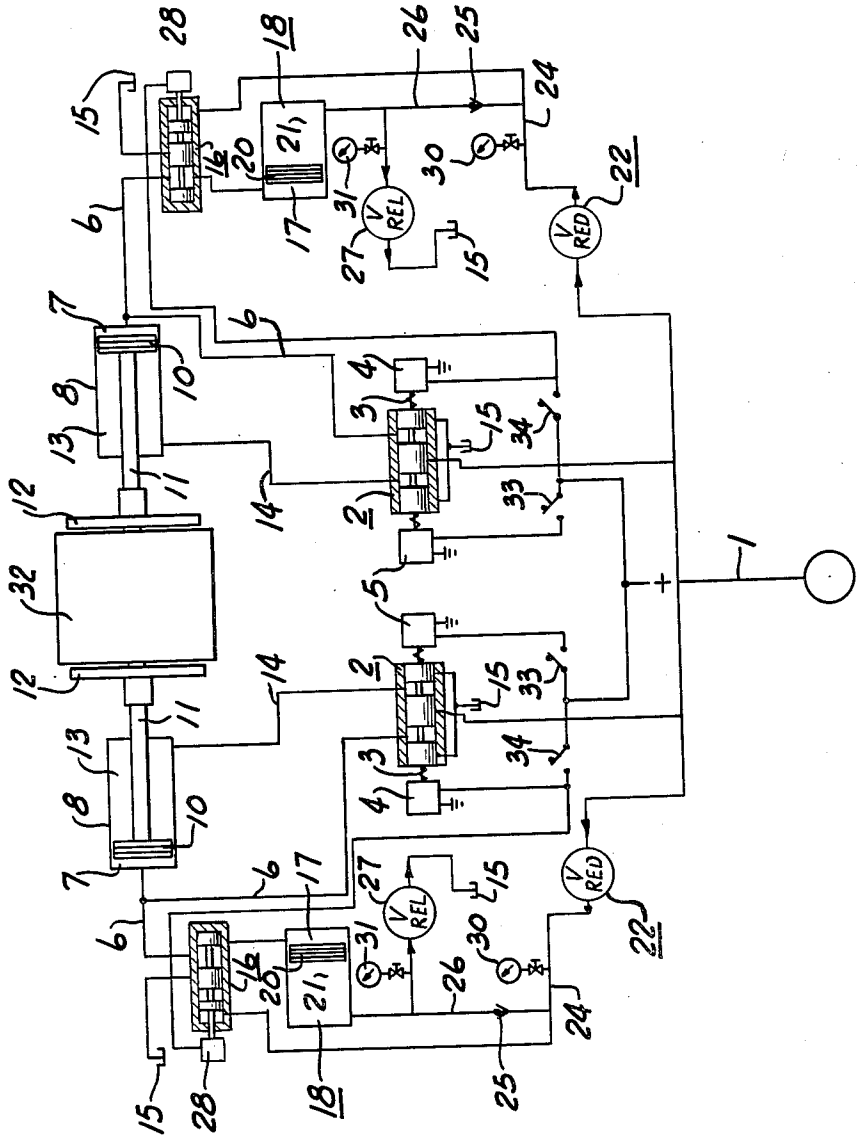
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HYDRAULIC CONSTANT PRESSURE APPLICATOR

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HYDRAULIC CONSTANT PRESSURE APPLICATOR

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This invention relates generally to hydraulic pressure applicators and more particularly to a hydraulic pressure applicator that exerts the same pressure regardless of the displacement.

The structure of this invention may be advantageously employed as a pressure member on guides set to engage the laterally moving sides of a coil being unreeled to exert a predetermined pressure on the coil to hold it from further lateral movement with a constant pressure regardless of the displacement. The lateral movement of the coil in unwinding is retarded by this pressure applicator at substantially the same resistant pressure. Thus the guide may be moved faster or slower but still resists movement at the same pressure. This constant pressure applicator may be applied to other uses that require a constant reaction pressure but still resists with the same pressure regardless of the displacement.

Another object is the provision of a pair of pressure guides for laterally moving a coil to a predetermined position and thereafter functioning to exert a predetermined pressure on the coil as it is unwound regardless of the lateral movement of the coil.

Another object is the provision of a guide which provides a constant pressure on the object which is being guided regardless of the movement of the object against the guide.

Another object is the provision of a hydraulic transfer unit which functions to serve independent hydraulic pressure systems for the purpose of determining a constant pressure from a predetermined reference from which the pressure is applied.

Another object is the provision of a transfer unit connecting independent hydraulic pressure systems in correlating proportionate pressures to exert a predetermined pressure on the subject being controlled.

Other objects and advantages of this invention appear hereinafter in the following description and claims.

The accompanying drawings show for the purpose of exemplification without limiting this invention or the claims thereto, certain practical embodiments illustrating the principles of this invention wherein the single FIGURE is a diagrammatic view of the constant pressure applicator comprising this invention.

Referring to the drawings the source of hydraulic fluid is indicated at 1 which may for instance contain a pressure of one thousand pounds per square inch. This source of fluid 1 is connected to the solenoid valve 2 which is a multiport three position valve with its normal position being closed as shown and being centered by the springs 3 and actuated by the solenoids 4 and 5. If the solenoid 4 is energized hydraulic fluid under pressure is admitted to the line 6 from whence it flows to the chamber 7 in one end of the cylinder 8 in which is operated the piston 10 operating the rod 11 which has in this instance revolvably secured thereto the circular rotary guide 12. When hydraulic fluid under pressure enters

the line 6 to move the piston 10 to the right the opposite end or the chamber 13 is exhausted through the line 14 to tank 15.

At the same time the multiport two position valve 16 is supplied through the line 6 with the hydraulic fluid under pressure to the chamber 17 of the hydraulic transfer unit 18. This unit has a free transfer piston 20 and is shown in the drawings as a single member but this transfer unit may be provided with a differential type piston. However, for sake of simplicity it is preferred to employ a free piston that has equal and opposite pressure areas as indicated in the diagrammatic view of the drawing. The opposite chamber 21 is supplied with fluid under pressure by the pressure reducing valve 22 which is spring loaded and has a connection to tank 15 and is set for supplying a pressure of two hundred pounds through the line 24, the check valve 25, the line 26 to the chamber 21. Thus the hydraulic transfer unit 18 is provided with a pressure of two hundred pounds in the chamber 21. A relief valve 27 is connected to the line 26 for the purpose of discharging excess fluid under pressure to the tank 15 when the pressure in the system of line 26 exceeds that of two hundred pounds per square inch.

Line 24 is also connected to the valve 16 as a pilot line to actuate the operator 28, the pilot line being discharged to tank 15 upon operation. The line 24 and the line 26 are each provided with a pressure gauge as indicated at 30 and 31 respectively. A duplicate guide is placed on each end of the coil 32 and by operating the valves 2 one may charge the cylinders 8 with a sufficient hydraulic fluid under pressure to properly position the coil which is ordinarily supported by some form of reel not shown. The positioning of the coil between the two rotary guides 12 has no particular location relative to the coil or relative to each other. This permits coils of different sizes and different lengths to be employed on the reel and in combination with the guides 12 so that they may pre-position the coil on the reel and after they have pre-positioned the coils the valves 2 may each be reversed so as to draw the guides 12 approximately one inch from the end of the coil. This slide clearance allows for small variations in movement of the coil as it is being unwound and yet does not bring the guides into play until after the clearance has been overcome at which time the coil or the strip being unwound therefrom will engage the guide causing the piston 10 to contract. The fluid in the line 6 is then transferred to the chamber 17 pushing the free piston 20 to the left thereby discharging fluid from the chamber 21 through the relief valve 27. There has been nothing done with the chamber 13 in the cylinder 8 and it retains the same amount of liquid that it previously had which of course determines the relative position of the guide 12 and as soon as the pressure is relieved from the guide 12 the pressure reducing valve 22 immediately replenishes the hydraulic fluid under pressure in the chamber 21 of the transfer unit 18 thereby moving it to its originally set position under the force of two hundred pounds and the fluid in the locked system representing the chamber 17 and the line 6 will enter the chamber 7 forcing the piston 10 to the right to its original position.

It will be noted that the special hydraulic transfer unit 18 has only two hundred pounds pressure subjected to the chamber 21. This represents the only pressure

that is supplied hydraulically through the liquid in the closed system represented by the line **6** and the chambers **7** and **17** and thus the guide **12** responds only to two hundred pounds pressure and this represents the only pressure applied to the side of the strip or coil.

After the guide is returned to its normal or pre-set position it will be only one inch from the end of the coil and is in readiness for instant performance if the end of the coil or the edge of the strip moves laterally at a distance greater than the inch clearance originally provided.

It will also be noted that since the hydraulic transfer unit **18** can only supply a pressure of two hundred pounds per square inch, this pressure on the closed system indicated by the line **6** and the chambers **7** and **17** are at all times provided with a pressure of two hundred pounds per square inch.

If it is desired to retract the piston **10** the solenoid **5** is energized to admit fluid pressure to the chamber **17** and exhaust it from the chamber **7** at which time the chamber **17** is likewise exhausted and the piston **20** is moved to the extreme right in the cylinder **18**.

The pilot valve **16** may be employed to exhaust the system represented by the line **6** and the chambers **7** and **17** by discharging the same to tank **15**. This likewise permits the piston **20** to move to the right end of the cylinder **18**.

Although this invention is illustrated as being duplicated to function as two entirely independent fluid actuated systems on opposite sides of a coil that is being unwound it will be noted that the function of both guides is entirely independent of one another and when one guide is moved laterally owing to the pressure from the coil the other guide remains as originally set and will not follow or otherwise enter into the operation of the guide on the opposite end of the coil. This independent operation is an important feature of this invention.

Thus by limiting the pressure applied to the guide one does not endanger or cause destruction of the work or the guide or the reel or other parts of the equipment because they can stand a pressure of two hundred pounds whereas the pressure that is ordinarily applied with the valve **2** may force the guide to destruction if it is not stopped in time and in any event pressure is apt to build up too quickly and destroy either the work or the equipment if it is subjected to a relatively high operating pressure such as a thousand pounds found in the supply line **1**.

During operation a push button is depressed until the guide is shoved the whole of the coil either to the right or to the left on the reel or to the position in which it is to be unwound for the purpose of aligning the same. After it has been properly aligned the second push button is depressed to back off the guide to the clearance that is believed to be necessary for this operation. Some times this clearance may be as small as an eighth or a sixteenth of an inch or an inch depending upon the coil and the character of the material being run. When the solenoid **4** is energized the solenoid actuating the pilot valve **16** is likewise energized so as to disconnect the transfer unit from the line **6** and discharge the chamber **17** to tank.

This circuit may be depicted as illustrated with the push button **33** being connected to energize the solenoid **5** and the push button **34** being connected to energize the solenoid **4** and the solenoid **28** of the pilot valve.

I claim:

1. In a hydraulic constant pressure applicator comprising an external actuating rod on a double-acting piston in a cylinder with a line to extend and a line to retract said piston and rod, a transfer unit having a transfer cylinder and a freely movable transfer piston therein, a continuous supply of constant hydraulic pressure on one side of said transfer unit, a connection on the other side of said transfer unit to said line to extend said piston, a relief valve connected to said transfer unit with said continuous supply of constant hydraulic pressure, and a three position multiple flow path valve means connected to simultaneously supply hydraulic pressure to said line to extend said piston while discharging the opposite side of said piston, said valve means biased to close both of said lines to said piston, a load pressure on said piston rod effective to move said piston and displace hydraulic fluid to move said transfer piston in said transfer unit and displace hydraulic fluid therein through said relief valve to maintain a constant hydraulic pressure on said piston regardless of its displacement.

2. The hydraulic constant pressure applicator of claim 1 characterized by a valve between said transfer unit and said line to extend said piston and rod when the latter is adjusted as to position relative to its load.

3. The hydraulic constant pressure applicator of claim 2 characterized in that said valve is a hand valve.

4. The hydraulic constant pressure applicator of claim 2 characterized in that said valve is an open multiple flow path and maintains connection between said transfer unit and said line to extend said piston and rod and connects said transfer unit to discharge when said valve means is operated to supply hydraulic fluid to said line to extend said piston and rod.

5. The hydraulic constant pressure applicator of claim 4 characterized in that said valve means and said valve are electrically controlled to effect simultaneous actuation.

6. The hydraulic constant pressure applicator of claim 4 characterized in that said valve has a pilot actuator connected to said continuous supply of constant hydraulic pressure.

7. The hydraulic constant pressure applicator of claim 1 characterized by a pressure reducing valve to supply said continuous supply of constant hydraulic pressure.

8. The hydraulic constant pressure applicator of claim 1 characterized by a guide on said piston rod, said piston and rod mounted to engage said guide with the side of the load being controlled.

9. The hydraulic constant pressure applicator of claim 1 characterized by a guide on each side of a rod and engageable by said load to produce a load pressure on the guide, each guide connected to said piston rod of a duplicate structure on opposite sides of the load and effective to preposition the load therebetween at a selected position.

10. A hydraulic contant pressure applicator for laterally guiding the unreeling of a coil comprising an external actuating rod having a guide thereon to engage one side of said coil to be guided, a double-acting piston on said rod and positioned in a cylinder with a line to extend and a line to retract said piston and rod, a transfer unit having a freely movable transfer piston in a transfer cylinder connected on one side to a continuous supply of constant hydraulic pressure and on its load side to said line to extend said piston and rod, an adjustable pressure relief valve connected between said transfer unit and said continuous supply of constant hydraulic pressure, an open multiflow path valve in the line connection between said transfer unit and said line to extend said piston and rod, and a three position multiple flow path valve means connected to simultaneously supply hydraulic pressure to one side while discharging the opposite side of said piston, said valve means biased to close both of said lines to said piston in its third position to permit a load pressure on said guide effective to move said rod and piston and force said head in said transfer unit to displace hydraulic fluid therein through said relief valve and maintain a constant pressure on said piston regardless of said displacement, said transfer unit returning said piston rod and guide to its original position when said load pressure is relieved.

11. The hydraulic constant pressure applicator of claim 10 characterized in that said open multiflow path valve exhausts the load side of said transfer unit when said valve means is positioning said guide.

12. The hydraulic control pressure applicator of claim 10 characterized by a duplicated structure on each side of the coil, one of said pistons extends by its valve means to create a load on the other of said pistons and preposition said coil between said guides.

13. The hydraulic control pressure applicator of claim 12 characterized by the valve means controlling each guide backing its respective guide from the coil, and means to simultaneously reset said transfer units while said valve means are operating.

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