage but preventing reverse flow therethrough;

(G) parts of said bodies cooperating to define a fluid reservoir of variable size at the lower end of said trip release device;

(H) an annular collar abutting against the upper end of said inner body and defining, with portions of said bodies, a variable fluid chamber at the upper end of said device, said passages interconnecting said reservoir and chamber, there being fluid filling said reservoir, chamber and passages in the outer body;

(I) an annular element adjacent the upper end of said hydraulic trip release device;

(J) and spring means reacting between said annular element and said collar urging relative movements of the bodies for increasing the size of the reservoir and diminishing the size of the chamber and for controlling the minimum jarring force of the mechanism.

2. In a jar mechanism:

(A) a tubular mandrel unit including a tubular trip mandrel having an external annular groove therein;

(B) a barrel unit including a tubular barrel telescopically receiving the upper portion of the mandrel unit;

(C) a tubular trip spring on the mandrel unit and operably connected to the barrel so as to be raised upwardly thereby and including a plurality of spring fingers each having means releasably received in said groove, said fingers also having a cam face at the respective upper ends thereof;

(D) a trip ring on the trip mandrel, said ring having an annular cam face at the lower end engageable with the cam surfaces of said fingers;

(E) a tubular hydraulic trip release device operably disposed on said trip ring, said device including outer and inner bodies longitudinally movable relative to each other;

(F) means, including parts of said bodies, for defining a fluid reservoir of variable size at the lower end of said trip release device and a variable fluid chamber above said reservoir, there being a plurality of passages interconnecting said reservoir and chamber, with fluid filling said reservoir, chamber and passages in the outer body;

(G) yielding means operably reacting between said bodies urging reduction in the size of said reservoir and increase in the size of said chamber,

(H) one of said passages comprising a calibrated bleed connection between said reservoir and said chamber, another of said passages comprising a return passage between said reservoir and chamber;

(I) a check valve operably disposed for controlling said return passage to permit flow of fluid from said reservoir but preventing reverse flow through said return passage, a third of said passages comprising an emergency relief passage;

(J) and a check valve operably disposed for controlling flow through said emergency relief passage,

(a) said emergency relief check valve permitting flow of fluid from said reservoir to the chamber when subjected to a predetermined maximum fluid pressure but preventing reverse flow through said emergency relief passage.

3. In a jar mechanism:

(A) a tubular mandrel unit including a tubular trip mandrel having an external groove therein;

(B) a barrel unit including a tubular barrel telescopically receiving the upper portion of the mandrel unit;

(C) a tubular trip spring on the mandrel unit and operably connected to the barrel so as to be raised upwardly thereby and including a plurality of spring fingers each having means releasably received in said groove, said fingers also having cam faces at the upper ends thereof;

(D) a trip ring on the trip mandrel, said ring having an annular cam face at the lower end engageable with the cam surfaces of said fingers;

(E) a tubular hydraulic trip release device operably disposed on said trip ring, said device including bodies longitudinally movable relative to each other and defining a pair of fluid chambers variable with longitudinal movement of said bodies, one of said chambers being disposed above the other chamber and increasing in size and the other chamber simultaneously decreasing in size, said other chamber normally having fluid therein;

(F) means providing a calibrated restricted connection between said chambers for flow of fluid from the lower to the upper chamber;

(G) means providing a second connection between said chambers permitting flow of fluid downwardly but preventing the reverse flow through said second connection;

(H) and means providing a third connection between said chambers permitting flow of fluid in the opposite direction relative to the flow through the second connection under predetermined fluid pressure conditions and preventing reverse flow through the third connection means;

(I) and means urging said bodies in opposite directions to thereby urge an increase in size in the chamber into which fluid may flow from a second connection and decreasing the size of the other chamber.

4. In a tubular hydraulic trip release control means adapted to be installed in a jarring tool:

(A) a tubular outer body including longitudinally extending annular flanges at each end;

(B) an inner tubular body including a radially outwardly extending annular flange at the lower end, said inner tubular body being operably disposed within the outer tubular body with the flange of the inner tubular body slidably related to the depending flange of the outer body and defining with the lower end of said outer body a variable capacity reservoir for fluid;

(C) an annular collar slidably disposed on the upper end of said inner body and slidable relative to said upwardly extending flange of the outer body to define therewith a variable capacity fluid chamber;

(D) spring abutment means adjacent the upper end of the upwardly extending flange of the outer body;

(E) spring means reacting between said abutment means and said collar urging said collar in a direction to reduce the size of said chamber;

(F) three passages in said outer body providing connections between the reservoir and chamber, one of said passages being calibrated;

(G) a check valve operably disposed for controlling another of said passages to permit flow of fluid to the reservoir but preventing reverse flow therethrough;

(H) and a pressure responsive, emergency relief check valve operably disposed for controlling flow through the third passage, said emergency relief check valve permitting flow of fluid from the reservoir to the chamber when subjected to a predetermined maximum fluid pressure but preventing reverse flow through said third passage.

5. In a tubular hydraulic trip release control means adapted to be installed in a jarring tool having a barrel unit:

(A) a tubular outer body having longitudinally extending annular flanges at each end;

(B) an inner tubular body having a radially outwardly extending annular flange at the lower end, said inner tubular body being operably disposed within the outer tubular body with the flange of the inner tubular body slidably related to the depending flange of the outer body and defining with the lower end of said depending flange, a variable capacity reservoir for fluid;

(C) an annular collar disposed between the inner body and the upwardly extending flange of the outer body and slidable relative to said flange to define therewith a variable fluid chamber,

(a) said collar having means engageable with the upper end of the inner body to limit inward movement of said collar relative to said fluid chamber;

(D) an annular ring secured within the upwardly extending flange of the outer body adjacent the upper end thereof;

(E) spring means reacting between said ring and said collar urging said collar in a direction to reduce the size of said chamber and increase the size of said reservoir;

(F) said outer body having a calibrated bleed connection between the reservoir and chamber;

(G) a return passage therebetween;

(H) a check valve operably disposed for controlling said return passage to permit flow of fluid to the reservoir but preventing reverse flow through said return passage;

(I) a third passage interconnecting said reservoir and chamber;

(J) and an emergency relief check valve operably disposed for controlling flow through said third passage, said emergency pressure responsive relief check valve permitting flow of fluid from the reservoir to the chamber through said third passage when subjected to a predetermined maximum fluid pressure but preventing reverse flow through said passage.

6. In a tubular hydraulic trip release control means for jarring tools:

(A) means defining a pair of oppositely variable capacity fluid chambers, said means including

(a) a tubular outer body,

(b) an inner tubular body operably disposed within the outer tubular body, said chambers being variable with relative longitudinal movement of said bodies, there being a plurality of passages interconnecting said chambers;

(B) yielding means operably reacting between said bodies urging reduction in the size of one of said chambers and increase in the size of the other chamber;

(C) one of said passages comprising a calibrated bleed connection between the chambers;

(D) another of said passages comprising a return passage between said chambers;

(E) a check valve operably disposed for controlling said return passage to permit flow of fluid from one chamber but preventing reverse flow through said return passage;

(F) a third of said passages comprising an emergency relief passage;

(G) and a check valve operably disposed for controlling flow through said emergency relief passage,

(a) said emergency relief check valve permitting flow of fluid from said one chamber to the other chamber when subjected to a predetermined maximum fluid pressure but preventing reverse flow through said emergency relief passage.

7. In a tubular hydraulic trip release control means for jarring tools and the like:

(A) means defining a pair of oppositely variable capacity fluid chambers, said means including a pair of body members;

(B) means providing a fluid connection between said chambers, said connection being of calibrated restricted size;

(C) passage means for providing a second connection between said chambers permitting fluid flow from one chamber to the other but preventing fluid flow in the reverse direction;

(D) means including a pressure responsive valve means, providing a third connection between said chambers permitting fluid flow from said other chamber to said one chamber but preventing reverse flow relative to said other chamber;

(E) and means urging said bodies in opposite directions to effect enlargement of said other chamber and reduction in size of said one chamber.

8. In a jar mechanism:

(A) a tubular mandrel unit including a tubular trip mandrel;

(B) a barrel unit including a tubular barrel portion

telescopically receiving the upper portion of the mandrel unit;

(C) trip spring means on the mandrel unit and operably connected to the barrel said trip spring tripping under a predetermined force for affecting jarring action;

(D) and a hydraulic trip release means for controlling release of said trip spring means;

(E) the trip release means having means therein to control the operation thereof and including means to operate the trip release means upon failure of the operation of the first mentioned means.

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