

July 31, 1934.

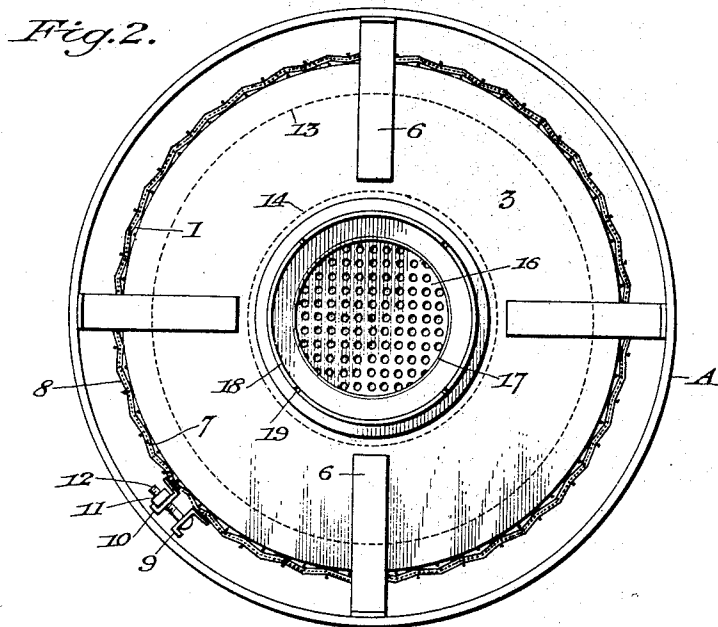
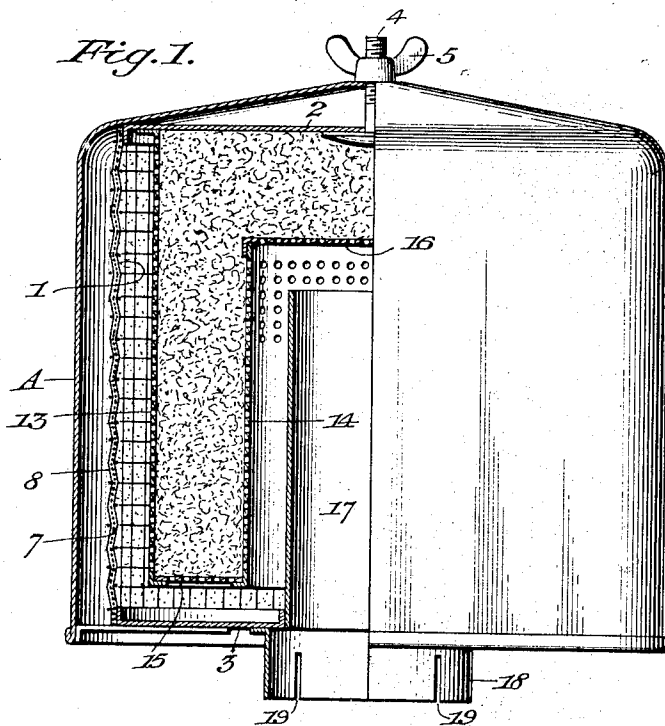
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1,968,312

AIR CLEANER AND SILENCER

Filed June 12, 1933

2 Sheets-Sheet 1



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Fig. 3.

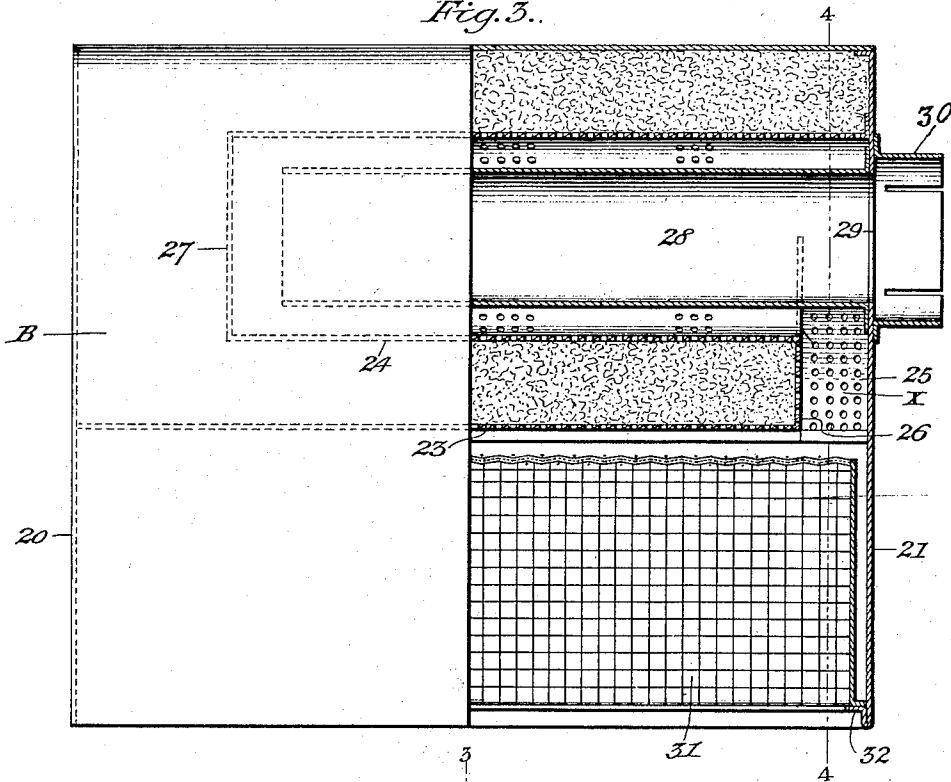
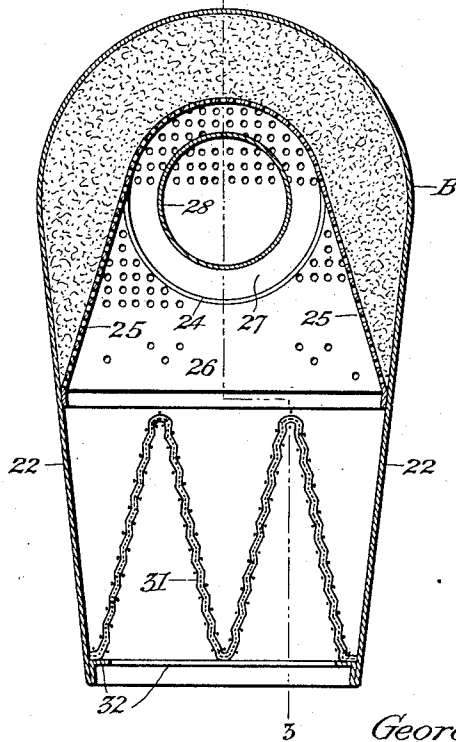


Fig. 4.



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UNITED STATES PATENT OFFICE

1,968,312

AIR CLEANER AND SILENCER

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Application June 12, 1933, Serial No. 675,389

8 Claims. (Cl. 183-44)

My invention relates to improvements in air cleaners and silencers for internal combustion engines.

The object of the invention is to provide a casing for attachment to a carburetor, having an air inlet pipe, a body of sound absorbing material surrounding but spaced from said pipe, and an air filtering medium, whereby air passing to the carburetor is thoroughly cleansed and the sound vibrations from the engine are delivered against the said body of sound absorbing material and are thereby suppressed by absorption; the dust and other foreign substances separated from the air being removed from the cleaner by the vibratory action of the engine while in operation, whereby a self cleaning filtering medium is provided.

Further, to provide a casing having an air inlet pipe therein for attachment to a carburetor, a circular body of sound absorbing material surrounding but spaced from the pipe, and a circular air filter surrounding but spaced from the body of sound absorbing material, whereby a large air filtering area is provided, as well as a circuitous passage connecting the filter and the inlet end of the air pipe, from which passage the sound vibrations pass into and are suppressed by the said sound absorbing material.

These objects are accomplished in the manner illustrated in the accompanying drawings, in which:

Fig. 1 is a view partly in side elevation and partly in section of a circular form of air cleaner and silencer particularly adapted for attachment to a down draught carburetor or one having vertically disposed intakes.

Fig. 2 is a bottom view of the same.

Fig. 3 is a side elevation partly in section, the section being taken on the line 3-3 of Fig. 4.

Fig. 4 is a sectional view on the line 4-4 of Fig. 3.

Referring to Figures 1 and 2 of the drawings, A refers to a circular housing which is open at the bottom and closed at its upper end which preferably slopes gently from its center toward the wall of the housing. Within the housing and spaced from the wall thereof, is placed a circular cage comprising a coarse mesh screen 1, which is soldered at its upper and lower ends to circular top and bottom plates 2 and 3, the top plate engaging the end wall of the housing and this plate carries a central bolt 4 which extends through a central hole in the end wall of the housing and receives a thumb nut 5 which, when screwed against the end wall, clamps the plate 2 against the said wall, thus supporting the cage compris-

ing upper and lower plates and the screen, within the housing, and radial strips 6 are secured to the bottom plate 3 and their outer ends terminate in short right angled bends which engage the inner face of the wall of the housing and thus maintain the cage in a position concentric with the said wall. A sheet 7 of a suitable air filtering material, such as filtering paper, is passed around the screen 1 and is held in place by a second coarse mesh screen 8 which encircles the sheet and is clamped against it in the following manner: To the vertical edges of this screen are soldered angle strips 9 and 10, each of which is provided with a series of screw holes, the holes in one strip being in line with those in the other strip. Nuts 11 are soldered to the strip 10 in alignment with the screw holes therein and screws 12 are passed through the holes in the strip 9 and screwed through the said nuts until their heads engage the strip 9, thus clamping the screen 8 against the sheet of filtering paper. A closely perforated circular sheet metal wall 13 is placed concentrically within the cage and spaced from it and is secured at its upper end to the plate 2, its lower end terminating a short distance from the plate 3. A second perforated circular sheet metal wall 14, of less diameter and less height than the wall 13, is placed concentrically therein and the lower ends of these walls are connected by a perforated ring plate 15 which closes the space between the two walls at their lower ends. A perforated plate 16 closes the upper end of the inner wall 14, and the space between the walls and between the plates 2 and 16 is filled with a suitable sound silencing material, such as mineral fibre, wool, cotton, or steel, copper or other metallic wool. While the walls 13 and 14 are shown as of perforated sheet metal, they may also be made of screen cloth, and the invention contemplates the use of either material.

The bottom plate 3 has a central hole of less diameter than that of the inner wall 14, and in this hole is secured the lower end of an air pipe 17, the upper end of which terminates a short distance from the plate 16 which closes the upper end of the inner wall 14, and a flat band or ring 18 is secured to the bottom plate 3, concentric with the air pipe 17, and of slightly greater diameter, and this band is adapted to fit over the intake end of a down draught carburetor and to be secured thereto in any suitable manner, the band being provided with slits 19 which extend in from its lower edge and permit expansion or contraction of the band so that it may be clamped upon the end of the carburetor.

It will thus be seen that the air cleaner, the upper and lower plates 2 and 3, the walls containing the silencing material and the air pipe 17, are all connected together and form one unit of the device, the other unit being the housing A, the units being held one within the other in co-operative relation by the bolt 4 and thumb nut 5. When it is desired to remove an old sheet of filter paper and replace it with a new sheet, it is only necessary to unscrew the thumb nut and remove the housing; then unscrew the screws 12 and remove the screen sheet 8. The old filter sheet may then be removed from the screen 1, and a new filter sheet may be placed around the screen 1, and clamped thereto by the screen 8. The air passing to the carburetor enters the space between the housing and screen wall and passes through the screen into the space between the screen and the outer perforated wall 13 of the container for the silencing material, thence through the space between the lower end of the said container and the plate 3 and up through the space between the inner wall 14 of the container and the air pipe 17, and into and through the said pipe to the carburetor. By this arrangement a large circular screen surface is provided, which permits an ample air supply to the carburetor, a portion of the air passing through the silencing material, and the sound vibrations from the engine pass up through the pipe 17 and into the circuitous passage between the pipe and the perforated wall of the container for the silencing material and into the said material, where the sound is suppressed by absorption and practically eliminated.

In Figures 3 and 4, I have shown a style of air cleaner and silencer which is more particularly adapted for carburetors having a horizontally disposed air intake. In this device, the housing B is rectangular in form and open at the bottom, the ends 20 and 21 being vertically disposed while the sides 22 have a slight outward inclination from their lower edges, and merge into a semi-circular top. A perforated horizontal plate 23 is secured in the housing about midway of its height, and extends from side to side and from the end 20 to within a short distance of the end 21, and a perforated tube 24 is positioned in the space between the top of the housing and the plate 23 and is concentric with the top of the housing. This tube is secured at one end to the end wall 21 of the housing, and the lower half of this end of the tube is cut away in line with the adjacent end of the horizontal plate 23 while perforated strips 25 forming a continuation of the upper half, extend downwardly and outwardly and are secured at their lower ends to the sides of the housing between the end of the plate 23 and the end wall 21 of the housing. The end of the lower half of the tube at this point rests in a saddle or semi-circular recess in a perforated plate 26, which is positioned between the strips 25, and thus the plate 26, the strips 25, and end wall 21 of the housing form an air passage X, which communicates with the tube 24, and this tube is closed at its opposite end by a perforated plate 27, a space of considerable width being left between this end of the tube and the end wall 20 of the housing, and the entire space surrounding the tube between the housing walls and the horizontal plate 23, is filled with sound absorbing material. An air tube 28 is disposed concentrically within the tube 24 and is secured at one end to the housing wall 21 which is provided at this point with an outlet hole 29 registering with the air

pipe, and a flat ring or band 30, similar to the ring 18 in Figures 1 and 2 is secured to the outer face of the end wall 21 concentrically with the hole 29, for connecting this housing with the intake of a carburetor. An air cleaner 31, which is preferably M-shaped in cross section, is secured in the housing below the perforated plate 23, and is made up of two sheets of coarse screen cloth between which is interposed a sheet of air filtering material. The free edges of the air cleaner are secured to narrow flanges 32, on the lower edges of the side and end walls of the housing. In this arrangement of the device, the greater volume of air, drawn through the cleaner, passes through the passage X to the space between the tube 24 and air pipe 28, and through the pipe to the carburetor while some of the air passes to the tube through the plate 23 and the silencing material, and the sound vibrations are silenced or absorbed in the same manner as previously described. By forming a circuitous passage from the air pipe to the air cleaner, the outer wall of which comprises a body of sound silencing material, the sound vibrations passing out of the air pipe are delivered directly against a body of silencing material and are surrounded by the silencing material throughout the passage, so that they expand into and are absorbed by the said material, thus practically eliminating the noise that would otherwise result.

Having described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an air filter and silencer for internal combustion engines, a housing, a pipe therein which opens out through the housing for attachment to a carburetor, means for filtering the air entering the housing, a hollow member surrounding said pipe but spaced therefrom and forming with the pipe a circuitous passage from the air cleaner to the inlet end of the pipe, said member having perforated walls, and sound silencing material in said member.

2. In an air filter and silencer for internal combustion engines, a housing, a pipe therein which opens out through the housing at one end for attachment to a carburetor, air filtering means in said housing, a perforated tube surrounding the pipe in spaced relation thereto, and extending beyond the inlet end of the pipe, this end of the tube being closed and perforated, a perforated wall surrounding the tube, the space between the open end of the tube and the adjacent end of the wall being closed by a perforated plate, said tube forming with the pipe a circuitous passage from the air cleaner to the inlet end of the pipe and sound silencing material in the space between the tube and wall.

3. In a device of the character described, a housing open at one end, a cage therein comprising a coarse mesh screen spaced from the housing and having upper and lower end plates, a sheet of air filtering material surrounding said screen and a removable coarse mesh screen for holding said filtering material in place, a pipe in said cage and secured at its lower end in a hole in the bottom plate of the cage and adapted to connect with a carburetor, a body of sound silencing material surrounding said pipe and spaced therefrom and from the air filter and bottom plate and forming with the pipe and bottom plate a circuitous passage to the upper end of the pipe, and foraminous means for confining said silencing material.

4. In a device of the character described, a circular housing, a cage therein comprising up-

per and lower plates and a circular coarse mesh screen secured at its ends to said plates, an air filter element surrounding said screen, a removable coarse mesh screen surrounding said filter element, means for securing the same in place, and means for removably securing the cage within the housing, a receptacle in the cage comprising an outer circular foraminous wall spaced from the air filter and secured at its upper end to the upper end of the cage, an inner circular foraminous wall closed at its upper end by a foraminous plate, and connected at its lower end to the adjacent end of the outer wall by a foraminous plate, and sound silencing material in said receptacle, and an air pipe within and spaced from the said inner wall, its lower end being secured in a hole in the bottom plate of the cage and adapted to connect with a carburetor.

5. The invention as set forth in claim 4 in which the vertical edges of the removable coarse mesh screen have metal angle strips secured thereto, and screw and nut connections for the strips, thereby to clamp the screen upon the filter material.

6. The invention as set forth in claim 4, in which the bottom plate of the cage is provided with a plurality of radial strips, the outer ends of which engage the inner face of the housing

wall and thereby prevent lateral movement of the cage in any direction.

7. In a device of the character described, a housing open at one end, a circular air filter in the housing closed at its ends and spaced from the housing wall, and means for removably securing the filter within the housing, a pipe within the filter and secured at its lower end in a hole in the bottom end of the filter, a circular foraminous receptacle supported within the filter and spaced from the pipe and the wall and bottom end of the filter, and sound silencing material in said receptacle.

8. In a device of the character described, a cylindrical housing open at its lower end, a cylindrical air filter in the housing spaced from the wall thereof and closed at its ends, an outlet tube in the filter which is secured at its lower end in a hole in the adjacent closed bottom end of the filter, a hollow cylindrical member surrounding the tube but spaced therefrom and from the filter wall and lower filter end, and forming with the tube an unobstructed air passage from the filter wall to the upper end of the tube, the walls of said member being perforated, and air penetrable sound absorbing material in said member.

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