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LOCK AND COMPENSATOR FOR HYDRAULIC SYSTEMS

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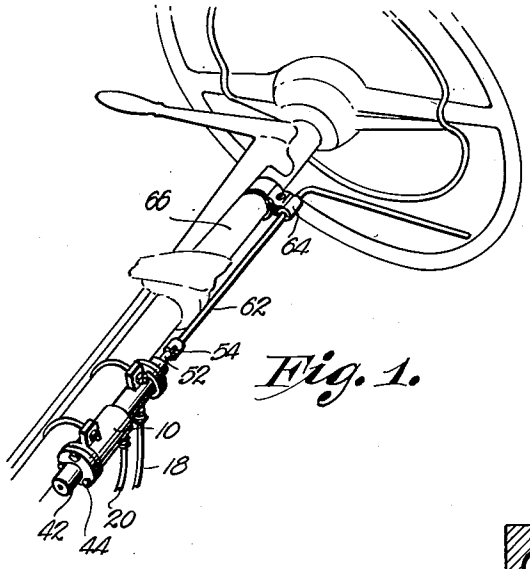


Fig. 1.

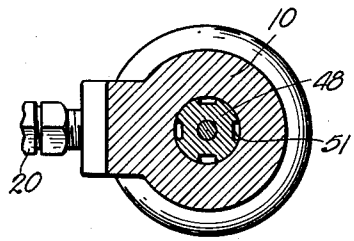


Fig. 3.

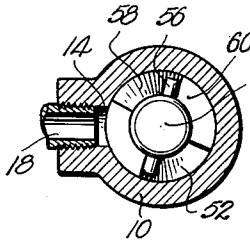


Fig. 4.

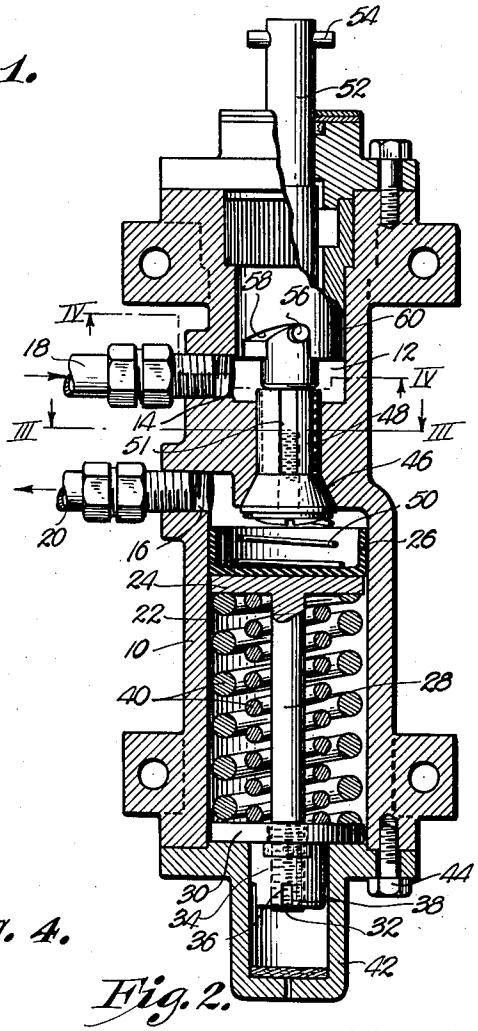


Fig. 2.

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LOCK AND COMPENSATOR FOR HYDRAULIC SYSTEMS

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1 Claim. (Cl. 137—69)

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This invention relates to hydraulic systems of the character wherein fluid is placed under pressure to actuate mechanism with which the system is associated and the primary object is the provision of means in the hydraulic system for automatically precluding the release of the force after being once applied and for maintaining a constant pressure of predetermined character in that part of the system where the fluid has been pressurized.

Another important object of this invention is to provide a lock and compensator for hydraulic systems which lock serves to selectively maintain fluid in a part of the system under a pressurized condition, the compensator being so positioned and disposed as to maintain the fluid in said part of the system under a constant pressure to insure against failure due to loss of pressure resulting from temperature changes, leakage or any other factor that might present itself.

Further aims of this invention are to provide an attachment or portion of an hydraulic system of the aforementioned type that is compact, relatively easy to introduce into operative position and constructed for ready application to such apparatus as automobile brakes; to provide a lock for such systems as hydraulic brakes that will maintain the fluid therein under pressure after the same has been pressurized by application of force to the brake mechanism; to provide a compensator for the loss of pressure in an hydraulic system; and to provide a unit wherein both the locking member and compensator are included therein.

Other aims of the invention will appear during the course of the following specification referring to the accompanying drawing, wherein:

Fig. 1 is a perspective view of a lock and compensator for hydraulic systems showing the same in use with an automobile braking system and mounted on the steering column of said automobile.

Fig. 2 is an enlarged longitudinal central sectional view through the lock and compensator.

Fig. 3 is a cross sectional view taken on line III—III of Fig. 2; and

Fig. 4 is a cross sectional view taken on the irregular line IV—IV of Fig. 2.

Locks for hydraulic systems are generally known and have heretofore been employed in automobile braking apparatus in a manner shown by my U. S. Letters Patent No. 2,285,781, issued June 9, 1942. Hydraulic locks that are manually operable to maintain fluid under pressure in a selected portion of the system are advantageous

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where a portion of fluid in the system is to be pressurized for a considerable period of time and such equipment is disclosed in my co-pending application for U. S. Letters Patent No. 624,859, filed October 26, 1945, of which this application is a continuation in part.

It has heretofore been discovered that when hydraulic locks of the character shown in my above identified U. S. Letters Patent or disclosed in my co-pending application are functioning and the fluid of the system loses its pressure, the work being performed is stopped with undesirable if not destructive results. Accordingly, therefore, locks for hydraulic systems such as automobile brakes must have some means of compensating for the loss in pressure due to temperature changes or leakage and, therefore, the unit about to be described serves an exceptionally useful purpose.

In the assembly shown in the attached drawing, the numeral 10 designates a body having a passage 12 through at least a portion thereof and with which intake port 14 and outlet port 16 communicate. A conventional tube 18 extends from a source of supply of fluid under pressure and since the master cylinder of an automobile braking system or the like is well known, the same has not been illustrated. It is from such equipment that the fluid is forced into passage 12 when the system is brought into use to perform work.

Another tube 20 communicates with outlet port 16 and leads to the said work such as the brakes of an automobile but these elements are likewise not illustrated because of the familiarity with such structure. The passage 12 of body 10 is enlarged into a cavity 22 wherein a plunger 24 is reciprocably mounted. Plunger 24 has a cup gasket 26 at the head thereof and the stem 28 of plunger 24 passes through a perforated follower disc 30 before its threaded end 32 engages nut 34. A cross pin 36 engages radial slots 38 of nut 34 to prevent maladjustment during the operation of the equipment. A resilient member in the form of a double spring 40 lies between the head of plunger 24 and follower 30, as clearly shown in Fig. 2.

The employment of a dual section spring 40 is for the purpose of presenting a sufficient amount of force to plunger 24 to perform the work through an adequately strong member without using an objectionably large amount of space.

Body 10 is provided with a cap 42 held in place by machine screws 44 and it is through the open end of body 10 normally covered by cap 42 that the plunger 24 and its associated parts are in-

troduced when the lock and compensator is assembled. A valve seat 46 formed on body 10 intermediate intake port 14 and outlet port 16 cooperates with valve member 48 enclosing the passage 12 at an appropriate time. Valve 48 is spring loaded through the medium of spring 50 normally urging valve 48 against seat 46. The cross sectional contour of valve 48 is as shown in Fig. 3. The longitudinal grooves 51 along the stem portion of valve 48 allow the passage of fluid therearound when the valve is open. Rod 52 having a cross pin 54 at the outer end thereof is provided with radially extending lugs 56 that ride over cam faces 58 respectively formed on members 60 housed within body 10 as illustrated in Fig. 2. Rod 52 is operably joined to the manually manipulable lever 62 journaled in a bracket 64 mounted upon steering post 66 when the lock and compensator is employed in connection with automobile brakes of the hydraulic type.

When operating lever 62 is manipulated, rod 52 travels longitudinally because of the contour of faces 58, and valve 48 is thereby held unseated to allow normal functioning of the system.

When the fluid in the system between outlet port 16, and the mechanism to which tube 20 is adjoined, is pressurized, such pressure may be maintained by closing valve 48. The closing is caused by the movement of rod 52 about its axis whereupon spring 50 will urge valve 48 against seat 46. In such condition (Fig. 2) the brakes of an automobile for example, will not be released until the operator moves lever 62 to unseat valve 48.

As set forth in the objects above, a change in temperature, accidental leakage or other factors that might reduce the pressure of the fluid in that portion of the system between outlet port 16 and the parts affected by the fluid pressure, would have a detrimental effect. As an example, the brakes of an automobile would be released even if the lock were functioning if the temperature change was such as to cause the pressure of the fluid to drop to a point where release could occur. To overcome this problem, the compensator in the form of plunger 24 and its related parts, is provided, and spring 40 will serve to maintain pressure after energy has been stored therein when the fluid was first pressurized. As an example, when brakes of an automobile are set, the brake pedal is manipulated to exert enough pressure upon plunger 24 to compress spring 40. This compression occurs at a pressure level substantially greater than that required to operate the brakes. When valve 48 is closed, the spring 40 will gradually compensate for any loss of pressure in the fluid remaining in that part of the system between valve 48 and the work. When brakes are set, therefore, the pedal should be depressed to a point

where spring 40 is positively compressed immediately prior to the closing of valve 48. If valve 48 is closed, the compensator plunger 24 may be depressed by exerting a pressure that will open valve 48 and force fluid past valve seat 46 and thence against plunger head 24 to depress spring 40. When such is done, valve 48 will be returned to its seat not only by spring 50 but by the pressure of the fluid within that part of passage 12 between valve seat 46 and outlet port 16.

The lock and compensator for hydraulic systems embodying my invention has been illustrated and described as being a portion of an automobile braking system but since the invention relates to assemblies capable of use with any hydraulic system where compensation for loss of pressure is desirable and where a "setting" of parts is needed, it is desired to be limited in its use only by the spirit of the invention and scope of the appended claim.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

A lock and compensator adapted for insertion within a hydraulic system and comprising a body having a passage therethrough for the fluid of the system; a valve seat formed in the body within said passage; a valve having an elongated stem reciprocable on its longitudinal axis for movement to and from a position with the valve engaging said seat and thereby closing the passage; a spring in the body having one end thereof bearing against the valve and disposed to yieldably hold the valve biased toward said closed position; grooves formed in said stem for passage of fluid when the valve is open; a plunger reciprocably mounted in the body for movement toward and away from the valve; a pair of relatively telescoped springs coiled about the plunger for yieldably holding the same biased toward the valve; a fluid retaining, cap-like gasket between the plunger and the valve, said first mentioned spring having its opposite end bearing against the gasket; and means carried by the body and engageable with said stem for moving the valve to an open position away from said seat against the action of all of said springs.

AUDIE ROSS PATRICK.

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