

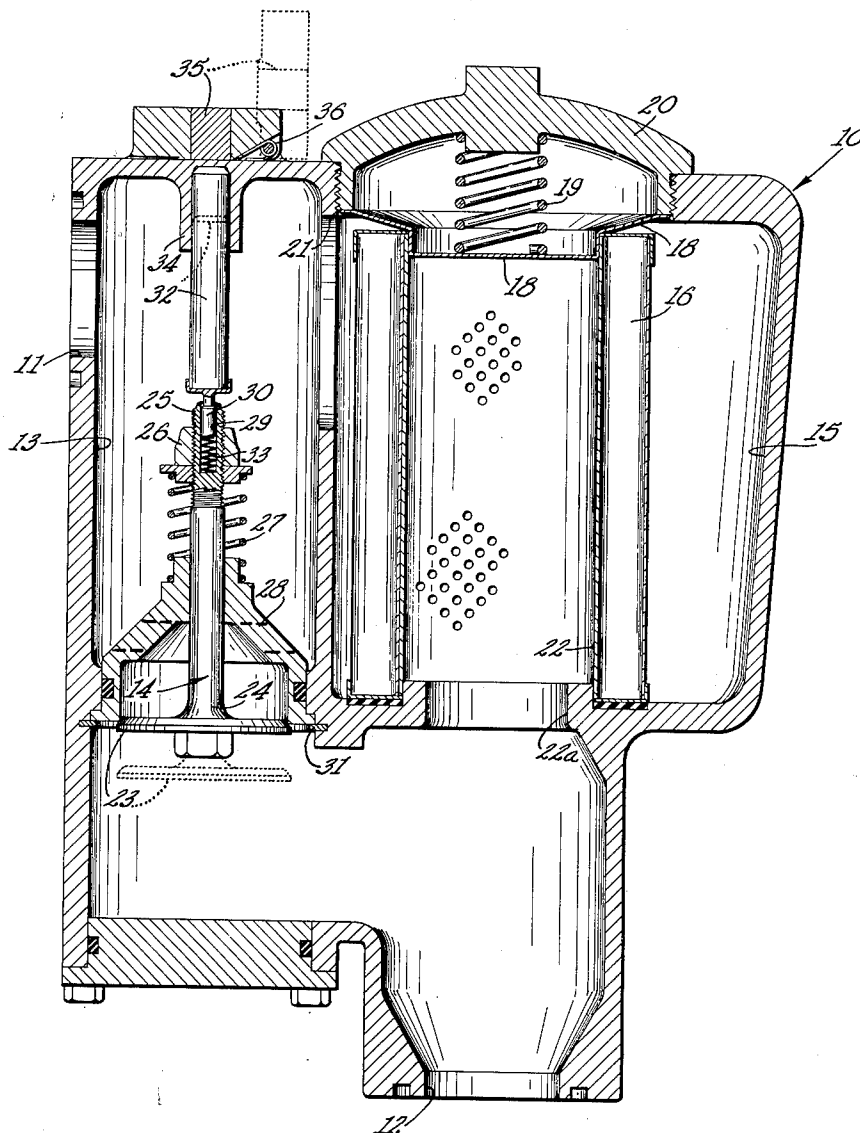
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FILTER SIGNAL DEVICE

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FILTER SIGNAL DEVICE

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The present invention relates to a signal device for indicating when a filter element becomes clogged and more particularly to a magnetic type signal device.

An object of the present invention is to provide a filter having a signal means operatively connected thereto to enable one to know when the filter must be cleaned or replaced to maintain an efficient degree of filtration and avoid mechanical failure of the mechanism which the fluid being filtered serves.

Another object of the present invention is to provide a signal means for detecting when the filter becomes clogged which signal actuator means is disposed entirely inside the filter housing so that it is not affected by any variance in atmospheric or external pressures.

Another object of the present invention is to provide a magnetic signal means for indicating the need for servicing the filter provided with self-adjusting means so that opposite ends of the by-pass signal device seat against their respective seats to prevent any leakage of fluid through the by-pass valve and to prevent a false signal that the filter needs changing caused by improper seating of the device.

Various other advantages of the invention will be apparent from the following description when considered in connection with the accompanying drawing forming a part thereof and illustrating the invention in an elevational sectional view.

Referring to the drawing the reference numeral 10 designates a filter housing or casing provided with an inlet 11 and a discharge opening 12 therein for flowing liquid to be filtered therethrough. A by-pass chamber 13 is provided in the housing adjacent inlet 11 having a by-pass valve 14 therein. A filter chamber 15 is provided in the housing adjacent chamber 13 and has disposed therein an annular resin impregnated pleated paper filter element 16. The bottom edge of the filter 16 is supported against the inner surface of chamber 15 while the upper end of the filter is sealed by member 18 which extends into the center tube of the filter and is held seated thereagainst by a compression spring 19 mounted on the detachable filter cover 20. Liquid flowing through inlet 11 passes into the filter chamber through inlet opening 21 between the chambers and is discharged from the filter through center tube 22 and chamber outlet 22a.

By-pass valve 14 comprises a valve disc 23 mounted on a valve stem 24 having an externally threaded upper end 25 on which is disposed an adjustable nut or member 26. A compression spring 27 mounted on the valve stem has its lower end in contact with the valve assembly or spider 28 and the upper end bearing against nut 26. Spider 28 is rigidly secured in chamber 13 by a shoulder thereon and snap ring 31 adapted to fit in a circumferential recess in the chamber wall. Valve disc 23 is maintained seated during normal operation of the filter against a complementary mating surface of spider assembly 28 by compression spring 27.

The end of valve stem 24 adjacent the threaded portion is provided with a recess or bore 29 therein into which extends a slidable self-adjusting rod 30 that is prevented from coming out of the recess by the rolled over upper edge of the stem. The upper end of rod 30 is fixedly connected to the lower end of a magnetized actuator rod 32. A compression spring 33 in the bore 29 normally maintains or holds magnetized rod 32 in its

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uppermost position therein. The upper end of the rod 32 extends into a sleeve 34 depending from the upper surface of by-pass chamber 13 in alignment with the rod. The tip of magnetized rod 32 normally seats against the upper end of this sleeve 34 when valve disc 23 is in a seated position bearing against the inner surface of the valve assembly 28. The provision of the self-adjusting rod 30 and compression spring 33 in bore 29 compensates for any play or variance in the filter assembly parts between the seating of magnetized rod 32, and the seating of valve disc 23, so that rod 32 will seat in sleeve 34 to provide a magnetic force for holding the ferrous snap signal device 35 in its non-signalling position at the same time that valve disc 23 seats against the valve assembly 28. When the magnet force is removed from the vicinity of device 35, i.e. when rod 32 becomes unseated from sleeve 34, the force of snap spring 36 throws the signal device into its signalling position, as indicated by dotted lines in the figure.

Liquid passed through the filter housing enters inlet 11 passing through by-pass chamber 13 and around the outside of filter 16 flowing therethrough in an outside in direction. Thereafter, the cleaned liquid is discharged from the center tube of the filter and is discharged through opening 12. During this operation by-pass valve 14 is in its seated position so as to prevent any liquid from by-passing filter element 16. The provision of the compression spring 33 and the rod 30 within the bore of valve stem 24 provides a continuous force urging the signal or indicator actuator rod 32 to seat against the inner upper surface of internal sleeve 34 at this time so that the magnetic force therein holds snap signal device 35 in a non-signalling position. Thus, snap signal device 35 will never give any false signal because of rod 32 not being seated to provide a magnetic holding force caused by machine tolerances, variances, or wear of the parts, but will respond only to an actual differential pressure across the filter element caused by contaminants clogging the filter element.

When filter element 16 becomes sufficiently clogged so as to exceed a predetermined pressure differential thereacross, the build up of excessive pressure on the upstream side of the filter element in by-pass chamber 13 will cause the valve disc 23 to move downwardly to its open position as shown in dotted lines in the figure, thereby moving rod 32 downwardly therewith as indicated in dotted lines, and removes the magnetic force holding snap signal device 35 in a horizontal non-signalling position. Thus, device 35 snaps up as shown in dotted lines into its signal position, indicating that the filter element needs servicing. After the filter element is cleaned or replaced the by-pass valve returns to its seated position and snap signal 35 is pushed downwardly by hand to its non-signal position where it is held by magnetized rod 32.

Inasmuch as various changes may be made in the form, location and relative arrangement of the several parts without departing from the essential characteristics of the invention, it will be understood that the invention is not to be limited except by the scope of the appended claims.

What is claimed is:

1. An indicator for use with a valve comprising a stem adapted to seat and unseat a valve, biasing means acting on said stem adapted to keep the valve seated when a differential pressure across it is below a predetermined pressure, a magnetized actuator rod operatively connected to said stem for movement thereby, a signal device, one end of said rod being disposed in a seated position adjacent the signal device to hold it in a non-signal position when the stem maintains the valve seated, means for moving the signal device to a signal position when the stem unseats the valve, said stem having a bore therein, a slidable rod

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in said bore fixed to the actuator rod, and means for urging the actuator rod and stem extended to their maximum length so that said actuator rod seats when said stem seats the valve.

2. The indicator of claim 1 wherein means operatively connect said actuator rod and stem to each other for movement in the same direction.

3. An indicator for use with a valve comprising a casing, a signal device disposed on the outside of said casing, a stem on the inside of said casing adapted to seat and unseat a valve, biasing means acting on said stem adapted to keep the valve seated when a differential pressure across it is below a predetermined pressure, a magnetized actuator rod operatively connected to said stem for movement thereby, one end of said rod being disposed in a seated position adjacent the signal device to hold it in a non-signal position when the stem maintains the valve seated, means for moving the signal device to a signal position when the stem unseats the valve, said stem having a bore therein, a slidable rod in said bore fixed to the actuator rod, and means for urging the actuator rod and stem extended to their maximum length so said actuator rod seats when said stem seats the valve.

4. The indicator of claim 3 wherein means connect said actuator rod and stem to each other for movement in the same direction.

5. The indicator of claim 3 wherein sleeve means are provided in said casing and said actuator rod extends therein.

6. An indicator for use with a valve comprising a stem adapted to seat and unseat a valve, biasing means acting on said stem adapted to keep the valve seated when a differential pressure across it is below a predetermined

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pressure, a magnetized actuator rod including means movably fixing the rod to said stem for movement therewith in the same direction, one end of said rod being disposed in a seated position adjacent the signal device to hold it in a non-signal position when the stem maintains the valve seated, means for moving the signal device to a signal position when the stem unseats the valve, and adjusting means for maintaining the magnetized actuator rod and stem extended to its maximum length whereby said rod seats when said stem seats the valve.

7. An indicator for use with a valve comprising a casing, a signal device disposed on the outside of said casing, a stem on the inside of said casing adapted to seat and unseat a valve, biasing means acting on said stem adapted to keep the valve seated when a differential pressure across it is below a predetermined value, a magnetized actuator rod including means movably fixing the rod to said stem for movement in the same direction therewith, one end of said rod being disposed in a seated position adjacent the signal device to hold it in a non-signal position when the stem maintains the valve seated, means for moving the signal device to a signal position when the stem unseats the valve, and self-adjusting means for maintaining said rod and stem extended to their maximum length so said rod seats when said stem seats the valve.

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