Jan. 26, 1960 W. N. SUTLIFF 2,922,626

HYDRAULIC JAR

Filed March 25, 1957 2 Sheets-Sheet 1

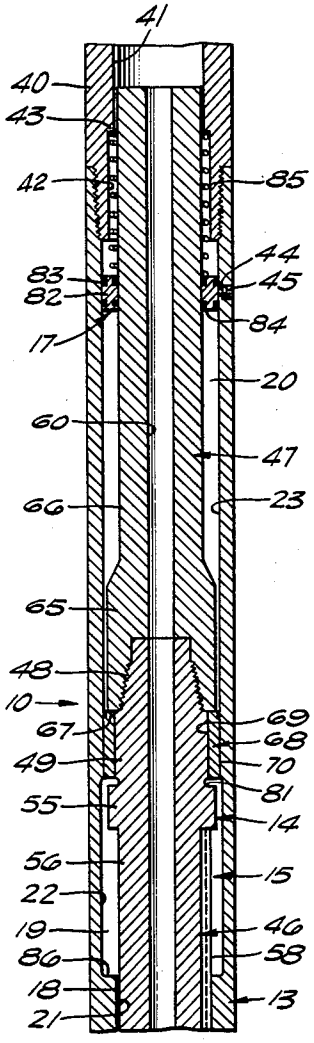


FIG. 3.

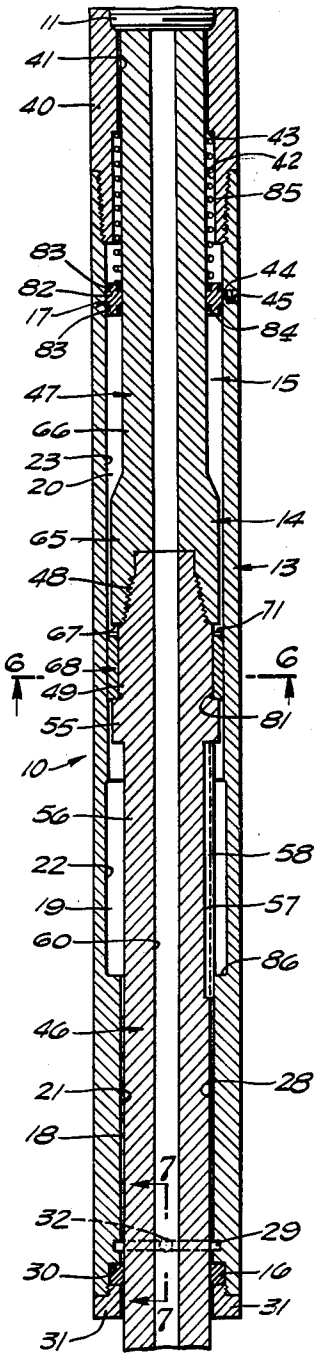


FIG. 2.

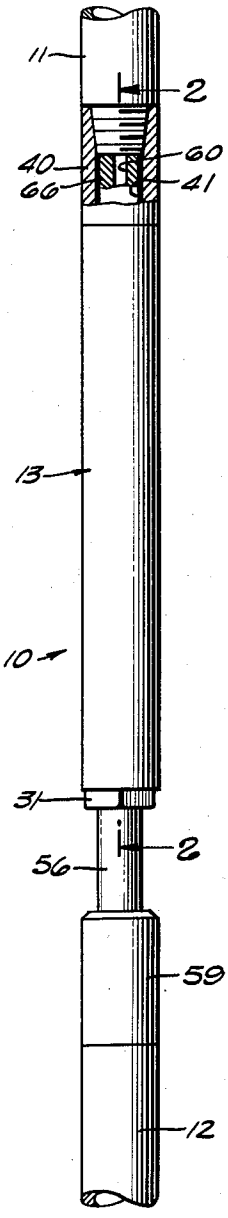


FIG. 1.

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FIG. 6.

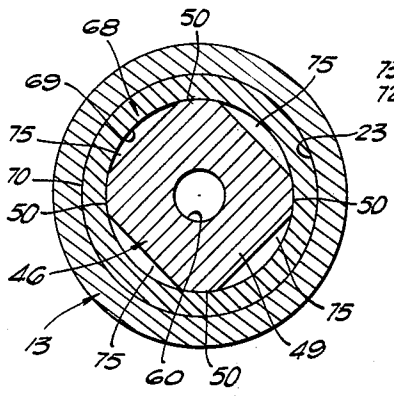


FIG. 5.

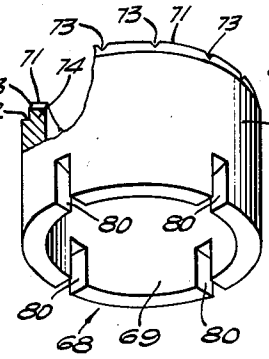


FIG. 4.

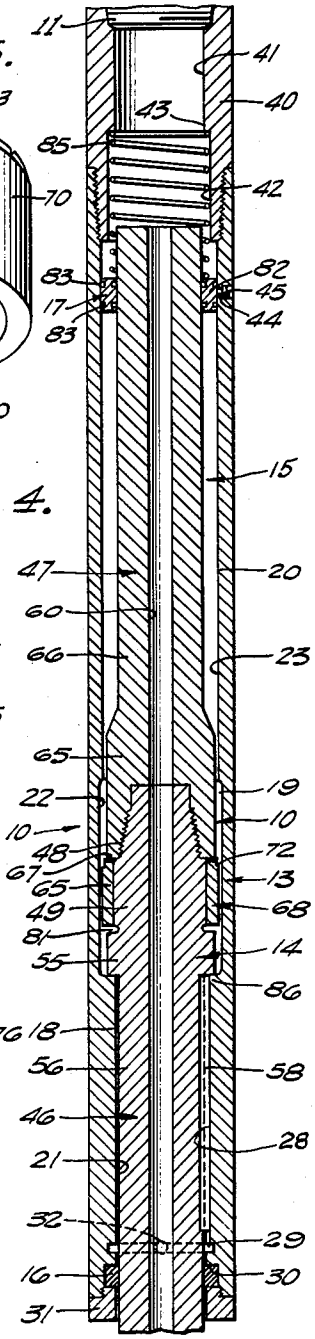
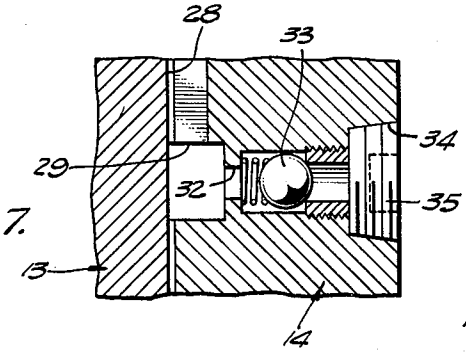


FIG. 7.



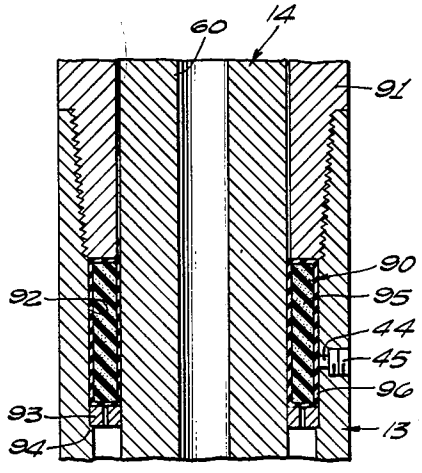


FIG. 8.

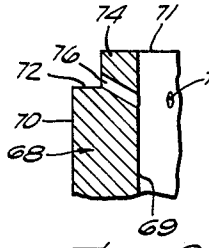


FIG. 9.

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HYDRAULIC JAR

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Application March 25, 1957, Serial No. 648,137

11 Claims. (Cl. 255—27)

This invention relates to oil well tools known as "jars" and particularly to such jars which are hydraulically operated.

Like all jars, a hydraulic jar is usually assembled as one element in a string of elements, and just above a fishing tool, which is extended into a well bore to recover a drill bit, drill string section, or some other piece of equipment which has been twisted off or otherwise lost in the bore and which is termed a "fish." The jar embodies a hammer and an anvil which have freedom for a limited degree of relative movement, and means for retarding movement of the hammer toward the anvil, while the supporting drill string or cable is placed under substantial tension, and then releasing the hammer causing it to respond to said tension and strike the anvil a violent blow. This blow is generally in an upward direction and is transmitted through the fishing tool to the fish whereby the latter is loosened permitting it to be withdrawn from the well. A repetition of such blows is ordinarily required to achieve this end.

The retarding of the hammer movement in a hydraulic jar is accomplished by confining a body of liquid in a cylinder chamber behind a piston and permitting the liquid to slowly escape as the tension increases in the suspending string, until at a certain point in the movement of the piston, a free escape of the confined liquid is permitted, resulting in the hammer striking the anvil.

A hydraulic jar in common use comprises external and internal tubes telescopically related, the cylinder chamber being formed by the inner surface of the external tube, and the piston being formed by the internal tube, the piston slidably fitting one section of the cylinder chamber and travelling completely freely through an adjacent section of said chamber of larger diameter. The anvil is formed by an annular shoulder on the external tube at the large end of the cylinder chamber and the hammer is formed on the internal tube and disposed towards the anvil from the piston.

The piston of said prior jar includes a valve sleeve, which shuts off passage of liquid between the sleeve and the piston during the jarring stroke by axially engaging an annular seat on the internal tube, and dependence is then placed on the escape of liquid through the space between the piston sleeve and the smaller diameter section of the cylinder chamber to retard the initial travel of the hammer toward the anvil. It is desired of course that this retarding action be at a given rate consistent with the satisfactory performance of the jar and to determine this rate of retardation, the piston sleeve is made with an external diameter which is enough less than the internal diameter of the cylinder chamber to give the sleeve a fairly sloppy fit. In practice, the amount of clearance provided between the sleeve and the cylinder chamber has not proven a satisfactory means of producing a precise degree of retardation on the telescopic action of the jar during the initial part of the jarring stroke. This is because that during this portion of the stroke, the liquid pressures developed in the jar and

against which the sleeve operates are transmitted to the space within the sleeve and this pressure tends to expand the sleeve. Owing to the fact that this same liquid under the same pressure is flowing from the leading end of the sleeve through the space between the sleeve and the cylinder chamber the pressure applied outwardly from within the sleeve is balanced for most of the length of the sleeve. At the trailing end of the sleeve, however, the film of liquid escaping past the sleeve has access to the low pressure area beyond the trailing end of the sleeve and escapes readily into this area. There being no inward pressure against the trailing end portion of the sleeve which would counterbalance the liquid pressure tending to expand this from inside, the trailing end portion of the sleeve is expanded into contact with the wall of the cylinder to an extent which causes an external set of increased external diameter in the trailing end portion of the sleeve. This reduces the clearance between the sleeve and the cylinder chamber and the planned degree of retardation by the escape of liquid through this space. The distortion of the trailing end of the sleeve in the prior art above described so impairs the operation of the jar so as to require it to be removed at intervals and the sleeve refinished to restore the normal clearance between the sleeve and the cylinder chamber.

It is another object of the present invention to provide a hydraulic jar embodying such a sleeve and having means facilitating a close control of the rate at which the liquid is allowed to by-pass the jar piston, and thus the rate of retardation of the piston travel, without the operation of said means being impaired by the expansion of the sleeve resulting from extremely high fluid pressures applied internally thereto.

The above mentioned prior hydraulic jar also has packing preventing escape of the confined liquid from the anvil end of the chamber and a floating packer between said tubes at the opposite end of said chamber to separate the confined liquid from the well liquid and prevent the development of voids in said chamber. It also has another packing outside the floating packer and a hole in the wall of the outer tube admitting well fluid between said packing and said floating packer. This hole has the disadvantage of providing access of abrasive particles of substantial size into the space between the jar tubes.

It is a still further object of the present invention to provide a hydraulic jar in which said hole, and its attendant disadvantage noted, and the fixed packing on the opposite side of said hole from the floating packer are eliminated without impairing the operation of the jar.

Yet another object is to provide a hydraulic jar in which the operating liquid is constantly confined under a static pressure in excess of that of the surrounding atmosphere or well liquid, whereby contamination of the confined operating liquid by well liquid leaking past the packings is virtually impossible.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which

Fig. 1 is a diagrammatic elevational view of a prefered embodiment of the hydraulic jar of the invention suspended on a drill string.

Fig. 2 is an enlarged vertical sectional view taken on the line 2—2 of Fig. 1 and shows the external tube of said jar in downward position and with the piston sleeve lowered from its seat.

Fig. 3 is a fragmentary view similar to Fig. 2, showing the external tube partially lifted as when beginning a jarring operation.

Fig. 4 is a view similar to Fig. 1 but showing the external tube in its upwardmost position at the conclusion of said jarring operation with the hammer engaging the anvil.

Fig. 5 is an enlarged perspective view of the piston valve sleeve of the invention, partially broken away to disclose the construction thereof.

Fig. 6 is an enlarged cross sectional view taken on the line 6—6 of Fig. 2.

Fig. 7 is an enlarged fragmentary cross sectional detail view taken on the line 7—7 of Fig. 2.

Fig. 8 is a fragmentary vertical sectional view illustrating a modified form of means for confining the operating liquid under a pressure exceeding that of the well fluid.

Fig. 9 is a fragmentary, enlarged, vertical sectional view of a modified form of the piston valve sleeve of the invention.

Referring specifically to the drawings, the invention is there shown as embodied in a hydraulic jar **10** with this jar suspended on the lower end of a drill string **11** and connecting at its lower end to a fishing tool **12**.

The jar **10** may (alternatively) be suspended on a drill cable (not shown) but is more commonly employed in the manner herein disclosed.

The jar **10** includes an external tube **13** which telescopically receives an internal tube **14** to provide a tubular shaped operating liquid chamber **15** between said tubes. The lower end of said chamber is closed by a fixed annular packing **16**. Its upper end is closed by a floating annular packing **17**, these packings being described in detail later.

Between these packings we find the chamber **15** has three sections **18**, **19** and **20** varying in outside diameter as determined by bore **21** and counterbores **22** and **23** respectively, formed in external tube **13**.

Bore **21** has a keyway **28** throughout its length, an annular liquid receiving groove **29** near its lower end, and a short threaded counter bore **30** for receiving the fixed packing **16**. A gland **31** screws into the mouth of said counterbore for compressing the packing **16** and retaining it in place.

Connecting with the liquid receiving groove **29** is a filling hole **32** (Figs. 2 and 7) having a spring ball check valve **33**. An outer tapered counterbore **34** of hole **32** is threaded to receive a liquid filling nipple (not shown) or a closure plug **35**.

Counterbore **23** has a smaller inside diameter than counterbore **22**, is separated by the latter, which is relatively short, from the bore **21**, and terminates at the upper end of external tube **13**, where it is threaded to receive tubular joint **40**. This joint connects the jar **10** with drill string **11** and has a bore **41** with a counterbore **42** providing an annular shoulder **43**.

An air vent **44**, normally closed by a plug **45**, is provided in external tube **13** near the upper end of liquid chamber **15** for a reason to be made clear later.

Internal tube **14** is formed by assembling two tubular elements **46** and **47** by a taper threaded joint **48**. Just below this joint, element **46** has a piston sleeve slide base **49** which is approximately square in cross section with rounded corner faces **50** (Fig. 6). Just below the base **49**, element **46** provides an annular anvil **55** extending radially beyond faces **50** to a diameter less than counterbore **23** but greater than bore **21** of external tube **13**. Below anvil **55**, element **46** provides a tubular seciton **56** which slidably extends downward through bore **21**, with a loose fit, and through packing **16** with a snug fit.

Tubular section **56** has a keyway **57** in which a key **58** is rigidly mounted, this key being slidable in keyway **28** in bore **21** to prevent relative rotation between external tube **13** and internal tube **14**. An alternate mode of providing the key **58** is to machine this as an integral part of tubular section **56**. Tubular section **56** extends loosely downward through packing gland **31** to connect, through a tubular joint **59**, with fishing tool **12**.

Internal tube **14** has a well fluid passage **60** throughout its length which connects similar passages in drill string **11** and fishing tool **12**.

Tubular element **47** has an enlarged lower section **65**, which is of approximately the same outside diameter as anvil **55**, and upper section **66** which is of approximately the same outside diameter as tubular section **56** and which has a loose sliding fit with tubular joint bore **41**.

Formed on the lower end of lower section **65** is a hardened and ground radial piston sleeve seat **67**. Slidably mounted on slide base **49** is a piston sleeve **68** (Fig. 4) having a cylindrical bore **69** which makes a close sliding fit with rounded base corner faces **50** (Fig. 6) and an outer cylindrical face **70** which makes a liquid-tight sliding fit with counter-bore **23** when disposed within this.

Piston sleeve **68** has a hardened and ground radial face **71** at its upper end which makes a liquid tight fit with seat **67** when held upwardly thereagainst by liquid pressure as shown in Figs. 3 and 4. An annular recess **72** is formed in the sleeve **68** by removing material at the juncture of outer cylindrical face **70** and radial face **71**.

Radial bleeder ports **73** are formed, in the upper end portion **74** of sleeve **68** opposite recess **72**, to allow liquid to pass from vertical passages **75**, provided between sleeve **68** and slide base **49** by the polygonal shape of the latter, and the portion of liquid chamber section **20** disposed above sleeve **68** when the latter is located within said section, as shown in Fig. 3, and is being hydraulically pressed upwardly against radial seat **67**. These bleeder ports preferably comprise notches carefully formed in ground face **71** to have a precise aggregate cross sectional area which will give exactly the desired rate of flow of liquid through these ports during a jarring operation.

The close control thus afforded may also be attained by leaving face **71** unbroken and forming bleeder ports by boring small diameter holes **76** in radial planes through upper end portion **74** of sleeve **68** as shown in Fig. 9. This way of providing bleeder ports, however, lacks the advantage of the notch-type bleeder ports **73** in these being washed free of any foreign matter, which might have gained admission thereto, on each return stroke of the jar **10** in which piston sleeve **68** is hydraulically lowered out of contact with radial sleeve seat **67** as shown in Fig. 2.

Provided in the lower end of sleeve **68** are deep notches **80** which admit operating liquid from below said sleeve into passages **75** when said sleeve is shifted downwardly against anvil **55** as in Fig. 2. Should notches **80** be opposite rounded base faces **50**, grooves **81**, at the lower ends of the latter, will connect notches **80** with passages **75**.

Floating packing **17** is preferably formed of a metal ring **82** which slideably fits both the counterbore **23** and internal tube section **66** and is double grooved both internally and externally to mount two pairs of O-rings **83** and **84**, the latter providing liquid tight seals between the packing **17** and the external and internal tubes **13** and **14** at the upper end of liquid chamber **15**.

The floating packing **17** of the invention includes a means to place the jar operating liquid in chamber **15** under a constant pressure in excess of that of the well liquid which may be flowing through the drill string **11**, jar **10** and fishing tool **12**. This means preferably comprises a coiled expansion spring **85** slidably fitting within counterbore **42** and compressed between shoulder **43** and packing **17**. An alternative means for this purpose is shown in Fig. 8 and will be described later.

The radial shoulder formed by the juncture of bore **21** and counterbore **22** provides an annular hammer **86**.

Operation

To prepare jar **10** for use, the chamber **15** must be filled

with operating liquid. This can be done either before the jar is assembled with other units as shown, or after this is accomplished, and is effected in the following manner.

Plugs 35 and 45 (Figs. 2 and 7) are removed and a pressure nipple from a pump for supplying operating liquid is applied in the place of plug 35 and the liquid is pumped into chamber 15 through ball check valve 33 (Fig. 7). Packing 17 is shifted past air escape port 44 by the increasing air pressure, thus allowing all the air to escape from chamber 15 and indicating to the operator when the chamber is filled with operating liquid when this starts to flow from air escape port 44.

Upon this happening, the pump is stopped, plug 45 is replaced, closing air escape port 44. The pump may, if desired, be restarted to fill chamber 15 to the point where packing 17 is shifted to place spring 85 under any desired degree of compression, although a free space is preferably always left between packing 17 and tubular joint 40 to allow for expansion of the liquid in chamber 15 due to increased temperatures generated by the operation of the jar.

The pump nipple is now removed from connection with check valve 33 and plug 35 is replaced in its counterbore 34.

The hydraulic jar 10 is now charged with operating liquid and is in readiness for a fishing operation in a well bore when assembled with other units as shown in Fig. 1.

The fishing tool 12 having been manipulated, by means of the drill string 11, to cause it to securely grip a fish to be recovered from the well bore, the jar 10 is operated to deliver one or more jarring upward blows through the fishing tool 12 to the fish. This is accomplished by first lowering the drill string to depress external tube 13 from its upwardmost position (Fig. 4) to its lowermost position (Fig. 2) and then lifting on drill string 11 to place this under substantial tension.

The operating liquid in chamber 15 offers practically no resistance to the downward movement of external tube 13. Piston sleeve 68 remains at rest upon anvil 55 as shown in Fig. 2, during this movement. Operating liquid in the portion of chamber 15 above sleeve 68 is thus free to flow between the seat 67 and upper end of sleeve 68, and pass downward through passages 75 and out through deep notches 80 in the lower end of sleeve 68, into the portion of chamber 15 below said sleeve.

There being practically no change in the net volume of chamber 15 due to the movement of external tube 13 in either direction relative to internal tube 14, neither of these movements occasions any change in the position of floating packing 17, relative to external tube 13.

When an upward pull is now applied to drill string 11, the friction developed by the liquid tight fit between sleeve 68 and counterbore 23 produces upward movement of this sleeve with external tube 13, until upper face 71 of said sleeve engages radial seat 67.

This closes all passage of operating liquid upwardly past piston sleeve 68 excepting through the bleeder orifices 73. These orifices, having been precision formed to allow operating liquid to by-pass sleeve 68 at exactly the rate required to give the necessary retardation to the upward travel of external tube 13, the operator can apply to the drill string the specific strain in thousands of pounds called for in the jarring operation before the piston freeing chamber section 19 moves upwardly with external tube 13 to where it contains piston sleeve 68. Thus the drill string 11 is under the necessary degree of tension to snap the external tube 13 upwardly, when the sleeve 68 is thus freed, to cause a blow to be delivered by the hammer 86 on anvil 55 of exactly the desired magnitude.

Another advantage of the present invention is that this degree of precision is not subject to rapid change through wear, as very little abrasion of seat 67 and sleeve face 71 results from contacts between these, and the erosion of orifices 73 caused by passage of operating liquid through these orifices under extremely high pressures, although appreciable, is at a very slow rate.

The floating packing 17 maintains the operating liquid in chamber 15 under a constant pressure in excess of that of the well liquid which has access to the upper end of this packing.

This positively prevents any seepage of well liquid into the operating liquid due to slight flaws developing in the packing 17, or other closures of openings having access to chamber 15.

A modified form of packing 90 which may be substituted for packing 17 and spring 85 is shown in Fig. 8. This packing engages the lower end of a tubular joint 91 which is substituted for joint 40, and lacks counterbore 42 of the latter, and is trapped within a shallow counterbore 92 provided in the upper portion of counterbore 23 of external tube 13.

Packing 90 includes a vertically perforated metal ring 93 which slides freely in counterbore 92 and is provided with a lower limit stop by a shoulder 94 formed by said counterbore. Trapped between joint 91 and ring 93 is a tubular section 95 of aerated vulcanized rubber known as "Unicel" rubber which is sheathed by a coating 96 of soft non-aerated rubber.

A salient feature of Unicel rubber is its being compressible, due to the air trapped therein being compressible. Thus, the ring 93 is caused to yield, when operating liquid is forced into chamber 15, causing Unicel rubber tube section 95 to become compressed axially so as to apply a reactive pressure on said liquid in a similar manner to the packing 17 and spring 85.

The claims are:

1. In a hydraulic well jar, the combination of: telescopically associated external and internal tubes producing a cylindrical tubular shaped chamber therebetween for confining a body of operating liquid; a fixed packing sealing off one end of said chamber; a floating packing sealing off the other end of said chamber, said external tube having, between said fixed packing and said floating packing, in the order stated, a first or piston-freeing section of substantially large inside diameter, and a second or piston-fitting section of a lesser inside diameter than said first section; a hammer formed on said external tube by the shoulder at the near end of said first section; an anvil formed on said internal tube and extending radially therefrom in axial opposition to said hammer, the outside diameter of said internal tube being reduced adjacent to and inwardly from said anvil to provide a piston sleeve slide base terminating at its inner end in a ground sleeve seat; a piston sleeve vertically slidable on said base between said anvil and said seat, and having a ground end face fitting said seat, said sleeve also having a cylindrical outer face making a liquid tight sliding fit with said second chamber section when disposed therein, there being liquid passage means between said sleeve and said base for freely conducting operating liquid from one end of said sleeve to the opposite end thereof, escape orifice means of small compact cross-section being provided to permit the escape of operating liquid from said passage means into said second section of said chamber between said sleeve and said floating packing, said anvil serving as a stop for said sleeve at one end of the axial travel of said sleeve on said base, notch means being provided in the corresponding end of said sleeve to allow operating liquid to flow from said passage means between said sleeve and said slide base and into said chamber during the resetting stroke of said jar; and means for connecting said tubes respectively to adjacent elements in a drill string.

2. A combination as in claim 1 in which said passage means is provided by giving said base substantially the cross section of a polygon, with rounded corners of a diameter slidably fitting the interior of said sleeve.

3. In a hydraulic well jar, the combination of: telescopically associated external and internal tubes producing a cylindrical tubular shaped chamber therebetween for confining a body of operating liquid; a fixed packing sealing one end of said chamber; a floating packing sealing the other end of said chamber, said external tube having, between said fixed packing and said floating packing, a first or piston-freeing section of substantially large inside diameter, and a second or piston-fitting section of a lesser inside diameter than said first section; a hammer formed on said external tube by a shoulder provided at the near end of said first section; an anvil formed on said internal tube, and extending radially therefrom into said first section in axial opposition to said hammer, the outside diameter of said internal tube being reduced adjacent to and inwardly from said anvil to provide a piston sleeve slide base terminating at its inner end in a ground sleeve seat; a piston sleeve vertically slidable on said base between said anvil and said seat, and having a ground end face fitting said seat, and a cylindrical outer face slidable within said second chamber section when disposed therein, slow leakage by-pass means being provided allowing operating liquid to by-pass said sleeve at a slow rate when it is in said second section and travelling relatively toward said first section, and rapid by-pass means allowing a rapid flow of operating liquid past said sleeve when it is in said second section and travelling relatively in the reverse direction; means apart from ambient fluid pressures for constantly yieldably urging said floating packing into compressive relation with said operating liquid; and check valve controlled inlet means for introducing liquid into said chamber until the chamber is filled and said yieldable compressing means is compressed by said liquid so as to maintain the latter under a pressure exceeding ambient fluid pressure.

4. A combination as in claim 3 in which said floating packing comprises a packer ring slidably engaging said internal tube and said second section of said external tube to form a floating seal with both said tubes and close that end of said liquid chamber, and in which said yieldable compressing means comprises an expansive coiled spring, and a shoulder provided internally on said external tube, said spring being interposed between said shoulder and said packer ring.

5. In a telescopic oil well tool the functioning of which depends upon the selective hydraulic damping of relative axial movement between the telescopic parts thereof in a given direction, the combination of: a cylinder; a piston telescopically shiftable in said cylinder, said piston including an inner body and a sleeve, the latter comprising the outer layer of said piston, the outside of said sleeve making a close sliding fit with the inside of said cylinder, and being free for a substantial degree of axial movement relative to said piston body; and stops on said piston body for limiting said relative axial movement between said sleeve and said piston body, one of said stops providing a ground seat, there being a matching ground face on the corresponding end of said sleeve which engages said seat to make a substantially liquid tight seal between said sleeve and said piston body during relative movement between said piston and cylinder in said given direction, there being relatively small liquid escape passage means of compact cross sectional area provided in said piston allowing liquid in said cylinder to by-pass said piston, during said relative movement in said direction, at a slow rate effective to substantially retard the rate of said movement in said direction, there also being relatively large liquid passage means provided in said piston, and access to which is supplied by the separation of said seat and sleeve face during relative movement between said cylinder and piston in the opposite direction, said large liquid passage means, when access is thus had thereto, allowing liquid in said cylinder to by-pass said piston relatively freely.

6. In a telescopic oil well tool, the functioning of which depends upon maintaining a quantity of liquid trapped between the telescopic parts thereof, the combination of: an outer tubular element comprising a cylinder; an inner tubular element telescopically related with said cylinder; a piston section provided on said inner tubular element between opposite end sections of the latter, said piston section functioning as a piston in said cylinder; packing means sealing off the space between said cylinder and one end section of said inner tubular element to prevent the escape of said liquid outwardly past said packing means; a floating packing ring disposed within said cylinder and surrounding the other end section of said inner tubular element and making a slidable sealing engagement with both said cylinder and said section, said ring, on one face thereof, thus cooperating with the other elements recited to complete an enclosed tubular liquid confining chamber between said two tubular elements and on its outer face being exposed to ambient fluid; resilient means for biasing said floating packing ring towards said packing means; and means for introducing liquid into said chamber to fill the same and place said resilient means under tension, there being passage means provided in said tool allowing liquid in said chamber to by-pass said piston at a restricted rate to retard a given relative axial movement between said tubular elements.

7. In a piston sleeve valve mechanism which differentially retards axial travel of a piston in opposite directions in a cylinder, and is adapted to operate with substantial precision under very large hydraulic loads, the combination of: a tubular cylinder a portion of which has a given uniform inside diameter; a piston reciprocable axially within said cylinder, and including a body element and a sleeve element mounted on said body element for a substantial degree of axial movement relative to said body element, said sleeve having an external diameter very close to said inside diameter of said portion of said cylinder whereby said sleeve makes a close sliding fit with the inside of said portion of said cylinder; a pair of stops on said body spaced apart to be engaged respectively by opposite ends of said sleeve to limit axial movement of said sleeve on said body, there being liquid passage means of substantial capacity formed in said piston and axially coextensive with the space between said stops; primary and secondary valve means formed by cooperating surfaces on opposite ends of said sleeve and the stops respectively alternately engaged thereby upon relative reciprocation between said sleeve and said body, each of said valve means being open when the other is closed and vice-versa, each valve means being closed by a relative axial movement between said cylinder and said piston tending to frictionally shift said sleeve towards said valve means, each valve means, when open, setting up free communication between said passage means and the adjacent free space between said cylinder and said piston body, said primary valve means, when closed, shutting off communication between said passage means and the adjacent free space in said cylinder excepting for relatively large primary escape orifice means provided in said piston to connect said passage means and said adjacent free space when said primary valve is closed thereby allowing the relative movement between said cylinder and piston which caused said primary valve to close, to continue substantially freely, said secondary valve means, when closed, likewise shutting off communication between said passage means and the adjacent free space in said cylinder excepting for relatively compact and minute secondary escape orifice means provided in said piston to connect said adjacent free space and said passage means when said secondary valve is closed thereby creating a powerful resistance retarding the relative movement between said cylinder and piston which caused said secondary valve to close, the bypassing of liquid past said piston during relative movement in either direction between said piston and said cylinder being restricted, by the close fit between said sleeve and said portion of said cylinder while said piston is in said portion,

to the flow of liquid through said primary or secondary orifice means, depending on whether said primary valve means or said secondary valve means is respectively closed at the time.

8. In a telescopic oil well tool, the functioning of which depends upon a selective hydraulic damping of relative axial movement between the telescopic parts thereof in a given direction, the combination of: a cylinder providing a liquid chamber; a piston telescopically shiftable in said cylinder, said piston including an inner body and a sleeve, the latter comprising the outer layer of said piston, the outside of said sleeve making a close sliding fit with the inside of said cylinder, and being free for a substantial degree of axial movement relative to said piston body; and stops on said piston body for limiting said relative axial movement between said sleeve and said piston body, a relatively large axial passage means being provided in said piston and extending between said stops, one end of said passage means being constantly in relatively free communication with the portion of said chamber at that end of said sleeve, annular ground mating faces being provided on the opposite end of said sleeve and the adjacent stop to form a by-pass valve, one of said faces being radially interrupted by at least one very small short groove forming a bleeder port for said valve when the latter is closed by engagement of said faces, movement of said piston axially in a direction causing said valve to close thus effecting a powerful damping action retarding said movement, while reversing the direction of movement of said piston opens said valve permitting free movement of said piston in that direction and exposing said port to the washing action of liquid flowing reversely through said opened valve.

9. In a telescopic oil well tool, the functioning of which depends upon a selective hydraulic damping of relative axial movement between the telescopic parts thereof in a given direction, the combination of: a cylinder providing a liquid chamber; a piston telescopically shiftable in said cylinder, said piston including an inner body and a sleeve, the latter comprising the outer layer of said piston, the outside of said sleeve making a close sliding fit with the inside of said cylinder, and being free for a substantial degree of axial movement relative to said piston body; and stops on said piston body for limiting said relative axial movement between said sleeve and said piston body, a relatively large axial passage means being provided in said piston and extending between said stops, one end of said passage means being constantly in relatively free communication with the portion of said chamber at that end of said sleeve, annular ground mating faces being provided on the opposite end of said sleeve and the adjacent stop to form a by-pass valve, at least one short bleeder port with compact cross sectional area being provided in said piston which radially connects the end of said passage means at said valve with the adjacent portion of said cylinder chamber, said port allowing a restricted flow of liquid from said passage means into said chamber portion when said valve is closed by engagement of said faces, movement of said piston axially in a direction causing said valve to close thus effecting a powerful damping action retarding said movement, while reversing the direction of movement of said piston opens said valve permitting free movement of said piston in that direction and exposing said port to the washing action of liquid flowing reversely through said opened valve.

10. A combination as in claim 9 in which said bleeder port comprises at least one hole provided in said piston close to and approximately coextensive with the radial dimension of an adjacent one of said ground faces.

11. A combination as in claim 9 in which said bleeder port is formed in said sleeve.

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