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J. B. SEBOK

2,848,065

AIR CLEANER

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2 Sheets-Sheet 1

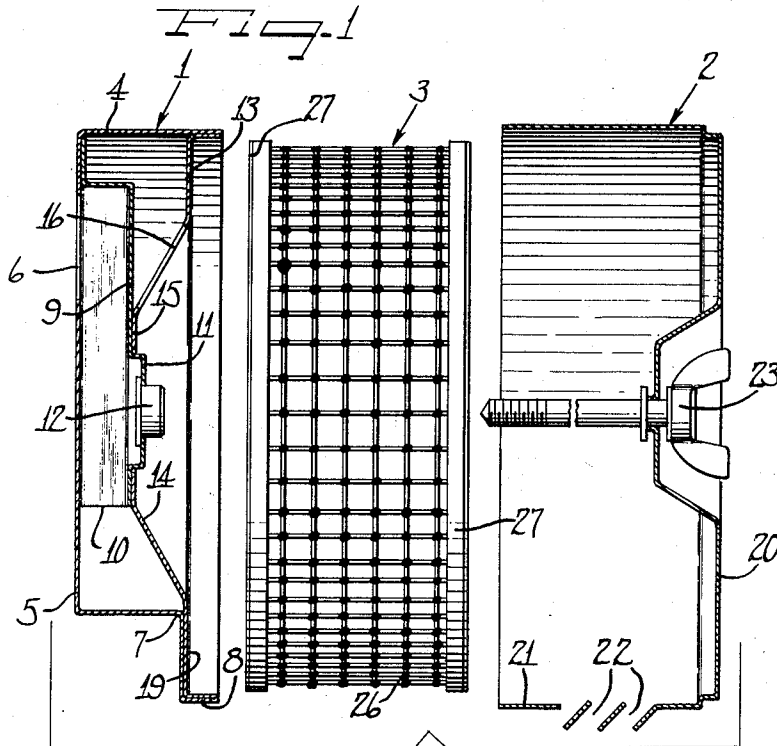
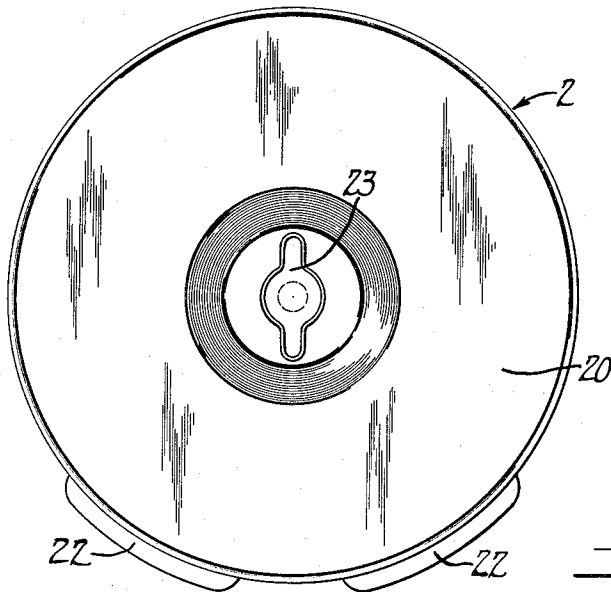


FIG. 2

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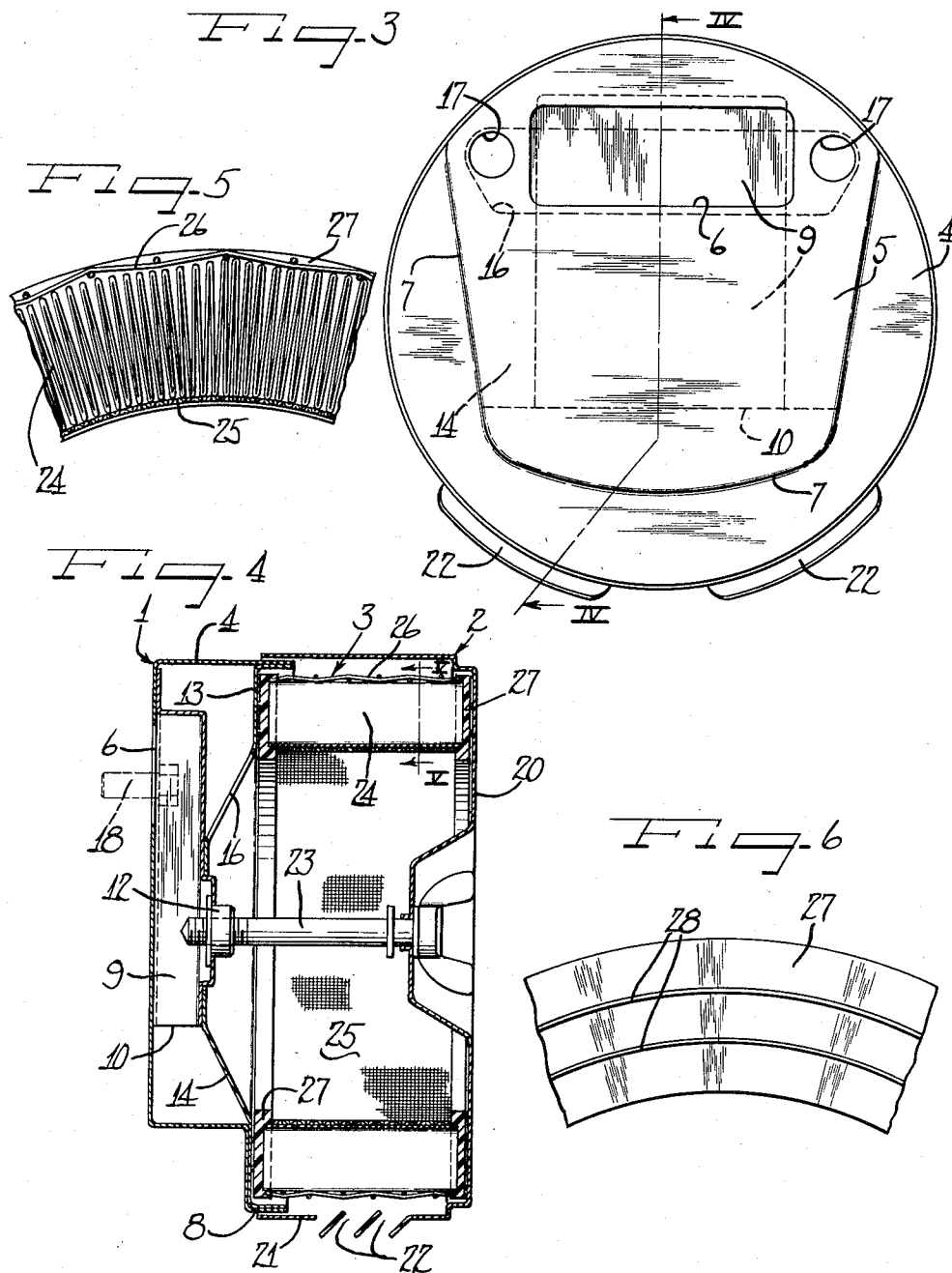
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AIR CLEANER

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Application February 15, 1956, Serial No. 565,729

3 Claims. (Cl. 183—71)

This invention relates to improvements in air cleaners, and more particularly to an air cleaner highly desirable for use on an air compressor of the type utilized on vehicle braking systems, although the invention will have other uses and purposes such as cleansing air for other types of equipment requiring a supply of clean air, all as will be apparent to one skilled in the art.

In the past, many and various types of air cleaners for cleansing the air supply to compressors as well as other apparatus have been developed, but in most instances have proven objectionable due to the cost of construction, the fact that the filter did not provide a desirable amount of surface area so that the capacity of the cleaner was materially limited, and further due to the fact that the air cleaner did not provide any protection for the terrific back pressure resulting periodically from the operation of an air compressor, such back pressure sometimes blowing out the filter element. Further, devices of this character heretofore known in the past did not silence the noise of an air compressor to a desirable degree.

An air compressor of the type utilized on motor trucks and trailers frequently shuts off every eight or ten seconds, and each time the air compressor shuts off there is a terrific blast of back pressure through the air cleaner supplying the compressor. Unless the adverse effects of that back pressure are eliminated, the filter element of the air cleaner is frequently blown apart or otherwise injured. At the same time, considerable noise results from the blasts of back pressure each time the compressor shuts off, which noise is objectionable and should be eliminated as much as possible.

With the foregoing in mind, it is an important object of the instant invention to provide a highly efficient air cleaner, that is extremely simple in construction, and economical to manufacture, and which is highly suitable for use on air compressors.

Another object of the instant invention is the provision of a simple and economical air cleaner designed to eliminate the adverse effects of back pressure blasts when the cleaner is mounted upon an air compressor.

It is also an object of this invention to provide an air cleaner of very small size, and yet which has a considerably greater cleaning surface area than cleaners of this type heretofore used.

A further feature of the instant invention resides in the provision of an air cleaner embodying a filter element of new and novel construction, which filter element is not only suitable for air cleaners utilized with compressors, but suitable for air cleaners of substantially any type and for substantially any purpose.

Still another feature of the instant invention resides in the provision of a filter for an air cleaner embodying resilient end caps in which the filter element itself is embedded, the end caps functioning as gaskets when the filter is mounted in position.

A further object of the instant invention resides in the provision of a filter element for an air cleaner embody-

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ing an annulus of paper pleated axially, with the marginal edges of the pleats embedded in resilient molded end caps which function as gaskets, and which also retain the paper pleats in proper position and spacing.

Still another object of the instant invention is the provision of an air cleaner highly desirable for use upon air compressors and which is provided with a double trap to eliminate the adverse effects of back pressure at the discharge cycle of the compressor, and also which prevent oil from the compressor reaching the filter element of the cleaner.

Still a further object of the instant invention resides in the provision of an air cleaner highly suitable for use with an air compressor, and which is so constructed as to materially silence noises emanating from the compressor.

While some of the more salient features, characteristics 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 an exploded view of an air cleaner embodying principles of the instant invention, showing the filter element in elevation, and the casing structure in central vertical section;

Figure 2 is a front face view of the air cleaner taken from the right-hand side of Fig. 1;

Figure 3 is a rear face view of the air cleaner taken from the left-hand side of Fig. 1;

Figure 4 is a central vertical sectional view through the air cleaner assembled, with parts illustrated in elevation, taken substantially as indicated by the staggered section line IV—IV of Fig. 3;

Figure 5 is an enlarged fragmentary plan sectional view through the filter element below or inside of one of the end caps, taken substantially as indicated by the line V—V of Fig. 4; and

Figure 6 is an enlarged fragmentary plan view of the filter element, showing the outer face of one of the end caps.

As shown on the drawings:

In the illustrated embodiment of the instant invention there is shown an air cleaner comprising a casing and a filter element. By way of example, and not by way of limitation, the casing is shown as comprising separable sections, generally indicated by numerals 1 and 2, which conjointly enclose the filter element generally indicated by numeral 3, in Fig. 1. This figure of the drawings shows the parts in exploded relationship, and to assemble the cleaner, it is simply necessary to seat the filter element in the inner casing section 1, and apply the top or outer casing section 2 over the element, until the assembly of Fig. 4 is established.

Looking now particularly at Figs. 1 and 3, it will be seen that the inner casing section 1 comprises a shell 4 having an offset and depressed bottom portion 5 which is closed except for an eccentrically disposed or offset opening 6 through which clean air may enter the device to which the cleaner is attached. The depressed bottom portion 5 extends upwardly as indicated at 7 to merge with a flat portion terminating in an annular cylindrical flange part 8. The flat portion of the casing surrounds the offset or depressed bottom 5 substantially on three sides thereof as clearly seen in Fig. 3.

Inside this casing section there is a box-like baffle 9 overlying the outlet opening 6 and extending well beyond that opening toward the other side of the casing. This box-like baffle has an open end 10, and is otherwise imperforate. A portion of the baffle is pressed outwardly as indicated at 11 to sustain a nut 12 rigidly secured thereto.

A second baffle 13 is spaced outwardly from the box-

like baffle 9, and is provided with a depressed portion 14 which slopes down to terminate in a flat part 15 apertured to accommodate the outward bulge 11 on the baffle 9, and the flat part 15 is secured to the baffle 9 as by spot welding, brazing, or the equivalent. The baffle 13 is provided with an opening 16 and it will be noted that this opening is almost in alignment with the outlet opening 6 in the casing bottom, and is wider than the opening 6 and baffle 9 (Fig. 3) so that access may be had for the securing of mounting bolts through spaced holes 17—17 in the casing bottom as indicated at 18 in dotted lines in Fig. 4. These mounting bolt holes 17—17 are completely closed by the mounting bolts when the cleaner is in position upon an air compressor or other structure. Inside the casing section generally indicated by numeral 1, the baffle 13 parallels the cylindrical flange portion 8 of the casing and forms an annular seat 19 for a filter element to be later described.

The outer casing section 2, embodies a cover part 20 and a cylindrical side skirt 21, this skirt being provided with one or more sets of louvered openings as indicated at 22 through which contaminated air may enter the cleaner. The central part of the cover 20 is depressed to accommodate a wing bolt 23 which is engageable with the aforesaid nut 12 in the other casing section when the cleaner is assembled. This cover 20 also provides a seat for the opposite end of the filter element 3, and the skirt portion 21 telescopes with the cylindrical wall portion 8 of the lower casing section, as clearly seen in Fig. 4. It is not essential that there be a tight telescopic fit between the two casing sections, because air that may enter between these sections must also pass through the filter.

The filter element itself comprises an annulus of filtering material, preferably paper, which may be treated to be oil resistant, in case any oil from the compressor should reach the filter element. As seen best in Fig. 5, the paper is radially pleated as at 24 with the pleats extending axially of the annular element. On the inside of the annular filter element is a cylindrical screen 25 which may be in the nature of an insect screen, and which is usually required by the Underwriters in case the cleaner is used with an internal combustion engine. Outside the filter annulus is a coarser screen 26, preferably in the nature of hardware cloth, and which is used for strengthening purposes.

At each end of the filter element there is a resilient molded cap 27, these caps being identical in construction. The caps 27 are preferably molded of an elastomeric compound. The selection of the elastomeric compound depends upon where the filter element is to be ultimately used. In the case of an air cleaner, a satisfactory elastomeric composition is polymerized chloroprene (neoprene). One advantage of this particular material is that it can be conveniently vulcanized or set without the use of sulfur vulcanizing agents, and provides a permanently flexible resilient end cap which may function as a gasket without any additional gasket material. Other suitable compositions for this purpose include a "Plastisol" composition consisting of a high molecular weight vinyl chloride polymer dissolved or dispersed in a plasticizer such as dibutyl phthalate, and a solution or suspension of a vinyl resin in a volatile solvent.

The end caps 27 are preferably molded, and as seen from the disclosure in Fig. 4 the end marginal portions of the pleated filter element 24, the inner screen 25, and the outer screen 26, are all embedded in the end caps. Thus, there is a positive seal against the passage of air except laterally through the filter element, and there is a firm bond between the filter element proper and the end caps.

With reference to Fig. 6, it will be seen that each end cap 27 is preferably provided with one or more outstanding integral annular ribs 28, these ribs being of small size and enhancing the sealing properties of the end

cap. On small size filter elements the ribs may not be necessary, but on larger size elements they add materially to the ability of the end cap to function as a gasket.

The filter element is extremely simple in construction, and after some usage, may be removed from the cleaner and jarred or bounced against a solid surface to knock off accumulated dirt particles. After the element has been used so long that the jarring or bouncing of the element is ineffective to remove a satisfactory amount of the dust particles, the element is discarded and a new element substituted therefor.

It will be especially noted that by utilizing a filter element of paper or the like, pleated as shown, a considerable amount of surface area is provided for the filter. For example, in comparison a small size compressor cleaner utilizing curled hair as a filter medium, would provide approximately six square inches external surface, whereas a pleated element of the character herein shown, for the same size job, would provide approximately 220 square inches external filter surface area.

The cleaner may be assembled simply by seating the filter element in the casing section 1, putting the casing section 2 over the element, and tightening the wing bolt 23 in the nut 12. The tightening of the bolt compresses the filter element between the two casing sections and provides an effective seal against the by-passing of contaminated air, because the end caps of the filter element function as gaskets. During use the filter element cannot become misaligned or have the inside folds of the pleats move out of proper spaced relationship, because the element is firmly held by virtue of its end embedment in the end caps.

In operation, the present invention is highly efficient both as a filtering medium and as a silencer. Assuming that the device is mounted by means of bolts 18 on the side surface of an air compressor, in the position seen in the drawings, air to be cleansed will enter the louvers 22 which will be disposed at the bottom or underside of the casing and thus protected from debris as well as moisture, pass through the pleated filter element, through the opening 16 in the baffle 13, pass around both sides of the baffle 9, entering the open end 10 thereof, and exiting into the air compressor through the outlet opening 6. When the compressor discharges, the force of the back pressure is assumed primarily by the box-like baffle 9 which takes the brunt of the blow. Back pressure air must pass through the open end 10 of this baffle, reverse its direction along both sides of the baffle, while inside of the baffle 13, in order to reach the openings 16 leading to the air filter. By that time the force of the blow is so dissipated that no damage will be done to the filter unit, and due to the tortuous path, no oil from the compressor should reach the filter element. At the same time, sound waves emanating from the compressor must follow the same tortuous path and by the time they reach the filter element, these waves are materially attenuated. Further attenuation occurs in the event a paper filter element is used since some of the sound waves will penetrate that paper element and be dissipated thereby. The baffle structure provides what may be termed a double trap to withstand back pressure from the compressor, and aid in the dissipation of sound waves.

From the foregoing, it is apparent that I have provided an extremely simple form of air cleaner highly desirable for use with air compressors, and which not only eliminates any adverse effects of back pressure from the compressor, but also effectively reduces noise emanating from the compressor. The structure is simple, easy to mount, easily dismantled for cleansing or replacement of the filter element, and is highly durable. When removing the filter element, it is of course not necessary to remove the casing section 1 from the compressor.

It will be understood that modifications and variations

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may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. In an air cleaner, a casing section having an open top and a bottom imperforate except for an offset outlet opening, a box-like baffle over said outlet opening and open at the end farthest from said opening, and a second baffle spaced inwardly from the first said baffle and having a depressed central portion in contact with the first baffle, said second baffle having an opening remote from the open end of the first said baffle, air cleaning means seated in said casing section and a cover over said air cleaning means.

2. In an air cleaner, a casing section having an open top and a bottom imperforate except for an offset outlet opening, a box-like baffle over said outlet opening and open at the end farthest from said opening, and a second baffle spaced inwardly from the first said baffle and having a depressed central portion in contact with the first baffle, said second baffle having an opening remote from the open end of the first said baffle, said second baffle being shaped to provide an annular filter element seat, a filter element on said seat, and a cover section having a seat for the other end of said element and a skirt around said element telescoping with the first said section, said cover section having an inlet opening therein.

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3. In combination, an air cleaner-silencer for a compressor comprising a casing having an open top and a bottom imperforate except for an offset outlet opening, a box-like baffle over said outlet opening and open at the end farthest from said opening, and a second baffle spaced inwardly from the first said baffle and having a portion in contact with the first baffle, said second baffle having an opening remote from the open end of the first said baffle, air cleaning means seated in said casing section, a cover over said air cleaning means, said cleaning means comprising an annulus of paper pleated in an axial direction, said baffles and annulus forming silencing means, and said baffles forming a double trap for back pressure from a compressor.

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