June 6, 1950 L. J. LECHTENBERG 2,510,825

AIR CLEANER

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Fig. 1.

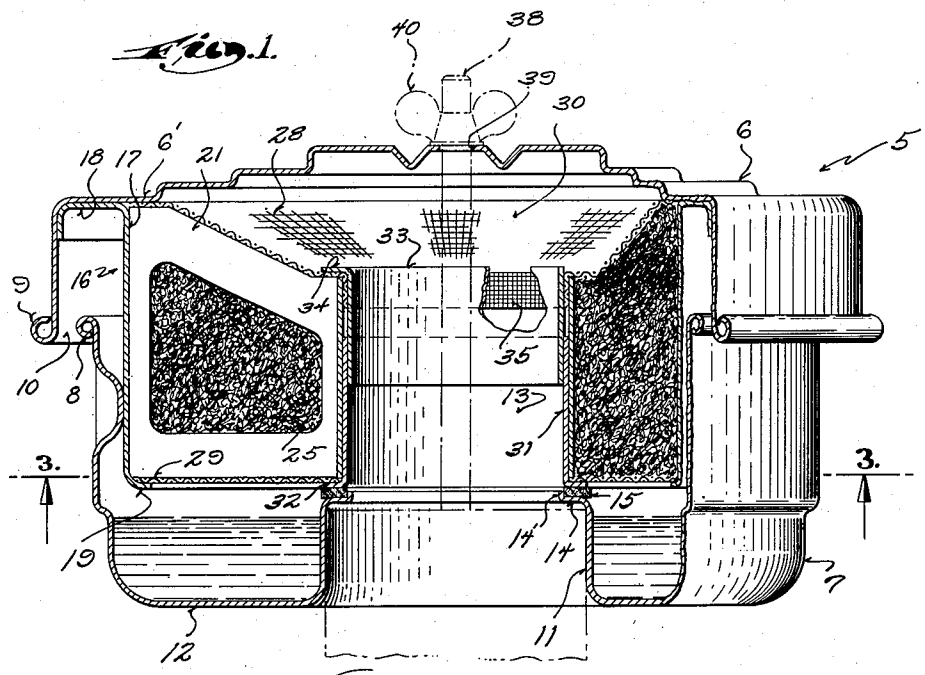
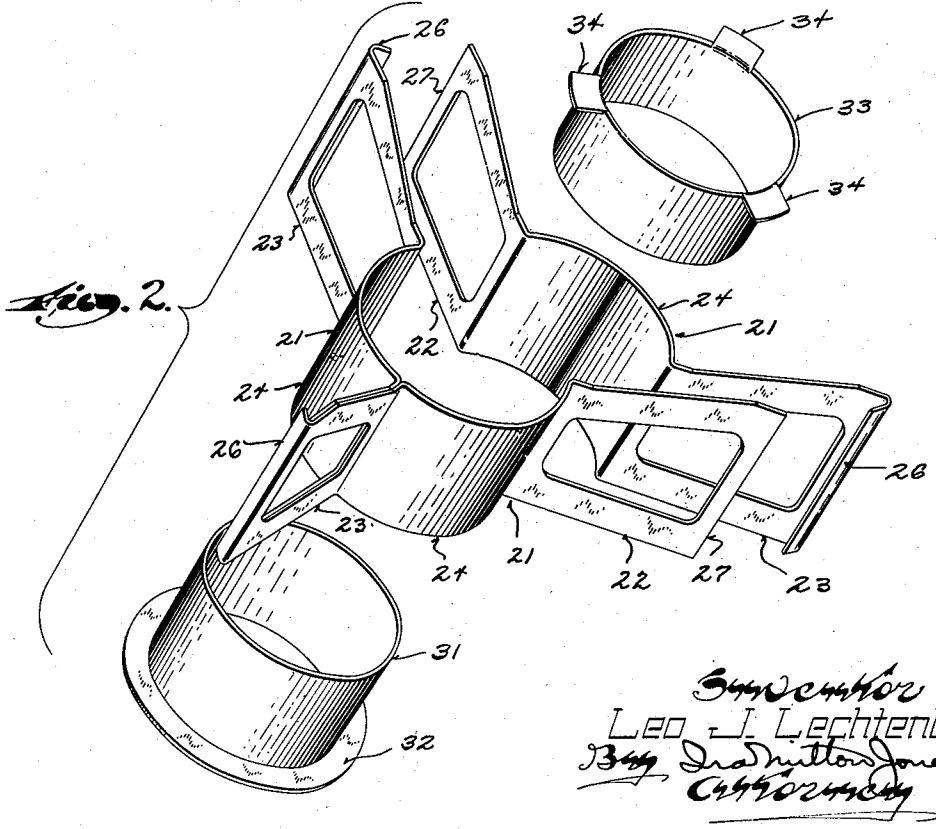


Fig. 2.



Inventor
Leo J. Lechtenberg
By Ira Dutton Jones
Attorney

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Fig. 3.

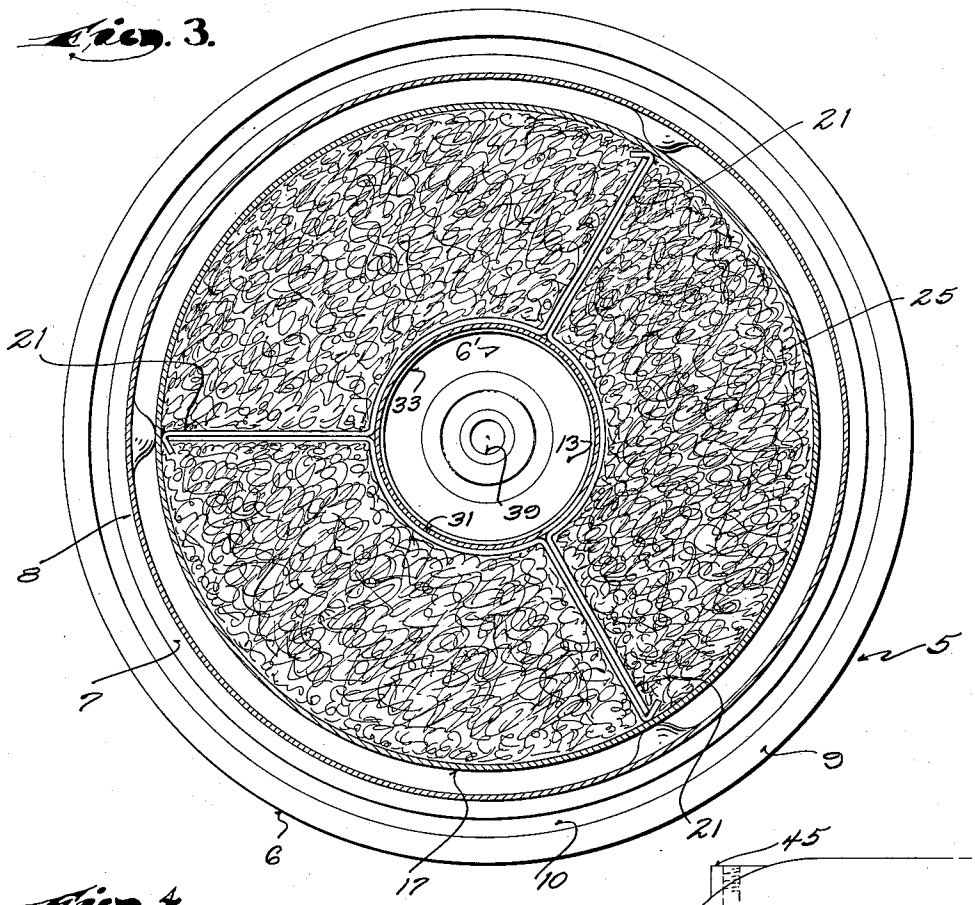


Fig. 4.

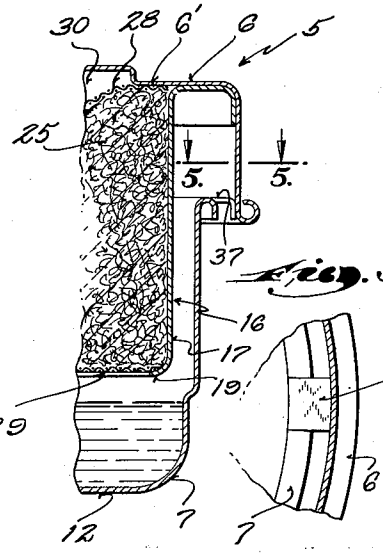
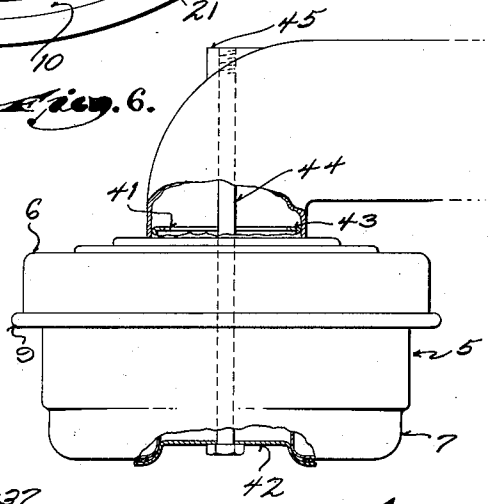


Fig. 5.

Fig. 6.



Inventor
Leo J. Lechtenberg
By Dick Sutton Jones
Attorneys

Patented June 6, 1950 2,510,825

UNITED STATES PATENT OFFICE

2,510,825

AIR CLEANER

Leo J. Lechtenberg, Milwaukee, Wis., assignor to Briggs & Stratton Corporation, Milwaukee, Wis., a corporation of Delaware

Application December 18, 1947, Serial No. 792,420

6 Claims. (Cl. 183—15)

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This invention relates to air cleaners and refers particularly to carburetor air cleaners of the oil bath type in which the air to be cleaned first impinges a body of oil or other suitable fluid and then passes through a filter maze.

Air cleaners of this type usually comprise a housing or casing formed jointly by a pair of axially separable complementary cup-like sections having their open ends substantially telescoped together to enclose a filter maze in the upper portion of the housing above the oil bath which is contained in the lower section.

It is customary to mount cleaners of this type in an upright position with the bottom of the lower casing section resting on a vertically disposed carburetor inlet duct and with the discharge port for cleaned air in the bottom wall of the lower casing section communicating with the carburetor inlet duct.

It is of course essential that the air cleaner be firmly held down onto the carburetor, and generally the means employed for this purpose also serves to hold the complementary casting sections together. A tension screw anchored to the carburetor and passing axially through the air cleaner with a wing nut threaded on the upper end thereof is ordinarily used. The transmission of the clamping force, resulting from tightening the nut, down onto the carburetor inlet duct without setting up distorting stresses in the casing sections has always been a problem. In the copending applications Serial Nos. 589,197 and 597,825 (now Patents 2,459,428 dated January 18, 1949, and 2,431,329 dated November 25, 1947, respectively) several ways of carrying the clamping pressure to the carburetor inlet duct without entailing distortion of the casing sections are illustrated.

While the expedients there shown perform this function satisfactorily the structures employed are somewhat involved and costly. Hence, it is an object of this invention to provide a simplified and less expensive way of transmitting the clamping pressure to points where it is needed.

Another object of the present invention resides in the provision of a simple and efficient air cleaner of the character described which may be constructed from relatively few inexpensive stampings and which may be manufactured and assembled at low cost.

Still another object of this invention resides in the provision of an air cleaner which may be readily adapted to either updraft or downdraft carburetors.

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With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is essentially a longitudinal sectional view through the air cleaner of this invention, portions thereof, however, being shown in elevation.

Figure 2 is an exploded perspective view of the frame work of the cleaner cartridge;

Figure 3 is a horizontal section through the air cleaner along the plane of the line 3—3 in Figure 1;

Figure 4 is a vertical sectional view through the side of the air cleaner to illustrate a modification of one of its details;

Figure 5 is a detail cross-sectional view on the plane of the line 5—5 in Figure 4; and

Figure 6 is a side view of the air cleaner of this invention, portions thereof being shown broken away, illustrating its application to an updraft carburetor.

Referring now to the accompanying drawings in which like numerals designate like parts throughout the several views, the numeral 5 designates generally the casing or housing of the air cleaner of this invention and which comprises an upper cup-shaped section 6 and a lower cup-shaped section 7 having a rim 8 of somewhat smaller diameter than the rim 9 of the upper section. The two housing sections have their open ends opposed and telescoped together to provide an annular air intake duct 10 between their rims.

The lower casing section 7 has a central standpipe 11 projecting up from its bottom wall 12 and opening therethrough so as to provide the lower end portion of an exit duct 13 for the discharge of cleaned air, and an annular reservoir for a body of oil or other suitable liquid. The oil depth is maintained at a level slightly less than the height of the standpipe, the upper extremity of which is flanged as at 14 to provide a seat for a gasket 15.

The filter cartridge, indicated generally by the

numeral 16, is permanently assembled in the upper casing section 6 and comprises a cylindrical shell or sleeve 17 provided at its top with an annular flange 18, the down turned peripheral edge of which is press-fitted into the skirt of the upper casing section 6. This shell or sleeve 17 is smaller in diameter than the lower casing section 7 and extends down into the section 7 a substantial distance to terminate just above the oil level. The annular space between the shell 17 and the side of the lower casing section thus provides an air passage which directs the incoming air against the surface of the oil bath.

The lower edge of the shell 17 is turned in to provide an annual ledge 19 and confined between this ledge and the under side of the top wall 6' of the upper casing section is a spider-like framework comprising a plurality of spacing struts 21.

The spacing struts 21 (see Figure 2) are formed by three identical stampings, each of which has a pair of substantially flat trapezoidal arms 22 and 23 extending radially, one from either side of a central arcuate hub segment 24. The trapezoidal arms are cut out to allow free flow of air through the maze of filter material 25 which fills the space between the shell 17 and the cylindrical duct formed conjointly by the arcuate segments 24. The outer marginal edge portion of the arm 23 of each stamping is bent over at an acute angle to form a flange 26 which hooks over the outer edge 27 of the adjacent arm 22 when the three stampings are assembled.

Upon assembly of the stampings their arcuate segments 24 cooperate to form a complete cylinder which defines the inner wall of the annular filter cartridge and a central tube through the filter cartridge. Since each stamping has two trapezoidal arms and since the abutting arms of each pair of adjacent stampings together form one strut there are as many struts radiating from the central cylinder as there are stampings; and as will be readily seen the extremities of the struts 21 abut the inner surface of the cylindrical shell 17 to retain the central tube and strut assembly in place therein.

The filter maze 25 is confined at the top and bottom by upper and lower screens 28 and 29 respectively. Each of the screens is annular, the upper screen being essentially conical to follow the slope of the upper edges of the struts 21 and define an air space 30 above the filter maze, and the lower screen being flat and having its peripheral edge portion resting on the ledge 19 of the shell 18, being gripped between this flange and the outer portion of the lower edge of each strut 21. A tube 31 having an outwardly turned flange 32 at its bottom telescopes into the central tube defined by the arcuate segments 24 and grips the inner marginal edge of the lower screen 29 between its flange 32 and the inner ends of the lower edges of the struts 21.

Similarly the upper screen 28 has its outer marginal edge gripped between the radially outer portions of the top edges of the struts 21 and the top wall 6' of the upper casing section 6. An upper telescoping tube 33 having three outwardly turned lugs 34 at its top one above each strut 21 telescopes downwardly into the lower tube 31. To provide stiffness for the inner marginal edge of the upper screen it has a downturned flange 35 which is received between the arcuate segments and the upper telescoping tube 33, the thickness of the screen being substantially equal to the wall thickness of the lower tube.

The telescoped tubes 31 and 33 are press fitted together and thus hold the inner marginal edges of the screens against the struts, and together define the upper end portion of the exit duct 13 leading from the space 30 above the upper screen to the standpipe 11. It will be noted that the diameters of the lower tube 31 and the standpipe 11 are such that the flange 32 at the bottom of the tube 31 rests on the gasket 15. It will also be seen that the gasket 15 is thicker than the height of the neck 14' on the flange 14. Hence there is no centering engagement between the tube 31 and the standpipe. To hold these parts axially aligned and return the upper and lower sections of the air cleaner properly centered, a plurality of indentations are formed in the side wall of the lower casing section 7 to engage the shell 17.

An alternative method of centering the separable parts is shown in Figures 4 and 5. In this case a number of radially projecting arms 37 extend from the rim of the lower casing section to have engagement with the skirt of the upper section.

The air cleaner of this invention is normally assembled onto a carburetor intake duct having an outer diameter such that it will fit snugly inside the standpipe 11 with its top abutting the in-turned flange 14 thereon. The customary tie rod 38, which has its lower end anchored to the carburetor air duct in the usual manner, extends upwardly axially through the air exit duct 13 and passes out of the casing through an aperture 39 formed centrally in the top wall 6' of the upper casing section. A wing nut 40 threaded on the upper end of the tie rod bears against the top will of the upper casing section to firmly hold the cleaner assembled on the carburetor inlet duct.

The top wall 6' is stiffened by the concentric steps formed therein so that the clamping pressure exerted by the wing nut will be imparted to the radially outer ends of the struts 21 with little or no deflection of the top wall. From these points the clamping force is carried through the spider-like frame composed of the struts 21 directly down onto the annular flange 32 which rests on the gasket 15. The gasket is thus firmly clamped between the flange 32 and the flange 14 at the top of the standpipe 11 with the result that the juncture between the upper and lower sections of the exit duct 13 is tightly sealed to preclude oil laden air being drawn therethrough and bypassing the filter maze. In addition the air cleaner is firmly held down onto the carburetor air inlet, and no distorting stresses are set up in the casing sections.

In operation the air entering the cleaner first flows upwardly through the annular intake 10 and thence downwardly between the side wall of the lower casing section and the shell 17 of the filter cartridge to impinge the oil bath which takes much of the dirt and foreign matter out of the air, and then through the filter maze where the oil and remaining dirt is extracted. Upon leaving the filter maze the cleaned air enters the upper open end of the central air exit duct 13 through which it flows down into the carburetor.

As shown in Figure 6 the air cleaner of this invention also may be readily adapted for use with an updraft carburetor by providing an enlarged aperture 41 in the center of the closed top 6' of the upper casing member section, and a flanged cover plate 42 to close the mouth of the air exit duct. The aperture 41 opens into the

carburetor intake, and a ridge 43 on the top of the upper section fits into the mouth of the duct to hold the air cleaner concentric therewith. A hole in the cover plate 42 allows a tension screw 44 to pass therethrough and be threaded into a boss 45 on the carburetor intake duct. The tension screw, like the tie rod 38, draws the sections of the air cleaner together and holds the entire structure firmly on the carburetor air inlet.

From the foregoing description, taken together with the accompanying drawings, it will be readily apparent that this invention provides a simple and efficient carburetor air cleaner of the oil bath type, and that the way in which the spiderlike framework of the filter cartridge is formed from a number of simple identical stampings greatly reduces the cost of manufacturing the cleaner.

What I claim as my invention is:

1. In an oil bath type air cleaner for carburetors, internal structure defining a filter unit and the upper portion of a central air duct comprising: a plurality of identical stampings each having a hub segment and an arm extending radially outwardly therefrom, said hub segments being of a size such that when arranged serially side-by-side they collectively form a tubular hub to provide the upper portion of the central air duct; screens extending across the top and bottom of the spaces between the arms; filter material between the screens and the arms; and an imperforate wall encircling the arms and the filter material therebetween and holding the stampings together with their hub sections arranged serially side by side and facing the upper portion of the central air duct, said encircling wall cooperating with the tubular hub to close off air flow into and from the filter material except through said screens.

2. The structure set forth in claim 1 further characterized by the provision of: means providing connections between the imperforate wall and the peripheries of the top and bottom screens by which the peripheries of the screens are held against the arms; and means providing connections between the tubular hub and the inner marginal edges of the top and bottom screens by which said inner marginal edges of the screens are held against the arms.

3. The structures set forth in claim 2 further characterized by the fact that: the last named means comprises a pair of telescoped tubes fitted into the tubular hub from opposite ends thereof; and out-turned portions on said telescoped tubes overlying the inner marginal edges of the screens.

4. The structure set forth in claim 1 further identified by the facts that the imperforate wall is higher than the tubular hub, that the top edges of the radial arms slope inwardly and downwardly from the top of the imperforate wall to the top of the tubular hub, and that the top screen rests on the top edges of the arms so as to be essentially concave.

5. As an article of manufacture, a combination thrust carrier and duct forming segment for use in an air cleaner, comprising: a stamping having an arcuate segment and a flat strut extending radially outwardly from each side edge thereof, each of said struts being substantially trapezoidal in outline and having its central portion cut away; and a hook-like portion on the outer extremity of one of said arms bent inwardly away from the other arm.

6. In an oil bath type air cleaner having upper and lower cup-shaped sections: means carried by the lower cup-shaped section and defining the lower portion of a central air duct for the cleaner; means defining the upper portion of said air duct; a plurality of arms integral with said last named means and radiating therefrom; means securing said arms in the upper cup-shaped section so that the upper portion of the air duct is carried by said upper cup-shaped section, said means including an imperforate shell fixed to the upper casing section and engaged around the outer ends of said arms, and means at the bottom of said shell engaged under the bottom edges of the arms to hold the upper edges of the arms against the underside of the upper casing section so as to provide for the transmission of downward force applied to the top of the upper cup-shaped section onto the radiating arms whereby such downward force is transmitted, through the arms, directly to the duct forming the upper portion of the central air duct; and sealing means between said upper and lower duct sections adapted to be placed in compression by downward force on the radiating arms.

LEO J. LECHTENBERG.

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The following references are of record in the file of this patent:

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