Aug. 16, 1932. L. BLACKMORE 1,872,229

OIL FILTER

Filed April 23, 1928

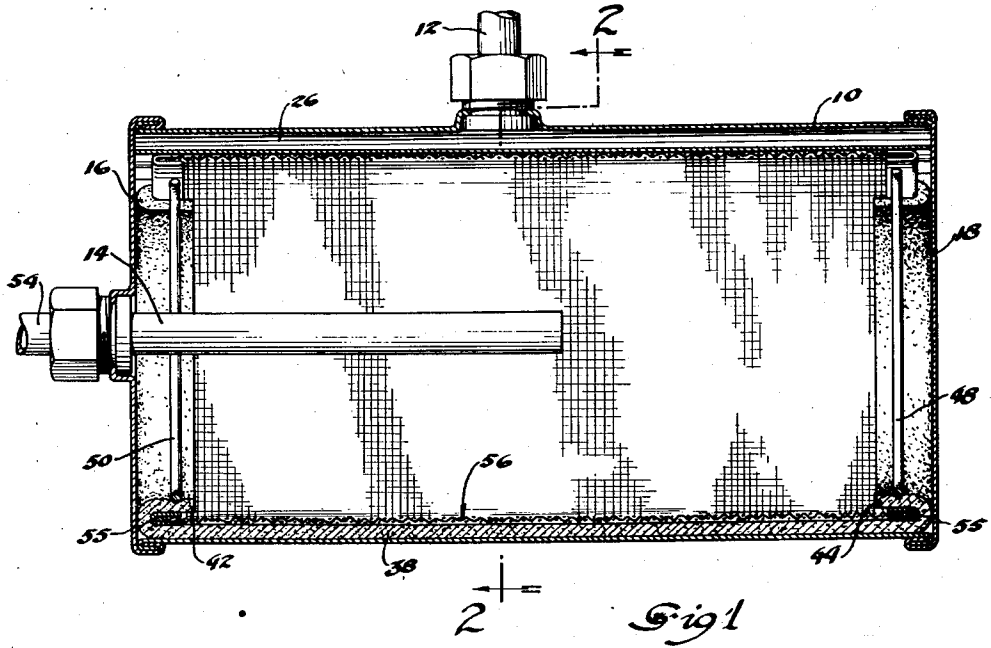


Fig. 1

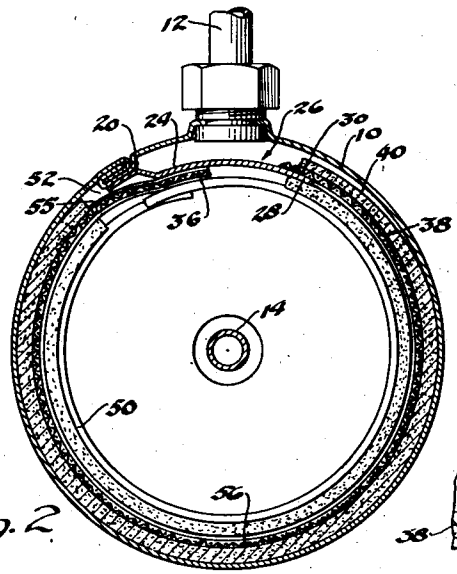


Fig. 2

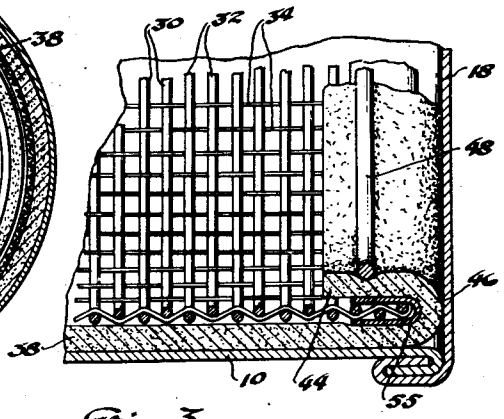


Fig. 3

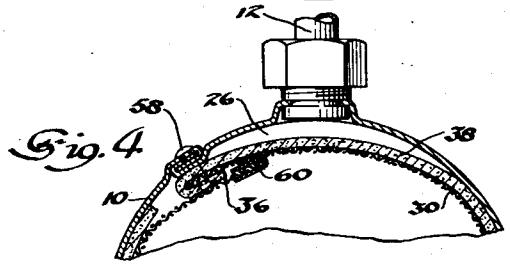


Fig. 4

Inventor

Lloyd Blackmore

By Blackmore, Spencer & Flint

Attorneys

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UNITED STATES PATENT OFFICE

LLOYD BLACKMORE, OF DETROIT, MICHIGAN, ASSIGNOR TO GENERAL MOTORS CORPORATION, OF DETROIT, MICHIGAN, A CORPORATION OF DELAWARE

OIL FILTER

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This invention relates to filters and has particular reference to a filter for removing impurities from oil in the lubricating system applied to engines of automotive vehicles.

In prior filters it has been customary to force the oil through a fabric, the impurities being caught in the meshes. The fabric has been either in the form of a spiral having a plurality of channels, or the cloth being mounted on parallel series of screens or perforated plates and the oil forced transversely through the fabric.

The present invention differs from prior constructions in that it forces the oil to pass under pressure along the length of the fabric which is resiliently held against a container. By forcing the oil along the fabric a purifying or scrubbing action takes place in which the impurities are caught in the nap of the cloth. The oil passes over and/or across or along the length of the fabric and out at the opposite end thereof, instead of through the fabric as in existing construction. By length is meant the circumferential or peripheral distance around the cloth from the inlet to the delivery end, or the distance between the fabric and container from the inlet or one end of the fabric to the outlet or the other end. In practice, the fabric is preferably mounted on a foraminous support in a cylindrical container and the fabric resiliently held against the container's inner periphery by the support.

As a support for the fabric, I preferably use a foraminous member in the form of a wire gauze having the wires which run parallel to the path of the oil, of a gage which is somewhat heavier than the gage of the wires which run at an angle to the path of travel of the lubricant. The function of this difference in the gage of the wires is to give a greater degree of stiffness to the support so that it will take a greater amount of pressure in the lubricating system to cause it to give.

One end of the support is preferably attached to the end of a plate which is rigidly secured to the container inside thereof. This plate is applied at the inlet and is spaced from the container to allow for an open portion or recess which will readily admit of the liquid to be filtered. The opposite end of the supporting screen is free, and overlaps and is adapted to slide on the plate. As the oil reaches the space or recess between the plate and the container, it will be forced between a fabric and the inner wall of the container, and as the pressure increases the supporting screen will give or wind up spirally to permit of the oil seeping along the nap or outer portion of the cloth.

The texture of the fabric may be of any suitable kind, but is preferably such that the oil will be forced therealong, rather than permitted to go therethrough. If the oil should seep through the cloth no harm will be done, but in practice it is the object of the invention to force the oil along the length of the cloth so that the impurities therein will be taken up by the meshes and interstices of the fabric.

The support for the fabric has a certain degree of resiliency sufficient to normally press the fabric rather tightly against the container. This tight contact is maintained through the entire periphery with the exception of a small space between the fabric and the container at the admission end. This small space is for the purpose of allowing an easy start for the lubricant along its travel between the fabric and the container.

The ends of the support extend short of the ends of the container and have the fabric overlapping and extending slightly inwardly of the support. At both ends, a split resilient spring wire is applied to hold the fabric in place. At the oil delivery end the fabric is preferably attached in any suitable way of supporting the screen.

The outlet to the filter preferably comprises a length of tubing which extends to substantially the filters mid portion, and leaves the filter at the center of the container's end. This arrangement of the outlet is made in order that the bottom of the filter may serve as a settling chamber. Should any impurities get around the filter ends, or at the cloth end, or through the fabric, it will arrive at the center portion of the filter and tend to settle at the bottom.

As an optional construction instead of providing the plate at the inlet, it is within the

scope of the invention to eliminate the plate entirely and extend the supporting screen and fabric to the point of attachment of the plate to the inside of the filter. At the inlet the supporting screen end is preferably formed with a recess or indentation in order to provide a space for the ready reception of the liquid to be filtered.

The invention is shown on the accompanying drawing in which:

Figure 1 is a longitudinal sectional view through the filter of the present invention.

Figure 2 is a transverse section on the line 2—2 of Figure 1.

Figure 3 is a detail enlarged sectional view of one end of the filter showing the lighter or heavier wire of the supporting screen, and the manner of securing the fabric to the screen end within the filter.

Figure 4 shows a modification.

Referring to Figure 1, the numeral 10 indicates a metallic container of any suitable type, but preferably cylindrical, having the inlet pipe 12 and the outlet pipe 14.

The filter is preferably positioned as shown in Figure 1, the oil arriving at the inlet at the top and leaving at the outlet 14 positioned at the center of one of the filter ends 16 or 18.

Secured to the inside of the filter at a point 20 adjacent the inlet 12 is a plate like member 24, which is spaced from the container 10 to form a space 26, which extends the entire length of the filter and is adapted to receive the liquid to be filtered from the inlet 12. This space is for the purpose of allowing the liquid to spread the entire width of the filter so that a better filtering is secured.

Secured to the opposite end 26 of the plate 24 is a foraminous supporting member 30, preferably in the form of a wire mesh screen, better shown in Figure 3. This wire mesh screen comprises the relatively heavy gage wires 32 and the lighter gage wires 34, the purpose of which will be later described. The opposite end 36 of the supporting screen 30 is free and overlaps and is adapted to slide on the plate 24.

Secured to and supported on the screen 30 is a cloth or fabric 38, the entrance end 40 of which is slightly spaced from the container 10, as is seen in Figure 2. The purpose of this space will be later described. The screen 30 will have considerable resiliency and tend to expand to force itself against the container 10. Due to this expansion, the fabric 40 is flatwise and rather tightly held against the inner periphery of the container 10.

The ends 42 and 44 of the fabric 38 are preferably folded as at 46 and extended inwardly of the foraminous member or screen 30. Inside the screen and over this folded portion there are applied the spring rings 48 and 50, open at their ends as shown at 52. The purpose of these rings is to resiliently, securely and removably hold the ends of the fabric onto the screen 30.

By referring to Figure 3, it will be noted that the end 55 of the screen 30 extends somewhat short of the end 18 of the container 10. This construction allows for a slight space between the container end and screen end 55, which space is slightly less than the width of the fabric 38 so that when end of the container 10 is applied, the fabric 38 will be pressed between the screen end 55 and the container end 18. A similar construction is applied at the opposite end 16 of the container 10.

In applying the fabric 38, the nap portion is preferably placed adjacent the inner periphery of the container 10. The purpose of this is to afford a greater surface and more obstruction for the impurities in the oil to catch on.

By referring to Figure 1, it will be noted that the outflow pipe 14, which has been applied at the center of the end 16, is considerably above the bottom 56 of the filter. The space between the bottom 56 and outlet 14 provides a settling chamber for any impurities or foreign matter which have gotten past the fabric 38. During the passage of the lubricant along the surface of the fabric 38 there is the possibility that some impurity may travel to the end of the cloth, or between the cloth end either of the container end 16 or 18. This impurity will reach the center of the filter and settle to the bottom instead of leaving the outflow pipe 14.

Referring to the modification of Figure 4 it will be seen that the plate 24 may be eliminated and the screen 30 attached directly to the container 10 as by means of rivets 58. In this species the free end 36 of the supporting screen 30 will have secured thereto an edge piece 60 to permit the free end to readily slide over the adjacent part.

The operation of the filter is as follows: The oil enters the inlet 12 and passes to the space 26 between the support 30 and the container 10. The oil after filling the space 26 will meet with resistance the resiliency or spring like action of the screen 30 and rings 48 and 50 in passing through the filter. As the pressure increases the oil will be forced between the fabric 38 and the inner periphery of the container 10, the space 40 allowing for the initial entry of oil. This increased pressure will cause the screen 30 to coil up due to the fact that its end 36 is free and may roll up and slide over the surface of the plate 24. As the pressure increases, the oil will be forced farther and farther along the surface of the cloth until it reaches the end 52, from where it will flow through the supporting screen 30 and drop to the inner portion of the filter. As the oil accumulates, the level will finally rise to the level of the outlet pipe 14, from where it will flow and be

conducted to any suitable point by means of the outflow pipe 54.

I claim:

1. In a filter, the container inlet and outlet means in said container, a fabric mounted in said container, means for causing the liquid to be filtered to pass across and along substantially the entire length of the filter, substantially all of said liquid passing over the length of the fabric under pressure in its travel through the filter.

2. In a filter, a container having inlet and outlet means, a fabric in said container held thereagainst throughout substantially its entire extent, a support for said fabric, said support adapted to yield in response to the pressure of the liquid to be filtered so as to cause said liquid to travel longitudinally over substantially the entire surface of said fabric between the fabric and container in its passage through the filter.

3. In a filter, inlet and outlet means therefor, a container, a fabric in said container held thereagainst, a support for said fabric, said support adapted to yield in response to the pressure of the liquid to be filtered so as to cause said liquid to travel over the surface of said fabric in its passage through the filter, said support including a wire mesh fabric having the wires running in one direction of a heavier gage.

4. In a filter, inlet and outlet means therefor, a container, a fabric in said container held thereagainst, a support for said fabric, said support adapted to yield in response to the pressure of the liquid to be filtered so as to cause said liquid to travel over the surface of said fabric in its passage through the filter, said support including a wire mesh fabric having the wires running in the direction of the flow of liquid to be filtered of a heavier gage.

5. In a filter, inlet and outlet means therefor, a container, a fabric in said container held thereagainst, a support for said fabric, said support adapted to yield in response to the pressure of the liquid to be filtered so as to cause said liquid to travel over the surface of said fabric in its passage through the filter, and a metallic plate for securing said support to the container.

6. In an oil filter, inlet and outlet means therefor, a foraminous member secured at one of its ends, its other end being free, a plate like member for securing said foraminous member to the inside of said container, said plate like member spaced from said container to form a space at the liquid inlet and the free end of said foraminous member slidably overlapping said plate, and a fabric mounted on said foraminous member and resiliently held against said container, the liquid in its travel through the filter being forced to travel over the surface of the fabric throughout its length.

7. The invention of claim 6, and a settling chamber below said outlet means.

8. The invention of claim 6, and a resilient member for holding said fabric on said foraminous member.

9. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, a foraminous member free at one end for supporting said fabric against the interior wall of said container, said member causing substantially all of the liquid to be filtered to pass between the fabric and container.

10. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, and a foraminous member rigidly mounted at one end to the container wall for supporting said fabric against the interior wall of the container, said member causing substantially all of the liquid to be filtered to pass between the fabric and container.

11. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, and a foraminous member rigidly mounted at the container wall at one end and free at its other end for supporting said fabric against the interior wall of the container, said member causing substantially all of the liquid to be filtered to pass between the fabric and container.

12. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, and a foraminous member secured to said container for supporting said fabric resiliently against the interior wall of the container, said member causing substantially all of the liquid to be filtered to pass between the fabric and container.

13. In a filter, a cylindrical container, inlet and outlet means therefor, a filtering fabric in said container, a cylindrical foraminous member rigidly mounted in said container and supporting said fabric over substantially its entire extent against the interior wall of said container.

14. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, a foraminous member rigidly mounted in said container and supporting said fabric over substantially its entire extent against the interior wall of said container, and a settling chamber in said container below said outlet.

15. In a filter, a container, an inlet, an outlet at the mid portion of the container, a filtering fabric in said container, and a foraminous member rigidly mounted at one end thereof at the inner wall of said container for supporting said fabric on one side only.

16. In a filter, a container, an inlet and an outlet for said container, a filtering fabric, and a foraminous member mounted in said container and resiliently holding said fabric against the container's interior, said fabric

and member extending only at the inner surface of said container.

17. In a filter, a container, an inlet at the side center portion thereof, a filtering fabric in the filter, and a foraminous member supporting said fabric against the container's interior, said support and container providing a space at the inlet extending longitudinally of the filter.

18. In a filter including a container, a foraminous supporting member in said filter, a filtering medium over said member, said medium held tightly against the ends and resiliently against the sides of the filter container by said member, and means to secure said medium to said member.

19. In a filter, a container, a lateral inlet to said container, a filtering medium positioned against the inner periphery only of said container, means for resiliently holding said medium against the filter, and an outlet at one end of the container.

20. In a filter, a container, a lateral inlet to said container, a filtering medium, a foraminous member in said filter for supporting said medium throughout substantially its entire extent at the inner periphery of said container in resilient relation, and an outlet for said container.

21. In a filter, a container, inlet and outlet means for said container, a filtering fabric, a foraminous member mounted in said container and resiliently holding said fabric flatwise against the container's interior, said fabric and member being substantially coextensive with the inner surface of the container.

22. In a filter, inlet means to said filter, a filtering medium in said filter, means for holding said medium flatwise against the filter, said fabric and member being substantially coextensive with the inner surface of the filter, and an outlet from said filter.

23. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, and a foraminous member free at one end and positioned adjacent the inner periphery of the container and pressing said fabric over substantially its entire extent outwardly of the container, said member causing the liquid to be filtered to pass between the fabric and the container.

24. In a filter, a container, inlet and outlet means therefor, a filtering fabric in said container, a foraminous member rigidly mounted at one end for supporting said fabric throughout substantially its entire extent against the interior of the container, said member causing the liquid to be filtered to pass between the fabric and the container.

25. In a filter, a container, inlet and outlet means therefor, a fabric in said container held thereagainst throughout substantially its entire extent, a support for said fabric, said support yielding in response to the pressure of the liquid to be filtered thereby causing substantially all of said liquid to travel over substantially the entire surface and to the end of said fabric in its passage through the filter, said fabric having its nap arranged directly against the container.

26. In a filter, a container, inlet and outlet means therefor, a fabric in said container held thereagainst throughout substantially its entire extent, a support for said fabric, said support yielding in response to the pressure of the liquid to be filtered thereby causing substantially all of said liquid to travel over substantially the entire surface and to the end of said fabric in its passage through the filter, said fabric and container arranged to provide a space therebetween at one of the fabric ends.

27. In a filter, a container, inlet and outlet means therefor, a fabric in said container held thereagainst throughout substantially its entire extent, a support for said fabric, said support yielding in response to the pressure of the liquid to be filtered thereby causing substantially all of said liquid to travel over substantially the entire surface on one side of said fabric in its passage through the filter, said container and support forming a recess or space at the inlet extending the length of the container to allow for the ready inflow of the liquid to be filtered.

28. In a filter, a cylindrical reticulated supporting member secured in said filter, and a filtering medium secured to and positioned on one side only of said member and held thereby against the filter walls throughout substantially its entire length, the fluid to be filtered passing lengthwise over said medium in passing through the filter.

In testimony whereof I affix my signature.

LLOYD BLACKMORE.