Feb. 23, 1937. F. A. HOWARD 2,071,529

FILTER FOR LUBRICATING OIL

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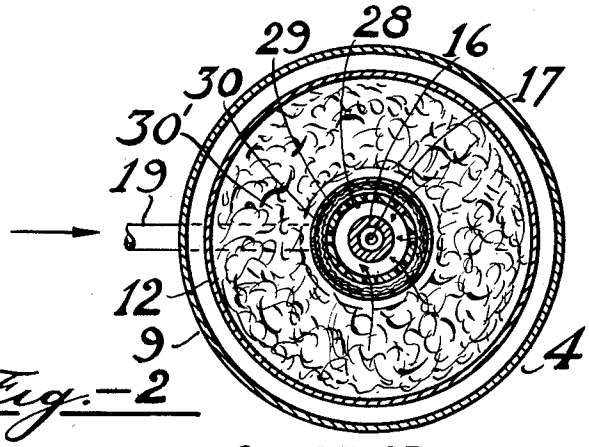


Fig.—2

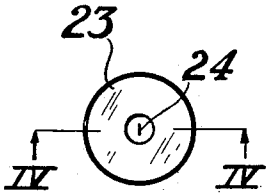


Fig.—3

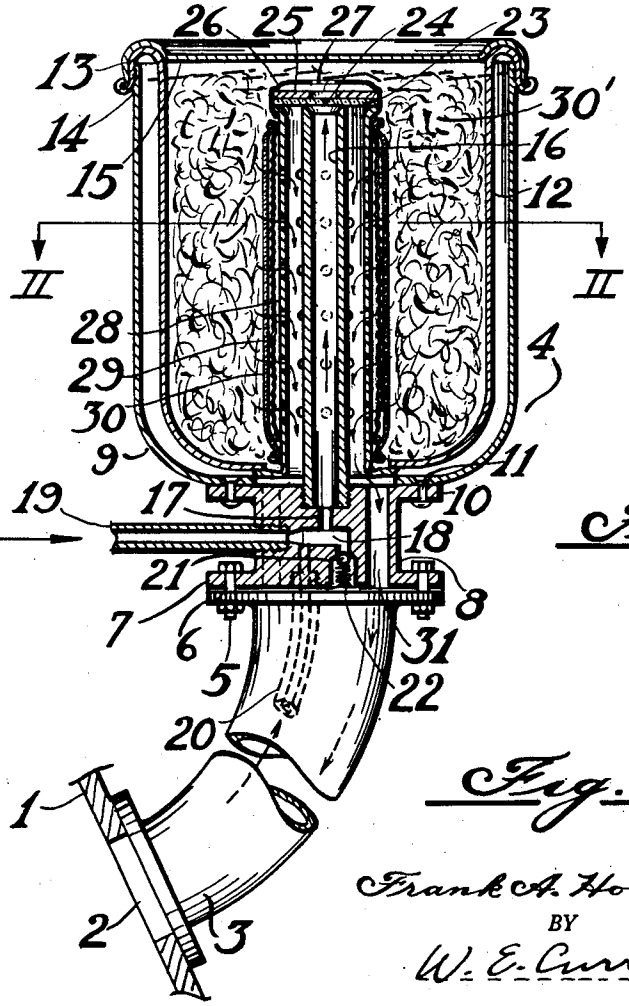


Fig.—1



Fig.—4

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FILTER FOR LUBRICATING OIL

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Application March 8, 1932, Serial No. 597,591

7 Claims. (Cl. 210—132)

This invention relates to improvements in filters of the depth type in which fibrous or filamentous materials are used to purify oils. The preferred use of the device is in the purification of lubricating oils circulating in internal combustion engines and the like, but the invention is not limited to this use.

The principal object of the invention is to provide an efficient, conveniently located filter which can be readily replaced, or with somewhat less convenience, refilled when its purifying action decreases objectionably. In the accomplishment of this object and others that will be apparent as the description proceeds, a filter element is secured to the filling opening of the crank case of the engine. A part of the circulating oil is sent through a mass of interlaced filaments or fibers in the filter and back to the crank case.

Reference is to be made to the accompanying drawing in which:

Fig. 1 is a vertical sectional view through a preferred form of the device;

Fig. 2 is a transverse section on line II—II of Fig. 1.

Fig. 3 is a plan view of a flow controlling member; and

Fig. 4 is a transverse section on line IV—IV of Fig. 3.

In the drawing reference numeral 1 indicates a portion of the wall of an internal combustion engine crank case, and 2 designates an opening therein. A filler pipe 3 leads from the opening 2 and is adapted to receive the oil filled into the crank case.

On the upper end of pipe 3 a filtering element designated generally 4 is secured by means of bolts 5 passing through the matched flanges 6 and 7 located respectively on the upper end of pipe 3 and the bottom of a filter support 8. The filter support carries a funnel-shaped member or shell 9 forming the usual funnel for the upper end of the filler pipe 3. This is secured to a flange 10 on the upper part of the filter support by means of rivets 11, or other suitable fastening means.

Within the funnel-shaped member is mounted a filter cartridge. This comprises a cup-shaped container 12, the upper end of which is rolled outwardly at 13 and is provided with screw threads 14, which engage the threads on the upper margin of the funnel-shaped member 9. A cap 15 is crimped beneath the up-turned lower edge of the screw threaded part 13.

Within the filter cartridge is a central vertical tube 16, screw threaded into the upper part of the filter support 8. Tube 16 communicates at its lower end with a passageway 17 which in turn leads into a passageway 18. Into this latter a portion of the oil circulating in the crank case is diverted by means of a pipe 19, or if preferred through a pipe 20. Pipe 19 is on the outside of the crank case as illustrated, while pipe 20 extends through the filling pipe 3.

As a safety provision a spring-pressed ball valve 21 is mounted in a chamber 22 communicating with passageway 18. In the event that excess pressure develops in the filter this ball valve will open and permit the by-passing oil to return to the crank case through pipe 3.

Tube 16 is obstructed at its upper end by a control device 23 which may be a mechanical valve but is preferably a simple disc of rubber having a central opening 24. A washer 25 overlies the disc 23 and these two members are held in place by a cap 26 which may be any of the usual types of closure having a central perforation 27.

Concentrically mounted with respect to the tube 8 is a perforated tube 28, and surrounding this are a fine wire screen 29 and a wrapping of canton flannel or similar fabric 30. It is preferred to have this combination of means, but in some circumstances a single mesh device of suitable fineness would be adequate. Surrounding the outer wrapping 30 and substantially filling the cup 12 is a mass of fibrous or filamentous material 30'. This may advantageously be a stable oil suspension of comminuted slag wool of the kind described in the patent application filed by Maverick and Metheson, Serial No. 598,092 of Mar. 10, 1932, which has issued as United States Patent No. 1,914,199, dated June 20, 1933. However, other suitable fibrous materials may be used such as wool, asbestos or the like. The function of the fibrous material is to form a filter bed which becomes impregnated with the impurities of the oil. A duct 31 leads from the open bottom of the funnel-shaped member 9 to the pipe 3. The disc of rubber, the washer 25 and the cap 26 together constitute a closure for the end of the cylindrical member 28 spaced from the base or filter support 8. This closure bears against the inlet tube 16.

The operation of this device is as follows: A part of the circulating oil is diverted in known manner through lines 19 or 20 and passes thence through passageways 18 and 17, tube 16, opening 24 in disc 23 and the openings in the washer 25

and cap 26 to the cup 12. Thence the oil passes through the fibrous material, the outer wrapping of cloth 30, the wire screen 29 and the perforations in the tube 28 to the duct 31, and thence back to the crank case through filler pipe 3.

It will be understood that the pressure on the oil is sufficient to permit the escape of oil through opening 24. Because of the normal state of compression of the upper surface of the disc 23, due to its curvature as shown in Fig. 4 the fibers cannot pass back through this opening into the tube 16.

The filtering element 4 is located as described on the filler pipe of the crank case. It is therefore necessarily removed and inspected whenever fresh oil is supplied to the crank case. This is done merely by unscrewing the cup 12, whereupon the entire filter member can be lifted out of the funnel 9, leaving the tube 16 however in place. It is preferred to make the central assembly of the filter unitary with the cup 12, securing the parts together as indicated by flanging the lower end of the tube 28 and securing it to the bottom of the cup. However, these parts may be made separate if desired so that the filter can be taken to pieces, the used filter cake removed, and a fresh filter mass inserted.

Various changes and alternative arrangements may be made within the scope of the appended claims, in which it is my intention to claim all novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. In combination with a receptacle, a filler pipe for the receptacle, an upstanding inlet tube in the filler pipe, a filter assembly in the filler pipe and including a shell having a top and a base and having an opening in its base surrounding and larger than the inlet tube and opening into the filler pipe, a hollow cylindrical member extending from the base around the opening into the shell and having an end terminating in spaced relation to the top of the shell, the side walls of the member being perforated, filter material in the shell surrounding the cylindrical member, a closure for the end of the cylindrical member spaced from the base, the closure bearing against the inlet tube and having an orifice communicating with the inlet tube whereby fluid flows from the inlet tube through the filter material and through the perforations of the cylindrical member to the filler pipe.

2. In combination with a receptacle, a filler pipe for the receptacle and having an enlarged end, an upstanding inlet tube in the end, a filter cartridge in the end and comprising a shell having a top and a base and having an opening in its base surrounding and larger than the inlet tube and opening into the filler pipe, a hollow cylindrical member extending from the base around the opening into the shell and having its end spaced from the base terminating in spaced relation to the top of the shell, the side walls of the member being perforated, filter material in the shell surrounding the cylindrical member, a closure for the end of the cylindrical member spaced from the base bearing against the inlet tube and having an orifice communicating with the tube whereby fluid passed into the inlet tube is sprayed through the orifice against the upper surface of the filter material and passes through the filter material and through the perforations of the cylindrical member to the filler pipe, and a cover for the shell closing the enlarged end of the filler pipe.

3. In combination with a crankcase, a filler pipe for the crankcase, an upstanding inlet tube in the filler pipe and communicating with the crankcase, a filter assembly in the filler pipe and comprising a shell having a top and a base and having an opening in its base surrounding and larger than the inlet tube and opening into the filler pipe, a hollow cylindrical member extending from the base around the opening into the shell and having its end spaced from the base terminating in spaced relation to the top of the shell, the side walls of the member being perforated, filter material in the shell surrounding the cylindrical member, a closure for the end of the cylindrical member spaced from the base, the closure being flexible and bearing against the delivery end of the inlet tube and having a slit communicating with the tube whereby fluid flows from the inlet tube through the filter material and through the perforations of the cylindrical member to the filler pipe.

4. Apparatus according to claim 3, in which a protective covering is provided over the closure of the cylindrical member.

5. In combination with an upstanding inlet tube, a filter assembly comprising a shell having a top and a base and having an opening in its base surrounding and larger than the inlet tube, a hollow cylindrical member extending from the base around the opening into the shell and having an inner end terminating in spaced relation to the top of the shell, the side walls of the cylindrical member being perforated, filter material in the shell surrounding the cylindrical member, a closure for the end of the cylindrical member spaced from the base, the closure bearing against the inlet tube and having an orifice communicating with the tube whereby fluid flows from the inlet tube through the filter material and through the perforations of the cylindrical member and is discharged through the space between the inlet tube and the walls of the opening.

6. In combination with an upstanding inlet tube, a filter assembly comprising a shell having a top and a base and having an opening in its base surrounding and larger than the inlet tube, a hollow cylindrical member extending from the base around the opening into the shell and having an inner end terminating in spaced relation to the top of the shell, the side walls of the cylindrical member being perforated, filter material in the shell surrounding the cylindrical member, a closure for the end of the cylindrical member spaced from the base, the closure being flexible and bearing against the delivery end of the inlet tube and having a slit communicating with the tube whereby fluid flows from the inlet tube through the filter material and through the perforations of the cylindrical member and is delivered through the space between the inlet tube and the walls of the opening.

7. A filter cartridge, comprising a shell having a top and a base and having an opening in its base, a hollow cylindrical member extending from the base around the opening into the shell and having its end spaced from the base terminating in spaced relation to the top of the shell, the side walls of the cylindrical member being perforated, filter material in the shell surrounding the cylindrical member, and a closure for the end of the hollow cylindrical member having an orifice.

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