Nov. 20, 1951 F. C. LORNITZO 2,575,389

SINGLE UNIT HYDRAULIC CHECK

Filed June 2, 1949 4 Sheets-Sheet 1

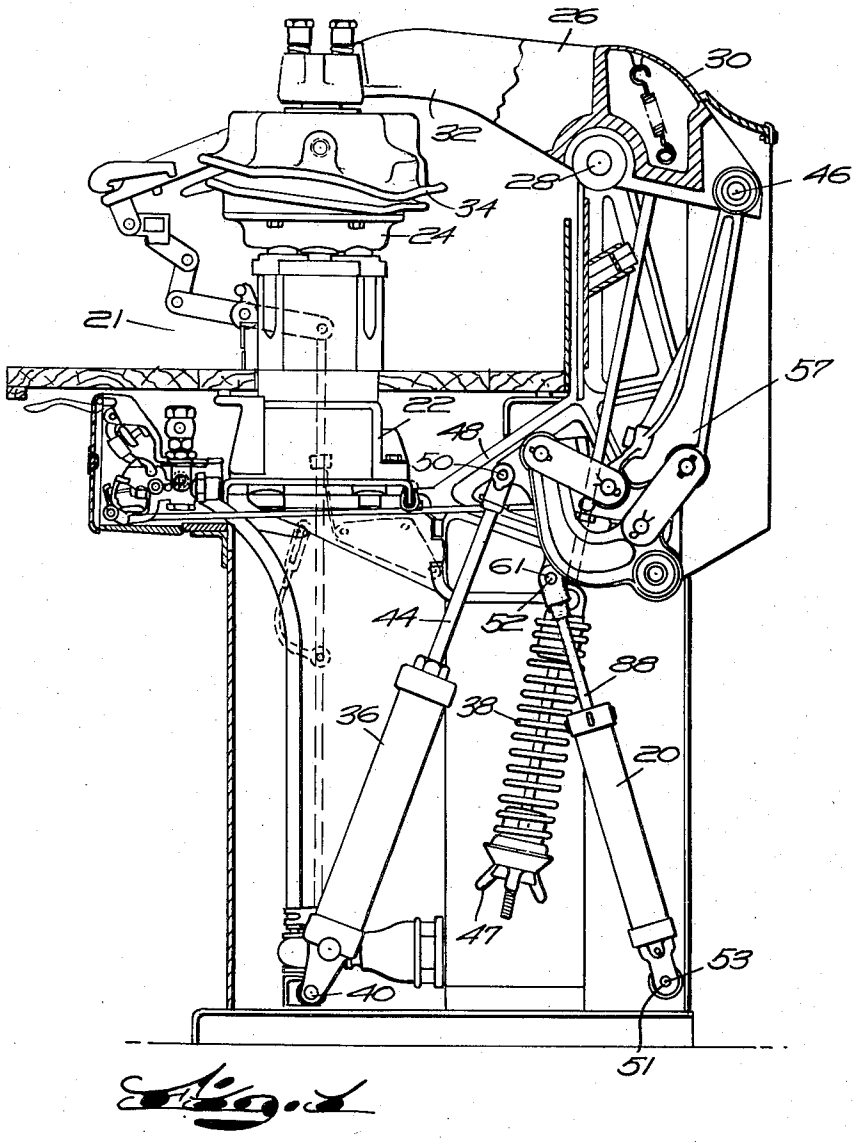


Fig. 1

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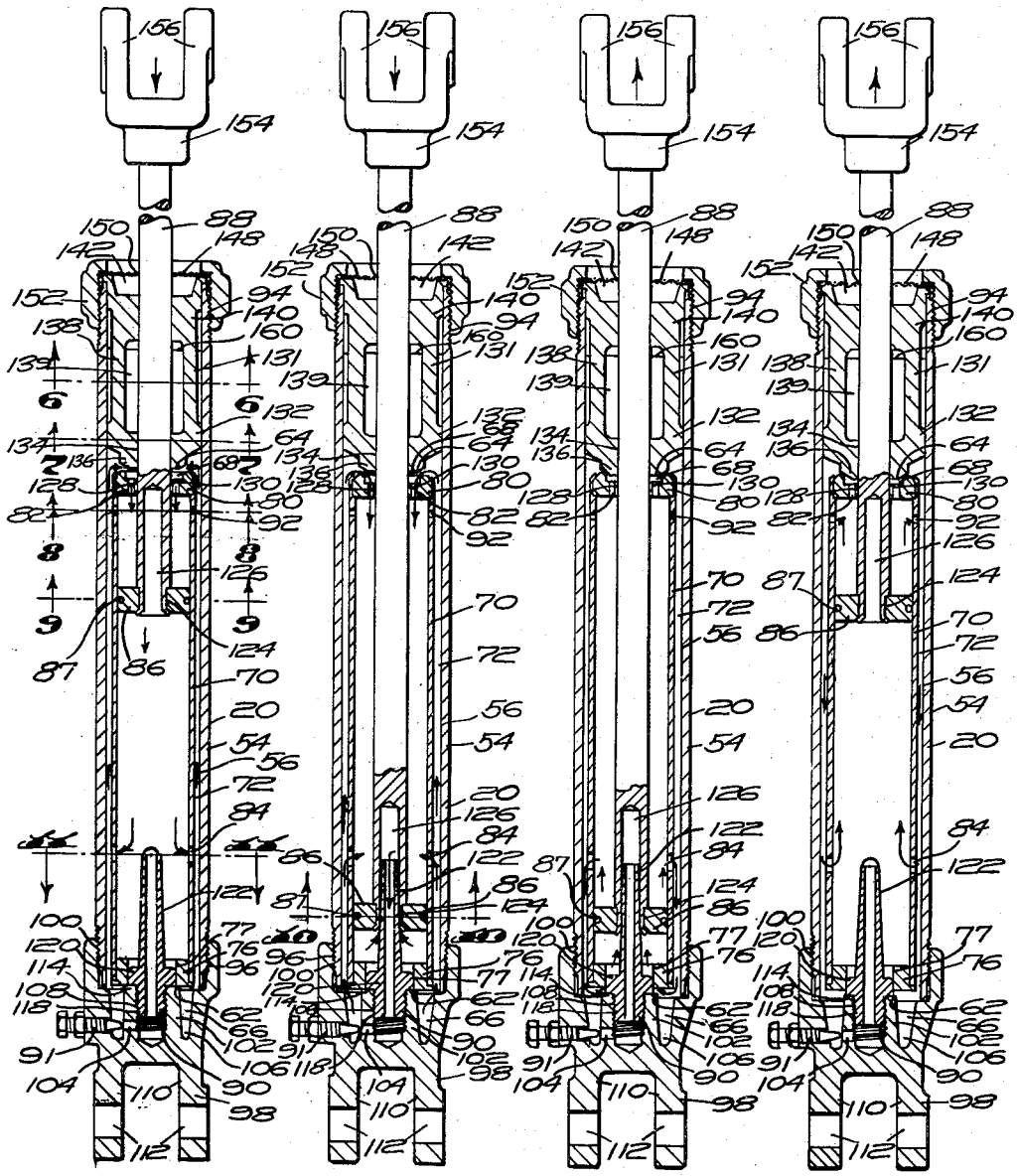


Fig. 2 Fig. 3 Fig. 4 Fig. 5

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SINGLE UNIT HYDRAULIC CHECK

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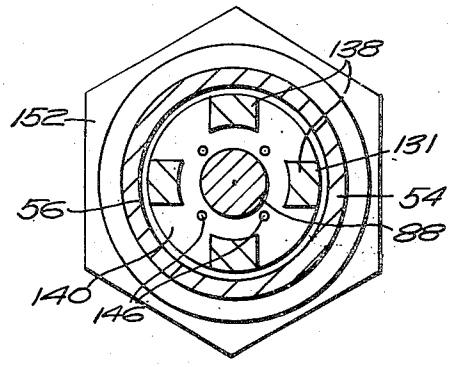


Fig. 6

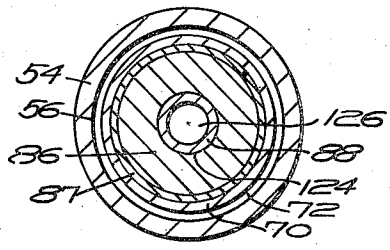


Fig. 9

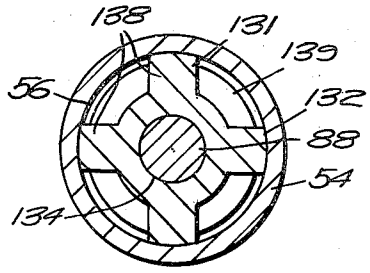


Fig. 2

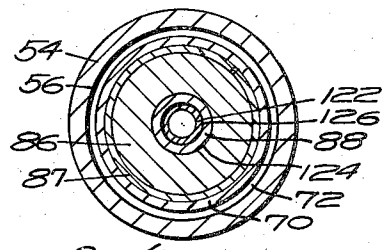


Fig. 10

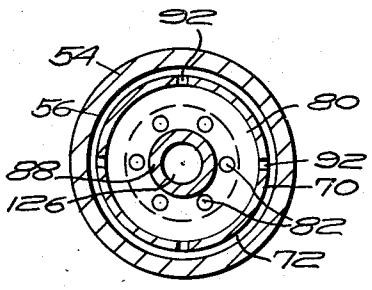


Fig. 8

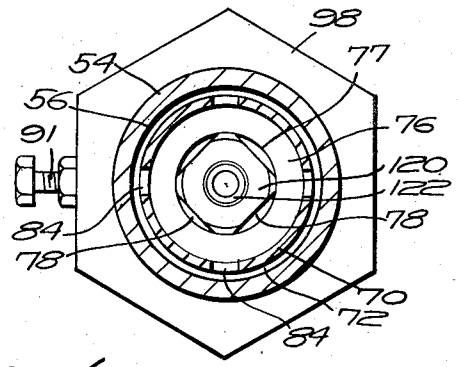


Fig. 11

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SINGLE UNIT HYDRAULIC CHECK

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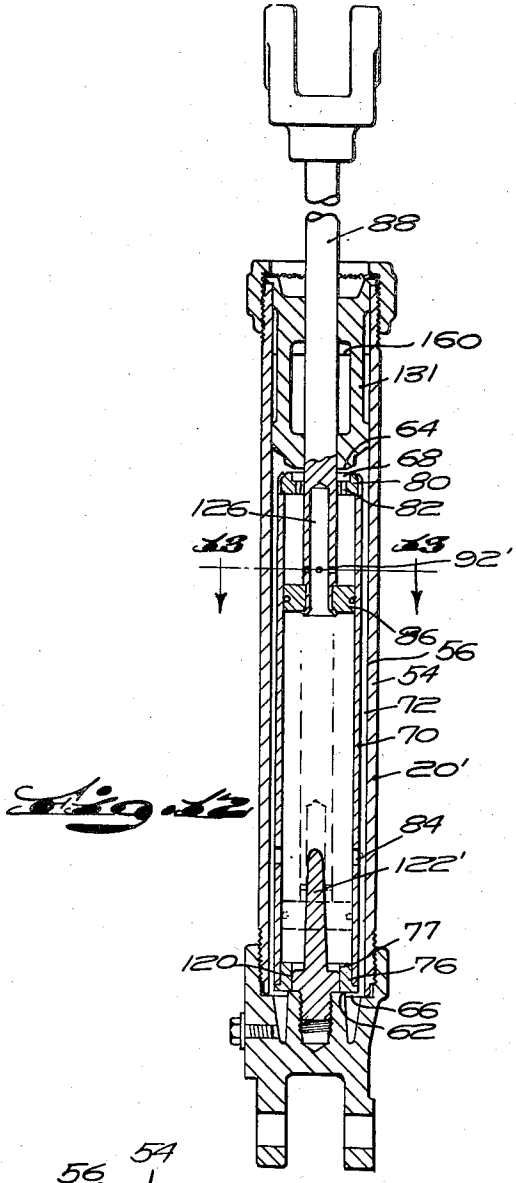


Fig. 12

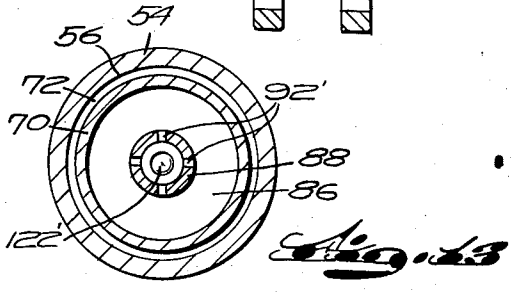


Fig. 13

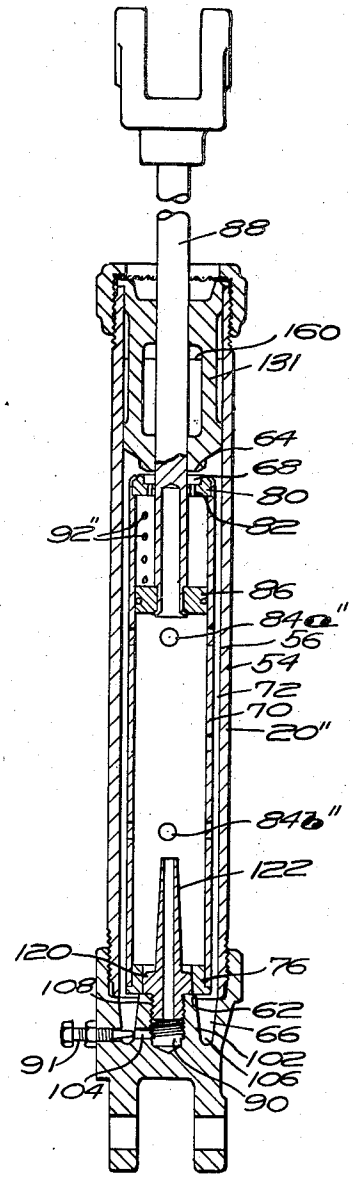


Fig. 14

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Patented Nov. 20, 1951

2,575,389

UNITED STATES PATENT OFFICE

2,575,389

SINGLE UNIT HYDRAULIC CHECK

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Application June 2, 1949, Serial No. 96,646

5 Claims. (Cl. 188—97)

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My invention relates to a single unit hydraulic check for checking portions of the opposite strokes of a member moving alternately in opposite directions and is particularly adapted for use in checking the movement of a pressing member of a garment pressing machine during the opening and closing portions of its opening and closing strokes, although my improved unit may be employed for checking the opposite strokes of any member moving alternately in opposite directions.

When a member reciprocates or oscillates in opposite directions and it has been desired to check the movement thereof in both directions, it has been usual in the prior art to provide a separate hydraulic check or dash-pot for checking the movements of said member in each direction. While others have attempted to provide single unit hydraulic checks for this purpose, these have usually employed a plurality of cylinders and hence have been in effect multiple unit devices. Employing my improved single unit structure, I am enabled to provide a check which will function to check the movement of the moving member in one direction and also the reverse movement of the moving member in the opposite direction.

My invention comprises a reservoir mounted against axial movement (rigidly mounted to check a direct reciprocating movement, and pivotally mounted to check an oscillating movement), having a cylindrical inner wall and annular valve seats adjacent each end thereof and reservoir extensions beyond said valve seats. I also telescopically mount a reciprocating cylinder within said reservoir of such small diameter as to provide annular axial passage means between the outer wall thereof and the inner cylindrical wall of the reservoir connected respectively to said reservoir extensions, of a length to reciprocate at least a short distance to be alternately in contact with an opposite valve seat, having hollow closures forming valve means in each end thereof and providing axial passage means from the center of said cylinder leading to each respective reservoir extension, closable as said cylinder moves into contact with the respective valve seat to stop the passage of fluid to its reservoir extension and having radial passage means intermediate the ends thereof. I also provide a piston head reciprocal in said cylinder to also reciprocate said cylinder to bring an end thereof against its respective valve seat, a piston rod connected to said piston head projecting upwardly through the upper cylinder valve and reservoir valve seat and extending through the upper end of the reservoir and having its upper end operably connectible to said moving member, each respective end of the reservoir having a reducing by-pass line preferably of progressively decreasing effective area connected to the axial passage means between said cylinder and reservoir, operable when the piston head passes beyond said radial passage means in said cylinder to provide a preferably progressively increasing cushioning effect as said movable member nears the end of its stroke in each direction.

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So far as I am aware, my structure of providing a reciprocating cylinder within a hollow reservoir movable by the fluid pressure to alternately close and open valves in each respective end thereof and providing cushioning by-pass means at each end thereof for cushioning the movement is novel.

My structure is an extremely advantageous one. A main advantage is that the cylinder which absorbs the pressure is locked in the fluid reservoir and any leakage is internal.

Another advantage of my structure is that internal by-pass lines only are used, these being formed by the novel annular space between the inner cylindrical surface of the reservoir and the outer surface of the cylinder, so that any leakage is also internal.

A further advantage of my invention resides in the fact that all by-pass lines are constructed so that high fluid pressures are confined within the cylinder.

A further feature of my invention resides in the fact that pressure seals along the piston rod are substantially eliminated.

A further feature of my invention resides in the fact that the inner cylinder alone is subject to wear and is, therefore, the only part which in time may need replacement.

A further feature of my invention resides in the fact that the flow of the by-pass fluid through the annular space permits better distribution of heat due to internal friction in the fluids and

thereby dissipating the frictional heat over a large surface.

A further feature of my invention resides in the fact that the cylinder, which is always immersed in oil, can be made out of ordinary steel and it will not rust as it is continuously submerged in the non-corrosive hydraulic fluid.

A further feature of my invention, therefore, comprises the fact that all of the internal parts can be made out of corrosive materials, whereas the housing only need be made out of a corrosion proof material.

A further feature of my invention resides in the structure of the means I employ comprising the valve means at the upper end of the cylinder.

A further feature of my invention relates to the construction of the upper end of the reservoir. The guide means or bearing for the piston rod is separated into two portions or bearings in such a way that only the lower portion of the guide means or lower bearing is exposed to high fluid pressures and confines any leakage along the guide means bearing or dash-pot to the lower portion thereof, which is always immersed in the fluid.

A further feature of my invention resides in the fact that the spaced ribs of the guide means provide additional storage space.

A further feature of my invention resides in the novel means I employ for filling the reservoir.

A further feature of my improved construction resides in the fact that the by-pass can become effective at any desired portion of the cylinder and hence stroke of the moving member, a feature which is often desirable in a pressing machine, as a large portion of the closing stroke takes place after closing, while applying pressing pressure, and the cushioning by-pass can be made to function very early in the closing stroke of my improved check.

A further feature of one embodiment of my invention resides in the fact that one element may provide the upper by-pass and also a portion of the lower by-pass.

Further features of my invention reside in the fact that either or both by-passes may be made of progressively decreasing effective area to provide progressively increasing cushioning effects.

In the drawings, Fig. 1 is a side elevation of a garment pressing machine equipped with my invention.

Figs. 2, 3, 4 and 5 are identical vertical sectional views of my improved check shown in Fig. 1, shown in different positions, namely, in Fig. 2, with the pressing lever about to open, and showing the oil flow in this position by arrows, Fig. 3, with the pressing lever almost open and also showing the oil flow by arrows, Fig. 4, with the pressing lever about to close and showing the oil flow by arrows, Fig. 5, with the pressing lever almost closed and showing the oil flow by arrows.

Figs. 6, 7, 8, 9 and 11 are cross sectional views taken along the respective lines 6—6, 7—7, 8—8, 9—9 and 11—11 of Fig. 2.

Fig. 10 is a cross sectional view taken along the line 10—10 of Fig. 3.

Fig. 12 is a vertical sectional view similar to Fig. 2 of an alternative embodiment of my invention showing the device about to open, in full lines, with the same parts shown in dotted lines in a cushioning position substantially at the end of the opening stroke.

Fig. 13 is a cross sectional view taken along the line 13—13 of Fig. 12.

Fig. 14 is a vertical sectional view generally

similar to Figs. 2–5 and 12 of a still further embodiment of my invention, having a reducing by-pass of progressively decreasing area for the ends of both the opening and closing strokes.

In the drawings, wherein like characters of reference generally indicate like parts throughout, 20 indicates a single unit hydraulic check for checking portions of the opposite strokes of a member moving alternately in opposite directions, constructed in accordance with my invention.

While my invention may be employed for checking portions of the opposite strokes of a member moving alternately in opposite directions, it was primarily designed and has been largely used to date for checking the movement of the pressing member of a garment pressing machine of the type shown in Fig. 1.

The embodiment of my invention shown in Figs. 2–11 and the embodiment shown in Figs. 12 and 13 are particularly designed for this purpose.

Said pressing machine 21 includes the frame 22, a pressing buck 24 mounted on the frame, a pressing lever 26 of the first class pivotally mounted on the frame as at 28, having a power arm 30 and a work arm 32 having a pressing head 34 mounted thereon to move to a closed position into pressing contact with the buck 24 as shown in full lines in Fig. 1.

Said pressing machine has the usual power applying cylinder 36 and means, such as the spring 38 connected to said power arm, to normally urge said power arm to an open position, the fluid power cylinder 36 being preferably pivotally mounted as at 40 on a lower portion of the frame 22.

Said fluid power cylinder 36 has the movable piston head connected by the rod 44 to the power arm 30 at the point 46. The piston rod 44 is operatively connected to the power arm 30 at the point 46 through suitable linkage mechanism 57.

The coil spring 38 has means, such as the wing nut 47, to variably adjust the tension thereof.

The transmutable lever linkage connecting means 57 connecting the upper end of said piston rod 44 with the power arm of the pressing lever 26 is capable of rapidly closing said pressing lever, and at a predetermined portion of its stroke applying a pressing pressure, and it has an input member 48 connected to said piston rod 44 as at 50, movable initially at a speed to close the press and thereafter at a speed to apply pressure, and to open initially at a speed to release the pressure and thereafter at a speed to open the press.

As shown in the drawings, I connect my improved two-way hydraulic check 20 to said input member 48 at the point 52 to move at said controlled speeds during the different portions of the opening and closing strokes, and so set my improved check in the manner to be explained, as a check to cushion the movement of said pressing lever 26 and input member 48 substantially at the end of the more rapid closing and opening movements of the input member of said linkage and hence closing and opening movements of the pressing lever as distinguished from pressure applying movements of said pressing lever.

My improved check is pivotally mounted on the pivot point 53 located adjacent the rear end of the frame 22.

My improved oil check 20 for a member 26 moving alternately in opposite directions comprises the reservoir 54 mounted against axial movement, in the embodiment shown being pivotally mount-

ed as at 53 on a lower portion of the pressing machine frame to check the oscillating movement of the power arm of the pressing lever in both directions, it being obvious that if it be desired to check the true reciprocating movement of a truly reciprocating member in a straight line, that it would be fixedly mounted.

Said reservoir 54 has the cylindrical inner wall 56. Said reservoir 54 has a lower annular valve seat 62 and an upper valve seat 64 at each respective end thereof and a lower reservoir extension 66 and an upper reservoir extension 68 beyond said respective valve seats.

One decidedly novel feature of my invention resides in the fact that I telescopically mount a reciprocating cylinder 70 within and at a spaced distance from the cylindrical inner wall 56 of the reservoir so as to provide the annular axial passage means 72 between the outer wall of said cylinder 70 and the cylindrical inner wall 56 of the reservoir 54 connected respectively to said lower and upper reservoir extensions 66 and 68 respectively.

Said cylinder 70 is of a length to be reciprocated by fluid pressure at least a short distance to have its respective ends alternately in contact with an alternate lower and upper opposite valve seat 62 and 64 respectively.

I provide the lower end of the cylinder 70 with the valve forming hollow end closure 76 providing axial passage means 78 from the center of said cylinder leading to the lower reservoir extension 66, and the upper end with the upper valve forming end closure 80 having the axial holes 82 therein providing the axial passage means 82 from the center of the cylinder leading to the upper respective reservoir extension 68, said end closures being closable on contact with the respective valve seat 62 or 64 to stop the passage of fluid to its respective reservoir extension 66 and 68 respectively.

Said cylinder is also provided with one or more radial passage means 84 intermediate the ends thereof.

I also provide a piston head 86 reciprocal in said cylinder adapted through the medium of the fluid pressure caused by its movement to also reciprocate said cylinder 70 to bring a respective end thereof against a respective valve seat, and I provide a piston rod 88 connected to said piston head 86 projecting upwardly through said upper cylinder valve 80, reservoir valve seat 64 and extending through the upper end of said reservoir and having its upper end connected to said moving member, in the embodiment shown, namely to said linkage input member 48 as at 52 in the manner explained.

The piston head is preferably provided with the split piston ring 87 to prevent leakage and obtain additional friction to shift the cylinder.

The lower end of the reservoir has a reducing by-pass line 90 preferably of progressively decreasing effective area preferably connected to said axial passage means 72 between said cylinder 70 and reservoir 54, operable when the piston head 86 passes below said radial passage means 84 to provide a less rapid fluid flow, providing a preferably progressively increasing cushioning effect on said movable member as it nears the end of its stroke in one direction.

The upper end of said reservoir also has a reducing by-pass line 92 preferably of progressively decreasing effective area connected to the axial passage means 72 between said cylinder 70 and reservoir 54, operable when the piston head 86 passes above said radial passage means 84 to provide a less rapid fluid flow, providing a preferably progressively increasing cushioning effect for the end of the movable member in the opposite direction.

In the embodiment shown in Figs. 1–13, the radial passage means 84 is located near the bottom of the cylinder, due to the peculiar construction of the pressing machine so as to provide an early cushioning effect for the closing portion of the stroke, continuing as the piston head passes upward during the pressure applying portion of the closing stroke.

In the embodiment shown in Fig. 14, however, I have employed the spaced radial passage means 84a'' and 84b'', so that the cushioning effect will only take place after the piston head 86 passes the last one in each direction, thus providing the center portions of its strokes with no cushioning effect at all.

I have shown in the drawings various forms in which the upper and lower reducing by-pass lines 92 and 90 may be made. In the preferred embodiment shown in Figs. 1–11 for use in the pressing machine, the upper reducing by-pass line comprises a circular row of radial passages 92 in said cylinder of less area than the area of the radial passage means 84 in said cylinder below them, in the embodiment 20' shown in Figs. 12 and 13, the upper reducing by-pass comprising a circular row of small holes 92' in the hollow lower end of the piston rod of smaller effective area than said radial cylinder passage means 84.

In the embodiment 20'' shown in Fig. 14, wherein the upper reducing by-pass line is of progressively decreasing area, it may comprise a row 92'' of small axially aligned holes in the cylinder providing a reducing by-pass line of progressively decreasing area connecting the portions of the cylinder above and below said piston head, providing a progressively increasing cushioning effect.

In the embodiment 20 shown in Figs. 1–11 and also in the embodiment shown in Figs. 12 and 13, the lower reducing by-pass line 90 is tapered inwardly to be of progressively decreasing area to provide a progressively increasing cushioning effect to be described structurally in more detail later herein.

In the embodiment 20 shown in Figs. 1–11, the reducing by-pass line may comprise the adjustable needle valve 91 extending within said by-pass line specifically within the radial hole 104.

The embodiment 20 of my invention shown in Figs. 1–11 is for use in a pressing machine and is constructed specifically as follows:

The cylindrical reservoir 54 has the external threads 94 near the upper end thereof and the external threads 96 near the lower end thereof. I provide a pivot head 98 comprising a cylindrical cap 98, having internal threads 100 for threading on the threads 96 on the lower end of the reservoir, and having an internally threaded cylindrical wall 102 projecting upwardly centrally thereof, having the radial hole 104 therein, forming an outer annular reservoir 106 connected to said axial passage means 72 between said reservoir and cylinder, and a central internally threaded well 108 connected by said radial hole 104 to said annular reservoir 106.

I may, if desired, for the lower by-pass, provide the radial needle valve 91 for said radial hole 104, adjustable from without said reservoir. The pivot head 98 has the pivot lugs 110 project-

ing diametrically downwardly therefrom having aligned transverse pivot pin holes 112 therein to receive the pivot pin 51 for pivotally mounting the reservoir on the frame in the manner explained.

The upper end 114 of said cylindrical wall 102 is enlarged to provide the lower valve seat 62 on the outer portion thereof.

As a portion of said by-pass, I provide the taper assembly having the lower threaded shank 118 threaded within said well, a central nut portion 120 having four flat sides as shown in Fig. 11 extending within the hollow closure 76 and to provide with the lower end of said hollow closure the axial passage 78 as shown in Fig. 11 between the inner circular wall 77 of said hollow closure 76 and the flat side walls of said nut portion 120 with the lower edge of said nut portion resting on the inner portion of said end top wall 114, providing the outer portion thereof to function as the lower valve seat 62.

I also provide the hollow inwardly and upwardly tapered tube 122 projecting upwardly through the axial passage means 78 of said valve closure and the lower end of the cylinder. To complete said by-pass means, I provide a cylindrical hole 124 through said piston head and an aligned cylindrical hole 126 in the lower end of said piston rod 88 for receiving the tapered tube 122 therein.

The cylinder assembly comprises the cylinder 70 of slightly less diameter than the internal diameter of the reservoir wall 56 forming the annular passage 72 between its outer periphery and said inner wall. As stated, said cylinder has a circular row of large spaced radial holes 84 intermediate the ends thereof, in the embodiment, near the lower end thereof, and the row 92 of smaller spaced radial holes forming the upper by-pass near the upper end thereof. As the valve 76 for the lower end of the cylinder, I provide the annular plug 76 having the central circular hole 77 surrounding said tapered tube nut portion 120 to provide the axial passage 78 to permit axial flow between said nut portion 120 and plug 76 as at 78 as shown in Fig. 11 to and from its reservoir extension 66, namely, the reservoir 106, radial hole 104 and well 108.

I also provide the hollow bushing or closure 80 forming the upper valve 80 for the upper end of said cylinder, having the central piston rod hole 128 and the annular wall 130 exterior of said hole, having the circumferentially spaced circular row of axial holes 82 therein providing the axial passage means 82 between the upper end of the cylinder 70 and the reservoir extension 68, namely, the space between the upper end of the cylinder 70 and the lower end of the piston rod guide member 131.

As stated, I provide the piston head 86 having the central hole 124 therein reciprocal within said cylinder 70 and the piston rod 88 having the lower end contained within the central hole 124 of the piston, having the cylindrical hole 126 extending upwardly substantially the height of said tapered tube 122 therein to provide an annular passage way extending upwardly, of decreasing area as said piston rod drops downwardly to cover said tube.

I provide a novel type of piston rod guide 131 for the upper end of the cylinder, comprising a base 132 of substantially the diameter of said reservoir, having a central piston rod hole 134, an annular portion 136 forming the valve seat 64 projecting downwardly therefrom, axially spaced ribs 138 projecting upwardly from said base 132 at a spaced distance from said reservoir wall, providing a central reservoir upper extension 139 and a top portion 140 mounted on said ribs also abutting the cylinder wall, having the central hollow reservior 142 in the upper surface thereof and spaced axial fill and vent ducts 146 (see Fig. 6) extending downwardly from said reservoir and a screen 148, having a central piston hole 150 mounted on the upper rim of said guide member and a hollow cylindrical internally threaded cap 152 for the upper end of said reservoir threaded on the external threads 94 thereof.

In the embodiment shown, the upper end of said piston rod 88 has a clevis 154 having upwardly projecting diametric arms 156 having aligned pintle holes therein projecting upwardly to receive the pivot pin 61 for attachment to the fast moving input member 48 of said linkage 57.

It is thus obvious that with this construction on the down stroke of the piston, said piston and fluid pressure urge said cylinder 70 downwardly against the lower cylinder valve seat 62. The cushioning fluid 160 may first flow freely outwardly through said lower large cylinder radial holes 84, upwardly in the channel 72 between said cylinder 70 and reservoir 54 into said upper reservoir extension 68 and downwardly through the axial holes 82 or passage in the upper cylinder valve closure 80 at the upper end of the cylinder in the manner shown in Fig. 2, until said piston head 86 passes below said cylinder radial holes 84, when fluid may flow at a decreasing rate upwardly in the decreasing annular space between said cylindrical piston rod hole 126 and the tapered tube 122 and downwardly through said tapered tube 122 and well 108, outwardly through said radial partition wall hole 104 and upwardly through said reservoir extension 66 and the annular channel 72 between said cylinder and reservoir, to be discharged inwardly through said radial holes 84 and/or downwardly through said axial holes 82 to cushion with increasing pressure the end of the stroke of said movable member in one direction, in a pressing machine on the end of the opening stroke of the pressing lever, and on the movement of said member in the opposite direction said piston head 86 may move upwardly to urge said cylinder 70 upwardly to free said lower valve seat 62, and to a position causing said projecting cylindrical portion 132 or upper valve seat 64 to close the upper axial valve bushing holes 82, permitting oil to flow outwardly through the lower radial holes 84 in the cylinder, downwardly through the annular space 72 between said cylinder and reservoir, inwardly between said cylinder end and lower valve seat 62, axially in the passage 78 between said nut and closure wall until said piston head passes said radial holes 84, then upwardly and outwardly through said small by-pass holes 92, downwardly through said annular passage 72 and inwardly through said radial holes 84 to permit the fluid to flow outwardly through said small upper cylinder radial holes 92 only to cushion the end of the stroke of the moving member in the opposite direction. The embodiment 20' shown in Figs. 12 and 13 is substantially identical to the embodiment shown in Figs. 1–11, with the exception that the radial holes 92 in the upper end of the cylinder are omitted and that a circular row of small radial holes 92' is provided in the hollow lower end 126 of said piston rod 88. These function on the up stroke as an upper by-pass line in said cylinder 70 between opposite ends of said piston

86 to cushion the final portion of the up stroke and they also function on the down stroke to permit fluid from the lower portion of the cylinder to pass upwardly between the cylindrical piston hole 126 and the tapered member 122' and outwardly into the cylinder 70 through said radial piston rod holes 92', with said holes 92' thus also functioning as a portion of the by-pass for the down stroke of the check. In this embodiment, the tapered tube 122 comprises a tapered member 122' having a closed upper end to prevent any passage of fluid therethrough and permitting the device to function in the manner just explained.

I have shown in Fig. 14 an embodiment 20'' of my invention exactly similar to that shown in Figs. 1–11, with the exception that I have provided an upper by-pass line of progressively decreasing area to provide a progressively increasing cushioning effect. For this purpose, as stated, I provide the axially aligned row of small axial holes 92'' adjacent the upper end of the cylinder. In the position shown, fluid may first discharge outwardly through all of the four holes in the row, each hole being successively blanked off as the piston head 86 passes beyond it to cut down the area of the by-pass line to the progressively decreasing area of the sum of the area of the remaining holes to apply a progressively increasing cushioning effect as the member nears the end of its stroke. In this embodiment I have also shown two sets of radial cylinder holes 84a'' and 84b'' located at spaced distances from the center of the cylinder, so that each respective upper and lower cushioning by-pass may function only on the ends of the stroke after the piston head 86 has passed by both said radial passage means 84a'' and 84b'', providing no cushioning effect at all as the piston head passes between said sets of holes 84a'' and 84b''.

It is apparent that I have provided a novel single unit hydraulic check for checking portions of the opposite strokes of a member moving alternately in opposite directions, with the advantages described above.

It is understood that my invention is not limited to the specific embodiments shown and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What I claim is:

1. A hydraulic check for a member moving alternately in opposite directions, comprising a reservoir mounted against axial movement, having a cylindrical inner wall and annular valve seats adjacent each end thereof and reservoir extensions beyond said valve seats, a cylinder of such small diameter as to provide annular axial passage means between the outer wall thereof and the inner cylindrical wall of the reservoir connected respectively to said reservoir extensions, of a length to reciprocate at least a short distance to be alternately in contact with an opposite valve seat, having hollow end closures forming valve means in each end thereof and providing axial passage means from the center of said cylinder leading to each respective reservoir extension, closable on contact with a respective valve seat to stop the passage of fluid to its reservoir extension and having radial passage means intermediate the ends thereof, a piston head reciprocal in said cylinder, operable to also reciprocate said cylinder to bring an end thereof against a respective valve seat, a piston rod connected to said piston head projecting upwardly through said upper cylinder valve and reservoir valve seat and

extending through the upper end of said reservoir and having its upper end operatively connectable to said moving member, the lower end of the reservoir having a reducing by-pass line of progressively decreasing effective area operable when the piston head passes below said radial passage means to provide a less rapid fluid flow, providing a progressively increasing cushioning effect on said movable member as it nears the end of its stroke in one direction, the upper end of said reservoir having a reducing by-pass line connected to the axial passage means between said cylinder and reservoir, operable when the piston head passes above said radial passage means to provide a less rapid fluid flow, providing a cushioning effect for the end of the stroke of the movable member in the opposite direction, said lower reducing by-pass comprising a cylindrical wall projecting upwardly from the lower end of the reservoir forming an outer annular reservoir extension connected to said axial passage means between said reservoir and cylinder and a central well, said wall having radial passage means connecting said reservoir extension with said well, with the upper end of said cylindrical wall forming the lower valve seat, and in which the radial hole in the cylindrical wall in the lower end of the reservoir has an adjustable needle valve extending therein to provide the reducing by-pass line for the lower end of the reservoir.

2. A hydraulic check for a member moving alternately in opposite directions, comprising a reservoir mounted against axial movement, having a cylindrical inner wall and annular valve seats adjacent each end thereof and reservoir extensions beyond said valve seats, a cylinder of such small diameter as to provide annular axial passage means between the outer wall thereof and the inner cylindrical wall of the reservoir connected respectively to said reservoir extensions, of a length to reciprocate at least a short distance to be alternately in contact with an opposite valve seat, having hollow end closures forming valve means in each end thereof and providing axial passage means from the center of said cylinder leading to each respective reservoir extension, closable on contact with a respective valve seat to stop the passage of fluid to its reservoir extension and having radial passage means intermediate the ends thereof, a piston head reciprocal in said cylinder, operable to also reciprocate said cylinder to bring an end thereof against a respective valve seat, a piston rod connected to said piston head projecting upwardly through said upper cylinder valve and reservoir valve seat and extending through the upper end of said reservoir and having its upper end operatively connectable to said moving member, the lower end of the reservoir having a reducing by pass line of progressively decreasing effective area operable when the piston head passes below said radial passage means to provide a less rapid fluid flow, providing a progressively increasing cushioning effect on said movable member as it nears the end of its stroke in one direction, the upper end of said reservoir having a reducing by-pass line connected to the axial passage means between said cylinder and reservoir, operable when the piston head passes above said radial passage means to provide a less rapid fluid flow, providing a cushioning effect for the end of the stroke of the movable member in the opposite direction, said lower reducing by-pass comprising a cylindrical wall pro-

jecting upwardly from the lower end of the reservoir forming an outer annular reservoir extension connected to said axial passage means between said reservoir and cylinder and a central well, said wall having radial passage means connecting said reservoir extension with said well, with the upper end of said cylindrical wall forming the lower valve seat and a tapered member projecting upwardly through the axial passage means of the hollow valve closure in the lower end of the cylinder and a cylindrical hole through said piston head extending within the adjacent lower end of the piston rod for receiving said tapered member, said tapered member having a nut portion extending when assembled within the cylindrical hole in the valve closure for the lower end of the cylinder, providing an axial passage between the flat walls of the nut and the internal cylindrical periphery of said valve closure.

3. A hydraulic check for a member moving alternately in opposite directions, comprising a reservoir mounted against axial movement, having a cylindrical inner wall and annular valve seats adjacent each end thereof and reservoir extensions beyond said valve seats, a cylinder of such small diameter as to provide annular axial passage means between the outer wall thereof and the inner cylindrical wall of the reservoir connected respectively to said reservoir extensions, of a length to reciprocate at least a short distance to be alternately in contact with an opposite valve seat, having hollow end closures forming valve means in each end thereof and providing axial passage means from the center of said cylinder leading to each respective reservoir extension, closable on contact with a respective valve seat to stop the passage of fluid to its reservoir extension and having radial passage means intermediate the ends thereof, a piston head reciprocal in said cylinder, operable to also reciprocate said cylinder to bring an end thereof against a respective valve seat, a piston rod connected to said piston head projecting upwardly through said upper cylinder valve and reservoir valve seat and extending through the upper end of said reservoir and having its upper end operatively connectable to said moving member, the lower end of the reservoir having a reducing by-pass line operable when the piston head passes below said radial passage means to provide a less rapid fluid flow, providing a cushioning effect on said movable member as it nears the end of its stroke in one direction, the upper end of said reservoir having a reducing by-pass line operable when the piston head passes above said radial passage means to provide a less rapid fluid flow, providing a cushioning effect for the end of the stroke of the movable member in the opposite direction, said axial passage means from the center of said cylinder leading to the upper reservoir extension comprising a circular row of axial holes in said closure for the upper end of said cylinder and the valve seat for said holes comprising a cylindrical projection extending downwardly from the upper end of said reservoir adapted to close said circular row of axial holes.

4. A hydraulic check for a member moving alternately in opposite directions, comprising a reservoir mounted against axial movement, having a cylindrical inner wall and annular valve seats adjacent each end thereof and reservoir extensions beyond said valve seats, a cylinder of such small diameter as to provide annular axial passage means between the outer wall thereof and the inner cylindrical wall of the reservoir connected respectively to said reservoir extensions, of a length to reciprocate at least a short distance to be alternately in contact with an opposite valve seat, having hollow end closures forming valve means in each end thereof and providing axial passage means from the center of said cylinder leading to each respective reservoir extension, closable on contact with a respective valve seat to stop the passage of fluid to its reservoir extension and having radial passage means intermediate the ends thereof, a piston head reciprocal in said cylinder, operable to also reciprocate said cylinder to bring an end thereof against a respective valve seat, a piston rod connected to said piston head projecting upwardly through said upper cylinder valve and reservoir valve seat and extending through the upper end of said reservoir and having its upper end operatively connectable to said moving member, the lower end of the reservoir having a reducing by-pass line operable when the piston head passes below said radial passage means to provide a less rapid fluid flow, providing a cushioning effect on said movable member as it nears the end of its stroke in one direction, the upper end of said reservoir having a reducing by-pass line operable when the piston head passes above said radial passage means to provide a less rapid fluid flow, providing a cushioning effect for the end of the stroke of the movable member in the opposite direction, said closure for the upper end of the reservoir comprising a piston rod guide comprising a cylindrical lower end of substantially the diameter of the internal cylindrical periphery of said reservoir contained within said reservoir having a central piston rod hole, a cylindrical valve seat projecting downwardly therefrom, axially spaced ribs projecting upwardly from said base at a spaced distance from the housing wall and a cylindrical top portion mounted on said ribs having a center hollow annular reservoir in the upper surface thereof and spaced axial ducts extending downwardly from said reservoir.

5. A hydraulic check for a member moving alternately in opposite directions, comprising a reservoir mounted against axial movement, having a cylindrical inner wall and annular valve seats adjacent each end thereof and reservoir extensions beyond said valve seats, a cylinder of such small diameter as to provide annular axial passage means between the outer wall thereof and the inner cylindrical wall of the reservoir connected respectively to said reservoir extensions, of a length to reciprocate at least a short distance to be alternately in contact with an opposite valve seat, having hollow end closures forming valve means in each end thereof and providing axial passage means from the center of said cylinder leading to each respective reservoir extension, closable on contact with a respective valve seat to stop the passage of fluid to its reservoir extension and having radial passage means intermediate the ends thereof, a piston head reciprocal in said cylinder, operable to also reciprocate said cylinder to bring an end thereof against a respective valve seat, a piston rod connected to said piston head projecting upwardly through said upper cylinder valve and reservoir valve seat and extending through the upper end of said reservoir and having its upper end operatively connectable to said moving member, the lower end of the reservoir having a reducing by-pass line operable when the piston head passes below said

radial passage means to provide a less rapid fluid flow, providing a cushioning effect on said movable member as it nears the end of its stroke in one direction, the upper end of said reservoir having a reducing by-pass line operable when the piston head passes above said radial passage means to provide a less rapid fluid flow, providing a cushioning effect for the end of the stroke of the movable member in the opposite direction, said piston rod providing a guide means for the upper end of said cylinder, and independent guide means extending upwardly from the lower end of the reservoir for guiding the lower end of said cylinder, said means comprising a tapered tube extending upwardly from the lower end of said cylinder and having a nut portion extending within the cylindrical hole in the lower valve closure.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,313,763	Thomas	Aug. 19, 1919
1,445,615	Ferres	Feb. 13, 1923
1,494,135	Robison et al.	May 13, 1924
2,087,426	Bechereau et al.	July 20, 1937