Feb. 7, 1967 H. G. MILLER 3,302,375

REMOVABLE AIR CLEANER FOR INTERNAL COMBUSTION ENGINE

Filed June 15, 1964

Fig. 1.

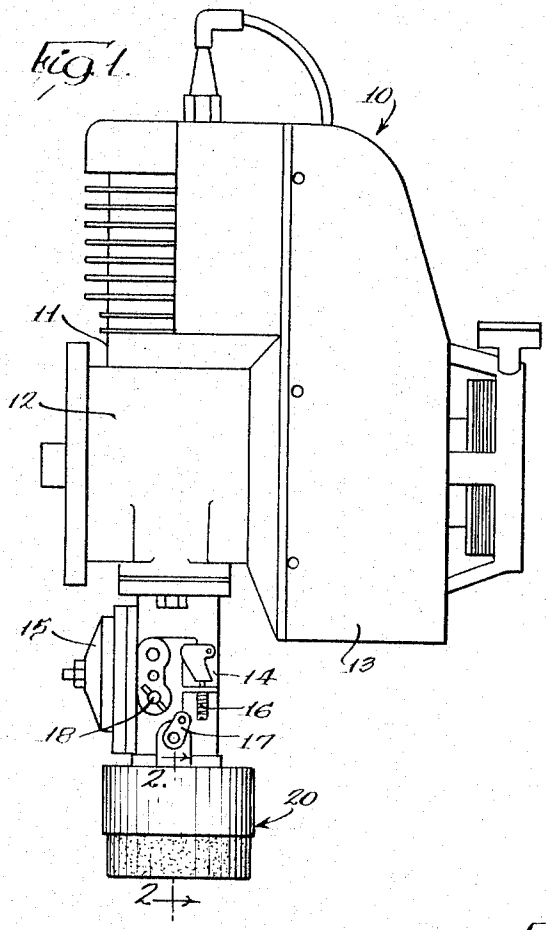


Fig. 2.

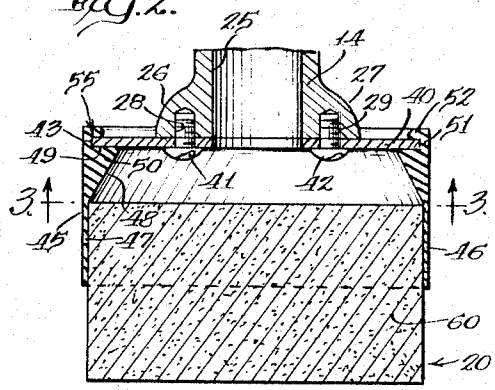


Fig. 3.

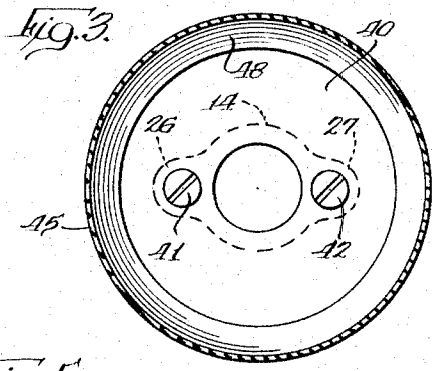


Fig. 4.

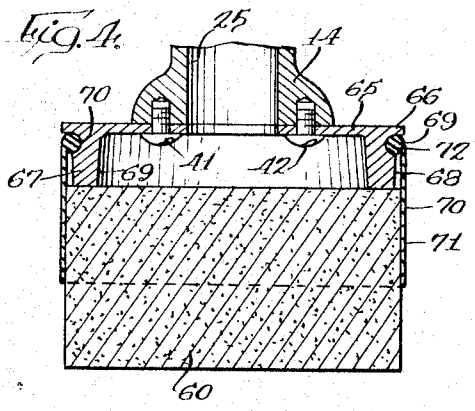
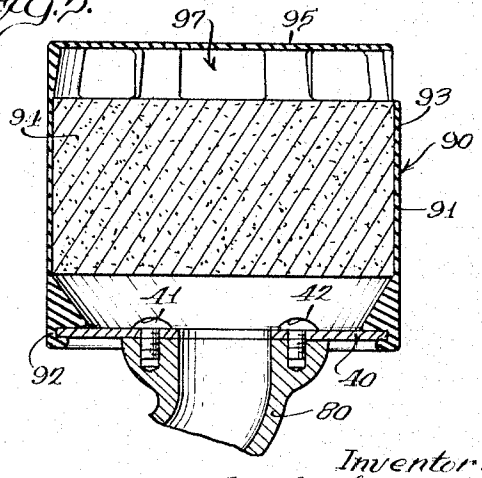


Fig. 5.



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REMOVABLE AIR CLEANER FOR INTERNAL COMBUSTION ENGINES

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This invention relates generally to air cleaners and more particularly to an air cleaner for a carburetor on an internal combustion engine.

The carburetor of an internal combustion engine serves to mix fuel and air in the proper proportions before delivery to the combustion cylinder. Since the smooth performance of the engine is in part dependent upon the fuel mixture being free of contaminating foreign particles, it is important that some filter be provided to free the incoming air of most of the entrained foreign matter. While air filters have been provided on carburetors in the past, these prior art structures have lacked simplicity and have been difficult to remove for cleaning or replacement. Most of the prior art air cleaner assemblies are made up of a number of separate parts which must be assembled together each time the air cleaner is removed for servicing the carburetor or cleaning the filter in the air cleaner. In these prior multipiece assemblies fastening means such as a wing nut, are provided for securing the air cleaner assembly together and for fastening the air cleaner assembly to the carburetor. However, the use of a separate fastener increases the time required to assemble and fasten the air cleaner to the carburetor, increases the likelihood of misplacing the fastener, and increases the cost of the air cleaner assembly.

It is therefore a primary object of this invention to provide simplified and readily removable air cleaner assembly for an internal combustion engine.

Another object of the present invention is to provide a snap-on connection between the carburetor and the filter housing so that the filter may be removed from the carburetor and replaced without the use of tools or without manually manipulating a fastener.

A further object of this invention is to provide a snap-on filter housing for an internal combustion engine which prevents the entry of water into the carburetor throat.

A more specific object of the present invention is to provide an air cleaner assembly for an internal combustion engine having a plate member permanently fastened to the carburetor at the throat opening, an annular plastic filter housing with a resilient annular gripper detachably engaged with the plate member, a synthetic foam filter bonded within the housing so that the filter and housing may be removed from the plate and the carburetor merely by pulling the housing away from the plate.

Other objects and advantages of the invention will be readily apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 is an elevational view of a preferred embodiment of the air cleaner assembly shown mounted on an internal combustion engine;

FIGURE 2 is a cross-sectional elevation of the preferred embodiment of the air cleaner assembly shown attached to a carburetor throat;

FIGURE 3 is a bottom plan view of the preferred air cleaner assembly with the air filter removed;

FIGURE 4 is a cross-sectional elevation of another embodiment of the air cleaner assembly shown attached to the carburetor throat;

FIGURE 5 is a cross-sectional elevation of still another embodiment of the air cleaner assembly for use in an engine with an upwardly opening carburetor throat.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will hereinafter be described in detail an embodiment of the invention together with modifications thereof with the understanding that the present disclosure is to be considered an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring to FIGURE 1, a two cycle gasoline engine generally designated by the numeral 10 consists of a cylinder block 11 mounted upon a crankshaft housing 12 which encloses a single throw crankshaft reciprocated by a piston slidably mounted in the cylinder block 11. A fly wheel housing 13 encloses a fly wheel and a recoil starter for the internal combustion engine. A carburetor 14 is mounted on the crankshaft housing 12 in a manner conventional with two cycle engines. The carburetor 14 includes the conventional components such as a float bowl 15, an idle adjustment screw 16, a choke link 17, and a mixture needle valve 18.

An air cleaner assembly of the present invention is generally designated by the numeral 20 and is shown fastened at the bottom of the carburetor adjacent the throat opening where it serves to filter air drawn in from the atmosphere to the crankshaft housing 12.

Viewing FIGURES 2 and 3, wherein the preferred embodiment of the present invention is shown in detail, the carburetor 14 has a throat 25 bored centrally therein and ears 26 and 27 having threaded bores 28 and 29 which receive a portion of the air cleaner assembly. The air cleaner assembly includes a circular plate 40 mounted on the carburetor 14 by two threaded fasteners 41 and 42 which extend through the plate 40 and into the threaded bores 28 and 29 in the projecting ears 26 and 27 respectively. Suitable lock washers and a gasket between the plate 40 and the carburetor 14 may be provided for the mounting. The plate 40 may be constructed of aluminum or a heat resistant plastic or other suitable material.

A filter housing 45, also part of the air cleaner assembly, is detachably mounted on the plate 40 and may be constructed of neoprene, rubber, or other suitable semi-resilient material in a one-piece molding. The filter housing 45 consists of a cylindrical member 46 having an interior cylindrical surface 47 meeting adjacent its upper end a frusto-conical surface 48 forming, together with a radially extending surface 49, an annular projection 50. A cylindrical surface 51 extends upwardly from the radial surface 49 and meets a flexible annular projection 52 at its upper end. Projection 50 is rigid as it is heavier and extends radially inward a greater distance than projection 52. The projections 50 and 52 form a tongue-and-groove connection 55 with plate 40.

A foam air filer 60 constructed of a suitable synthetic material is bonded to the cylindrical surface 47 of the filter housing 45.

When it is desired to remove the filter 60 for cleaning or for better access to the carburetor, it is merely necessary to grasp the housing 45 and pull the housing away from the plate 40. When this is done, the projection 52, due to the projection's natural resiliency and size, will bend upwardly and radially outward due to the force exerted thereon by the peripheral surface 43 of the plate 40. When the filter is replaced, it is merely necessary to grasp the filter housing 45 and place the upper surface of the projection 52 against the lower surface of the plate 40 and push the filter housing upwardly. This serves to spread the projection 52 radially until it passes over the surface 43 of the cover plate at which time the projection 52 snaps back around the cover plate thereby gripping the same. The projection 50 is considerably heavier and

wider than the projection 52 to prevent both projections from snapping over the plate 40 when the housing 45 is snapped on the plate.

Referring to FIGURE 4 wherein a further embodiment of the air cleaner assembly is shown, like numerals designate the parts of the carburetor which are common to this embodiment and the preferred embodiment shown in FIGURES 2 and 3. An annular plate 65 is attached to the carburetor 14 by threaded fasteners 41 and 42. The plate 65 consists of a circular disc 66 having an axially extending flange 67 defined by oppositely tapered frusto-conical surfaces 68 and 69. A semi-toroidal groove 70 is formed on the upper portion of surface 68 and is tangentially disposed to surface 69 on the disc 66.

A filter housing 70 constructed of a material similar to that of housing 45 in the preferred embodiment, consists of a cylindrical sleeve 71 having a ring 72 extending radially inwardly therefrom and interfitted with toroidal groove 70. Ring 72 is resilient and will bend out under a radial force. The ring 72 and toroidal groove 70 form a tongue-and-groove snap connection between the filter housing 70 and the plate 65. When replacing the filter housing 70 on the plate 65, the surface 68 serves to center the housing thereby facilitating replacement. As the ring moves up the surface 68, it bends radially outward until adjacent the toroidal groove 70 at which time the ring snaps into the grove. The stop surface 69 on the disc 65 prevents over-travel of the ring 72 past the toroidal groove 70 in the same manner as projection 50 in the preferred embodiment.

Referring to FIGURE 5, wherein still another embodiment of the air cleaner assembly is shown, like numerals designate parts identical to those in the preferred embodiment shown in FIGURES 2 and 3. In this embodiment, however, the air cleaner assembly 90 is adapted to be mounted on an upwardly extending carburetor 80. A cylindrical filter housing 91 has a tongue-and-groove connection with the plate 40 in the same manner as the tongue-and-groove connection 55 in FIGURE 2. The filter housing 91 consists of a cylindrical sleeve 93 which extends above a foam filter 94 bonded within the housing 91. A cover plate 95, formed integrally with the housing 91, prevents the entry of water and other matter foreign to the normal fuel mixture into the carburetor 80. Vents, generally designated by the numeral 97, are formed by circumferentially spaced rectangular apertures molded in the cylindrical sleeve 93 between the cover plate 95 and the filter 94. In this manner, sufficient air is permitted to enter the carburetor through the filter but water and other foreign matter is prevented from entering by the solid cover 95.

I claim:

1. An air cleaner assembly for an internal combustion engine carburetor comprising, a rigid plate member adapted to be mounted on the open end of a carburetor throat, said plate having an opening therein adapted to complement the carburetor throat and also having a peripheral surface, a cylindrical one piece resilient housing member extending from said plate substantially normal thereto, said housing member having a hollow interior and also having a peripheral surface adjacent said plate peripheral surface, an annular tongue on one of said surfaces and an annular groove on the other of said surfaces forming a snap connection between said housing member and said plate member, said groove being defined by two generally radially extending surfaces, one of said radial surfaces extending radially a lesser distance than the other of said radial surfaces to facilitate insertion of the tongue in the groove, and a filter mounted within and fixedly secured to said housing member and having a diameter substantially equal to said hollow interior whereby said housing may be removed from the carburetor without the use of any tools.

2. An air cleaner assembly for an internal combustion engine carburetor as described in claim 1 in which said housing member is constructed of neoprene, and said filter is constructed of a synthetic foam bonded within said housing.

3. An air cleaner assembly for an internal combustion engine comprising, an annular rigid plate member having connecting means thereon adapted to be mounted on the open end of a carburetor throat, said plate having an opening therein adapted to open into said throat and also having an annular peripheral surface thereon, an annular one piece housing member extending normal to said plate and having a diameter substantially larger than said plate opening, said housing member having a groove at one end thereof formed by two spaced annular projections, one of said projections being rigid, the other of said projections being resilient, said projections straddling and gripping said plate, and a filter mounted within, fixedly secured to, and having a diameter substantially equal to said filter housing whereby said filter may be readily removed from said plate and carburetor.

4. An air cleaner assembly for an internal combustion engine carburetor as described in claim 3 in which said housing member is formed entirely from a molded synthetic material, said projections having an inside diameter less than the outside diameter of said peripheral surface and also having two surfaces parallel to said plate, and a third surface extending from one of said surfaces away from said plate at an angle thereto thereby providing a rigid support for said one of said projections.

5. An air cleaner assembly for an internal combustion engine carburetor comprising an annular rigid plate member having connecting means thereon adapted to be mounted on the open throat of a carburetor, said plate having an opening therein adapted to open into said throat, said plate having an annular groove about the periphery thereof and a rigid conical surface extending from said groove, an annular one piece resilient housing member extending normal to said plate and having a ring extending therefrom interfitted with said groove, and a filter fixedly secured to and having a diameter substantially equal to said housing whereby the housing and filter may be removed from the plate member and the carburetor as a unit without the use of tools.

6. An air cleaner assembly for an internal combustion engine comprising: a rigid annular plate member having connecting means thereon adapted to be mounted on the open end of a carburetor throat, said plate having an opening therein adapted to open into said throat and also having an annular rigid peripheral surface thereon, an annular resilient housing member extending normal to said plate and having a diameter substantially larger than said plate opening, said housing member having an inwardly facing groove at one end thereof formed by two spaced annular projections, the projection closest said one end being resilient, the other projection extending radially inwardly a greater distance than said one projection and having a generally conical surface extending away from said groove, said projections straddling and gripping said plate, and a cylindrical foam filter having a diameter substantially equal to said housing member and bonded within and contiguous with said housing whereby the filter and housing may be readily removed from said plate and said carburetor.

7. An air cleaner assembly for an internal combustion engine carburetor comprising: a rigid annular plate member having connecting means thereon adapted to be mounted on the open throat of a carburetor, said plate having an opening therein adapted to open into said throat, said plate having a rigid axially extending annular flange projecting therefrom, said flange having a conical exterior surface and a rigid semi-toroidal annular groove adjacent said plate, an annular resilient housing member extending normal to said plate having a circumferentially expandable ring extending radially inwardly therefrom interfitted with said semi-toroidal groove, said

conical flange surface being sized to expand said ring as the ring is slid axially thereover toward said groove, and a cylindrical foam filter having a diameter substantially equal to said annular housing member and bonded therewithin.

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