

Aug. 30, 1932.

E. E. HANS

1,874,976

LUBRICANT FILTER

Original Filed Oct. 20, 1922

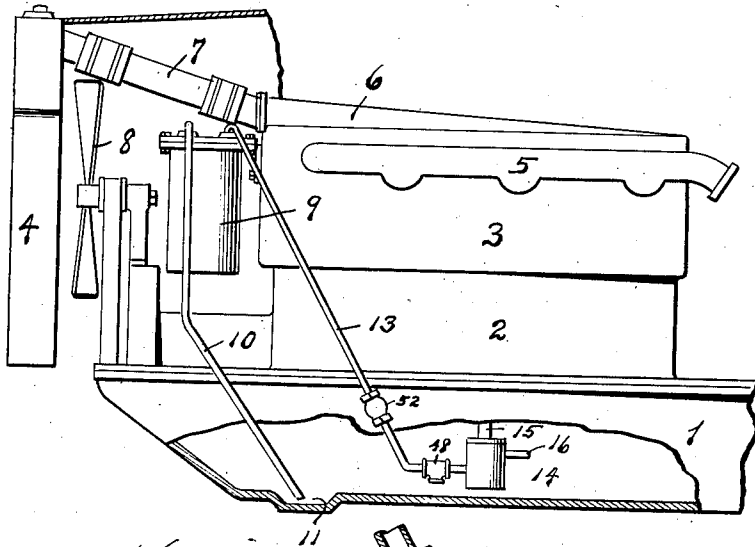


Fig. 1.

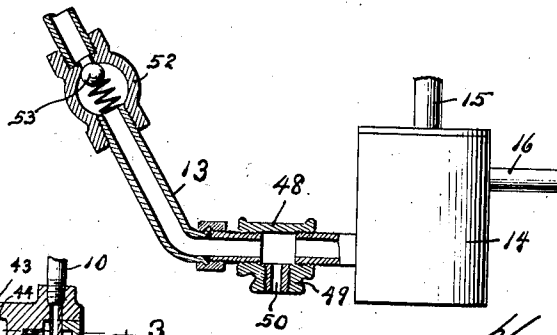


Fig. 4.

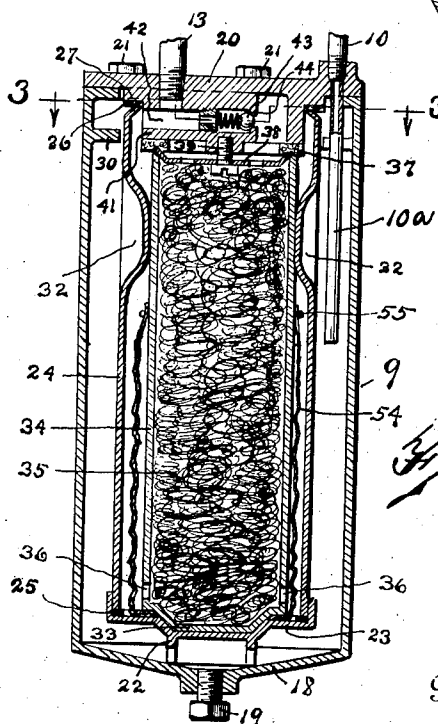


Fig. 2.

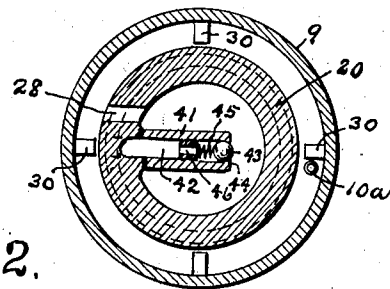


Fig. 3.

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LUBRICANT FILTER

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This invention relates to means for removing the impurities from the lubricating oil used in connection with the moving parts within the crank case and cylinders of internal combustion engines, and its object is to provide means whereby a sufficient delivery of the lubricant to such working parts may be assured should the filter or the conduits leading thereto or therefrom become clogged.

Another object of this invention is to provide means for by-passing the filtering material within the filter casing when the resistance of the filtering material to the passage of the lubricating oil becomes too great.

This invention consists in the details of construction and the combination of parts illustrated in the accompanying drawing and particularly pointed out in the claims.

In the drawing, Fig. 1 is a side elevation of an engine equipped with this improved filtering system. Fig. 2 is a vertical section of the filter. Fig. 3 is a section on the line 3—3 of Fig. 2. Fig. 4 is a section of the suction connection of a feed pump for the lubricant.

Similar reference characters refer to like parts throughout the several views.

As no claim is made to novelty of the construction of the engine and the parts connected thereto, a conventional view only is presented.

The engine embodies a lower portion 1 and upper portion 2 of the crank case, a cylinder block 3, a radiator 4, an exhaust manifold 5, a water outlet manifold 6 connecting by means of the usual rubber hose 7 to the top of the radiator, and a fan 8. Mounted between the fan and the cylinder block, or at any other convenient place, is a filter casing 9 to which a suction pipe 10 extends from the lowest part 11 of the crank case 1, which may be a sump or merely the normal lowest point of the straight bottom crank case. The suction pipe 13 connects to a conventionally shown pump 14 which is driven by means of a rotating shaft 15 and forces lubricating oil through the pipe 16 to the lubricating system of the engine. The construction of the pump 14 and of the pressure system forms no part of the present invention and no further

description or illustration thereof is therefore given.

The preferred construction of the filter is shown in Figs. 2 and 3. The casing 9 is shown with a conical bottom 18 provided with a drain plug 19. The top of the casing is closed by means of a cap 20 held in position by means of the cap screws 21. The cap 20 is not only a closure but is also the valve chamber of the filter and is described below. Resting on the bottom 18 and having a notched flange 22 is a head 23 of an intermediate chamber 24, the packing ring 25 of rubber, felt or any similar resilient material being provided to prevent leakage. A second packing ring 26 closes the joint between the upper end of this intermediate chamber 24 and the circumferential shoulder 27 on the cap 20.

The lubricant passes into the space between the casing 9 and the intermediate chamber 24 through the pipe 10 which preferably extends down some distance between these two walls. Instead of forming the intake pipe of a single section, it may be formed of two parts 10 and 10a, as indicated in Fig. 2. I prefer to form guide lugs 30 on the casing 9 so that the chamber 24 may always be properly positioned. The conical form of the bottom 18 serves to retain the head 23 centrally of the casing 9.

Within the chamber 24 and spaced therefrom by means of the longitudinal ribs 32 formed in its wall and by the head 33 at the lower end thereof, is a cylindrical retainer of shell 34 for the filtering material 35, the shell being formed with holes 36 at its lower end to permit the passage of the lubricant to the intermediate chamber 24 from the filtering material. The resilient packing ring 37 at the upper end of the shell 34 holds this retainer in proper position. This packing ring may be secured in position by a perforated head 38 for the retainer 34, this head being attached to the cap 20 by a screw 39, if desired. This head also serves to center the upper end of the retainer 34.

Extending down from the cap 20 of the filter casing is a transverse rib 41, clearly shown in Fig. 3, which has a chamber 42 in which the ball valve 43 is mounted, the

ball being normally held on its seat 44 at the inner end of this valve chamber by means of a spring 45 and a hollow plug 46, the plug being insertable from the left end of this chamber, as shown in Fig. 2. The suction pipe 13 connects into this chamber.

The operation of this filter is as follows. The flow of the lubricant through the filter depends upon the difference in pressure at the outer ends of the pipes 10 and 13, whether this pressure is caused by suction in the pipe 13 or by pressure in the pipe 10. The lubricant flows through the pipes 10 and 10a into the space around the chamber 24 and passes upward to the passage 28 in the cap. The flow of lubricant is very slow and therefore it remains in the space between the casing 9 and the chamber 24 for some period of time, the greater portion of the impurities settling down to the bottom of this casing 9 from which they can be drawn at intervals upon removing the plug 19, the notches in the flange 22 permitting this removal. The lubricant slowly rises and passes through the passage 28 into the space around the valve chamber 41 and passes down through the perforations in the plate or head 38 to the filtering material 35, the finer impurities being left behind in the filtering material, which is preferably closely packed curled hair.

Escaping from the bottom of the receptacle 34 through the hole 36, it rises between this receptacle and the wall 24 of the intermediate chamber to the passage 42 and then passes out through the pipe 13. Should the filtering material 35 become clogged so that the oil cannot pass through, a relative pressure will be created within the head 20 around the valve chamber 41 sufficient to press back the ball 43 and permit the lubricant to flow through the hollow plug 46 and valve chamber 42 directly to the pipe 13. In this case again the larger portion of the impurities in the lubricant will settle to the bottom of the outer chamber 9, from which they may be withdrawn upon the removal of the plug 19.

A bag 54 of knitted or woven fabric may be slipped up over the lower end of the shell 34 and be held in position by a wire or strap 55 at its upper end, the lower end of this bag extending into the space between the end 33 of the inner shell 34 and the end 23 of the intermediate chamber 24. This bag will intercept small particles of hair and other impurities which might otherwise pass to the working parts.

Under normal conditions it is desirable that the pump 14 shall draw at least a portion of the lubricant through the filter and force this pure oil to the wearing parts of the engine. The pipe 13 is made large to avoid friction. The entire filtering system may, however, become clogged, in which case provision must be made to supply lubricant

to the wearing parts of the engine. For this purpose a T 48 is placed between the pipe 13 and the pump 14, two arms of the T receiving full sized conduits, while the third arm 49 is fitted with a calibrated plug 50 whose opening is so small that under normal conditions a portion of the lubricant will pass through the filter while the remainder will pass through this plug to the pump. When, however, the filter becomes clogged, the suction at the plug 50 will become greater and a somewhat larger flow of lubricant will take place through this plug, this amount being sufficient to properly lubricate the wearing parts of the engine. The intake end of the plug 50 is at a higher level than the intake end of the pipe 10. The result is that the pipe 10 will conduct the most impure oil in the crank case to the filter while the oil which enters the plug 50 is much less impure.

In order to prevent the contents of the filter being siphoned back into the crank case through the pipes 10 and 13, a check valve 52 provided with a ball 53 may be mounted in one of the pipes, preferably the pipe 13.

It will be noticed that the shell 9 is secured to the head 20 by means of the screws 21 and that the bottom 18 of this shell presses the chambers 24 and 34 upward against their packing rings. It is therefore only necessary to remove the screws 21 in order to gain access to all the parts of this filter, which can be readily cleaned and replaced without disengaging or disconnecting any of the other parts of the filtering system.

The details of construction and the proportions of the parts may all be changed by those skilled in the art without departing from the spirit of my invention as set forth in the following claims.

I claim:—

1. In combination, an engine having an oil receptacle, a filter, a pump, a conduit leading from the outlet of the filter to the inlet of the pump, a second conduit leading from near the bottom of the receptacle to the inlet of the filter, a third conduit leading to said first conduit from a point above the lower end of the second conduit and being of less cross-sectional area than said second conduit, a conduit leading from the outlet of the pump to the working parts of the engine, a bypass around said filter and a relief valve in said bypass.

2. In combination with an engine, a receptacle, a filter and a pump, conduits connecting said receptacle, said filter and said pump in series with one another, and a constantly open connection from said receptacle to the inlet side of the pump forming a means to by-pass said filter, said connection being provided with means whereby it offers greater resistance to the flow of oil therethrough

than does the path leading through said filter.

3. In combination, an engine having an oil sump, a filter, a pump, a conduit leading from the outlet of the filter to the inlet of the pump, a second conduit leading to the inlet of the filter from the lower portion of the sump, a constantly open conduit leading to the pump inlet from a higher level of the sump than the end of the pipe leading to the filter, and a fourth conduit leading from the outlet of the pump to the working parts of the engine.

4. In combination, an engine having an oil sump, a filter, a pump, a conduit leading from the outlet of the filter to the inlet of the pump, a second conduit leading to the inlet of the filter from the lower portion of the sump, a constantly open conduit leading to the pump inlet from a higher level of the sump than the end of the pipe leading to the filter, and a fourth conduit leading from the outlet of the pump to the working parts of the engine, the third conduit being provided with means whereby it offers greater resistance to the flow of oil therethrough than is presented by the path through the filter.

5. In combination, an engine having an oil sump, a filter, a pump, a conduit leading from the outlet of the filter to the inlet of the pump, a second conduit leading to the inlet of the filter from the lower portion of the sump, a constantly open conduit leading to the pump inlet from a higher level of the sump than the end of the pipe leading to the filter, and a fourth conduit leading from the outlet of the pump to the working parts of the engine, the third conduit being of less cross-sectional area than the second conduit.

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CERTIFICATE OF CORRECTION.

Patent No. 1,874,976.

August 30, 1932.

EDMUND E. HANS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, after line 40, insert the following as claim 6:-

6. In combination, an engine having an oil receptacle, a filter, a pump, a conduit leading from the outlet of the filter to the inlet of the pump, a second conduit leading from near the bottom of the receptacle to the inlet of the filter, a third conduit leading to said first conduit from a point above the lower end of the second conduit and being of less cross-sectional area than said second conduit and a conduit leading from the outlet of the pump to the working parts of the engine.;

and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of November, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.