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W. KASTEN

2,413,769

FILTER

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Fig. 1

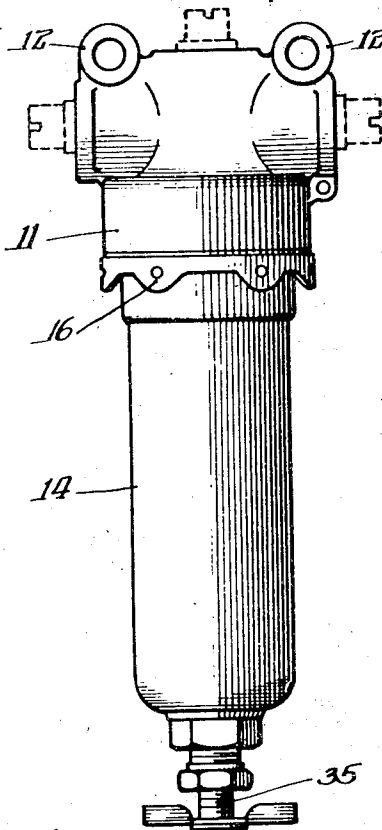


Fig. 2

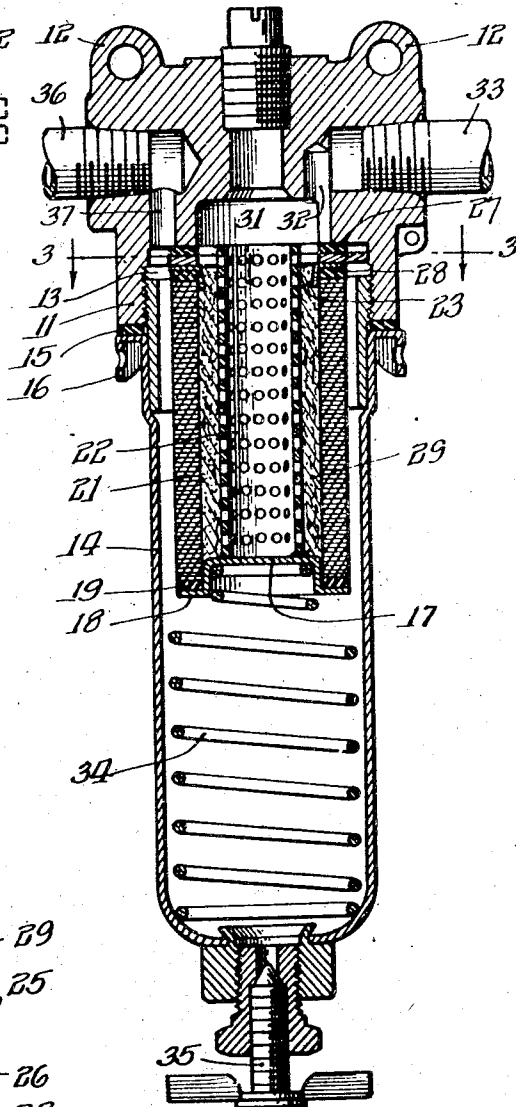


Fig. 3

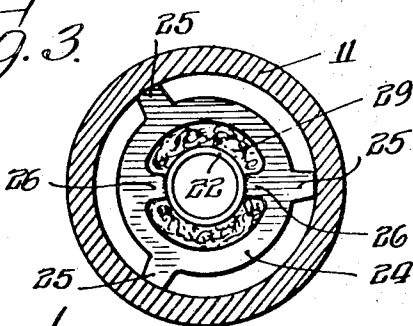
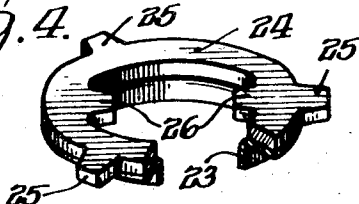


Fig. 4



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FILTER

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1 Claim. (Cl. 183—44)

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The present invention relates to certain structural and functional features involving novelty and originality in filters for various types of uses, one especially being the filtering and purification of the exhaust or combustion gases of internal-combustion engines or motors, whereby to precondition such gases for subsequent testing or analysis for determination of whether the carburetor of the engine and its explosion characteristics are the most favorable and efficient for the operation of the engine.

Such emitted gases ordinarily contain some lubricant, water and extremely fine particles, such as smoke, tars, etc., suspended in the gases, especially when ethyl-gasoline is used, and these should be effectively and adequately removed or eliminated to render the later analysis a procedure which will produce most reliable results.

One leading aim and primary purpose of the invention is the provision of a filter of such character that it will segregate out all of such contaminating ingredients to allow the analysis to proceed with the accomplishment of wholly trustworthy conclusions and deductions.

Another object of the invention is to supply a filter of this general type and style which is simple in construction, which is relatively inexpensive to produce, and which is unlikely to become damaged or injured in ordinary service.

So that those acquainted with and skilled in this art may understand the new structure and mode of operation of a present approved embodiment of the invention, such a filter has been illustrated in detail in the accompanying drawing, forming a part of this specification, and to which reference should be had in connection with the following full and complete description.

In this drawing, in which the same parts have been designated with like reference numerals throughout the several views thereof:

Figure 1 is an elevation of the complete filter;

Figure 2 is a central, longitudinal, vertical section through the filter on a larger scale;

Figure 3 is a cross-section on line 3—3 of Figure 2, the parts being viewed in the direction indicated by the arrows; and

Figure 4 is a perspective view of two united elements of the filter partly broken away to more clearly show the construction.

Referring to such drawing, it will be observed that the novel and improved filter includes a top casting or body 11 adapted to be suitably mounted and supported in position, by means, now shown, extended through a pair of horizontally-apertured ears 12, 12, the lower portion of

such member 11 having an internally-screw-threaded, round cavity or chamber 13 with a lower open end or mouth in which is screwed the upper, open, terminal portion of a round metal shell or casing 14 with an appropriate, resilient, pressure-sealing gasket 15 between the bottom face of the body 11 and the top surface of an apertured flange 16 depending around the upper portion of such shell, and by means of which the latter may be readily turned to screw it into place.

The innovatory, edge-filtration filter-element enclosed in such casing includes an inverted, cup-shaped, round, metal bottom-closure 17 having an outstanding, flat, marginal flange 18 on which, and preferably adhered or cemented to the top surface of which, is a ring-shaped, resilient, neoprene or other suitable gasket 19, and above, and bearing on, such gasket and desirably adhered thereto, is an elongated, cylindrical, hollow filter-body 21 composed of either a stack or pack of washer-shaped, registered, paper or cellulose discs, or a helically-wound paper or other ribbon with its plurality of layers in registration and in face-to-face contact with one another, but, in either case, the paper or other material thereof is impregnated with a suitable varnish, plastic, resin, or other appropriate agent protecting the material which it permeates against detrimental action thereon by any of the materials or substances with which it will come in contact in service, such agent acting additionally to adhere said paper or other cellulose layers together, but not closing the shallow spaces or gaps between the layers through which the filtrate passes inwardly of the filter to its hollow interior.

Internally of the filter-member 21 and spaced inwardly away from its inner surface, a uniformly-perforated, cylindrical metal tube 22 is soldered or otherwise adhered at its lower end to, and concentric with, the bottom-closure 17, such multi-apertured tube extending upwardly through a downwardly-flanged metal ring 23 soldered to the underside of, and in register with, a flat metal-ring 24 having external and internal projections 25 and 26, respectively, such inner lugs 26 spacing the double-ring 23, 24 equally and uniformly outwardly away from the top part of tube 22, the external lugs 25 engaging the unthreaded upper portion of the circular wall of chamber 13 thereby holding the filter-member centered in the casing, neoprene gaskets 27, 28 being present between the top face of ring 24 and the under-surface of the end-wall of chamber 13 and also between the bottom face of ring

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23 and the upper layer of the filter-element proper, these parts desirably being cemented or adhered together.

The circular or annular space between the elements 21, 23, and 24, and the perforated or foraminous member 22 is completely occupied by compacted, fine-spun fiber-glass 29, such open-top apertured-conduit 22 being in register with and discharging the filtrate upwardly into a cavity 31 in the block 11 communicating through a passage 32 with a discharge-pipe 33.

As will readily be perceived from Figure 2 of the drawing, the filter-member as a whole is normally maintained forced up into position by a coiled-spring 34 bearing on the inside of the lower end of shell 14 and pressing up against the underside of the end-closure 17, such lower portion of the elongated shell or casing having a manually-controlled valve 35, the opening of which permits the accumulated, trapped contents in the bottom portion of the shell to be drained off as occasion requires, whereupon the valve may be again closed.

The admission or inlet pipe 36 delivers the contaminated fluid to be filtered under pressure through the passage 37 into the casing 14 outside of the filter-member as is common practice.

The outstanding novel structural features of this filter and its particularly valuable functional properties reside in substantial measure in the duplex character of the compound filter in that, when the filter, operating on the exhaust gases or the products of combustion from an internal-combustion engine, for example, both the outer or external edge-filtration filter 21 and the inner "through" fiber-glass filter coact with one another in an unusual manner, each to improve and modify the performance of the other.

That is to say, the outer filter, composed of the registered face-to-face contacting, adhered-together layers of the impregnated rugose-surface paper or other comparable cellulose material, acts to more or less coagulate and to filter out the lubricant or oil from the gases, and this function is facilitated as to evenness and equality due to the fact that the gases undergoing treatment are forced under pressure through such edge-filtration filter, and the evenness or uniformity of disposition of such gases while undergoing treatment is facilitated and augmented by the presence and action of the central, uniformly-apertured tube

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22 through which they must automatically flow to escape to the discharge-pipe.

The secondary medium of finely-spun fiber-glass filaments or similar substance has an affinity for water and moisture which it removes from the gas undergoing treatment, and in this connection it should be borne in mind that the direct enclosure of such spun-glass body by the surrounding and confining edge-filtration filter 21 with its numerous, spaced-apart, extremely-shallow, annular, thin gaps or passages provides a very efficient distributor and subdivider of the gases before they reach the spun-glass, so that the entire external area of the glass body functions evenly, efficiently, and effectively.

Another advantage resulting from the use of the two media is that the fiber-glass alone would allow channelling, that is, would allow the particles to follow the same path of least resistance through the filter, but the use of the primary filter directs the flow to the secondary filter, thus eliminating this trouble, and, in addition, the primary medium adds materially to the useful life of the secondary or glass medium by coagulating and removing many particles which would tend to clog the extremely fine and minute passages through the spun-glass layer.

I claim:

In a hollow edge-filtration filter-element formed of a series of registered layers of rugose-surface, substantially fluid-impervious material in face-to-face contact with one another providing separated shallow filtering spaces between such layers through which the filtrate of said element passes, and means closing one end of such filter-element, the other end of the filter-element remaining open as a discharge-port, the novel combination of a substantially uniformly apertured tube inside of and spaced inwardly away from the inner surface of said filter-element and in communication with said discharge-port, and compacted spun-glass having an affinity for water and moisture filling the space between said filter-element and said tube, whereby in the treatment of internal-combustion engine exhaust gases said filter-element acts to more or less coagulate and filter out the lubricant or oil from the gases, and also functions as a substantially uniformly acting distributor for the gases undergoing filtration before they reach said spun-glass and prevents channeling through the latter.

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