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FILTER ACTUATING MECHANISM

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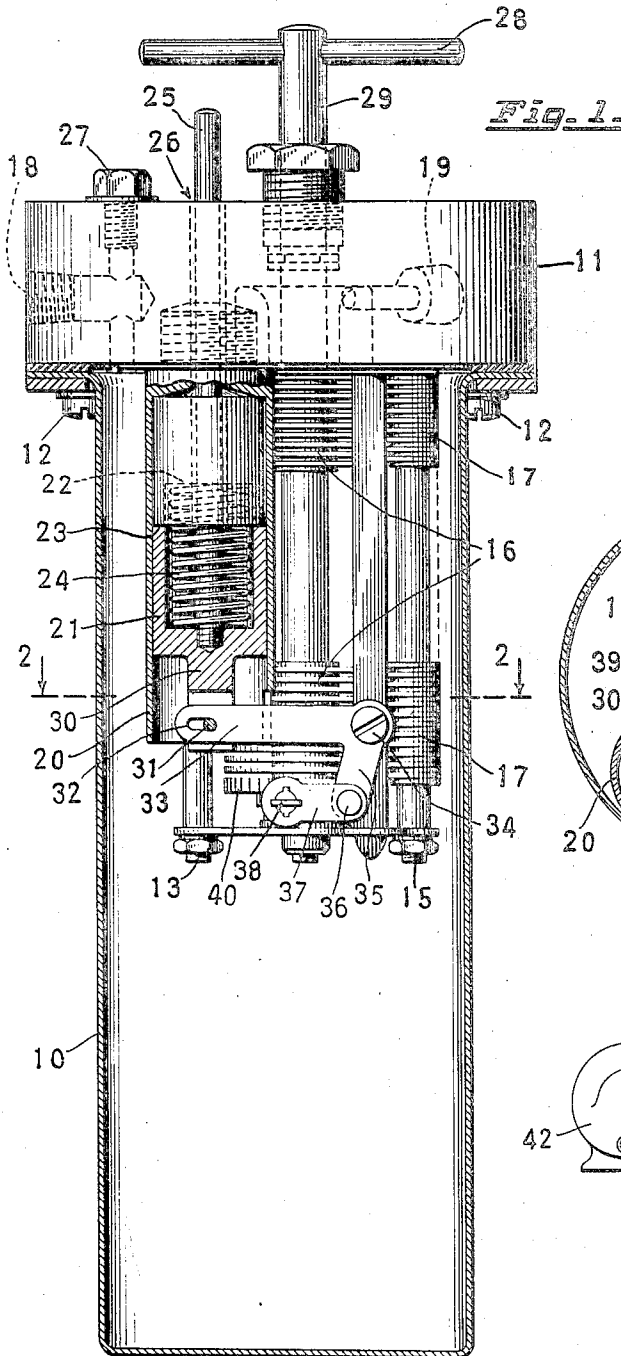


Fig. 1.

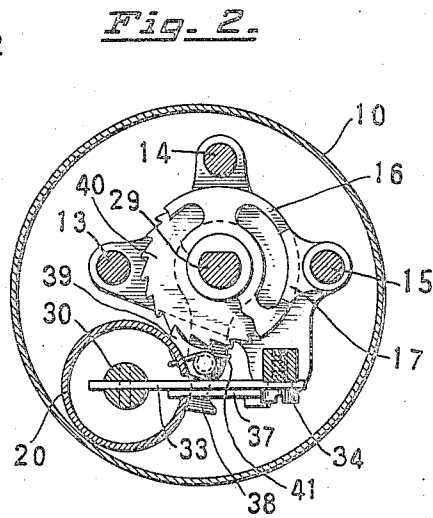


Fig. 2.

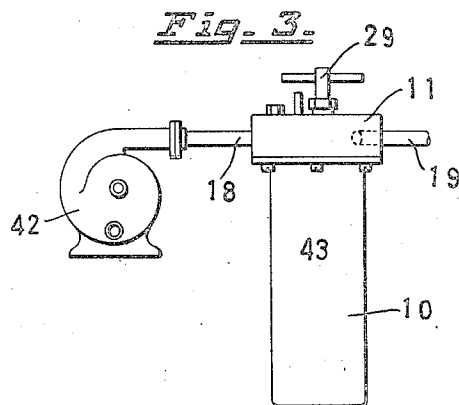


Fig. 3.

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FILTER-ACTUATING MECHANISM

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This invention relates to filters and especially to those of the type having spaced filter plates with cleaner plates adapted to be movable relative to the filter plates to clean the filter, and has for an object to automatically clean such a filter in response to pressure changes in the fluid passing through the filter.

Referring to the drawings, Fig. 1 is an elevation partly in section of one embodiment of this invention.

Fig. 2 is a section of the line 2—2 of Fig. 1 showing a view of the pawl and ratchet mechanism.

Fig. 3 is a diagrammatic illustration of an oil pump with the filter mechanism of this invention for use on an automobile.

This invention is an improvement on my prior Patent 1,657,346 of January 24, 1928, for filter for fluids.

According to this invention an automatic mechanism is provided to clean the filter so as to minimize the danger of clogging in event the operator should forget to move the cleaner with respect to the filter. Specifically this automatic mechanism is made responsive to pressure changes in the fluid supplied to the filter.

For example, on an automobile when this invention is used with a filter for lubricating oil the pressure changes due to speed changes or stopping and starting of the engine are effective in producing relative movement between the cleaner and filter.

In Fig. 1 is shown a removable closed casing 10 attached to the head 11 by screws 12. The head 11 is preferably a casting, although it may be formed in other ways. Depending from the head are the supporting posts 13, 14 and 15 to which are attached the series of closely spaced filter plates 16. The cleaning member 17 comprises stationary spaced plates constructed to fit between the filter plates for cleaning the same. The head 11 is provided with a supply port 18 through which fluid is fed to the outside of the filter plates and after passing between the plates passes through an inner passage within the plates, thence upwardly and through the outlet port 19.

Within the casing 10 is mounted a station-

ary cylinder 20 provided with a piston 21. The upward travel of the piston is limited by the stationary abutment 23 to prevent excess pressure compressing the spring 24 an undesirable amount. This spring 24 is mounted between the piston 21 and a stationary abutment 22. A rod 25 may be secured to the piston and extend out through the head in order to indicate motion of the piston. As illustrated, a clearance space 26 is provided around the rod 25 so that the upper side of the piston is subject to air pressure. In order to vent the casing 10 when desired the bolt 27 is removed. The filter plates 16 are mounted on the shaft 29 which projects through the head and is provided on its upper end with a handle to permit manual rotation of the filter plates for cleaning, independent of the automatic mechanism.

The piston 21 is provided with a projection 30 having thereon a pin 31 engaging the slot 32 in the arm 33 of the bell crank lever, which is pivoted at 34, as illustrated. The other arm 35 of the bell crank lever extends down and is pivotally secured at 36 to the link 37. This link 37 engages an arm 38 which is freely rotatable on the shaft 29 and carries a pawl 39 for engagement with the ratchet 40 which is keyed or otherwise secured to the shaft 29. A spring 41 maintains the pawl in engagement with the ratchet teeth.

From the foregoing it will be seen that an increase in pressure on the filter raises the piston and compresses the spring and at the same time transmits the motion through the bell crank lever to the pawl which turns the shaft 29 through the space of one tooth. With the twenty-four teeth illustrated the filter plates are thus rotated 15 degrees. On reduction in pressure the spring 24 moves the piston downwardly and retracts the pawl so that it is again in position for moving the filter plates on increase in pressure. The rotation of the filter plates with respect to the cleaner plates involves substantial friction so that the spring 24 will need to be so proportioned in the embodiment as to enable pressure of between fifteen to twenty pounds on the piston to turn the filter plates and permit the piston to be moved downwardly on

reduction in pressure of about ten pounds, that is, when the pressure drops to five pounds. While the pressure rotates the filter plates in the embodiment illustrated it will nevertheless be understood that the spring may be arranged to accomplish the same purpose and the pressure increase effect the return of the pawl. To clean the casing of impurities which collect in the bottom it is readily removable by means of the screws 12.

In Fig. 3 is illustrated an ordinary pump 42 such as is used for a lubricating oil in an automobile and the filter and automatic mechanism is illustrated at 43. The filter is preferably located on the outlet side of the pump between the pump and the bearings, piston rings, and other mechanism supplied with oil, although the filter may be located in any portion of the oil circuit. While the top side of the piston in Fig. 1 as shown, is being exposed to pressure of the outside air, it will be understood that if desired this side of the piston may be in contact with the filter fluid at lower pressure as for example, on the low pressure side of the pump. While the preferred use of the filter and automatic cleaning mechanism is for liquids, it will be seen that the invention is also applicable with gases and in both cases cleaning of the filter is responsive to pressure changes in the fluid supplied to the filter. The handle 28 enables the filter to be cleaned independently of the automatic mechanism and in event that some unforeseen accident should impair operation of the automatic means.

While Fig. 3 shows the filter and automatic mechanism located close to the oil pump of course such need not be always the case, but the filter and actuating mechanism can be located wherever there is convenient room, preferably under the head of the motor car. While the filter plates are shown in Fig. 1 in two groups it will be understood that the space between these groups also contains filter plates as indicated by the dotted line.

I claim—

1. The combination with a pump, of a circuit through which fluid travels under the influence of said pump, a filter in said circuit, cleaning means for the filter, mechanism for producing relative movement between the cleaning means and filter, and spring means for moving said mechanism on reduction in pressure in said circuit without relative movement between said cleaning means and filter.

2. The combination with a filter comprising spaced plates, of a shaft on which said plates are mounted for rotation, spaced cleaning members for insertion between the filter plates means for turning said plates in response to pressure changes on the filter, a head and a casing enclosing said filter turning means and cleaning members, a handle pro-

jecting from said head for manual rotation of the filter plates, and means for detachably securing said casing to said head.

3. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, of means for automatically moving one of said members with respect to the other member in response to changes in pressure on the filter member to clean the same, a head supporting the aforesaid parts and a casing detachably secured to said head and enclosing all of the other parts but removable independently thereof.

4. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, of means for automatically moving one of said members with respect to the other member in response to changes in pressure on the filter member to clean the same, said means including a spring actuated piston and mechanism for changing the reciprocating piston motion into rotative motion of the member moved thereby, a head supporting the aforesaid parts and a casing detachably secured to said head and enclosing all of the other parts but removable independently thereof.

5. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, of pressure responsive means for rotating one of said members to clean the spaces between the filter plates, a head supporting the aforesaid parts and a casing detachably secured to said head and enclosing all of the other parts but removable independently thereof.

6. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, of means for automatically moving one of said members with respect to the other member in response to changes in pressure on the filter member to clean the same, said means including a spring actuated piston and mechanism for changing the reciprocating piston motion into rotative motion of the member moved thereby, said mechanism including a pawl and ratchet, a head supporting the aforesaid parts and a casing detachably secured to said head and enclosing all of the other parts but removable independently thereof.

7. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, a head supporting said filter member, of means for automatically moving one of said members with respect to the other member in response to changes in pressure on the filter member to clean the same, said automatic means including a pressure actuated member having a movement of translation independently of the filter member, means for actuating said pressure member in the opposite direction on reduction in pressure on said member, mechanism for changing the motion of said pressure mem-

ber into rotative motion of the member moved thereby and a casing detachably secured to the head and enclosing all of the other parts.

8. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, of means for automatically moving one of said members with respect to the other member in response to changes in pressure on the filter member to clean the same, said actuating means having a movement of translation and being responsive solely to a selective pressure, spring means for actuating said pressure member in the opposite direction on reduction in pressure on said member, and a mechanism for changing the translational motion of said pressure member into rotative motion of substantially less than one revolution of the member moved thereby with each movement of said pressure member.

9. A filter comprising a head having inlet and outlet passages, filtering means supported by said head, cleaning means coacting therewith, one of said means being rotatable, a cylinder and a liquid-pressure-actuated plunger in the cylinder supported by said head, a spring for moving said plunger in opposition to the liquid pressure, ratchet means of connection between said plunger and the rotatable means and a casing detachably secured to said head and enclosing all the other parts.

10. A filter comprising a supporting head having inlet and outlet passages, a series of spaced perforated strainer plates rotatably supported by said head, the perforations communicating with the outlet passage, cleaning members extending between the plates, a casing detachably carried by said head and providing a chamber surrounding the plates and cleaning members, said chamber communicating with said inlet passage and fluid pressure actuated means within the casing for rotating said plates.

11. The combination with a filter member comprising a series of spaced filter plates and a cleaning member, of means for automatically moving one of said members with respect to the other member in response to changes in pressure on the filter member to clean the same, a single casing enclosing all of said members and automatic means, and means projecting from said casing to indicate motion of said automatic means.

12. The combination with a pump, of a circuit through which fluid is pumped, a filter connected in said circuit, cleaning means for the filter, and mechanism for producing relative step by step movement between said cleaning means and filter in response to a given pressure change in said circuit in only one direction and not both increase and decrease of pressure.

13. The combination with a source of fluid pressure, of a circuit through which fluid

passes from said source of pressure, a filtering means in said circuit and provided with a plurality of filtering passages, cleaning means having parts projecting within said passages, mechanism responsive to fluid pressure for producing relative movement between the walls of said passages of said filtering means and the cleaning means, and a casing enclosing said filtering means and said mechanism and adapted to retain impurities removed from the filter, at least a portion of the casing being removable to permit withdrawal of impurities from the casing, the filtering means being operable for filtering independently of the motion of the mechanism for producing relative movement.

14. A filter comprising an enclosing receptacle consisting of a head member and a casing member, said enclosing receptacle having inlet and outlet passages, means for detachably securing the casing member to the head member, a set of filtering plates having passages between them, a set of cleaning plates coacting with the walls of the passages between the filtering plates, one of said sets of plates being rotatable with respect to the other set of plates, a cylinder and a fluid pressure actuated plunger operable in the cylinder and supported within said enclosing receptacle, a spring for moving said plunger in opposition to fluid pressure, and ratchet means connecting said plunger with said movable set of plates, said filtering plates being adapted for filtering action independently of the movement of said plunger.

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