Oct. 22, 1957 A. H. CRISP 2,810,451

AIR CLEANER

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Fig. 1

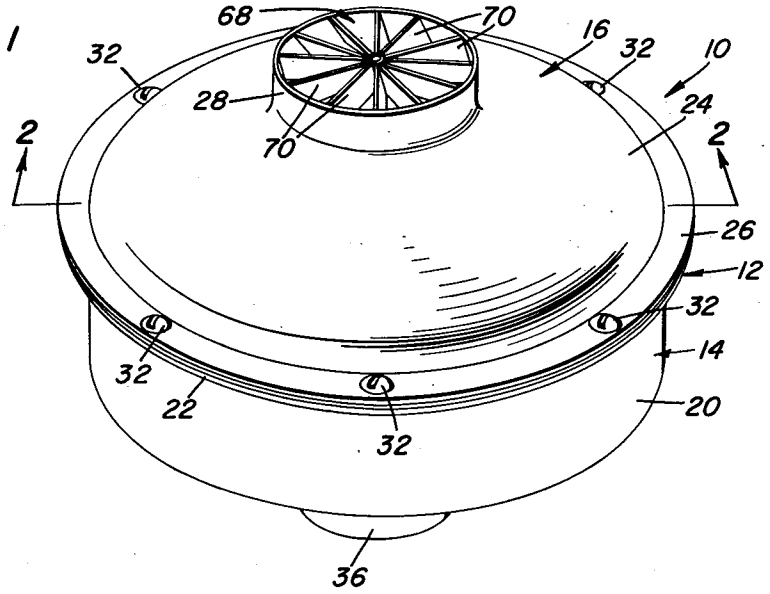
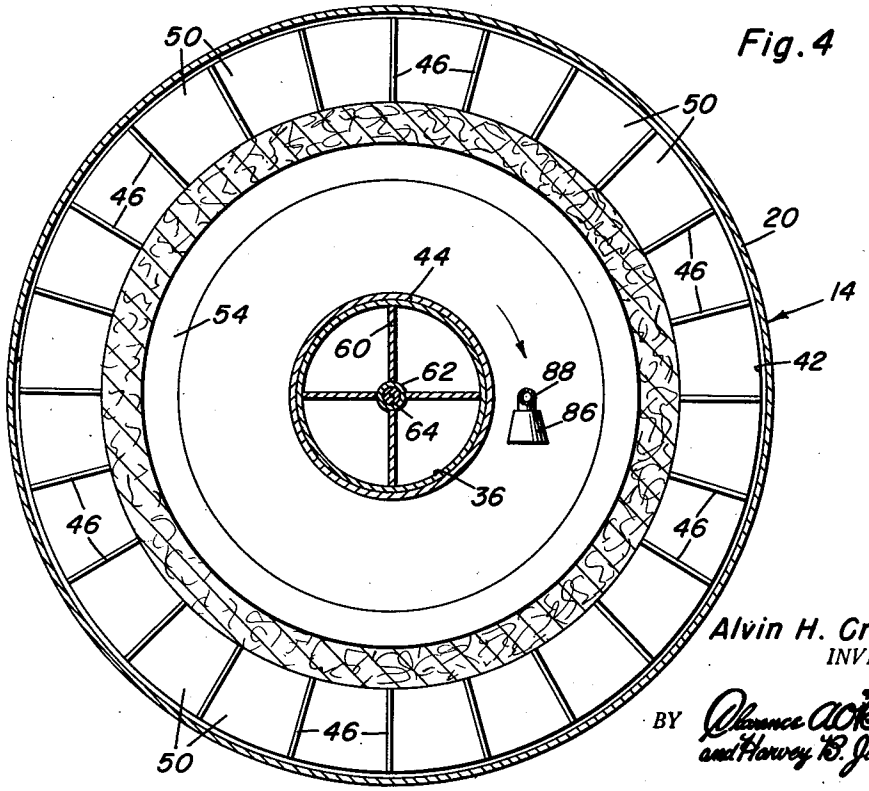


Fig. 4



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Fig. 2

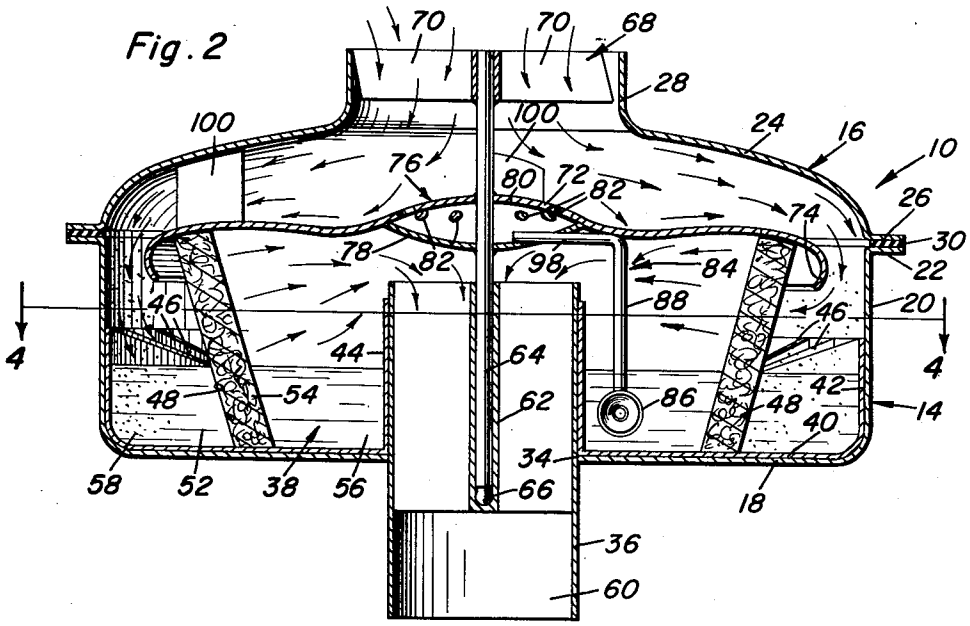
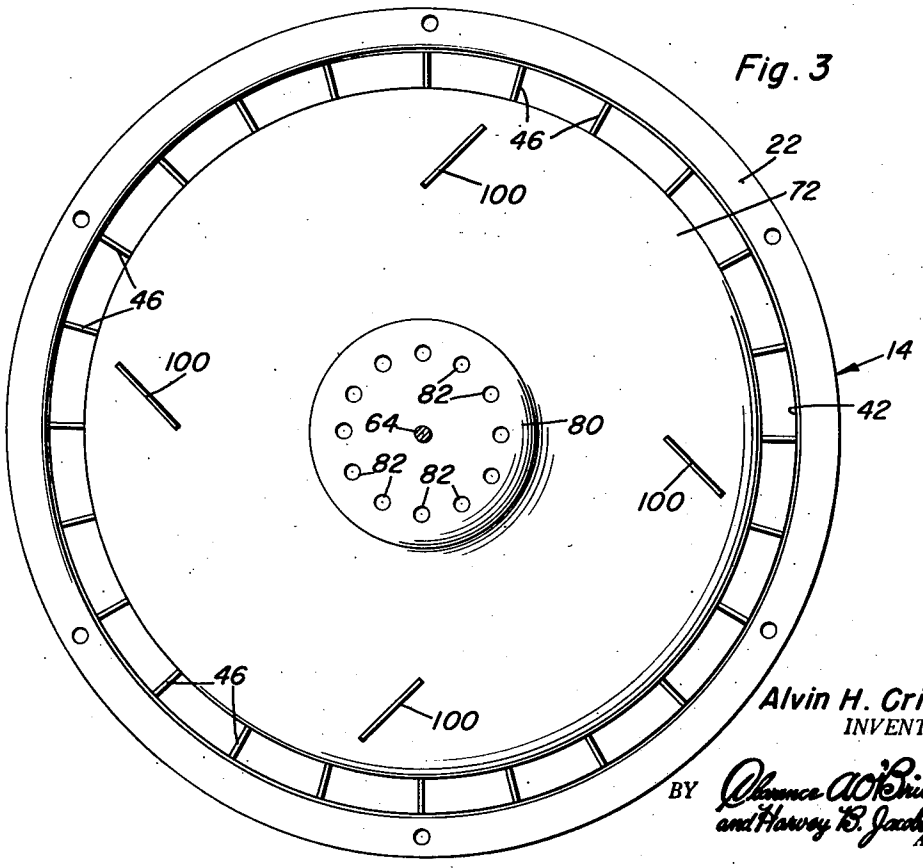


Fig. 3



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AIR CLEANER

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6 Claims. (Cl. 183—13)

This invention relates generally to devices for cleaning gases, and is more particularly concerned with a novel device for cleaning the air supply for internal combustion engines, for example, although it is not necessarily limited only to this particular use.

A primary object of invention is to provide a film of cleaning liquid for intimate surface contact with uncleaned gases being drawn into a cleaner compartment and including filter means for separating foreign matter from the cleaning liquid while permitting the passage of clean gas to pass therethrough.

Another object of invention in conformance with that set forth above is to provide a rotary plate member driven by unclean gas drawn into a gas cleaner which includes a cleaning fluid reservoir divided into separate reservoir compartments containing cleaning liquid, and pump means driven by the rotary plate for drawing cleaned cleaning fluid from the one reservoir compartment and centrifugally depositing a film thereof on the upper surface of the rotary plate for intimate contact with uncleaned gas.

A still further object of invention in conformance with that set forth above is to provide a gas cleaner of the character set forth which is readily and economically manufactured, easily installed and maintained, and readily acceptable and highly efficient for the purpose intended.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a perspective view of the novel gas cleaner;

Figure 2 is a vertical sectional view taken substantially on line 2—2 of Figure 1;

Figure 3 is a top plan view of the gas cleaner with the upper housing member shell removed; and

Figure 4 is a sectional view taken substantially on line 4—4 of Figure 2.

Indicated generally at 10 is the novel gas cleaner which includes a housing member 12 comprised of a lower housing shell member 14 and an upper housing shell member 16. Although the housing member is disclosed as being circular any suitable configuration such as square, rectangular, etc. may be adapted.

The lower shell member 14 includes a body wall portion 18 terminating in an annular side wall 20 which terminates in an annular flange 22. The upper or inverted shell 16 includes a generally concave wall portion 24 terminating in an annular flange 26 and an upwardly opening tubular inlet conduit portion 28, said inlet conduit portion 28 providing an ingress for uncleaned gas, such as air being drawn into the intake manifold of an internal combustion engine. Thus the air or uncleaned gas drawn into the inlet conduit 28 might be said to be under forced draft condition. A suitable annular seal 30, of any suitable material, is interposed between the annular flange portions 22 and 26 of the lower and

upper shell portions of the housing, and said flanges are sealingly secured by means of suitable fastener elements 32 extending around the circumference of the housing member.

The bottom wall 18 of the lower shell member 14 includes a central aperture portion 34 accommodating therein a tubular outlet conduit 36 which is in substantial co-axial alignment with the inlet conduit portion 28 of the upper housing shell member, said conduit 36 defining in the lower shell member 14 a cleaning fluid reservoir indicated generally at 38 which will contain a suitable cleaning liquid such as any lightweight oil, kerosene, etc.

An annular dish-shaped member including a bottom wall portion 40, vertically disposed annular side wall portion 42 and central tubular support portion 44 is suitably secured within the lower shell portion of the housing member and conforming generally to the configuration thereof, the tubular support portion 44 surrounding the tubular outlet conduit portion 36 and being secured thereto for providing substantial rigidity thereto. The outlet conduit portion 36 may be secured to any suitable source of vacuum such as the intake manifold of the previously mentioned internal combustion engine.

The annular wall portion 42 of the inner dish member in the lower shell portion of the housing has secured thereto a plurality of circumferentially spaced baffle elements 46 which terminate in a downwardly angulated edge portion 48, see Figure 2, providing a plurality of separate compartments 50 for diminishing turbulence in the cleaning liquid indicated at 52, the edges 48 providing an abutment for an annularly disposed vertically extending filter element 54 which defines an inner fluid reservoir compartment 56 normally containing filtered and cleaned cleaning liquid, and an outer reservoir compartment 58 normally containing the unfiltered or contaminated cleaning liquid. The filter element is of any suitable material which permits the ready passage of the cleaning liquid therethrough while retaining in the reservoir compartment the foreign matter normally contained in the uncleaned gas.

The outlet conduit 36 includes therein a suitable spider member of a cruciform shape, for example, see Figure 4, suitably secured therein and indicated at 60, said spider 60 supporting a vertical bearing shaft element 62 which is in coaxial alignment with the inlet and outlet conduit portions 28 and 36, respectively, and which rotatably supports therein a shaft element 64 having a lower suitable bearing end portion 66 the upper end of which having suitably secured thereon a forced draft propelling assembly 68 comprised of a plurality of suitably disposed blade elements 70 extending radially within the inlet conduit 28. Air drawn into the inlet conduit 28 will thus cause rotation of the propeller assembly 68 accordingly resulting in rotation of the shaft 64.

Intermediately secured on the shaft 64 is a rotary plate member 72 which extends horizontally in overlying relationship to the inner reservoir compartment 56 over the top edge of the filter element 54 terminating in a downwardly disposed curved edge 74 in intermediate overlying relationship to the outer reservoir compartment 58. Air drawn into the inlet compartment 28, as indicated by the direction arrows, passes into intimate contact with the upper surface of the rotary plate 72 and thence passes into the outer reservoir compartment 58, through the filter element 54, into the inner reservoir compartment 56 and finally out of the outlet conduit 36.

The rotary plate member 72 includes a central lense shaped compartment portion 76 comprised of a solid bottom wall portion 78 and a uniformly perforated upper wall portion 80 containing a plurality of equidistantly spaced aperture portions 82.

A pump assembly is indicated generally at 84 and in-

cludes a conical scoop portion 86 opening in the direction of rotation of the rotary plate member and movable therewith, said scoop member communicating with an upwardly extending conduit portion 88 terminating in a right angular outlet portion 90 extending through the lower plate portion 78 in the chamber 76 providing said chamber 76 with filtered cleaning liquid inasmuch as the scoop 86 rotates the inner reservoir compartment containing said filter and cleaned cleaning liquid, the liquid deposited in said compartment 76 being distributed as a surface film on top of the rotary plate 72 by centrifugal motion of said plate and being centrifugally urged over the outer periphery of said plate into the outer compartment 58. The uncleaned gas being drawn into the conduit 28 comes in intimate contact with the outer surface of the rotary plate, said gas being drawn through the filter element 54 as indicated by the direction arrows, and the contaminated oil being drawn through the filter element 54 by the pump scoop 86. The previously mentioned baffles 46 will tend to diminish turbulence in the cleaning liquid. The cleaning liquid contained in the reservoir will be sufficient to provide lubrication for the shaft 64 and the bearing end portion 66 thereof.

The rotary plate 72 includes a plurality of medially disposed stop elements 100 suitably secured equidistantly about said rotary plate, said stop plates 100 being disposed in angular relation to the diameter of said rotary plate whereby air drawn in from the conduit 28 will be directed toward the outer periphery of the rotary plate member 72 thus tending to aid rotation of said plate.

Various positional directional terms such as "top," "bottom," etc. are utilized herein to have only a relative connotation to aid in describing the device and are not intended to require any particular orientation with respect to any internal elements.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A gas cleaner comprising annular stationary shell including a central tubular gas conduit extending downwardly from a bottom wall portion providing an annular reservoir compartment for a cleaning liquid, an inverted upper stationary shell securable in overlying relationship to the lower shell and including a central tubular conduit extending upwardly and providing an inlet for uncleaned forced draft gas, a vertically disposed filter member extending upwardly from the bottom wall portion of the annular reservoir compartment and defining separate inner and outer adjacent reservoir compartments disposed circumferentially about the central tubular conduit of the lower shell, a rotor plate member including a central portion overlying the inner reservoir compartment section, said plate including a peripheral edge portion extending in overlying relationship to said filter member and terminating intermediate the outer reservoir compartment section, means suporting said rotor plate member for free rotation, means rotating said rotor plate member in response to forced draft gas drawn into the upper central conduit, over the rotor plate member, through the filter element, between said outer and inner reservoir compartment sections and out of the lower tubular conduit, and pump means operable in response to rotation of the rotor plate member for moving filtered clean liquid from the inner reservoir section and providing an overlying film on the outer surface of said rotor plate member for intimate contact with the uncleaned gas being drawn into said inlet conduit.

2. A gas cleaner as set forth in claim 1 wherein said pump means includes a scoop element immersed in the cleaning liquid and opening in the direction of rotation of the rotor plate member, and conduit means extending upwardly from said scoop element and including an outlet portion centrifugally depositing cleaning liquid on the outer surface of said rotor plate member.

3. A gas cleaner as set forth in claim 2 wherein said rotor plate member includes a central cleaning liquid compartment in communication with the outlet portion of the conduit means, said compartment including a plurality of equidistant circumferentially disposed aperture portions for centrifugally dispersing the cleaning liquid as a film on the upper surface portion of said rotor plate member.

4. A gas cleaner as set forth in claim 1 wherein said outer reservoir compartment includes a plurality of vertically disposed and radially extending baffle elements extending between the filter element and an inner surface wall portion of said lower reservoir section for tending to diminish turbulence in the cleaning liquid.

5. A gas cleaner as set forth in claim 1 including a plurality of vertical stop elements extending integrally from an upper surface portion of said rotor plate member, said stop elements being equidistantly disposed in circumferential relationship on said rotor plate member for maintaining a spaced relationship between the inner surface of the upper shell and said rotor plate member, said stop elements being disposed in an angular relationship relative to the diameter of said rotor plate member for directing uncleaned gas circumferentially away from the direction of rotation of said rotor plate member.

6. A gas cleaner comprising a horizontally disposed housing member including an upper inlet portion and a tubular outlet extending through a bottom wall portion, said tubular outlet defining a liquid reservoir in said housing member, an annular filter element dividing said liquid reservoir into inner and outer compartments, a horizontally rotatable plate member extending over said inner compartment and an upper edge portion of said filter element, said plate member including a peripheral edge overlying said outer compartment, rotary power means in said inlet portion for said plate member, said rotary power means being energized by uncleaned gas drawn into said inlet portion, above the top of said plate member, and pump means including a scoop depending from said rotary plate member into said inner compartment and operated in response to rotation of said rotary plate member for lifting filtered cleaning liquid from said inner compartment and centrifugally depositing a film of cleaning liquid on the top of said rotary plate member for intimate contact with uncleaned gas being drawn into the inlet portion of said housing member.

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