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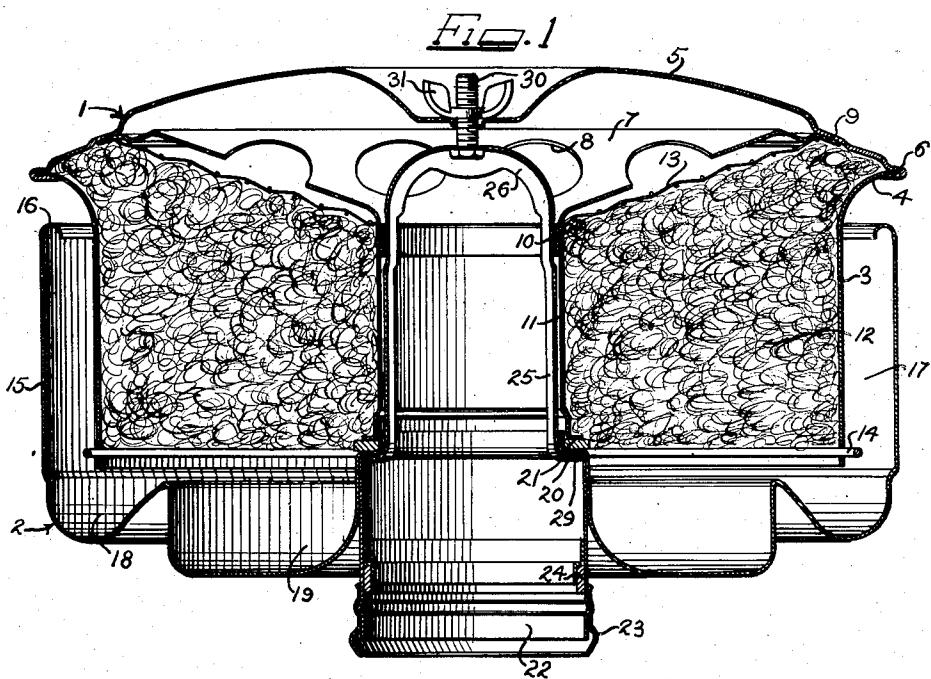
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2,575,136

AIR CLEANER AND METHOD OF MAKING PARTS THEREOF

Filed Oct. 26, 1946

2 SHEETS—SHEET 1



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AIR CLEANER AND METHOD OF MAKING PARTS THEREOF

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2 SHEETS—SHEET 2

FIG. 3

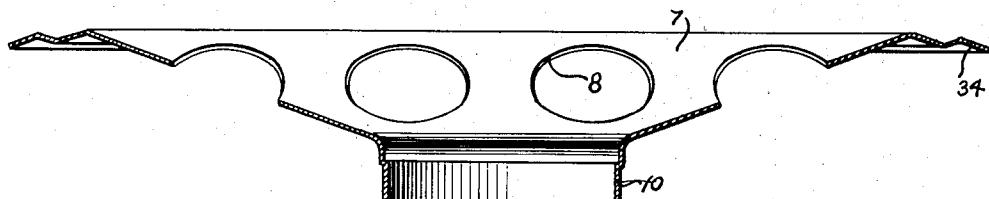


FIG. 4

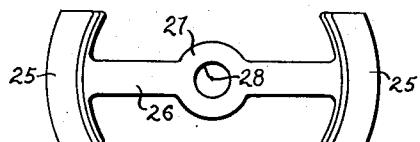


FIG. 5

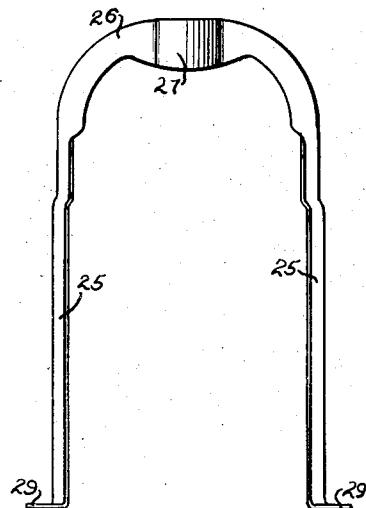
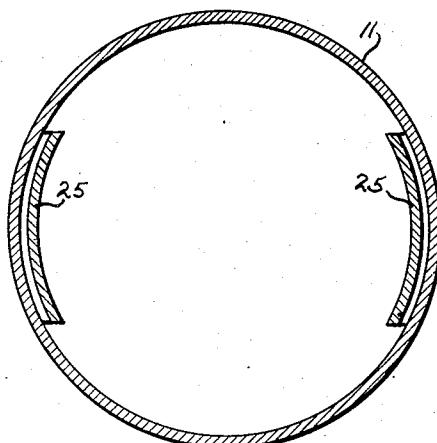


FIG. 6



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## UNITED STATES PATENT OFFICE

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AIR CLEANER AND METHOD OF MAKING  
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This invention relates to improvements in an air cleaner and to improvements in the method of making parts therefor, the invention being highly desirable for use in connection with liquid bath air cleaners of the automotive type, although the invention will have other uses and purposes as will be apparent to one skilled in the art.

In the past, many and various types of liquid bath air cleaners having a center tube outlet construction have been developed. Such air cleaners are frequently referred to as hat type cleaners because they are especially adapted for easy association with a downdraft carburetor and are customarily mounted over the air intake of such a carburetor in the manner of a hat, seating on top of the air intake. Such cleaners have been most frequently made with a casing comprising separable sections, of which the lower section was shaped to define a sump for cleansing liquid. Frequently with such air cleaners as heretofore known, a separate outlet tube was used in the lower casing section with a cross bar in that tube. A stud was secured in the cross bar that extended lengthwise through the tube and was removably attached to the cover of the other casing section so as to hold the two sections together during use but permit easy separation of the sections for servicing. In many cases, the tube so provided in the lower casing section, telescoped with a similar tube provided in the upper casing section to form the entire outlet conduit. That type of construction was objectionably expensive, especially in view of the fact that insofar as air cleaners used with automobile engines are concerned, economy in manufacture is a prime requisite.

Further, with cleaners of the type heretofore known wherein a central outlet tube was not used in the lower casing section, a Z-bar or cross bar was used in the outlet portion down below the cleaner which connects with the carburetor intake. In such location that Z-bar which holds the stud to which the cover is attached was located very near the butterfly valve of the carburetor, and the bar and the stud head, etc., all took up room to such an extent that at a low rate of air flow carburetion was adversely disturbed. Carburetor designers have been troubled with overcoming that particular difficulty for many years.

In addition, in connection with hat type air cleaners of liquid bath type, more particularly, anything or any improvement in the method of

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manufacture that reduces the cost of making the cleaner is highly desirable, as heretofore an objectionable amount of material was wasted in forming the parts that make up the cleaner casing.

With the foregoing in mind, it is an important object of the instant invention to provide a liquid bath air cleaner having a center tube outlet, with that center tube substantially free and unrestricted throughout its entire length so that carburetion is not adversely affected even when there is a very low air flow through the cleaner.

A further object of the invention is the provision of a liquid bath air cleaner embodying a casing comprising separable sections of which one section is provided with a relatively thin bracket that extends upwardly above the outlet passage of the cleaner and may be connected in that region to the opposite casing section to hold the sections joined together during operation.

A further object of the invention resides in the provision of a liquid bath air cleaner comprising separable sections and having a center tube outlet in one of those sections, wherein a bracket in substantially inverted U-shape is secured to one of the sections, and extends upwardly through the outlet conduit or center tube with the yoke of the U well above the top of that tube, and it is at that point that attachment to the opposite casing section is made, so that the center tube itself is free and unrestricted by any securing or connecting means.

Still another feature of the instant invention is the provision of a liquid bath air cleaner having a center tube outlet and embodying a casing comprising separable sections, so constructed as to eliminate any need for an upstanding outlet conduit in the lower casing section.

Still another feature of this invention resides in the provision of a liquid bath air cleaner in which one part of the cleaner is made from what would normally be wastage resulting from the manufacture of another part of the cleaner.

It is also a feature of the invention to provide a new and novel method of making a casing section for an air cleaner.

Still another feature of the invention resides in the provision of a new method of making a casing section for an air cleaner including the drawing of the part into substantially cup shape, the severance of the bottom from that part, the punching of openings in the severed bottom, and the ultimate use of the first portion as a filter holding element and the punched bottom portion

as a spider for disposition above the filter element inside the cleaner casing.

Still another object of the invention resides in the provision of the method of making a casing section for an air cleaner including the drawing of a filter holding shell into a cup-like formation having an inwardly and downwardly sloping bottom, the severance of that bottom from the filter holding shell, the punching of openings in that severed bottom portion while maintaining the taper thereof intact, and the ultimate use of that punched and severed bottom as a spider for disposition inside the cleaner casing.

While some of the more advantageous characteristics, features and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which

Figure 1 is a central vertical sectional view through a liquid bath air cleaner embodying improvements of the instant invention;

Figure 2 is a central vertical sectional view of the filter holding shell of the structure of Figure 1 after it has been drawn from a blank, this figure actually illustrating the making of two parts of the air cleaner in an earlier stage of formation;

Figure 3 is a vertical sectional view through the spider seen in the upper portion of the structure of Figure 1, which is made from the bottom only of the structure seen in Figure 2;

Figure 4 is a top plan view of the bracket alone which is used to unite the separable casing sections of the cleaner;

Figure 5 is a side elevational view of the bracket in Figure 4 alone; and

Figure 6 is an enlarged plan sectional view taken substantially centrally through the outlet conduit and bracket of the cleaner, other parts being removed.

As shown on the drawings:

In the illustrated embodiment of this invention there is shown a liquid bath center tube outlet air cleaner including a casing made up of separable sections, an upper section generally indicated by numeral 1, and a lower section generally indicated by numeral 2.

The upper casing section embodies a filter holding shell 3 comprising a cylindrical side wall with a flared top as indicated at 4. A cover 5 extends over the entire upper portion of the cleaner and is locked-seamed at its outer margin to the edge portion of the shell 3 as indicated at 6. Inside the cover is a spider 7 having a plurality of apertures or openings 8 therein. This spider has its outer margin spot welded, brazed or equivalently secured to the inside of the cover as indicated at 9, and the inner portion of the spider is apertured and a margin is turned down to provide a depending neck 10 which is firmly secured as by welding or brazing to a center tube or outlet conduit 11. Between the center tube and the shell 3 is a filter mass 12 which may be of any suitable material, such as animal hair, vegetable fiber, metallic wire or ribbon, etc. Over the top of this filter mass beneath the spider 7 an annular sheet of hardware cloth 13 or equivalent material may be used if desired. The lower marginal portion of the shell 3 may be provided with apertures at spaced intervals through which portions of a spring wire 14 may snap into position to retain the filter mass in the shell. It is a simple expedient to spring the portions of the wire 14 out of position in the event it is desired to remove the filter mass.

The lower casing section 2 is of greater diameter than the filter holding shell 3 and includes an upstanding wall 15 turned inwardly at the top as at 16, which wall defines a downwardly leading path 17 for incoming air between itself and the shell 3. The upper edge of this wall is spaced below but beneath the flare defined by the lock seam 6, which functions as a hood over the inlet opening. This wall 15 merges into a liquid sump 18 at the bottom so shaped as to define an outer annular trough 18 and an inner annular well 19. The inside wall of the well portion 19 extends upwardly and then is offset as at 20 to provide a seat for a gasket 21 against which the lower end of the outlet conduit 11 seats when the two casing sections are joined together. A conduit portion 22 having an upper end shaped complementary to the gasket holding seat 20 extends downwardly through the inner wall of the well 19 and is secured to that wall by brazing, welding or any equivalent operation. This conduit 22 carries at its lower end a suitable clamp 23 for engagement around the carburetor intake pipe, such carburetor intake pipe seating against a gasket 24 carried inside the conduit 22.

In order to hold the two casing sections together for operation, my novel bracket is utilized. With reference more particularly to Figures 4 and 5 it will be seen that the bracket is substantially in the shape of an inverted U including leg portions 25-25 and a yoke portion 26 joining the upper ends of the legs. As best seen in Figure 4 the yoke portion is centrally expanded as at 27 and provided with an aperture 28 to accommodate a retaining bolt. It will also be noted that the yoke portion 26 is preferably narrower at the legs 25-25, this may be accomplished by turning down the marginal portions of the yoke portion as best seen in Figure 5. The legs are preferably curvate to complement the curvature of the center tube outlet 11. As also seen in Figure 5, the lower extremities of the legs are outwardly and oppositely turned as indicated at 29-29 and these turned portions are welded, brazed, or equivalently secured to the underside of the gasket holding shoulder defined by the inner wall of the well 19 and the conduit 22.

From the foregoing description, it will be noted that the entire bracket may be made in a single operation from a flat piece of material, proper dies being used. The bracket is therefore extremely economical.

Through the aperture 28 in the yoke of the bracket an ordinary bolt may be inserted with the shank uppermost. The illustrated instance has a stove bolt 30, which is extremely economical, and this bolt extends through the yoke of the bracket and through a suitable aperture in the cover 5. A wing nut 31 may be tightened down upon the bolt until the two casing sections are firmly joined together.

It should be especially noted that with the use of the bracket there is no obstruction in the center tube outlet 11. This is substantially free and unrestricted throughout its entire length. The yoke portion of the bracket is in the space beneath the cover above this center tube outlet where it will not interfere with air entering or passing through the outlet. Consequently, assuming that the cleaner is connected with internal combustion engine of the automotive type, even when the engine is running at an extremely slow speed, there is no interference whatever with proper carburetion. Likewise, with this arrangement it is not necessary to have any outlet

conduit portion extending upwardly from the lower casing section and telescoping within the upper section. Thus, with this arrangement, carburetion problems are not added to in any degree by virtue of the use of the air cleaner, and the structure of the air cleaner provides for more economical manufacture.

Another feature of the invention going toward economical manufacture resides in the method of producing the filter holding shell 3 and the spider 7. With reference more particularly to Figures 2 and 3, it will be seen that the filter holding shell is preferably drawn from a suitable blank. In the drawing operation, the flare 4 is formed and the vertical side wall 3 is formed. However, at this stage of the formation the cup-like structure is provided which includes an inwardly and downwardly sloping bottom 31. After the cup-like structure seen in Figure 2 has been drawn, the cup is laterally cut through substantially as indicated by the line 32 to remove the bottom. This leaves the filter holding shell as above described, and the bottom as a separate piece. Then, in a simple stamping operation the central portion of the bottom 31 is removed and the margin therearound the opening is turned down to form the neck 10 of the spider, as seen in Figure 3. The upwardly curved surrounding margin just below the line of cut 32 is preferably substantially corrugated to produce an outer margin 34 of proper slope for securement to the inside of the cover at the point 9. During this stamping operation the apertures 8 are provided in the inwardly and downwardly sloping portion of the spider. These apertures are preferably in the form of round holes, which are easy to cut all at once, easily machined if so desired, and it is also quite economical to maintain the cutting dies for round holes. It should be especially noted that the spider, when in use, has the same slant or oblique wall construction as when the cup-like structure of Figure 2 was first drawn. In short, the slope of the bottom 31 is never changed, but the resultant spider retains that particular slope, thereby adding further to the economy of production and the economy of maintenance of dies. In many cases, the bottom of the cup-like structure in Figure 2, when removed, would merely be wasted material. Here, the general shape of that bottom is not only preserved, but the entire bottom is preserved and used as an integral part of the air cleaner, with the exception of the relatively small waste occurring upon the provision of the apertures.

In operation, the cleaner functions in the same manner as liquid bath cleaners in general. Air enters beneath the flare 4 on the upper casing section, descends through the annular passage 17, commingles with and removes substantially all the sump liquid contained in the outer annular trough portion 18, and carries this liquid into the lower portion of the filter mass. During the comminglement with the liquid, and in the filter mass, dirt particles are removed from the air and the upper portion of the filter mass removes any entrained cleansing liquid as well so that the air leaves the cleaner by passing through the apertures 8 of the spider and descends through the center tube 11 in a clean and dry state. Most of the dirt removed from the air will collect in the central well portion 19 of the lower casing section and there it will be in a zone of quiet where there will be little or no danger of any of that removed dirt being carried back into the filter mass during further operation.

From the foregoing, it is apparent that I have provided a novel air cleaner structure in which a simple form of bracket is utilized to join the casing sections together, eliminating the necessity of a conduit with a cross bar secured to the lower casing section. Thus, economy of production is increased, and there is no danger of interference with adequate carburetion even at low engine speed when the air cleaner is associated with an internal combustion engine. The outlet tube is left free and unrestricted throughout its length. Further, it will be noted that I have provided a new and novel method of making parts of the air cleaner, namely the economical method of forming the spider from the bottom of the drawing resulting from the manufacture of the filter holding shell of the cleaner.

It will, of course, be understood that various details of construction may be varied through a wide range without departing from the principles of this invention and it is, therefore, not the purpose to limit the patent granted hereon otherwise than necessitated by the scope of the appended claims.

25 I claim as my invention:

1. In a liquid bath air cleaner, a casing comprising separable upper and lower sections, a center tube outlet in one of said sections, a bracket of generally inverted U-shape extending through said center tube, releasable means connecting the yoke portion of said bracket to the other casing section, said bracket being made of a single stamping with relatively narrow legs, and each bracket leg having the lower part thereof turned outwardly for securement to the lower of said casing sections.

2. In the method of making an air cleaner casing section, the steps of drawing a filter holding shell into cup shape, cutting the bottom from the drawn shell and punching a series of openings in said bottom to form a spider, attaching a cover to said shell, and securing said spider to the inside of said cover.

3. In the method of making an air cleaner casing section, the steps of drawing a blank into a cup-like form with an inwardly and downwardly sloping bottom, severing said bottom from the cup-like form at a location to leave a straight side wall to define a filter holding shell, punching openings in said severed bottom leaving the slope thereof intact to define a spider, mounting a cover on the filter holding shell, and securing said spider to the inside of said cover.

4. In the method of making an air cleaner casing section, the steps of drawing a blank into cup-like form with an inwardly and downwardly sloping bottom, cutting the bottom from said cup-like form to leave a filter holding shell, cutting a central opening and a series of openings therearound in said bottom and drawing a depending neck portion around the central opening to define a spider, attaching a cover to said filter holding shell, securing said spider to the inside of said cover, and connecting said neck portion to an outlet conduit.

5. In a liquid bath air cleaner, a casing comprising separable sections and having separated inlet and outlet openings, one of said sections including a filter holding shell, a cover on said shell, a spider secured to the inside of said cover and sloping inwardly and downwardly, an outlet conduit attached centrally to said spider, and a filter mass in said shell around said conduit, the other casing section defining a liquid sump, a conduit section in said other casing section

of greater diameter than said outlet conduit but functioning as a continuation of the same, said other casing section being turned inwardly above said conduit section to provide a shoulder, a bracket of an inverted U - shape extending through said outlet conduit and having the leg ends bent outwardly and secured beneath said shoulder, the yoke portion of said bracket being above said outlet conduit inside said spider, and releasable means connecting the yoke portion of said bracket with said cover to maintain said casing sections joined.

6. In a liquid bath air cleaner, a casing comprising separable upper and lower sections, a center tube outlet in one of said sections, a supporting shoulder on the lower of said sections, said center tube outlet being seated against said shoulder, a bracket of generally inverted U-shape extending through said center tube and having the ends of its legs secured to the underside of said shoulder, and releasable means connecting the yoke portion of said bracket to the upper of said sections.

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7. In a liquid bath air cleaner, a casing comprising separable upper and lower sections, a center tube outlet secured to the upper section, a supporting shoulder on the lower of said sections, a resilient gasket between said center tube outlet and said shoulder, a bracket of generally inverted U-shape extending through said center tube and having the ends of its legs secured to the underside of said shoulder, and releasable means connecting the yoke portion of said bracket to the upper of said sections.

FRANK SEBOK.

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