

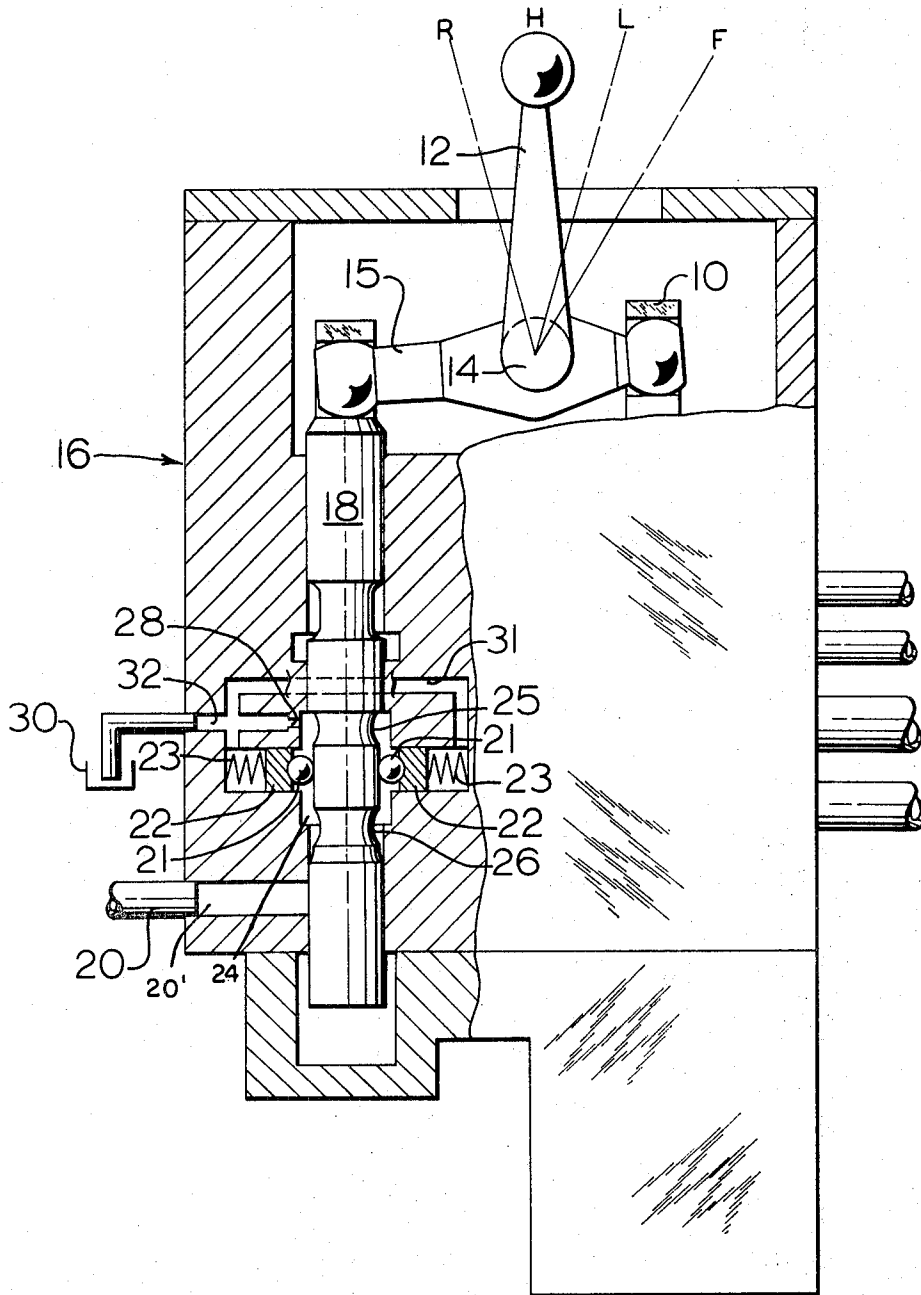
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DETENT FOR VALVES WITH AUTOMATIC RELEASE MEANS

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DETENT FOR VALVES WITH AUTOMATIC RELEASE MEANS

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3 Claims

ABSTRACT OF THE DISCLOSURE

A mechanism for use on or with a valve which includes detent means for holding the valve in a certain operative position and fluid pressure actuated means to release the valve in response to the positioning of a part that is controlled by the valve.

An example of one use for which the present invention is adapted is present in our assignee's U.S. patent to Erickson, No. 3,289,546, in which is described a bucket-type loader with lift arms actuated by a hydraulic jack. When the bucket is to be raised from a loading position to a carrying position, the valve which directs fluid to the bucket is opened. A latch or detent mechanism holds the valve open until the bucket attains the proper height and relative motion of the parts triggers detent release mechanism. This permits the valve to close and the bucket remains in its raised position until subsequent manual manipulation of the valve.

It is an object of the present invention to provide detent mechanism capable of use either with a valve or as a part of the spool mechanism of a spool-type valve and which acts positively by the application of fluid pressure directly to elements of the detent. Further and more specific objects and advantages of the invention and the manner in which it is carried into practice are made apparent in the following specification wherein reference is made to the accompanying drawing.

In the drawing:

The detent mechanism is shown as included in the housing with a spool valve which might be used, as in the example given above, in association with the bucket lift arm mechanism of a loader. The housing is in section to expose the detent mechanism, but the valve is not disclosed herein as it does not form a part of the invention and its specific construction may be varied considerably.

An extension of the spool of the valve to be controlled, which in the present instance is a pilot valve for directing pilot fluid to an operating valve which controls the operation of a jack associated with the lift arm, is shown at 10. The spool is controlled by a lever 12 pivotally supported at 14. The valve is adjustable through the broken line positions indicated as R, H, L and F, representing raise, hold, lower and float. When the spool of the pilot valve is adjusted to these positions, a detent assembly generally indicated at 16 is also adjusted as by an arm 15 of the lever 12. The detent mechanism includes a spool 18 adjustable in a suitable bore to which fluid, utilized as a signal pressure means, is introduced through a conduit 20. Adjacent the bore in which spool 18 is reciprocally mounted are two or more detent assemblies, each having a ball 21, a plunger 22, a suitable cylindrical bore, and a spring 23, urging the plunger inwardly and urging the ball into contact with the spool 18.

When the pilot valve is adjusted from the hold position shown toward the raise position, the spool 18 moves downwardly until the balls 21 are urged into a detent groove 25. A second detent groove is shown at 26 and will receive the detent balls when the lever is moved to the float

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position, although it is not necessary to have an automatic detent release in this position. In both the hold and lower positions, detents are not necessary and the balls will remain on the land disposed between the grooves 25 and 26.

When the pilot valve is adjusted to the raise position and the detent spool moves downwardly, it will be held in its lowermost position by the action of the detent balls 21 in the groove 25. This downward movement also communicates pressure from line 20 and a passage 20' into the detent chamber 24 through the reduced diameter of the spool formed by the detent grooves 25 and 26 and the area between them. Pressure for line 20, which is a signal pressure, can be derived from any suitable source, and in some cases is taken from a pressurized part of the system, as in the Erickson patent referred to above, wherein the pressure is taken directly from the lift jack. In any event, fluid is admitted to line 20 and passage 20' which forms a continuation thereof by a suitable mechanism not herein disclosed, which mechanism is actuated when the lift arm attains its desired carry position. Consequently, the pressure bears directly against the pistons 22 in the detent mechanisms, temporarily overcoming the force of springs 23 and permitting the spool 18 to move upwardly to the hold position in which it is shown. It will be understood that the pilot valve 10 has a spool with centering springs of conventional type which always tend to urge it to the hold position, and these springs also afford the force necessary to raise the spool 18. The pressure in the detent chamber is maintained temporarily in order to permit movement of the spool to its hold position and then is relieved through a restricted orifice 28 by means of which it is vented to a tank or reservoir 30. The spring chambers in the detent cylinders are also vented to atmospheric pressure by passages shown at 31 and 32.

While the detent mechanism of the present invention is illustrated as having a spool separate from the spool of the valve, the same system can be employed by simply making the spool of any conventional spool valve longer and combining with it the other elements of the system as herein shown. It is, however, an advantage in some cases to use a separate spool in the interest of saving space where a long pilot spool is impractical.

The foregoing description, which is directed to the use of the detent mechanism in conjunction with the lift arm of a bucket loader, is not intended to be limiting in any way, but only as typical of many different applications. In fact, most any hydraulic jack or lineal actuator can readily be controlled to stop in any desirable position by the detent mechanism of the present invention, used either as a separate mechanism or in conjunction with the spool of an ordinary spool valve.

What is claimed is:

1. Detent and release means for holding a valve in an open position against a normal closing force comprising a spool with a detent groove, a detent assembly including a cylinder and piston, resilient means urging the piston toward the spool, a detent part supported by the piston to enter the groove, a housing embracing the spool and having a chamber communicating with a surface of the piston adjacent the spool, means to introduce fluid under pressure to said chamber to cause retraction of the piston to permit the valve to close, and a restricted orifice venting the chamber to atmosphere so that the pressure which causes retraction is momentary.

2. Detent and release means for holding a valve in an open position against a normal closing force comprising a spool with a detent groove, a detent assembly including a cylinder and piston, resilient means urging the piston toward the spool, a detent part supported by the piston to enter the groove, a housing embracing the spool and

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having a chamber communicating with a surface of the piston adjacent the spool, and means to introduce fluid under pressure to said chamber to cause retraction of the piston to permit the valve to close, said means including a passage and means for opening the passage to the chamber when the detent is engaged and closing the passage from the chamber when the detent is released. 5

3. The detent and release means of claim 2 wherein the passage is in communication with the spool and the means for opening and closing the passage with respect to the chamber is a portion of the spool having a relatively reduced diameter, said spool portion entering into 10

communication with both the passage and the chamber when the detent is engaged.

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