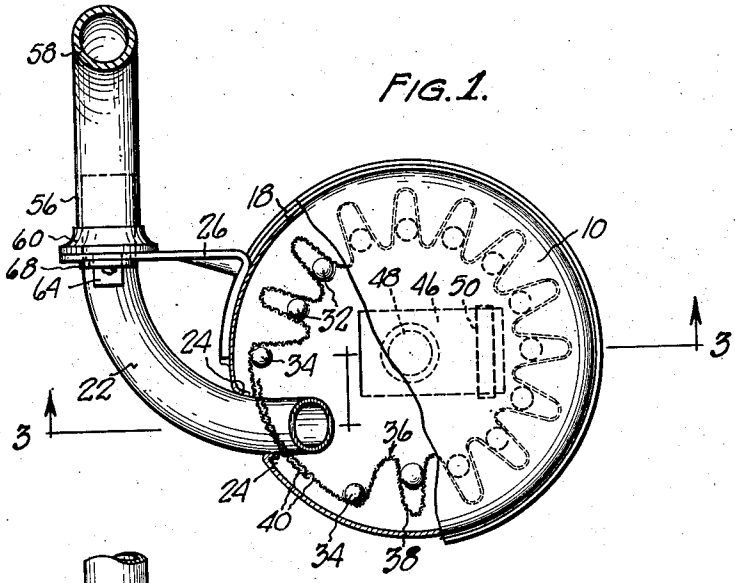
Aug. 31, 1948. C. L. DEWEY 2,448,212

FLOATING FILTER

Filed July 21, 1944

FIG. 1.



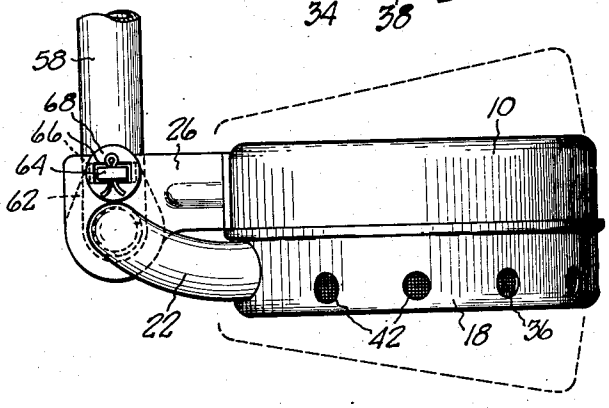
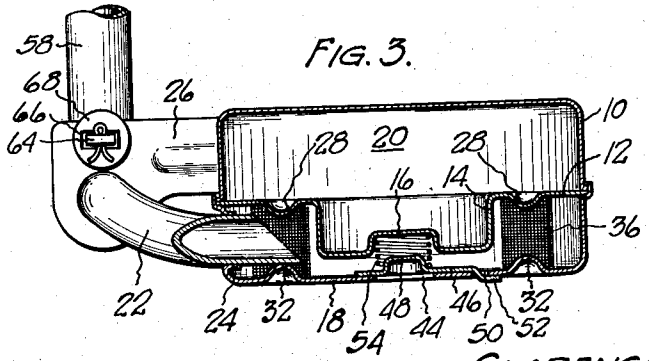


FIG. 2.

FIG. 3.



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2,448,212

FLOATING FILTER

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7 Claims. (Cl. 210—97)

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This invention relates to improvements in floating filters. One use of the invention is to filter the oil drawn from the sump or oil pan at the bottom of an internal combustion engine by a suction pump for forced lubrication of the engine. The floating properties of the device permit the oil to be drawn from the sump at a level at or adjacent to the upper level of the oil supply in said sump.

The primary object of the invention is to provide a device having a filter element of large area to minimize the danger of clogging thereof.

A further object is to provide a filter device having a novel arrangement of float chamber, filter element and inlet and outlet openings.

A further object is to provide a device of this character with normally closed valve means adapted to be opened by suction in the outlet in the event the filter element becomes clogged.

A further object is to provide a device of this character having a pivot mounting, and novel means for limiting pivotal movement of the device.

Other objects will be apparent from the description, drawing and appended claims.

In the drawing:

Fig. 1 is a top plan view of the device with parts broken away.

Fig. 2 is a side view of the device.

Fig. 3 is a transverse vertical sectional view of the device, taken on line 3—3 of Fig. 1.

Referring to the drawing which illustrates one embodiment of the invention, the numeral 10 designates an inverted imperforate cup-shaped housing portion. At the lower marginal edges of portion 10 is secured in sealed relation, as by soldering, an imperforate metal disc 12. Disc 12 has a central cup-shaped depressed portion 14, preferably integral therewith and of a radius approximately one-half the radius of the disc. At the center of the base of portion 14 is formed an integral inverted cup-shaped portion 16. A second cup-shaped portion 18 of approximately the same size as portion 10 is fixedly secured at its marginal edge to the lower marginal edge of portion 10. The parts 10, 12 and 18 form the housing of the device, with the parts 10 and 12 defining a sealed float chamber 20 in the upper portion of the housing.

A curved pipe or tube 22 projects into the housing through an opening in the side of the lower cup-shaped housing part 18 which is preferably defined by an annular inturned flange 24 in which the tube is solidly supported and to which the tube is secured in sealed relation, as by soldering. The inner end of the tube 22 projects inside of the housing and terminates in spaced relation to the cup-shaped depressed portion 14 of the disc 12. A bracket 26 may be secured fixedly to the housing to project outwardly therefrom and support the free outer end portion of tube 22.

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An arcuate series of spaced bosses 28 is formed in disc 12 in downwardly projecting relation thereto and spaced between the margin thereof and the cup-shaped portion 14. The opposite terminal bosses of the series are preferably arranged in substantially similar spaced relation to the inner end of tube 22. An arcuate series of upwardly off-set bosses 32 is formed in the base of housing portion 18, each in substantially vertical alignment or registration with a boss 28 of the series in disc 12. A pair of upwardly off-set bosses 34 is formed in the base of housing part 18 at opposite sides of tube 22, preferably spaced closer to both the tube and the margin of the housing part than the terminal bosses 32 of the arcuate series. Bosses (not shown) are formed in disc 12 in axial alignment with the bosses 34.

A metal filter screen 36 of suitable mesh is positioned in the lower chamber of the housing. This screen is of a width equal to the height of the lower or filter chamber of the housing. The central or intermediate portion of the screen, spaced from its ends, is bent or folded in alternate reverse direction, i. e. in an accordion-like fold. The number of folds 38 is equal to the number of spaces between the bosses 28. Each fold 38 is positioned between adjacent bosses 28 and 32 at its upper and lower edges, respectively, with the folds positioned in spaced relation to the outer wall of the filter chamber and to the central depression 14 in said chamber as shown in Fig. 1. The end portions 40 of the filter are each passed outwardly around the bosses 34 and thence extend substantially in engagement and in the direction of the other bosses of said pairs, i. e. adjacent to but spaced from the housing wall. Filter ends 40 have openings therein fitting snugly around the inner projecting end of the tube 22.

Spaced openings 42 are formed in the lower housing part 18, either in the side wall thereof as shown or at some other part thereof outwardly of the circular filter screen 36. Oil is drawn through these openings by the suction of a suitable oil pump (not shown) acting through tube 22. The oil drawn through the openings passes through the filter and into the open inner end of the tube 22. It will be noted that the folded

character of the screen which has been illustrated provides a large filter area. Also, the arrangement insures that any foreign matter contained in the oil is filtered before it enters said tube, regardless of the position of the opening through which it enters the housing. In other words, since the open end of the outlet tube is within the cylindrical filter element, any foreign matter entering the housing at opening **42** is prevented by the screen interposed between the tube **22** and openings **42** from entering said tube. A further advantage of the construction is that the filter **36** may be removed for cleaning or replacement by removing bottom housing part **18**, the filter then being readily removed by simply sliding it free from the inner end of the tube since the filter is not otherwise secured to the device. Replacement of a filter is also simple because its proper location is facilitated by the bosses **28 32** and **34**.

An opening **44** is preferably provided centrally in the bottom of housing part **18** in coaxial relation to socket off-set **16**. A flat valve plate **46** having an inwardly extending boss **48** concentric with opening **44**, serves to normally close said opening. Valve plate **46** may be pivoted within the housing in any suitable manner. As here illustrated, an elongated slot **50** is formed in the bottom of housing part **18** spaced from opening **44** and preferably positioned within the outline of annular filter screen **36**. Plate **46** is elongated and has an off-set terminal portion **52** fitting snugly in slot **50** and normally bearing at its end against the outer face of housing part **18**. A coil spring **54** fits around boss **48** and its opposite end fits in socket **16** to normally hold the valve in closed position.

This valve construction provides a safety factor in adverse conditions, as when the filter has become clogged or when the oil does not flow freely through the filter in extremely cold weather. In such cases, the suction of the pump becomes effective within the space defined by the annular filter to open the valve plate **46** against the action of spring **54**.

The free or outer end of tube **22** terminates in a short straight portion projecting through and beyond the bracket **26** which supports it. This tube portion fits snugly and rotatably in the horizontal lower end portion **56** of the tube **58** connected with the intake end of the oil pump (not shown). Tube **58** fixedly mounts a collar **60** flush with its end and adapted for large area face engagement with bracket **26** to provide a substantially sealed joint retarding the ingress of oil into the tube and substantially preventing leakage of oil from the tube. Collar **60** has an upwardly projecting ear **62** which mounts a rectangular lug **64** projecting longitudinally therefrom in spaced relation above tube **22** through a rectangular opening **66** in the bracket **26** and in a washer **68** bearing against said bracket. A cotter pin at the outer end of lug **64** retains the filter unit in operative position on tube **58**. The opening **66** is coaxial with lug **64** but of somewhat larger size. This permits tube **22** to have a limited pivotal movement in tube **58** to accommodate swinging of the filter housing vertically as required to compensate its position relative to different levels of the oil in which it floats, as illustrated in dotted lines in Fig. 2. It will be noted that any stresses occurring incident to sudden stopping of such pivotal or swinging movement are taken at the bracket **26** and collar **60**, rather than at the tubes on the housing, thus providing a strong construction capable of withstanding the conditions of use occurring in vehicles traveling over rough roads, etc.

I claim:

1. A floating filter comprising a housing having an upper sealed float chamber and a lower filter chamber having opposed walls each provided with a series of bosses and a marginal wall connecting said first walls and having an aperture therein, a filter element within said filter chamber spanning said opposed walls and bent to provide folds and a tubular shape defining an inner compartment of irregular outline spaced from the marginal wall of the housing, said folds extending partially around said bosses to position said filter element, and an outlet conduit communicating with said inner compartment.

2. A floating filter as defined in claim 1, wherein said filter element constitutes a screen having a plurality of zig-zag folds each positioned at its opposite edges between adjacent bosses of said respective series.

3. In a floating filter, a housing having a buoyant upper portion and a filter chamber defined by opposed walls and a marginal wall connecting said first walls and having an aperture, said opposed walls provided with a plurality of spaced bosses each registering with a boss in the opposite wall, an elongated filter screen between and spanning said walls and bent longitudinally in annular form to enclose a space within said chamber, said bosses engaging and positioning the ends of said screen, the end portions of said screen being substantially in engagement, and a conduit projecting into said chamber and through the end portions of said screen.

4. The combination defined in claim 3, wherein said screen has a plurality of folds each positioned between adjacent bosses in each of said walls.

5. In a floating filter, a buoyant housing, means dividing said housing to provide a sealed upper float chamber and a lower filter chamber having a marginal wall with apertures therein, a filter element dividing said filter chamber into inner and outer compartments, said apertures communicating with said outer compartment, an outlet conduit connecting with said inner compartment, and a normally closed spring loaded valved inlet in said housing communicating with said inner compartment to permit flow to said outlet when said filter element clogs.

6. A floating filter adapted to be connected by a conduit with a suction pump, comprising a housing having a partition therein dividing the same to provide a sealed upper float chamber and a lower filter chamber, said housing having apertures opening into said filter chamber, a filter element dividing said filter chamber into inner and outer compartments, said conduit communicating with said inner compartment, said inner compartment being defined in part by a portion of said housing having an aperture therein, the remaining apertures communicating with said outer compartment, and a spring pressed valve normally closing the aperture communicating with the inner compartment and adapted to be opened by suction when said filter element clogs.

7. A floating filter comprising a housing having an annular wall, opposed end walls and a transverse partition defining a sealed upper float chamber and a lower filter chamber, said annular wall having apertures open at said filter cham-

ber, a substantially annular filter element positioned within and spanning said filter chamber, an outlet conduit communicating with the space enclosed by said filter element, the housing end wall defining the outer end of said filter chamber having an opening therein positioned inwardly of said filter element, a plate pivotally carried by said last named end wall and normally sealing said opening, and a coil spring positioned within and spanning said filter chamber, said spring bearing at its ends against said partition and said plate to normally urge said plate to closed position.

CLARENCE L. DEWEY.

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