

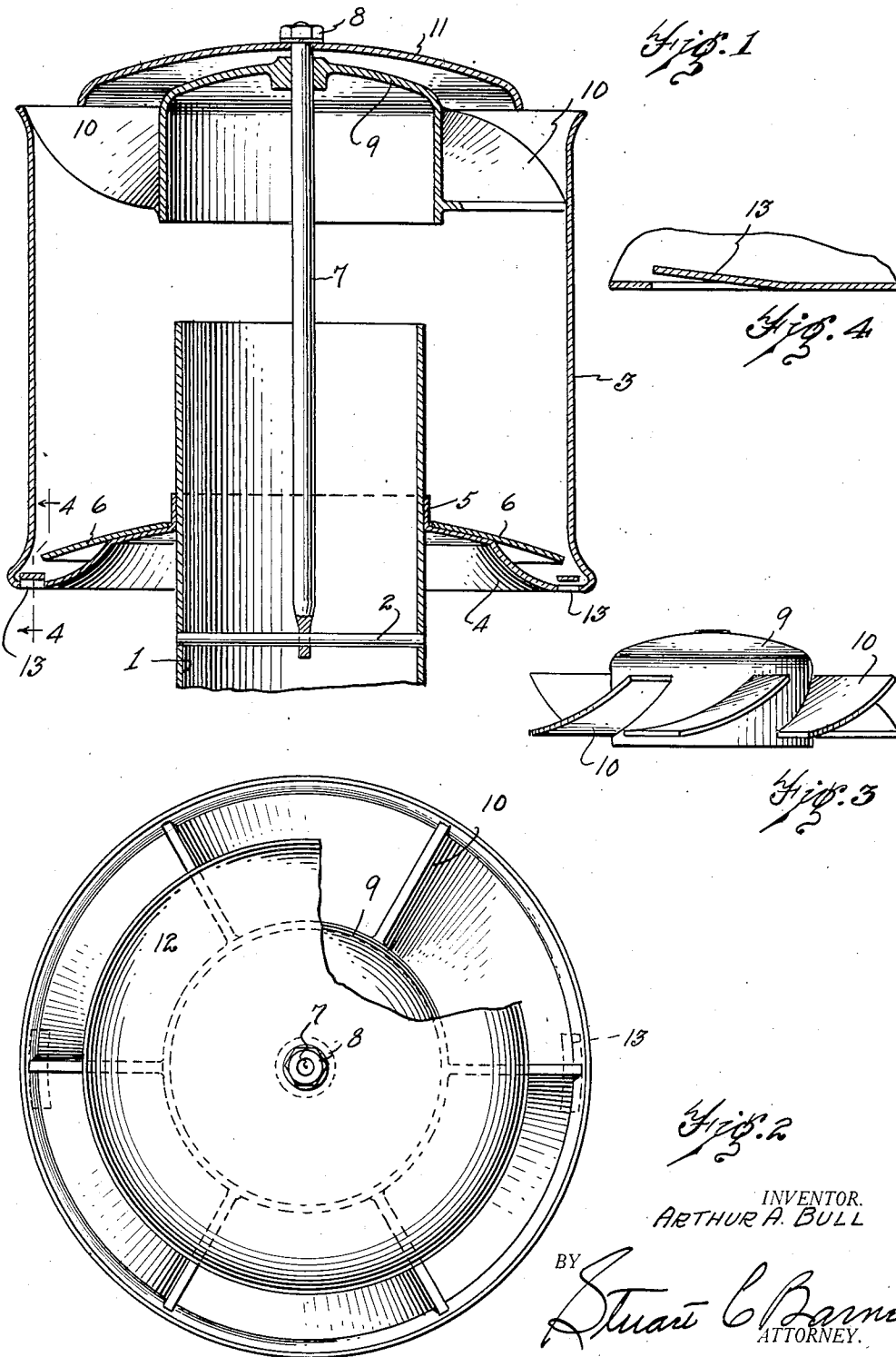
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AIR CLEANER

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AIR CLEANER

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This invention relates to air cleaners and more particularly to air cleaners for efficiently delivering purified air to carburetors for use with internal combustion engines.

5 In the past, in devices for cleaning air for admission to carburetors it has been the general practice to separate the dust particles from the air by centrifugal action, by a sudden reversal of the direction movement of
10 the air or a combination of the two. Many devices of varying structural characteristics have been utilized for so separating dust particles from the air, but all of such devices have been objectionable in that the admission
15 of the air to the cleaner and the initial or subsequent rejection of the air column has caused a large amount of noise. Thus, regardless of the efficiency of the cleaner in separating the dust particles, the objectionable
20 noise caused by the entrance of the air has always been present.

The present invention primarily relates to means for directing air into air cleaners without causing the large amount of noise as has
25 heretofore been present. This production of noise caused by the entrance of the air to the cleaner is reduced to a minimum by means of a simple cover structure which is adapted to be positioned at the opened end of the
30 cleaner. This cover structure may obviously be utilized advantageously with various types of cleaners, but as shown in the present application I prefer to use this cover structure in combination with a novel compact air
35 cleaner such as is described in my prior applications Serial Nos. 729,866 and 26,860.

One of the objects of my invention contemplates the provision of means positioned adjacent the air entrance of an air cleaner
40 for forming a restricted entrance between the cover and the walls of the air cleaner for controlling the amount of air entering the air cleaner and thus reducing the noise caused by variations in pressure, swirling action and
45 other causes.

Another object of my invention has to do with the provision of an air cleaner having an open end, means in said open end for
50 forming an annular space in the end of the cleaner, means in the said space for impart-

ing a swirling action to the incoming air and means positioned adjacent the inlet of the cleaner for predetermining the cross sectional area of the entrance to said annular space, relative to the cross sectional area at the base
55 of said annular space.

A further object of my invention relates to the provision of an air cleaner shell having an open end, a dome positioned centrally of said open end and a series of vanes positioned between said dome and said shell for
60 giving the air a swirling motion, and means adjacent the open end of said shell for restricting the entrance of said air and for directing the same to give it the maximum
65 amount of centrifugal action.

Other features of my invention will be brought out as this description progresses, and will be embodied in the claims appended hereto. The various features of this invention are disclosed in the drawings wherein
70 like reference numerals designate similar parts, and wherein;

Fig. 1 is a vertical longitudinal section of an air cleaner provided with my novel means
75 for controlling the entrance of the air thereto.

Fig. 2 is a plan view of the structure shown in Fig. 1, being partly cut away to show the arrangement of the vanes and dome beneath the restricting cover.

Fig. 3 is a detail view of the dome and vane structure which form a part of the air cleaner which I prefer to use in combination with my novel cover.

Fig. 4 is a fragmentary detail view of the restricted opening at the base of the air cleaner wall for permitting continuous discharge of the separated dust particles.

In the drawings, the air cleaner which is shown and described in my prior applications Nos. 729,866 and 26,860, and which preferably forms a part of the present invention, comprises a conduit 1 which is adapted to be readily connected to the intake manifold or inlet of any standard carburetor. This conduit is connected with the source of vacuum supply, produced by the motor, and as shown, is preferably positioned centrally of the base of the cleaner and extends upwardly into the inside thereof. The shell of this cleaner struc-

ture which may be designated 3 is preferably integrally formed with an open ended cylindrical portion and a closed end or bottom 4 which terminates in a flange 5. This flange 5 forms a pressure fit with, or may be otherwise suitably secured to the conduit 1.

The inner portion of this bottom 4 is preferably shaped, as shown in Fig. 1 to receive a hood or baffle member 6 which as shown, extends from the conduit 1 outwardly and downwardly towards the periphery of the bottom of the shell 3. This baffle 6 terminates at a point adjacent the side walls of the shells 3 and thereby forms an annular chamber or trap for the reception of the dust particles.

The conduit 1 is preferably provided with a diametrically positioned rod 2 suitably secured thereto. Pivoted to this rod 2 and extending upwardly therefrom is a second rod or shaft 7 which extends upwardly past the upper edge of the shell 3 and in axial alignment therewith. The upper end of this rod 7 is threaded to receive a nut or lock washer 8.

A dome 9, preferably shaped as shown in Fig. 1, and provided with the vanes 10, is adapted to be frictionally held in a stationary position in the open end of the shell 3. The vanes 10 are preferably shaped and spirally positioned about the circumference of the dome 9, as best shown in Fig. 3. It will be obvious that the dome 9 with its vanes 10, may be inserted in the open end of the shell 3 about the shaft 7, the outer ends of the vanes being formed to seat upon the flared end of the shell 3.

A cover 11, preferably bowl shaped, is provided with an aperture in the center thereof whereby the cover may be positioned by means of the rod 7 at the open end of the shell 3, as best shown in Fig. 1. The base of this bowl 11 preferably seats upon the upper edge of the vanes 10, as best shown in Fig. 2, and it will be obvious that the screwing into position of the nut 8 will centrally locate and securely position the dome member 9 with its vanes 10, and the cover 11 in the open end of the shell 3.

Due to the shape of the vanes 10 the cross sectional area of the opening at the base of the vanes is less than the cross sectional area at the entrance of the vanes. The base of the dome 9 may also be outwardly and downwardly flared and such outward and downward flare would also tend to decrease the cross sectional area of the opening at the base of the vanes. The bowl shaped cover 11, is therefore of such predetermined diameter that it will form an annular opening between its periphery and the upper edge of the shell 3, whereby the cross sectional area of such annular opening will be approximately equal to the cross sectional area of the openings at the base of the vanes 10. It will be understood however, that I do not intend to

limit myself to making the cross sectional area of this annular inlet equal to the cross sectional area of the openings at the base of the vanes, as it will be understood that the diameter of the cover 11 may be varied more or less in order to reduce the noise caused by the air entering the cleaner, to a minimum. Various types and shapes of vanes will obviously have a different effect upon the incoming current of air, as to the creation of noise, and it will be understood that such cover 11 may be of such diameter as to restrict the entrance of the air to prevent the creation of unequal pressures and of eddy currents normally created by the vanes.

In the normal operation of my air cleaner, the air entering the annular opening between the dome 9 and shell 3 will be given such a downward and outward swirling motion by the vanes 10, that such air will be directed past the upper edge of the conduit 1 and towards the lower outer edge of the shell 3, where the separated dust particles will be entrapped by the hood 6 and continuously discharged through the restricted openings 13, positioned circumferentially around the outer edge of the base 4. By providing a bowl shaped cover 11, the air entering the cleaner will not only be restricted as to volume, but will also be directed towards the outer edges of the vanes 10. Thus substantially all the air entering the annular space between the dome 9 and the shell 3, will be given a maximum centrifugal action due to the fact that such air will contact with the outer surfaces of the vanes 10.

I have shown and described my air cleaner as operating in a vertical position. This is the most advantageous position for successful operation due to the combined effect of the centrifugal action and gravity. However, my air cleaner will effectively separate the dust particles from the air when positioned horizontally, due to the fact that the annular column of incoming air is given a positive spiral swirling motion past the upper edge of the baffle conduit and towards the outer periphery of the base of the shell 3.

Having thus described my invention, what I claim is:

1. An air cleaner comprising a shell having an open end, a cylindrical member of less diameter than the shell positioned centrally of said open end, a plurality of vanes positioned between said member and said shell for giving the air an axial and outward swirling motion, and means adapted to seat upon said vanes for directing the incoming air toward the outer ends of said vanes.

2. An air cleaner comprising a shell having an open end, a dome positioned centrally of said open end, a plurality of vanes positioned between said dome and said shell for giving the air an axial and outward swirling motion, and means positioned above said

dome and open end of the shell for directing the incoming air towards the outer ends of said vanes.

3. An air cleaner comprising a shell having an open end, a cylindrical member positioned within and centrally of said open end, a plurality of vanes positioned between said member and said shell for giving the air an axial and outward swirling motion, and means positioned above the vanes for directing incoming air toward the outer ends of said vanes said means being of materially less diameter than the open end of said shell for predetermining the cross sectional area at the entrance to said vanes relative to the cross sectional area at the base of said vanes whereby the noise caused by the entrance of the air into the cleaner, is reduced to a minimum.

4. An air cleaner comprising a shell having an open end, a dome positioned centrally of said open end to form an annular chamber at said open end, and a plurality of vanes positioned between said dome and shell for forming a plurality of spiral channels for the entrance of the air and a single axially sloping member above and at the open end of said shell and of materially less diameter than the open end of the shell for predetermining the cross sectional area at the entrance to said vanes relative to the cross sectional area at the base of said vanes whereby the noise caused by the entrance of the air into the cleaner is reduced to a minimum.

5. An air cleaner comprising a shell having an open end and a closed end, a conduit positioned centrally of said closed end and extending into said shell for forming a relatively deep chamber at the base of said cleaner, and stationary vanes positioned adjacent said open end for giving the incoming air an axial and outward swirling motion past the edge of said conduit and means for directing the incoming air towards the outer ends of said vanes.

In testimony whereof I have affixed my signature.

ARTHUR A. BULL.

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