This invention relates to a gage protector and more particularly to a valve associated with a choke coil for dampening and stopping surges and excessive pressures in a hydraulic system from reaching the pressure indicating gage.

One of the objects of the present invention is to provide a gage protector valve in combination with a choke coil for preventing surges of pressure in a hydraulic system from causing the needle of the gage to indicate a false pressure reading.

Another object of the present invention is to provide a gage protector valve in combination with a choke coil for preventing high amplitude surges from reaching the gage needle mechanism, whereby the surges of pressure would drive the needle beyond its reading limits and thereby destroy the gage.

And still another object of the present invention is to provide a gage protector valve in combination with a choke coil which will shut-off or block out at a predetermined setting to prevent static pressure in excess of the limits of the gage from reaching the gage.

Other objects of the present invention will be pointed out in part and become apparent in part in the following specification and claims.

In the past surge dampening valves have incorporated various types of choke coil or in an independent structure reciprocating plugs have been used in valve construction. Applicant provides a unique choke coil and a unique reciprocating plug combined in one structure for special use in high pressure hydraulic systems. The choke coil and reciprocating plug complement each other.

The choke coil herein depicted is the subject of a patent application by the same inventors, Serial No. 516,412 filed October 23, 1952 for a Gage Dampening Device, now abandoned.

Like reference characters refer to like parts in the accompanying drawing, wherein:

Figure 1 is a longitudinal, medial sectional view of the new and improved gage protector valve.

Figure 2 is similar to Figure 1 except the reciprocating valve plug is shown in closed or operative position.

Figure 3 is a transverse, longitudinal, sectional view taken along line 3–3 of Figure 2.

Figure 4 is a transverse, longitudinal, view partly in section as taken along line 4–4 of Figure 2.

In proceeding with this invention reference is had to the figures of the drawing wherein reference character 10 generally indicates the new and improved gage protector valve combined with a choke coil. A longitudinal body 11 having a cross member 12 in the form of a T integrally formed therewith is provided with a stepped bore 13 communicating with a transverse bore 14. An adjusting screw 15 is threadedly mounted in one end of stepped bore 13. A stem 16 is slidable mounted in stepped bore 13 with a spring 17 interposed between stem 16 and adjusting screw 15. A longitudinal passage 18 is provided in a portion of stepped bore 13. An abutment 20 is formed in stepped bore 13 as a stop limiting the movement of stem 16 while allowing an end of stem 16 to project into longitudinal passage 18. Stepped bore 13 beyond longitudinal passage 18 is of an enlarged diameter forming a chamber 21 having a wall 22 between longitudinal passage 18 and chamber 21. Threads 24 or any other type of fitting for uniting gage protector valve 10 with the line of a hydraulic system may be provided.

A washer 25 fabricated from rubber, neoprene, Teflon, Rulon or other oil impervious material is located in chamber 21 abutting wall 22. Washer 25 serves the function of a valve seat. A valve or reciprocating plug 27 is provided with a Shank having a collar 28 which slidesably engages longitudinal passage 18, on one end and a head 30, provided with a seating ring 31, on the other end. Seating ring 31 engages and disengages washer 25. Collar 28 is provided with a recess 29 which retains an O ring 39 engageable with longitudinal passage 18. Head 30 is provided with a serrated edge 22.

Transverse bore 14 has a disk 32 provided with a multiple number of ports 33 fixed in one end at the juncture of transverse bore 14 with stepped bore 13. A screen 34 is fixed to disk 32 in such a manner as to provide a shallow well 35 between the screen 34 and the disk 32. A bushing 36 is placed in transverse bore 14 with one end abutting disk 32. The other end of transverse bore 14 is provided with a threaded area 37 which is larger in diameter than the diameter of the bore 14 which retains bushing 36. A groove 38 is provided in the outer end of threaded area 37. A cap 40, T-shaped, is provided with a recess 42 which retains an O ring 41 engageable with groove 38. On one side of recess 42 threads are provided to engage threaded area 37. On the other side of recess 42 the cross arm 43 of the T abuts the end of cross member 12.

Axially cap 40 is provided with pipe threads 44 to which a hydraulic pressure gage may be secured. Below pipe threads 40 a well head 45 is provided. A choke coil 46 has one end fixed in cap 40 and in communication with well head 45. The other end of choke coil 46 is fixed in disk 32 and in communication with shallow well 35.

Choke coil 46 is located in cavity 47 formed by disk 32, the bottom of cap 40 and the inside walls of bushing 36.

In operation fluid under pressure will enter chamber 21 with the several parts of the mechanism shown in Figure 1. Adjusting screw 15 will have been set to tension spring 17 a predetermined amount, so that spring 17 through stem 16 acting on valve 27 will position head 30 and seating ring 31 away from valve seat 25. The fluid will flow through serrations 22 and the passageway in washer valve seat 25 into longitudinal passage 18. Neoprene O ring 9 will prevent passage of the fluid beyond collar 28. The threads of adjusting screw 15 are sufficiently loose to prevent air from being trapped in stepped bore 13.

The fluid will flow through screen 34 into shallow well 35 where it will divide into two directions. It will flow through ports 33 into cavity 47 where it will surround the convolutions of choke coil 46 and act as a cushioning medium in resisting flexing of the choke coils 46. O ring 41 will prevent fluid passing beyond recess 42. Fluid flowing through choke coil 46 from shallow well 35 will also pass into choke coil 46 from shallow well 35 and travel to well head 45 from whence it can proceed to a pressure gage mounted in threads 44.

Should surges or fluctuations of fluid be present in the fluid, choke coil 46 will dampen or remove the surge before it reaches well head 45 so that the surge will not be recorded on the gage. The surge or fluctuation in that event must not exceed the pressure setting of spring 17.

In the event a surge or the static pressure of the fluid exceeds the setting of spring 17, then valve 27 through the action of the fluid pressure on head 30 will oppose the
tension of the spring until seating ring 31 engages valve seat 23 thereby blocking passage of the fluid beyond chamber 21. The gage mounted in threads 44 cannot be damaged or driven beyond the limits of its reading as determined by the setting of spring 17. The gage will always record the uniform static pressure of the fluid below the predetermined pressure set up in spring 17 by adjusting screw 15.

Having shown and described a preferred embodiment of the present invention, by way of example, but realizing that structural changes could be made and other examples given without departing from either the spirit or scope of this invention,

What I claim is:

1. A gage protector valve comprising a body having a stepped bore and a transverse member having a bore communicating with the stepped bore, a reciprocating plug located in said stepped bore provided with a recess in one end and a seating ring and a serrated edge in the other end, said transverse bore being located between said recess and said seating ring, an O ring, said recess housing said O ring, said recess housing said O ring in fluid tight relationship with said stepped bore, a valve seat in said stepped bore, said seating ring in said reciprocating plug engaging and disengaging said valve seat, an adjusting screw rotatively engaging said stepped bore in air vent relationship, a spring located in said stepped bore between said adjusting screw and said reciprocating plug to urge said reciprocating plug and seating ring away from said valve seat, a disk provided with a port secured in said bore at the intersection of said bore and said stepped bore, a cap secured in said bore and axially provided with threads terminating in a well head, a cavity located between said disk and the base of said cap, a choke collar located in said cavity with one end of said collar fixed to communicate with said well head and the other end of said collar fixed to and extending through said disk whereby fluid under pressure from the hydraulic system enters said chamber and acting on the head of said reciprocating plug to act against the tension of said spring before bypassing said end to pass through said serratations and said valve seat to and through said choke collar to said well head and through said port to said cavity to surround said choke collar.

2. A gage protector valve comprising a body having a stepped bore and a transverse integral member having a bore communicating with the stepped bore, a longitudinal passage formed within said stepped bore and extending either side of the intersection of said bore, a valve seat fixed in said stepped bore, an adjusting screw located in one end of said stepped bore, a stop in said stepped bore, a screen fixed to the end of said disk and forming a shallow well between the screen and end of the disk, a bushing fixed in said bore between said disk and said cap to hold said disk in position in said bore, a cavity formed in said bushing between said disk and said cap, a choke collar located in said cavity with one end fixed in said disk to communicate with said shallow well and the other end fixed in said cap to communicate with said well head, a thread in one end of said stepped bore to be attached to the conduit of a hydraulic system, a chamber formed between said threads and said valve seat whereby fluid under pressure from the hydraulic system enters said chamber and acting on the head of said reciprocating plug bypasses the serratations to enter said longitudinal passage and pass through said screen to said choke collar and through said port to said cavity to surround said choke collar so that the fluid offers resistance to the flexing of said choke collar when the fluid pressure is below the resistance of said resilient member.

References Cited in the file of this patent

UNITED STATES PATENTS

1,143,639 Loomis ----------------- June 22, 1915
1,622,843 Price ----------------- Mar. 29, 1927
1,941,613 McDonell --------------- Jan. 2, 1934
2,353,191 Samarian ---------------- July 11, 1944
2,498,366 Greer ----------------- Feb. 21, 1950

FOREIGN PATENTS

601,752 Great Britain -------------- May 12, 1948