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M. RABBITT ET AL

2,732,031

COMBINATION SEAL AND GASKET FOR END OF PLEATED CARTRIDGE

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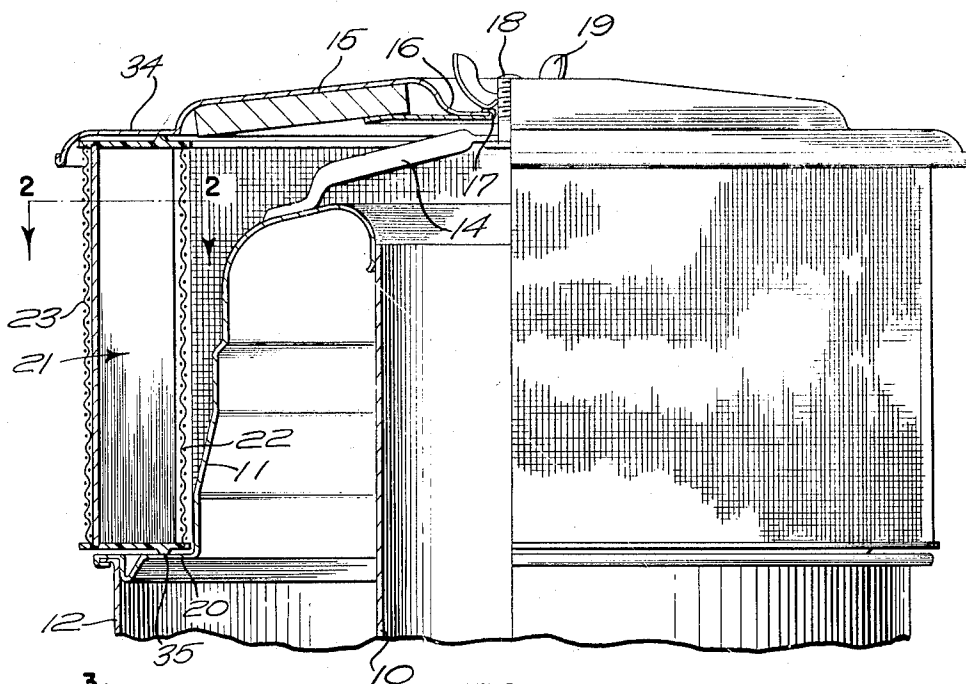


FIG. 1

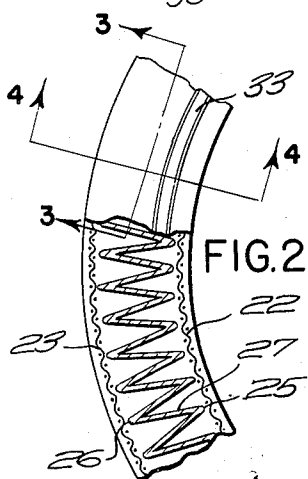


FIG. 2

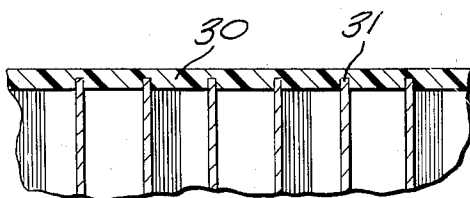


FIG. 3

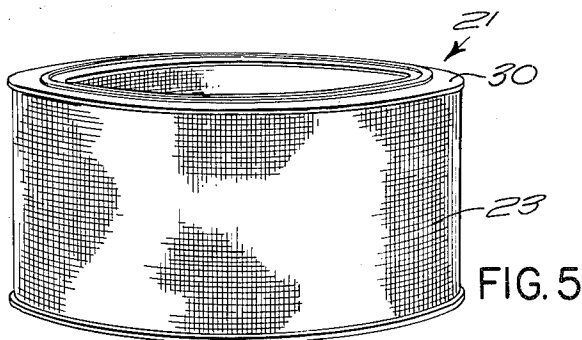


FIG. 5

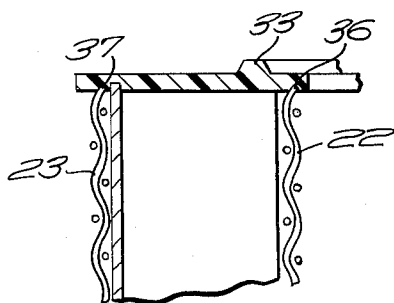


FIG. 4

INVENTORS
MILTON RABBITT
CARL F. BINDER

BY *Barlow & Barlow*
ATTORNEYS

1

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COMBINATION SEAL AND GASKET FOR END OF PLEATED CARTRIDGE

Milton Rabbitt, Gregory, and Carl F. Binder, Ann Arbor, Mich., assignors to Fram Corporation, a corporation of Rhode Island

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1 Claim. (Cl. 183—69)

This invention relates to a cartridge for a filter for any fluid, particularly for filtering air, although it is not exclusively for this purpose.

Using a paper, or other porous or permeable membrane material, disposed in generally the shape of an annulus with the paper in zigzag pleats extending generally radially of the annulus presents a problem for sealing the ends of the pleated paper which may be effected quickly and inexpensively and yet provide a complete and satisfactory seal. Such filters, or filter cartridges, are also usually mounted between metal parts and require separate gaskets so that they may be sealed with relation to these more rigid parts to control the passage of air in the desired direction.

One of the objects of this invention is to provide an inexpensive seal for a pleated annulus which may be quickly and easily applied.

Another object of the invention is to provide a seal which at the same time may act as a gasket to seal the pleated annulus in its more rigid casing or mounting.

Another object of the convention is to provide a material which will have a rubber-like consistency and be flexible and resilient so that it may not only seal the pleated cartridge in the framework in which it is mounted, but may also seal the pleats at the upper and lower ends of these pleats and serve to maintain the pleated annulus in substantially the desired annular shape which it is to assume.

Another object of the invention is the use of a sealing material that may be slush-molded or dip-coated in a cold state, and then heat-treated.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claim.

In the accompanying drawings:

Fig. 1 is an elevation partly in section showing an air cleaner for a carburetor equipped with a pleated cartridge which is the subject of this invention.

Fig. 2 is a fragmental section on line 2—2 of Fig. 1 of the cartridge alone.

Fig. 3 is a section on substantially line 3—3 of Fig. 2.

Fig. 4 is a fragmental section showing the upper portion of the cartridge as seen in Fig. 1 but on an enlarged scale.

Fig. 5 is a perspective view showing the cartridge as separated from the rigid casing in which it is mounted.

In proceeding with this invention we provide concentric screens through which air may freely pass, and position between these screens, paper in zigzag or pleated form with the sections between fold lines disposed generally radially of the annulus in which it is disposed. This paper is sealed at its ends by a rubber-like material which is so formed that it holds the pleats in place and provides a gasket for mounting the pleated annulus within the metallic framework of the structure for supporting it.

With reference to the drawings, 10 designates an intake air conduit supported by the shell 11 which is a part of a resonating device mounted upon the casing 12. A

2

spider 14 is mounted on the shell 11 bridging the conduit 10 and supports a cover 15 which is bent inwardly as at 16 and provided with an opening 17 to receive there-through a threaded stud 18 which is carried by the spider.

A wing nut 19 secures the cover in position. Between the cover and the shoulder 20 of the casing 12 at the lower edge of the shell 11, I mount a cartridge 21 constructed as best shown in perspective in Fig. 5.

This cartridge comprises an inner cylindrical screen 22 and an outer cylindrical screen 23 which are spaced and are concentric. Disposed between these screens a web of paper is provided in zigzag pleated relation formed with folds 25 at its inner edge and folds 26 at its outer edge. The extent of each of the portions 27 between the fold lines is substantially the distance that the concentric screens are spaced. Thus, the fold lines 25 may contact the inner screen wall 22 should pressure be so exerted as to cause the pleated form to tend to move inwardly or the fold lines 26 might engage the inner surface of the screen 23 were there such back pressure as to cause the pleated annulus to tend to move outwardly.

This assembly is sealed by molding or dip-coating its opposite ends in a rubber-like material 30 which imbeds the edges 31 of the pleated paper therein and also imbeds edges 36 and 37 of the screens, although in some cases the screens may be separate from the material 30 and not imbedded. As this material is applied to the ends of the paper annulus, there may be formed a rib 33 on the upper surface at one end and a rib 35 on the lower surface at the other end. The lower rib 35 will contact the shoulder 20 at the lower end of the cartridge and the upper rib 33 will contact the under surface of the portion 34 of the cover at the upper end, thus providing a good seal between the cover and the shell at these locations while permitting air to pass through the pleated material along the outer surface of the shell 11 and into the duct 10 to the carburetor.

The material which we prefer to use for sealing the ends of pleated paper comprises an intimate mixture or dispersion of a vinyl resin in a liquid plasticizer which will be a non-volatile liquid plasticizer. The vinyl resin may be of a vinyl chloride or poly-vinyl chloride and is present usually in a dispersed phase in the non-volatile liquid plasticizer and which will remain in this state at room temperatures and will be of a viscous or thick nature so that it may be spread, dipped, or slush-molded into the form desired. Due to the fact that the plasticizers are non-volatile, there is no shrinkage as drying occurs.

After the material is molded into substantially the form desired or acquires that form by some other method, in order to set the material it is heated to a temperature of from 300° to 350° F. in such a way that the entire mass is subjected to this heat range which causes the resin dispersions to fuse into the plasticizer and become substantially one homogeneous mass of material. The conversion makes a very tough, flexible, elastomeric vinyl resin product without shrinkage which serves to maintain the pleated paper annulus in substantially the form it is given; also to provide a seal for this annulus at its ends. Further, by reason of the shape given to this sealing medium, a gasket is provided which will serve to seal the annulus when put in place between two rigid surfaces, such as a lower shoulder and a cover plate, and serve throughout the life of the cartridge upon which it is formed. If desired, the paper forming the filter membrane may be impregnated with a heat curing material, such as one of the phenolic resins commonly used for stiffening paper, of a type suitable for curing, or final curing, at the same time that the end-sealing material is cured. This combined curing would not only obviate any separate cures of the paper and end-sealing members but

will facilitate forming the filter membrane into a pleated annulus with its impregnating resin in an unset, plastic or semi-plastic state and then stiffening the whole assembly by curing the various components susceptible to such treatment, all at the same time.

We claim:

A filter element comprising an annulus formed of a pleated porous fibrous sheet having the pleats extending longitudinally of the annulus, and a combined closure and gasket for an end of the pleated annulus and which is formed throughout of a resilient rubber-like impermeable plastic consisting of a vinyl resin compound molded to shape with the ends of the pleats embedded therein and having an integral molded gasket of the same material protruding from an outer face of the closure.

5

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15

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