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AIR CLEANER AND SILENCER ASSEMBLY

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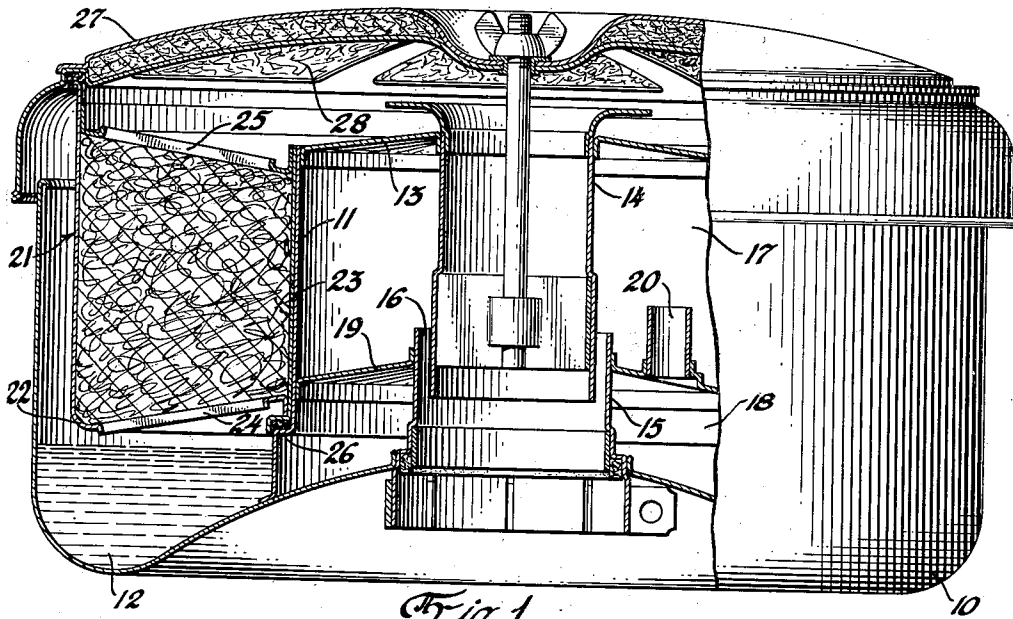


Fig. 1

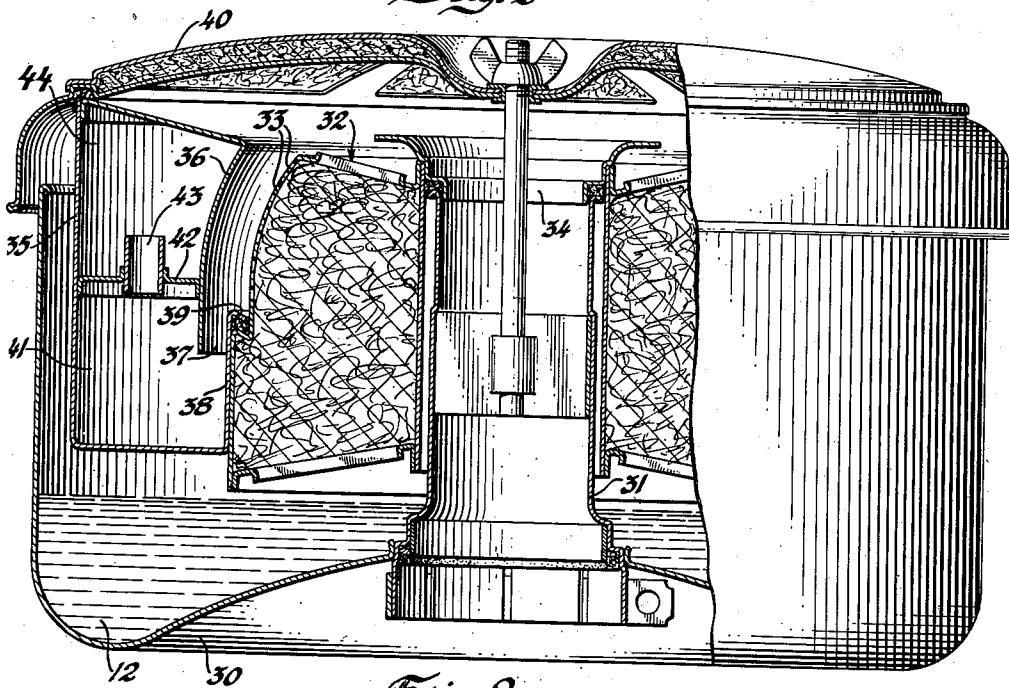


Fig. 2

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AIR CLEANER AND SILENCER ASSEMBLY

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4 Claims. (Cl. 183—15)

This invention has for its principal object to provide an air cleaner and silencer assembly in which the elements are so constructed and arranged as to minimize the height of the assembly and to make it in all respects as compact as possible.

The invention is primarily concerned with assemblies of liquid bath type air cleaners and resonator silencers and to the end mentioned above I construct and arrange the air cleaner and the silencer so that one encircles the other.

For a better understanding of the nature and objects of this invention, reference is made to the following specification wherein are described the preferred embodiments of the invention which are illustrated in the accompany drawing.

In the accompanying drawing:

Figure 1 is a view, mainly in vertical section, of a liquid bath type air cleaner and resonator silencer assembly in which the air cleaner encircles the silencer.

Figure 2 is a view, similar to Figure 1, of a liquid bath type air cleaner and resonator silenced assembly in which the silencer encircles the air cleaner.

The assembly shown in Figure 1 includes a member 10 shaped generally like a shallow circular bowl. Within the bowl-like member 10 there is disposed coaxially with it a cylindrical shell 11 whose lower end is seated on and welded or otherwise suitably secured to the bottom of the bowl-like member. The cylindrical shell and the bowl-like member define an annular reservoir which is filled with oil or some other suitable liquid 12 to about the level indicated in the drawing before the assembly is put into use.

Over the upper end of the cylindrical shell 11 there is secured a head 13 with an orifice in it which is coaxial with the cylindrical shell and in which there is secured a tube 14 which extends well toward but ends short of the bottom of the bowl-like member 10. In an orifice in the bottom of the bowl-like member 10 within the confines of the cylindrical shell 11 and coaxial with the orifice in the head 13 there is secured a tube 15 which is of larger diameter than the tube 14 and extends toward but ends short of the head 13 and encircles but is spaced from the lower end of the tube 14 by an annular aperture 16. The compartment defined by the shell 11, the tubes 14 and 15, the head 13 and the portion of the bottom of the bowl-like member 10 within the confines of the shell 11 which communicates through the aperture 16 with the duct defined by the tubes 14 and 15 through which air leaves the assembly is sub-

divided into two chambers 17 and 18 by a partition 19 through which extends a tube 20 which establishes communication between the chambers. The chambers 17 and 18 and the tube 20 and the aperture 16, of course, constitute a compound resonator.

Between the cylindrical shell 11 and the side wall of the bowl-like member 10 there is disposed an annular filter 21 which consists of an annular shell 22 filled with a suitable air filtering medium 23 which is wetted with the liquid 12. The inner and outer walls of the annular shell 22 are imperforate but there are in its lower wall air inlet orifices 24 and in its upper wall air outlet orifices 25 from which air passes toward the upper end of the duct 14—15. The inner wall of the annular shell fits snugly around the cylindrical shell 11 but the outer wall thereof is spaced from the side wall of the bowl-like member 10 to define a passage through which air travels from the atmosphere toward the air inlet orifices in the filter. The filter is supported with its lower wall spaced above the liquid level in the reservoir to define a passage through which air travels from the passage between the side wall of the bowl-like member 10 and the outer wall of the filter to the air inlet orifices in the filter by a step 26 in the cylindrical shell 11 on which the lower end of the inner wall of the filter is seated.

On the outer edge of the filter there is seated a cover 27 which is lined with a sound absorbent 28 and closes the upper ends of the filter and the duct 14—15 to the atmosphere but is spaced from the latter and from the former except at its outer edge so that air may pass from the orifices 25 into the upper end of the duct 14—15.

The assembly shown in Figure 2 includes a member 30 which is similar to the member 10 and has an orifice in the center of its bottom in which there is secured a tube 31 which extends into the bowl-like member 30 to about the level of the upper edge of its side wall. The tube 31 through which air leaves the assembly defines with the bowl-like member 30 an annular reservoir which is filled to about the level indicated in the drawing with oil or some other suitable liquid 12 before the assembly is put into use. The tube 31 is encircled by an annular filter 32 which does not differ materially from the filter 21 except in size and in that its outer wall is offset inwardly about midway between its lower and upper ends and the portion above the offset is curved inwardly and upwardly and riddled with perforations 33. The filter 32 is supported with its lower wall above the liquid level in the annular reservoir by an annular element 34

which is secured to its inner wall and seated on the upper end of the tube 31.

Between the filter and the side wall of the bowl-like member 30 there is disposed an annular shell 35 whose upper and lower and outer walls are imperforate. The inner wall of the annular shell 35, however, consists of a member 36 which depends from the inner edge of the upper wall of the annular shell and whose upper part follows closely the contour of but is spaced from the upper portion of the outer wall of the filter to define an aperture 37 and a member 38 which projects upwardly from the inner edge of the lower wall of the annular shell and fits snugly around the lower portion of the outer wall of the filter and overlaps but is spaced outwardly from the lower edge of the member 36 by a continuation of the aperture 37. The annular shell 35 is supported from the filter 32 with its outer side wall spaced from the side wall of the bowl-like member 30 and its lower wall spaced above the liquid level in the annular reservoir to define a passage through which and the space between the lower wall of the filter and the liquid level in the annular reservoir air passes from the atmosphere into the air inlet orifices in the lower wall of the filter by a lip 39 on the member 38 which is seated on the step in the outer wall of the filter.

On the outer edge of the annular shell 35 there is seated a cover 40 which is similar to the cover 27 and closes the upper end of the aperture 37, the air outlet orifices in the upper wall of the filter and the upper end of the tube 31 to the atmosphere but is spaced from them so that air can pass from the air outlet orifices in the upper wall of the filter into the upper end of the tube and the aperture 37 communicates with this passage. The interior of the annular shell 35 which communicates, besides as I have intimated with the passage between the air outlet orifices in the upper wall of the filter and the upper end of the tube 31 through the aperture 37, with the interior of the filter through the aperture 37 and the perforations 33 is subdivided into two chambers 41 and 44 by a partition 42 through which extends a tube 43 which establishes communication between the chambers. The chambers 41 and 44 and the tube 43 and the aperture 37 and the perforations 33, of course, constitute a compound resonator.

The assemblies shown in the drawing were designed for use on internal combustion engine carburetors with the lower ends of the tubes 15 and 31 connected to the air intake tubes of the carburetors. The path of travel of air through the assemblies has been indicated in the foregoing description and since individually the air cleaners and silencers included in the assemblies are of well known types further description of the mode of operation of the assemblies appears unnecessary—it being understood, of course, that the resonators 17—20—18—16 and 41—43—44—37—33 are to be so tuned that they will respond to and attenuate by resonance preselected objectionable sound waves in the intake noises of the engines on which the assemblies are installed. Both of the assemblies, of course, represent realizations of the objects of invention previously set forth and both do substantially the same thing in substantially the same way but it is, of course, apparent that the assembly shown in Figure 1 has the greater air cleaning capacity and the assembly shown in Figure 2 the greater silencing capacity. It will, of course, be under-

stood that in neither of the assemblies is it necessary to locate the outer "neck" of the resonator in the wall in which it is shown. For example, in either of the assemblies, the outer "neck" may be located in the outer instead of the inner wall of the resonator. In the case of the assembly shown in Figure 1, this location of the outer "neck" will make it possible to use it, as the assembly shown in Figure 2 may be used without re-locating the outer "neck" of the resonator included in it, with an outlet duct which opens into it through its cover instead of through its bottom.

I claim:

1. In an appliance of the type disclosed, a bowl-like member, a shell which is disposed within the bowl-like member with its lower end seated on the bottom thereof and defines with the bowl-like member an annular liquid reservoir, means, including a duct which extends through the shell and the bottom of the bowl-like member and through which air leaves the appliance, which with the shell defines a sound wave attenuating compartment which communicates with the duct as a side branch, an annular filter with air inlet and outlet orifices in its lower and upper walls which is disposed within the bowl-like member and encircles the shell with its outer side and lower walls spaced from the side and bottom walls of the bowl-like member to define a passage through which air travels from the atmosphere to the air inlet orifices in the lower wall of the filter, and a cover which closes the air outlet orifices in the upper wall of the filter and the upper end of the duct to the atmosphere but does not prevent air traveling from the former into the latter.

2. In an appliance of the type disclosed, a member which is shaped generally like a bowl and has in its bottom near its outer edge a pool of liquid, a tubular member which extends through the bottom of the generally bowl-shaped member and constitutes the duct through which air leaves the appliance, a generally cylindrical wall which is disposed within the generally bowl-shaped member and encircles and is radially spaced from the tubular member and defines with the latter a sound wave attenuating compartment which communicates with the duct as a side branch, a filter member with air inlet and outlet orifices in it near its lower and upper ends disposed within the generally bowl-shaped member around the sound wave attenuating compartment and above the pool of liquid in the bottom of the generally bowl-shaped member with its outer wall spaced from the outer side wall of the generally bowl-shaped member to define with it a passage through which air travels from the atmosphere to the air inlet orifice in the filter member, and a cover which closes the air outlet orifice in the filter member and the upper end of the tubular member to the atmosphere and constitutes a wall of a passage through which air travels from the former into the latter.

3. In an appliance of the type disclosed, a member which is shaped generally like a bowl and has in its bottom near its outer edge a pool of liquid, a tubular member which constitutes the duct through which air leaves the appliance, a generally cylindrical wall which is disposed within the generally bowl-shaped member and defines a sound wave attenuating compartment which communicates as a side branch with the passage through which air travels through the appliance, a filter member with air inlet and outlet orifices

in it near its lower and upper ends disposed within the generally bowl-shaped member around the sound wave attenuating compartment and above the pool of liquid in the bottom of the generally bowl-shaped member with its outer wall spaced from the outer side wall of the generally bowl-shaped member to define with it a passage through which air travels from the atmosphere to the air inlet orifice in the filter member, and a cover which closes the air outlet orifice in the filter member to the atmosphere and constitutes a wall of a passage through which air travels from it into the tubular member.

4. In an appliance of the type disclosed, a member which is shaped generally like a bowl and has in its bottom near its outer edge a pool of liquid, a tubular member which constitutes the duct through which air leaves the appliance, a generally cylindrical wall which is disposed within the generally bowl-shaped member and defines

a sound wave attenuating compartment which communicates as a side branch with the passage through which air travels through the appliance, a filter member with air inlet and outlet orifices in it near its lower and upper ends carried by the sound wave attenuating compartment and disposed within the generally bowl-shaped member around the sound wave attenuating compartment and above the pool of liquid in the bottom of the generally bowl-shaped member with its outer wall spaced from the outer side wall of the generally bowl-shaped member to define with it a passage through which air travels from the atmosphere to the air inlet orifice in the filter member, and a cover which closes the air outlet orifice in the filter member to the atmosphere and constitutes a wall of a passage through which air travels from it into the tubular member.

ALEXANDER F. BAILLIO. 20