

J. G. UTZ & C. S. PELTON.
FILTER.

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1,165,640.

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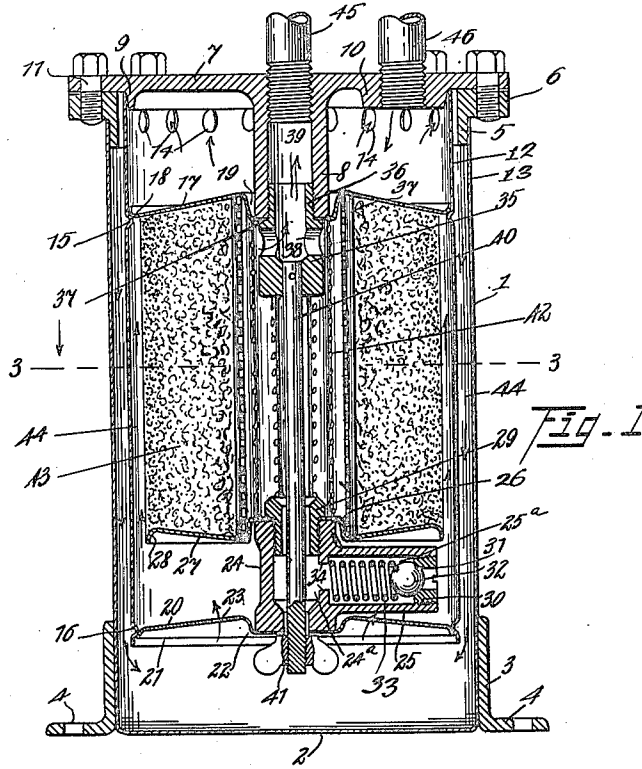
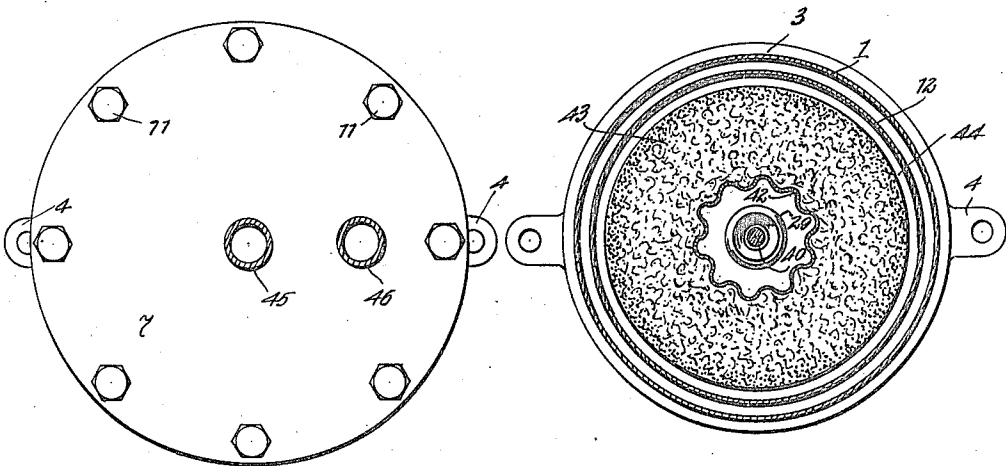


Fig. 2
Witnesses:

R. L. Bruck.

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Fig. 3

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UNITED STATES PATENT OFFICE.

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FILTER.

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To all whom it may concern:

Be it known that we, (1) JOHN G. UTZ and (2) CLYDE S. PELTON, citizens of the United States, residing at (1) Detroit and (2) Cleveland, in the counties of (1) Wayne and (2) Cuyahoga and States of (1) Michigan and (2) Ohio, have invented a certain new and useful Improvement in Filters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to filters, and more particularly to filters employed for the purpose of removing sediment from oil.

While certain, if not all, features of our filter are capable of general application, the design and construction illustrated and described in detail herein adapt the filter for the incidents of use to which the lubricating systems of automobiles are subjected.

Among the objects which it is exceedingly desirable, if not absolutely necessary, to obtain in such filters are efficiency of filtration; the cooling of the oil in transit through the filter; large capacity; and convenience of assembling and disassembling. The foregoing and other objects are accomplished by the construction illustrated herein wherein:

Figure 1 represents a central longitudinal sectional view taken through a filter constructed in accordance with our invention; Fig. 2 a top plan view; and Fig. 3 a transverse sectional view corresponding to the line 3—3 of Fig. 1.

Describing now by reference characters the various parts illustrated herein, 1 denotes the outer shell or casing of a filter, said shell or casing being preferably a sheet metal cylinder having a closed bottom 2 and an open top, the bottom being supported by a ring 3 of metal having outwardly projecting lugs or feet 4 whereby the filter may be secured to any suitable supporting device.

The upper end of the shell 1 has snugly fitted therewithin a ring 5, said ring having an outwardly projecting flange 6. Assuming that the filter will be used in a vertical position (which is the position generally or most frequently assumed) the top of the flange 6 forms a horizontal supporting surface for a detachable cover 7. This cover is preferably of cast metal and has a central depending tubular projection 8 provided with an internal thread at the top and at

the bottom thereof. On the bottom of and between the central and peripheral portions of the cover there is a circular rib 9, said rib having its outer surface upwardly beveled, for a purpose to be explained hereinafter. Projecting from the cover between the rib 9 and the central portion thereof is an internally threaded boss 10. The outer or peripheral portion of the cover overlies the flange 6 and may be secured thereto as by means of bolts 11 passing through holes in the cover and threaded into holes in the flange.

12 denotes an inner shell, which is inserted within the outer shell 1 and is of sufficiently smaller diameter than the outer shell to form therewith an annular narrow passageway 13 for the oil which is to be filtered. The shell 12 is provided, a short distance below the top thereof, with overflow perforations 14 and is also provided, below such perforations, with an inwardly projecting bead 15. Near the bottom it is provided with a similar bead 16.

17 denotes a plate having its outer edge bent upwardly, as shown at 18, to engage the upper surface of the bead 15, said plate being of such diameter that its outer edge will fit snugly within and against the shell 12, being soldered to the shell. The plate 17 is generally frustoconical in shape and has a central depressed cup 19, the bottom of the cup being provided with a central perforation, for a purpose to be described.

20 denotes a plate which is similar to the plate 18, except that its outer edge is downwardly deflected, as shown at 21, to engage the under surface of the bead 16 while its upwardly inclined surface is provided, near the cup-shaped central portion 22, with apertures 23, for a purpose to be explained hereinafter. For convenience of removal the plate 20 is not soldered to the shell 12.

24 and 25 denote the vertical and horizontal branches of a T-shaped spacing member, the bottom of the branch 24 resting within the cup 22 while the upper end of this branch rests within an inverted cup 26 carried at the central portion of a plate 27. This plate is of inverted frusto-conical shape and has its outer edge deflected downwardly, as shown at 28. The plate 27 is of somewhat smaller diameter than the casing 12, for a purpose to be explained hereinafter.

Within the upper end of the spacer branch 24 there is threaded a bushing 29. The branch 25 is provided with a bore 25^a communicating with the central bore 24^a of the spacer. The outer end of the branch 25 is provided with a bushing 30 which is threaded thereto and has a valve seat 31 at its inner end, said seat cooperating with a ball valve 32, which valve is normally held to its seat by means of a spring 33 engaging the ball at one end, its opposite end bearing against an annular seat 34. When the parts are assembled, the lower end of the tubular boss 8 projects into the central portion of the cup 19. A coupling 35 has a reduced neck 36 threaded into the bottom of the tubular boss 8, there being a shoulder 37 provided below said neck and adapted to engage the bottom of the cup 19. The coupling 35 has its bottom closed against the passage of oil, but is provided above such bottom with lateral ports 38 communicating with the central bore 39.

40 denotes a rod the upper end of which is connected to the bottom of the coupling 35 (being conveniently pinned thereto) while its lower end projects through the bushing 29, the bottom of the vertical branch 24 of the spacer, and through the cup 22, and is provided with a wing-nut 41 threaded thereon, whereby the plates 17, 20 and 27 and the interposed parts may be clamped together, with the assembly suspended from the cover 7.

Between the plates 17 and 27 there is inserted a perforated metal tube 42. This tube has a longitudinally corrugated cylindrical body, the opposite ends whereof are adapted to fit more or less snugly about the cups 19 and 26, whereby the tube is centered. The space surrounding the tube 42, between the plates 17 and 27, is filled with a filter mass 43, preferably a one-piece felt body. This felt body has substantially the same diameter as the bottom plate 27, whereby an annular passageway 44 is provided between the outer periphery of the felt body and the inner shell 12.

The inner shell 12 and the parts therein being assembled, the neck 36 is threaded into the boss 8, whereby the elements which constitute the filtering mechanism proper are suspended from the cover 7, the engagement of the top of the casing 12 with the flaring surface of the rib 9 forming a tight joint at this place. The cover may then be applied to the casing 1, the outlet pipe 45 be threaded into the top of the boss 8 and the inlet pipe 46 into the boss 10.

The oil to be filtered is introduced into the upper part of the inner casing through the connection 46. The oil accumulates within the cup formed by the top of the casing or shell 12 and the plate 17 and finally overflows through the openings 14, descends

the narrow annular passageway 13 and fills the lower part of the shell or casing 1 and the cup formed thereby, passes upwardly through the apertures 23 in the plate 20 and into the narrow annular passageway 44 surrounding the filter mass 43. The convergence of the outer portions of the plates 17 and 27 enables these parts to retain the filter mass securely therebetween while the outer portions of these plates press against and squeeze the outer top and bottom edges of the mass and thus prevent the oil from following a path adjacent to the plates 17 and 27 instead of passing radially through the filter mass. As previously stated, this mass is preferably of felt. The oil passes radially inwardly through the felt body to the central perforated tube 42, this arrangement presenting a maximum area of the filter mass to the liquid to be filtered. The perforated tube, as previously stated, is provided with vertically extending corrugations as shown to best advantage in Fig. 3. These corrugations not only increase the effective area of perforation of the tube but also prevent the filter mass from clogging the perforations. This action will be apparent from an inspection of Fig. 3, wherein it will be seen that the troughs formed between adjacent corrugations are unoccupied by the filter mass, allowing the perforations in these troughs to remain unobstructed. From the central tube 42, the oil passes through the perforations 38, neck 36, and hollow boss 8 into the outlet tube 45.

It is expected that the main field of usefulness of this filter will be in connection with motor vehicles and that the heated oil will be pumped from the crank case to the filter. Should there be any clogging of the filter as, for instance, through the action of cold weather upon the oil, and an undesirable pressure be thereby produced within the filter, the ball 32 will be unseated, allowing the oil to by-pass through the spacer 24, 25, into the tube 42. After the parts have become warmed up, or the stoppage of oil by the filter mass otherwise overcome, the oil will pass through the filter in the normal manner. Furthermore, as the speed of the engine increases, the pressure within the filter will correspondingly increase, due to the frictional resistance of the filter mass to the accelerated passage of the oil there-through. Under excessive speeds, the filter and the pipes connected thereto are liable to be subjected to such pressure as will be injurious, producing leakage in the filter and its connected parts. By adjusting the bushing 30, the tension of the spring 33 can be varied and the pressure at which the valve 31 will allow the oil to by-pass can be regulated to any predetermined limit.

By the construction illustrated and described herein, it will be apparent that an

extremely economical and efficient filter has been produced and one whereby the various objects of the invention are fully attained. It should be noted further that the construction is such that the filter is enabled to utilize the natural thermal path of the oil film passing through the passageway 13. The oil entering this channel has been heated in the crank case and through its contact with the machinery and, as it enters the filter, its natural tendency is to fall as it cools. This filter makes use of this natural tendency of the oil, and the cooler but still warm oil accumulates in the bottom of the filter, passes up into the passageway 44 in a warm condition (which condition is most suitable for filtering through the mass 43) and, in such condition, passes through such mass into the inner tube 42 and to the outlet 45 leading to the engine parts to be lubricated. Furthermore, in passing through the filter, the oil is caused to change its direction many times. At each change of direction, means are provided for collecting the sediment deposited incidental to such change. At the top and the bottom, where a complete reversal of direction occurs, large sediment collecting chambers are provided, these chambers being formed above the plate 17 and the bottom of the outer shell, respectively. When the oil is not flowing, as, for instance, when the motor is at rest, the sediment which settles from the oil accumulates in pockets so located that the sediment thus deposited will not be disturbed when the oil is again caused to flow.

While, as stated hereinbefore, the filter forming the subject of our invention will ordinarily be used in a vertical position, we do not wish it to be understood as being limited to such position, and the terms "upper" and "lower" and "top" and "bottom" as applied to the filter are not intended to limit the use of the filter to cases wherein it is placed in a vertical position, except as such limitation may be rendered necessary by the state of the prior art or by necessary implication.

Having thus described our invention, what we claim is:—

1. In a filter, the combination of an outer shell, an inner shell within the outer shell and spaced therefrom to provide an annular passageway, a plate or partition extending across the inner shell and joined to the same, a plate extending across the said shell below the first mentioned plate and having its periphery spaced from the inner shell, a perforated tube extending between the central portions of said plates, a filter mass surrounding the said tube and interposed between said plates and providing with the inner shell an annular passageway communicating around the second plate with the first passageway, means for supplying liquid to

the cup formed at the upper portion of the inner shell, and an outlet extending from the central tube.

2. In a filter, the combination of a shell, a supporting plate secured within said shell, a plate extending across the said shell below the first mentioned plate and having its periphery spaced from the wall of the shell to provide a passageway thereby for liquid, a perforated tube extending between the central portions of said plates, a filter mass surrounding the said tube and interposed between said plates and providing with said shell an annular passageway, means for supplying liquid to said passageway, and an outlet connection extending from the central tube, said plates being tapered or dished toward each other so as to clamp the outer part of said filter mass more tightly than the inner part.

3. In a filter, the combination of a shell, a perforated tube within the central portion of said shell and having corrugations in its wall, a plate extending across said shell and closing an end of said tube and having an outlet connection communicating with the interior of said tube, a second plate spaced from the first mentioned plate and extending across and closing the other end of said tube, a filter mass interposed between said plate and support and surrounding the said tube, there being a passageway provided between the filter mass and the shell, and means whereby liquid may be supplied to the space between the filter mass and the shell, said plates being tapered or dished toward each other so as to clamp the outer part of said filter mass more tightly than the inner part and force said mass toward said tube.

4. In a filter, the combination of a shell, a plate extending across said shell and having a cup shaped depression at the central portion thereof, said plate engaging the inner surface of the shell, a perforated tube having one end fitted over the cup shaped depression of said plate, a second plate within the shell and having a cup shaped central boss adapted to enter the opposite end of the tube, a filter mass interposed between said plates and surrounding the tube, there being an annular passageway between said second plate, the mass, and the shell, means for securing said plates together, means for supplying liquid to said passageway, and an outlet connection extending from the central portion of the first mentioned plate.

5. In a filter, the combination of a shell, a plate extending across said shell and having a boss at the central portion thereof, said plate engaging the inner surface of the shell, a perforated tube having one end fitted over said boss and having a corrugated outer wall, a second plate within the shell and also having a central boss adapted to

enter the opposite end of the tube, a filter mass interposed between said plates and surrounding the tube, there being an annular passageway between said second plate, the mass, and the shell, means for securing said plates together, and an outlet connection extending from the central portion of the first mentioned plate and communicating with the interior of said tube.

6. In a filter, the combination of a shell, a perforated tube within said shell, an outlet connection extending from one end of the said tube, and a coupling connected to the opposite end of said tube, said coupling being arranged within the shell and provided with a pressure relief valve, a filter mass surrounding the tube and spaced from the shell thereby providing an annular passageway, and means for supplying liquid to said passage-way.

7. In a filter, the combination with a shell, of a perforated tube within said shell, an outlet connection extending from the top of said tube, a coupling connected to the lower end of said tube, a pressure relief valve carried by said coupling, a filter mass surrounding the tube and means for holding said mass in position, and spaced from the shell together with means for supplying liquid to said space.

8. In a filter, the combination of a shell, a plate extending across said shell and forming a partition thereacross and having a central cup-like depression, a perforated tube receiving said depression, a second plate spaced from the first mentioned plate and having a central cup-shaped depression fitted within the opposite end of the tube and having its periphery spaced from the inner shell, a filter mass surrounding said tube and interposed between said plates, a third plate beneath the second plate and extending across the shell and forming a partition therewith and having a central cup shaped depression and provided with perforations outside said depression, a T-fitting having its opposite ends seated in the last mentioned cups and having a spring seated valve in the branch thereof in the space between the last two plates, an outlet connection communicating with the central portion of the tube and extending through the cup of the first mentioned plate, a bolt extending through the second and third plates and connecting the third plate to the first plate, and means for supplying liquid through the perforations in the third plate, into the chamber between the second and third plates, and into the annular passageway surrounding the filter mass.

9. In a filter, the combination of a shell, a plate extending across said shell and forming a partition thereacross, a perforated tube beneath said plate, a second plate spaced from the first mentioned plate and engaging the opposite end of the tube and having its periphery spaced from the inner shell, a filter mass surrounding said tube and interposed between said plates, a third plate beneath the second plate and extending across the shell and having a central cup shaped depression and provided with perforations outside said depression, a hollow fitting having its opposite ends seated in the last mentioned depressions and having a spring seated valve therein, an outlet connection communicating with the central portion of the tube and extending through the cup in the first-mentioned plate, and means for supplying liquid beneath the third plate.

10. In a filter, the combination of a shell, a plate extending across said shell and forming a partition, a second plate longitudinally spaced from the first mentioned plate, a perforated tube interposed between the central portions of said plates, a filter mass surrounding said tube and interposed between said plates, there being a passageway provided between the mass and the shell, said plates being provided with portions deflected toward each other whereby they are adapted to clamp and compress the peripheral portions of the filter mass, means for supplying liquid to said annular space, and an outlet connection leading from the perforated tube.

11. In a filter, combination with an outer receptacle, of a shell arranged therein and spaced therefrom, a filtering mass arranged within the shell and spaced therefrom, a perforated tube arranged centrally of the filtering mass, an outlet connection leading from one end of said perforated tube, a connection at the opposite end of said tube having an inwardly opening check valve said valve connection being within the shell, means for supplying liquid to the spaces between the receptacle and shell, and shell and filtering mass, and means for connecting said parts together as set forth.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses.

JOHN G. UTZ.
CLYDE S. PELTON.

Witnesses:

JOHN B. HULL,
HAROLD E. SMITH.