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2,839,042

AIR INTAKE SILENCER

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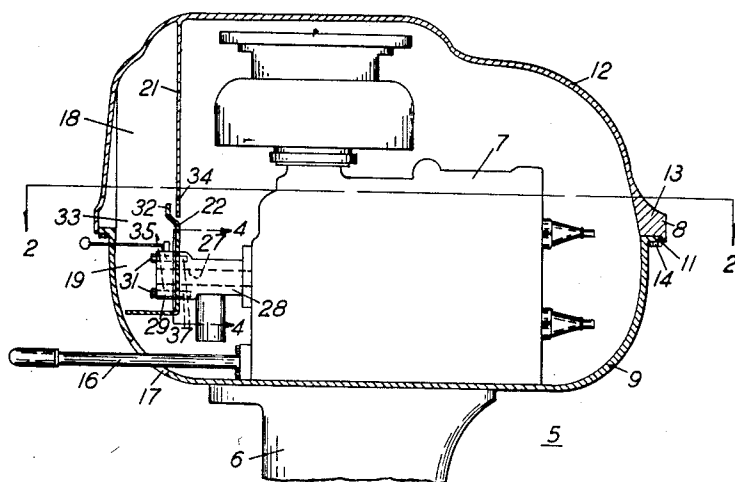


FIG. 1.

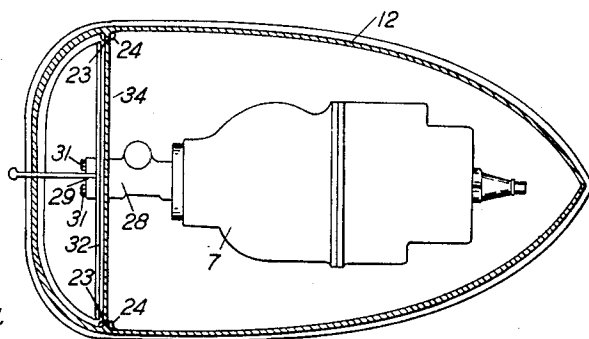


FIG. 2.

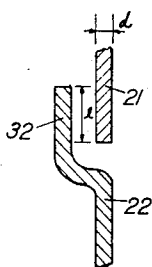


FIG. 3.

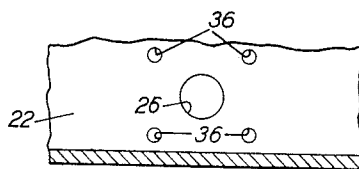


FIG. 4.

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AIR INTAKE SILENCER

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5 Claims. (Cl. 123—198)

This invention relates generally to a noise silencer or muffler, and more specifically to an air intake silencer for an internal combustion engine encased within a cowl.

In an internal combustion engine, a mixture of fuel and air is drawn into the piston cylinders through an intake valve that is alternately opened and closed. Certain actions such as the sudden opening and closing of the intake valve, the moving stream of fuel and air impinging against the valve in the closed position, and the throttling of the fuel and air mixture as it is drawn through the carburetor produce detrimental noise vibrations. Since the valve alternately opens and closes at a rapid rate, as often as 100 times per second, the noise produced by the foregoing actions is of considerable magnitude. Applicants' invention provides a carburetor air inlet silencer for an internal combustion engine of novel and improved construction for minimizing the production of noise therein.

It is therefore an object of the present invention to provide an air inlet silencer for an internal combustion engine encased within a cowl to minimize the noise produced therein.

Another object of the invention is to provide an air inlet silencer for an internal combustion engine encased within a cowl that is inexpensive in construction, more simple in design requiring fewer parts of less complicated shape, and is easier to assemble than prior known silencers.

Another object of the invention is to provide an air inlet silencer for an internal combustion engine encased within a cowl that requires fewer machining operations than any prior known air inlet silencer.

Objects and advantages other than those set forth above will be apparent from the following description when read in connection with the accompanying drawing, in which:

Fig. 1 is an elevation view in section of a fragmentary part of an outboard motor embodying the invention;

Fig. 2 is a section view taken along line 2—2 of Fig. 1;

Fig. 3 is an enlarged, fragmentary view of a portion of applicants' novel silencer shown in Fig. 1; and

Fig. 4 is an enlarged section view taken along line 4—4 of Fig. 1.

As shown in the drawings, a preferred embodiment of this invention is illustrated as applied to an internal combustion engine 7 encased within a cowl 8 as embodied in an outboard motor 5, only a part of which is shown. The outboard motor 5 is shown as having a segmental drive shaft housing 6 on which the internal combustion engine 7 is mounted. The cowl 8 has a lower part 9 in the form of a generally upwardly dished member mounted between the drive shaft housing 6 and the engine 7, and is provided with an annular flange 11 along the top thereof. An upper part 12 of the cowl 8 forms a cover for the engine 7 and is also provided with an annular flange 13 along the bottom thereof registering with the annular flange 11 of the lower part 9 and

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mating therewith to enclose and protect the engine 7. The lower part 9 is securely fastened to the upper part 12 by means of studs 14. A tiller 16 is secured to the engine 7 for the purpose of pivotably moving the outboard motor 5 to steer same and extends through an opening 17 in the cowl 8 where it is readily accessible to the outboard motor operator. The opening 17 further provides means through which air may enter the cowl 8 to provide combustion air for the engine 7.

The air intake silencer of applicants' invention comprises an upper pocket 18 and a lower pocket 19. The upper pocket 18 is formed by a portion of the upper cowl 12 and a plate member 21 of generally semi-circular cross section corresponding to the shape of the upper cowl 12 and preferably formed integrally therewith. The lower pocket 19 of the silencer is formed by the lower cowl 9 and a generally L-shaped element 22 corresponding to the shape of the lower cowl 9 and having edges 23 loosely fitted in a grooved portion 24 formed by the lower cowl 9. The element 22 is provided with an opening 26 as shown in Fig. 4 in alignment with an air inlet passage 27 shown dotted in Fig. 1 of a carburetor 28. Element 22 is interposed between a choke member 29 and the carburetor 28 and is secured thereto by means of bolts 31, shown partially dotted in Fig. 1, passing through openings 35 in the choke member 29, openings 36 provided in the element 22 and engaging tapped openings 37 in the carburetor 28. Any liquid such as gas that accumulates in the lower pocket 19 as a result of drippings and blow back from the carburetor 28 gradually leaks out of the pocket 19 into the lower cowl 9 through the non-sealed junction of the element 22 and lower cowl 9. The element 22 is constructed of light plate metal and may be readily stamped out into the desired shape. Although the element 22 is shown as L-shaped, it may be planar similar to the plate member 21 or any other suitable shape. The element 22 is further provided with a lip portion 32 at one end thereof for a purpose to be explained hereinafter.

The upper and lower pockets 18, 19 respectively are so positioned that when the upper and lower cowl portions 12, 9 respectively are joined, the pockets 18, 19 register to define a silencing chamber 33. The plate member 21 and L-shaped element 22 of the silencer are substantially in register, with the lip portion 32 of the element 22 laterally spaced from and in juxtaposition with the end portion 34 of the plate member 21 to form an air inlet into the silencing chamber 33. The shortest distance between the lip portion 32 and end portion 34 multiplied by the width of the air inlet determines the cross sectional area of the air inlet. The effective length of the air inlet of applicants' preferred embodiment as shown in Figs. 1 and 3 is equal substantially to the width of the plate member 21 designated by the letter d plus the length l of the portion of the plate member 21 subtended by a line drawn from the tip of the lip 32 normal to the plate member 21. An effective frequency f below which the silence will transmit and above which the filtering action begins can be readily determined by a proper selection of the effective length of the air inlet, cross sectional area of the air inlet and volume of the silencing chamber as is well known in the art in accordance with the equation

$$f = C \sqrt{\frac{A}{LV}}$$

where C is a constant, A is the area of cross section in square inches, L is the length of the air inlet in inches and V is the volume of the silencing chamber in cubic inches.

Although but one embodiment has been illustrated and described, it will be apparent to those skilled in

the art that various changes and modifications of the invention may be made without departing from the spirit of the invention or from the scope of the appended claims.

It is claimed and desired to secure by Letters Patent:

1. An air intake silencer for the carburetor of an internal combustion engine encased within a cowl comprising: a first plate member cooperating with said cowl to form a first pocket; and a second plate member having an opening in register with the air inlet of said carburetor, said second plate member cooperating with said cowl to form a second pocket in register with said first pocket to define a silencing chamber, and a portion of said second plate member being spaced from said first plate member to provide an air inlet into said silencing chamber.

2. An air intake silencer as set forth in claim 1 wherein said first plate member is formed integrally with said cowl.

3. An air intake silencer as set forth in claim 2 wherein said second plate member is mounted to said carburetor.

4. The combination set forth in claim 3 wherein the edges of said second plate member mate with grooves formed by said cowl, and said second plate member has a portion thereof laterally spaced from and in juxtaposi-

tion with a portion of said first plate member to form said air inlet into said silencing chamber.

5. The combination with an internal combustion engine having a carburetor and being encased within first and second cowl members, of an air intake silencer comprising: a plate member integrally formed with said first cowl member to define a first pocket; an L-shaped member having its periphery corresponding to the shape of said second cowl member with portions of the outer edges of said L-shaped member being disposed within grooves formed by said second cowl member to define a second pocket in register with said first pocket, said pockets together forming a silencing chamber, said L-shaped member being mounted on said carburetor and having an opening in register with the air inlet of said carburetor, and said L-shaped member having a lip formed on one end thereof laterally spaced from and in juxtaposition with the end of said plate member to form an air inlet into said chamber.

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