

Jan. 15, 1952

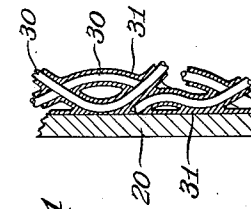
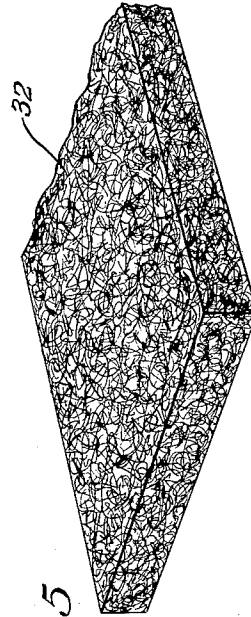
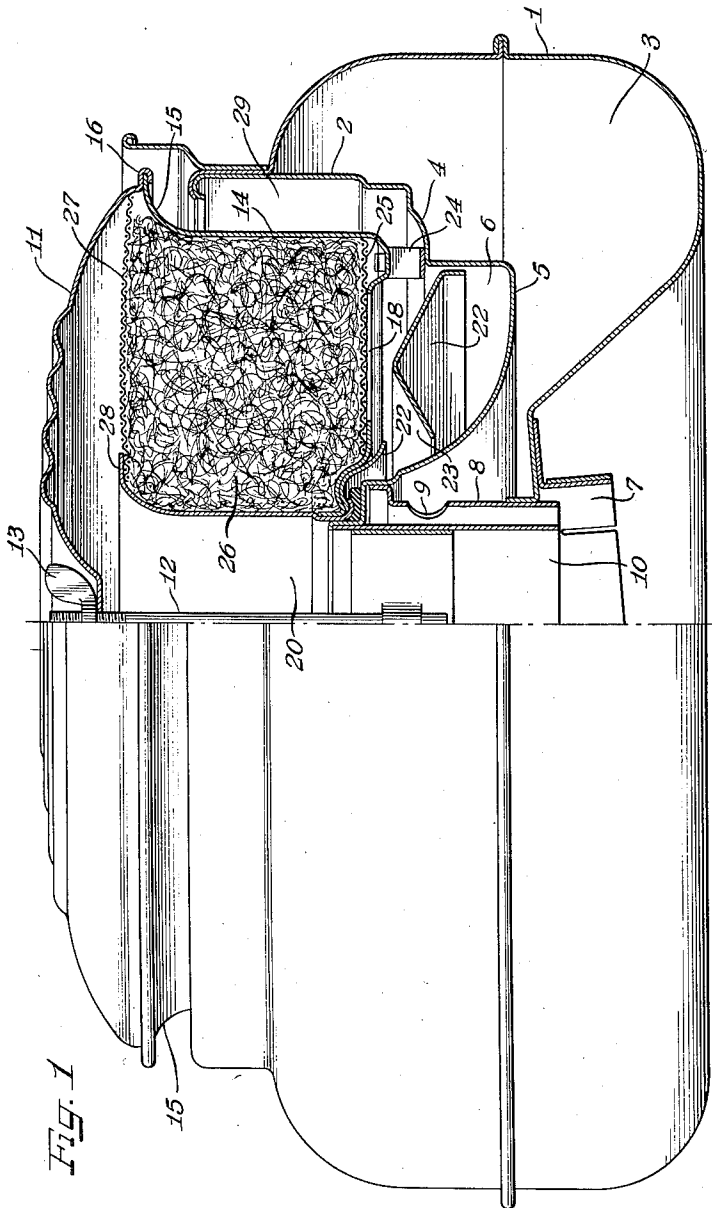
J. B. SEBOK

2,582,915

FILTER UNIT

Filed March 20, 1948

2 SHEETS—SHEET 1



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2,532,915

FILTER UNIT

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2 SHEETS—SHEET 2

Fig. 2

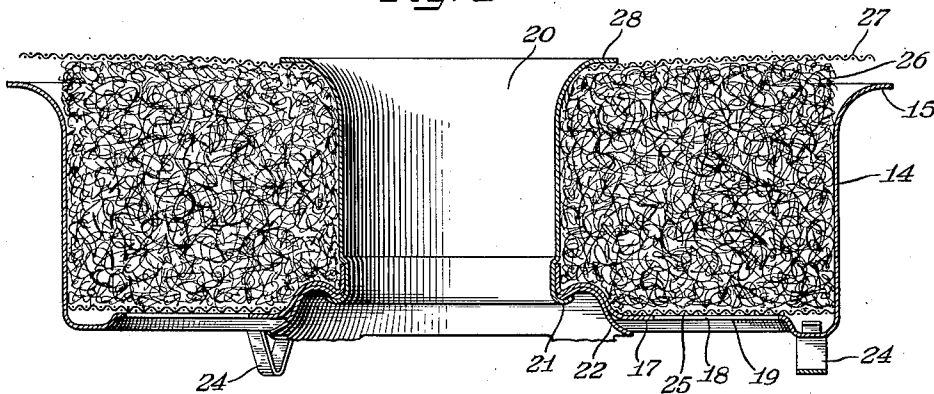
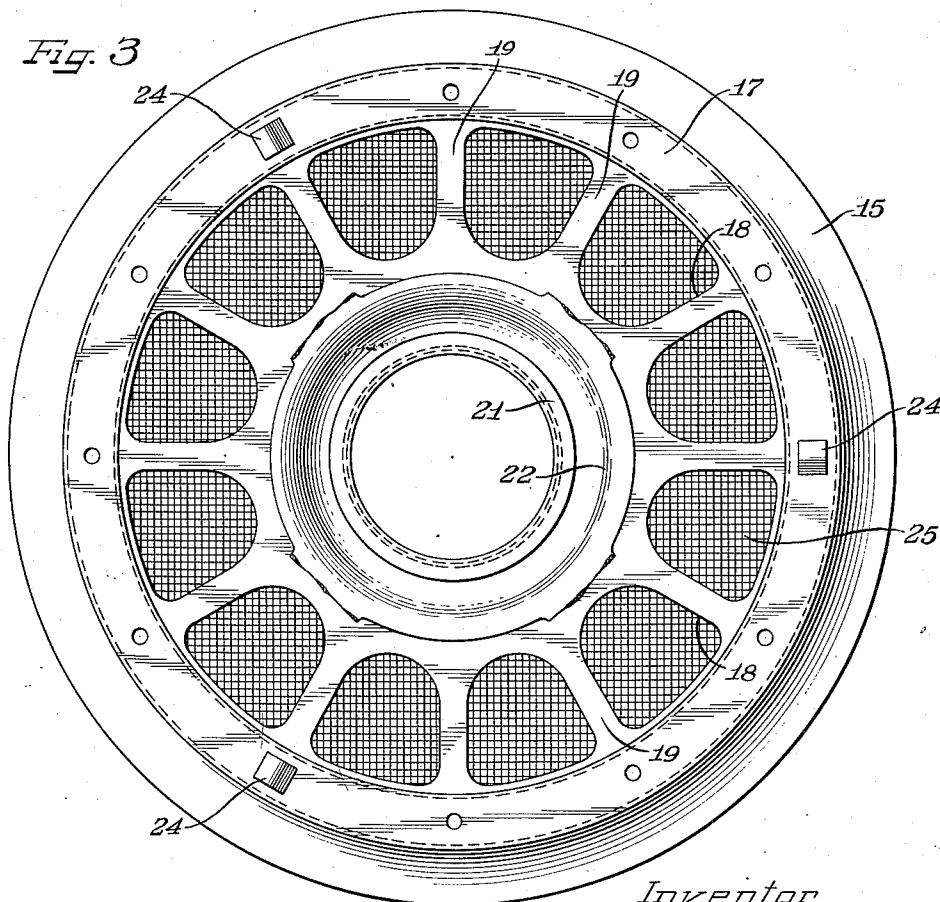


Fig. 3



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UNITED STATES PATENT OFFICE

2,582,915

FILTER UNIT

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Application March 20, 1948, Serial No. 16,078

1 Claim. (Cl. 183-15)

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This invention relates to improvements in a filter unit, and to a resilient filter element or batt from which filter elements or other devices may be cut, such for example as seat cushions, packing, and devices for miscellaneous automotive uses, although the invention will have still other purposes as will be apparent to one skilled in the art.

More particularly, the invention relates to a self-sustaining resilient batt of material which may be in the form of a filter element for automotive air cleaners, a filter element for air conditioning equipment, a seat cushion, or of a general shape from which various devices may be cut. One of the prime objects of this invention is to produce such an item far more economically than has heretofore been possible.

Another object of the invention is the provision of a filter unit or resilient batt made up of numerous short fibers bonded together at random, and preferably a filter element or resilient batt in which the main material is short animal hair, the use of which in this particular field of endeavor has been practically non-existent.

Heretofore, cattle tail hair has been used as filter elements for automotive air cleaners, and also in the manufacture of seat cushions, but that hair comes in long lengths and most frequently requires curling as well as other expensive operations to adapt it for its particular purpose or use. In filter elements for automotive air cleaners, the cattle tail hair was not bonded together but curled and steamed into a desired shape and such element was prone to mat or compact in various locations after relatively short usage, and it was extremely difficult to acquire a desired uniform density.

A product embodying the instant invention may easily and economically be formed from short animal hair such as rabbit fur, horse hair, hair from the body of a cow or similar animal, but preferably hog hair, a product having an extremely limited use prior to the advent of this invention. When used in a device embodying principles of this invention, it makes no difference whether summer or winter hair is used, the average variation in length being approximately three-eighths of an inch, and that variation not affecting the use of the relatively short hog hair in any manner.

Another object of this invention, therefore, is the provision of a filter element or resilient batt, or similar device, that is not only resilient but self-sustaining, and which is made from hog hair bonded together by a suitable medium at random.

Another object of this invention is the provision of a filter element or batt that is extremely economical to produce, self-sustaining, resilient, and of such character that it retains its resiliency

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and uniform density after extremely long usage.

Still a further object of this invention is the provision of a filter unit, highly desirable for use in automotive air cleaners, in which unit the filter element is self-bonded in and to the holding shell.

A further feature of this invention is the provision of a filter unit for use in automotive air cleaners in which the filter element itself holds the lower protective screen in the holding shell of the unit without any further aid.

Still another object of the invention resides in the provision of a filter unit for automotive air cleaners and the like in which the filter element is self-bonded to the holding shell and to a central outlet conduit in that shell, thus checking the tendency of cleansing liquid to climb the central outlet conduit during operation of the cleaner.

Still a further object of the invention resides in the provision of a filter unit comprising an element and a holding shell, the element being made up of short animal hair bonded together at random by a suitable plastic medium which also bonds the filter element to the holding shell.

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 a part elevation part vertical sectional view of an automotive air cleaner incorporating a filter unit embodying principles of the instant invention;

Figure 2 is a central vertical sectional view through the filter unit itself;

Figure 3 is a bottom plan view of the structure of Fig. 2, with parts broken away;

Fig. 4 is a fragmentary greatly magnified view of the central portion of the structure of Fig. 2 to illustrate the bonding of the filter element to the holding shell and outlet conduit, if an outlet conduit is used; and

Figure 5 is a fragmentary projection view of a resilient batt embodying principles of the instant invention.

As shown on the drawings:

For purposes of clarity, and to illustrate one example of a practical use of the instant invention, the invention is embodied in the show of Fig. 1 in a liquid bath air cleaner of the automotive type, and in this instance the so-called hat type of air cleaner has been selected, which is highly desirable for use in connection with a downdraft carburetor. The air cleaner is made in separable sections to facilitate servicing of the cleaner. In the illustrated instance there is a lower section, which embodies no principles of the instant invention, and an upper section

which embodies the filter unit that is an important part of this invention.

The lower cleaner section includes an outer wall 1 and an inner wall 2 spaced therefrom to define a sound attenuating chamber 3 between these walls. The inner wall 2 has a substantially vertical upper portion, that is stepped inwardly as indicated at 4, to merge into a deeper portion 5 defining a liquid sump 6 to contain a predetermined quantity of cleansing liquid to aid in cleaning the air. Secured to the bottom of the outer wall 1 is a clamp ring 7 for tight engagement with the carburetor air intake horn. Extending inside the clamp ring 7 is another conduit portion 8 having an opening 9 therein to establish communication with the attenuating chamber 3. Also secured to the inner termination of the wall 2 is an outlet conduit section 10 for the exit of cleaned air from the cleaner into the carburetor. The outlet conduit 10 is concentric with the aforesaid conduit 8 but of small diameter so as to provide a passage there between for sound waves.

The upper section includes a cover 11 and the filter unit embodying principles of this invention. The two casing sections are held together by a bolt 12 anchored to the lower section and extending through the cover of the upper section, to accommodate a wing nut 13.

With reference now to Figs. 1, 2 and 3, it will be seen that the filter unit includes a shell having a substantially vertical imperforate wall 14, the upper portion of which is outwardly flared as at 15 for interlocking engagement with the cover as indicated at 16 in Fig. 1. The shell also includes a bottom 17 integral with the wall 14, which bottom is provided with a plurality of relatively large apertures 18 defined by radially extending ribs 19, of which there are twelve in the illustrated embodiment of the invention. In the illustrated instance, since the filter unit is to be embodied in a hat type air cleaner, an outlet conduit 20 is provided centrally of the unit, and the lower margin of this conduit portion may be rolled over a part of the bottom of the shell as indicated at 21. In the illustrated instance a baffle 22 is included, the upper marginal portion of which is also secured inside the roll 21 on the outlet conduit. This baffle 22, as best seen in Fig. 1, is provided with turned down portions 23 to provide spaced openings in the inner portion of the baffle. Obviously, if the baffle is not desired for a particular air cleaner it may be omitted. Also attached to the bottom of the shell is a plurality of depending stabilizing feet 24.

Inside the filter holding shell a protective screen 25 is disposed over the openings 18 in the bottom of the shell. Over this screen is a filter mass 26 that preferably completely fills the shell and on top of the filter mass 26 another protective screen 27 may be disposed, the inner marginal portion of this screen being locked under a flare 28 on the outlet conduit, and the outer edge of the screen engaging the cover 11, as seen in Fig. 1.

From the showing in Fig. 1 it will be seen that the shell is of less diameter than the wall 2 of the lower section of the cleaner so that between the shell wall 14 and the wall 2 there is an annular inlet passage 29 leading downwardly toward the liquid sump 6. Incoming air descends this passage, passes over the upper face of the baffle 22, comingling with sump liquid at the same time, then passes upwardly through

the filter mass 26, and clean substantially dry air exits from the cleaner into the carburetor through the outlet conduits 20 and 10.

The filter element 26 itself is preferably made of short animal hair, and that animal hair is preferably hog hair. In the making of this filter, the hog hair is deposited directly in the filter holding shell on top of the protective screen 25, as the shell rotates until the mass of hair is built up somewhat higher than is shown in the drawings. The hair is disposed in the shell with each individual hair or fiber separated and at random. Then the shell including the deposited hair or fibrous material is dipped into a suitable plastic solution which is permitted to set, thus bonding the hair into a substantially homogeneous mass of uniform density. For bonding purposes, an oil resistant rubber substitute bonding agent, such as neoprene latex, may be used, and a solution of 25% solids and 75% water is satisfactory for this purpose. The neoprene latex may be cured or set by heat treatment at 250° F. for 2 to 5 minutes. Of course, once set, the bonding agent is not soluble in water, and is of substantially a permanent character. A vinyl solution may also be utilized for this purpose and one satisfactory example of such a solution includes 15% vinyl polymer or copolymer, 15% methyl ethyl ketone, and 70% commercial toluol. That solution is then made into an even mix with a half portion of the solution and a half portion of toluene, into which the filter unit may be dipped. A method of making the filter unit is more fully set forth, described, and claimed in a Joseph B. Sebok and Frank Sebok copending application entitled "Machine for and Method of Making Resilient Filter Elements and Batts," filed May 7, 1948, Serial No. 25,726.

The plastic bonding agent not only bonds the individual hairs or fibers together in the filter mass but also in effect self-bonds the filter mass to the inside of the shell, including the outlet conduit 20, and to the protective screen 25. That is an important feature of this invention, because heretofore it has been deemed necessary to spot weld or equivalently secure the screen 25 to each of the ribs 19 in the bottom of the shell. Such operation is completely eliminated by virtue of the bonding of the filter element to the shell, and it will be noted that no extra medium is necessary for this bonding purpose, the plastic bonding element forming a part of the element also accomplishing this purpose. Of course, when the element is raised out of the dipping bath, it will be slightly compressed to substantially the relative size shown in the drawings in comparison with the holding shell.

In Fig. 4 I have endeavored to indicate diagrammatically how the bonding of the filter element to the shell is effected. The individual hairs or fibers 30 are substantially covered by the bonding agent 31, and it will be seen that this bonding agent also adheres to the outlet conduit 20, and of course in the same manner to the wall 14 and screen 25.

The bonding agents specifically mentioned above, and the proportions given, were given by way of example and not by way of limitation, and it should be understood that herein and in the appended claims where the term plastic is used, such is to be construed as including substantially any satisfactory bonding agent.

Actual tests have proven that an animal hair, and especially a hog hair filter element is at least as efficient and in most cases more effi-

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cient than substantially any other form of commercially practicable filter element heretofore used. Hog hair may be used in its natural state, without the necessity of any curling or crimping, and regardless of its relatively short length. The entire filter element is thus extremely economical.

In Fig. 5 I have illustrated a batt 32 composed of the same material as the filter element 26. This is to indicate that such a batt may be formed of animal hair and a suitable bonding medium. The resultant batt will be of substantially uniform density, resilient in character, and maintain those properties throughout a long life. Obviously, the batt may be shaped as may be desired, or desired shapes of articles may be severed from it.

From the foregoing, it is apparent that I have provided a novel filter element or resilient batt made from material that heretofore has had an extremely limited use, and material of a character not heretofore used for the manufacture of resilient batts, filter elements, and similar articles. When the instant invention is used in the form of a filter element, and incorporated in a filter unit, extreme economy of production is provided, and the element is of uniform density, resilient, and possesses great durability.

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 claim.

I claim as my invention:

In a filter unit for automotive type air cleaners

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including a metallic shell having concentric inner and outer side wall portions and an integral bottom portion extending therebetween, radially disposed ribs formed in said bottom portion defining relatively large openings therebetween, a screen of relatively small mesh initially loosely disposed on said radial ribs and being substantially coextensive with said bottom portion, and a filter element disposed in said shell on said screen, said filter element comprising a mass of hog hair in its natural length and shape, the filaments of said mass being bonded to each other, to said shell and to said screen by a set plastic bonding agent, the density of said filter mass being thereby maintained uniform throughout the confines of said filter unit.

JOSEPH B. SEBOK.

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