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FILTER CAP ASSEMBLY

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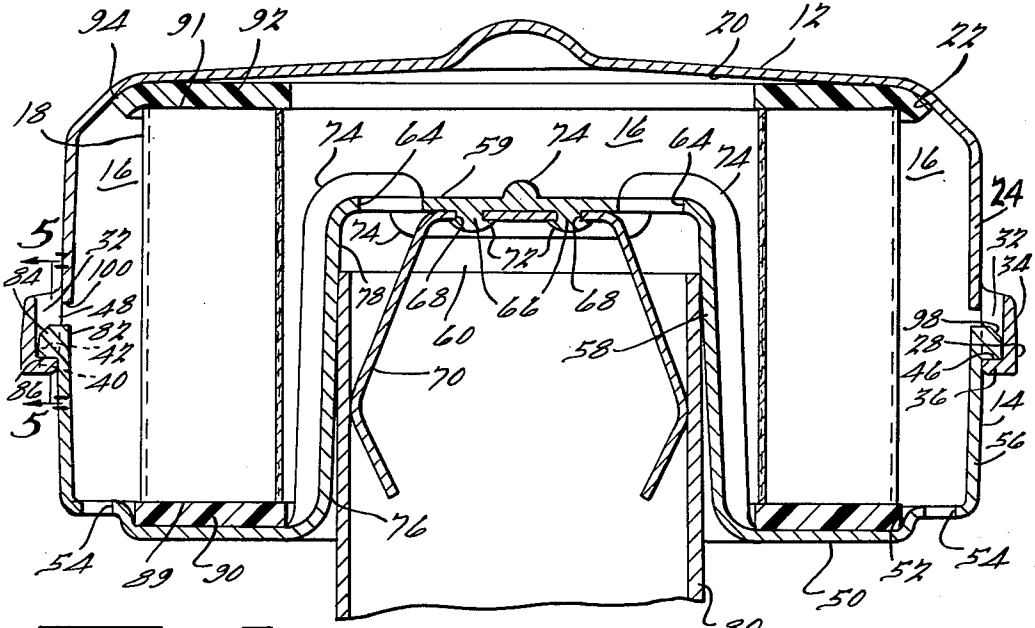


FIG. 2.

FIG. 1.

FIG. 3.

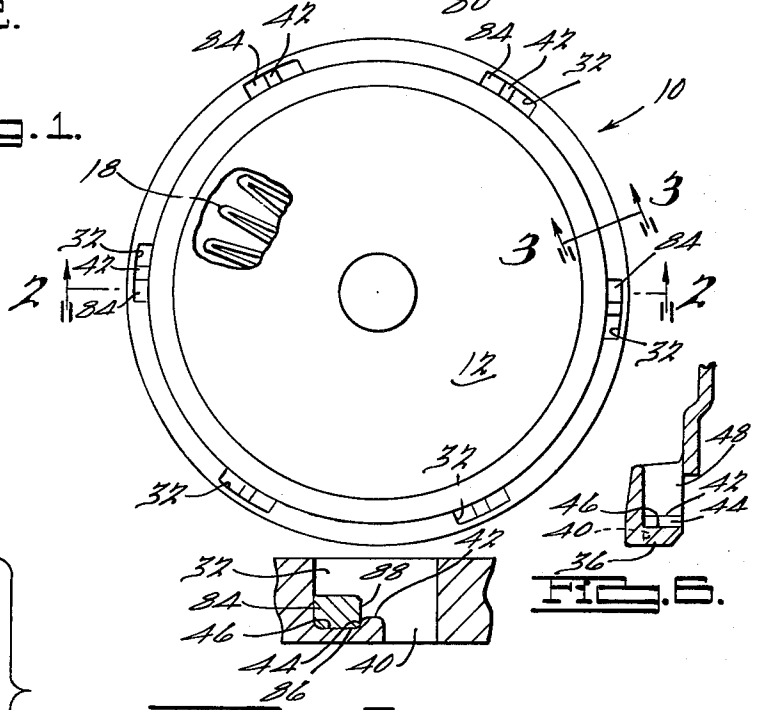
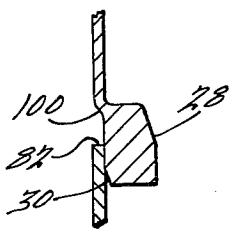


FIG. 4.

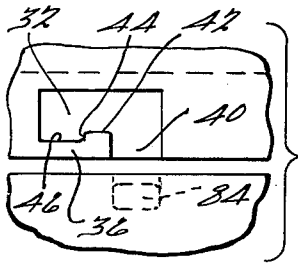


FIG. 5.

FIG. 6.

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3,218,785

FILTER CAP ASSEMBLY

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4 Claims. (Cl. 55-503)

This invention relates to breather caps and similar types of gas transmitting devices and particularly concerns an improved type of breather cap shell and filter element contained therein finding special utility for use as a crankcase breather cap for internal combustion engines.

Heretofore crankcase breather caps have been provided with various types of air filtering means which become clogged with oil and dirt and thereby lose considerable effectiveness for allowing proper breathing of the crankcase which is necessary for efficient operation of the engine. These breather caps have in the past been cleaned by dipping the cap into a solvent in an attempt to dissolve the oil and dirt from the filtering material held therein. This cleaning process is of course time-consuming and requires much agitation of the cap in order to dissolve significant portions of the clogging materials therefrom.

The present invention is characterized by a breather cap having separable housing portions containing a disposable paper-type of filter element. The cap housing and paper element are specifically designed so that they can be made so cheaply that the element may be economically disposed of and replaced or cleaned if so desired. Since the element may be removed from the cap housing, the cleaning thereof can be much more efficiently accomplished than heretofore possible.

The main objects of the invention are: to provide a breather cap having separable housing sections and a separate filter element; to provide separable housing sections for a breather cap which are so constructed as to be readily locked or separated by simple manual manipulation; to provide a filter element with integral sealing means on the ends thereof engageable with specially formed inner portions of the cap sections to provide positive sealing therewith; to provide the breather cap sections with such structure that they may be readily molded from plastic without requiring intricate molding apparatus; to provide cooperating structure on the housing sections and on the filter element which provides a spring-type action tending to positively lock the sections together; and to provide bayonet-type locking means on the housing sections to allow locking of the sections together and separation thereof by simple manipulation of the sections relative to each other.

Further objects, advantages and novel features of the invention will become apparent from the following description taken in conjunction with the drawings wherein:

FIGURE 1 is a top view of the breather cap assembly with portions broken away;

FIG. 2 is an enlarged longitudinal sectional view taken along the line 2-2 of FIG. 1;

FIG. 3 is a sectional view taken along the line 3-3 of FIG. 1;

FIG. 4 is a plan view of the locking structure of the cap sections in disassembled array looking from the inside of the sections; and

FIG. 5 is a sectional view taken along the line 5-5 of FIG. 2.

FIG. 6 is an enlarged, fragmentary, sectional view of the bottom portion of the upper cap section with the lower cap section removed.

In the drawings:

A breather cap and filter assembly 10 comprises a hous-

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ing consisting of an upper section 12 and a lower section 14 which form a cavity 16 therebetween containing a pleated paper-type of filter element 18. Sections 12 and 14 are preferably molded from suitable plastic material such as nylon which material must be relatively strong and resistant to deterioration by oil fumes and other chemicals commonly incurred with internal combustion engines. They are designed to be made from simple molds having only axially extending core pins.

Section 12 has a cup shape and is provided with a slanting bottom 20 and an angularly directed inner peripheral surface 22 intermediate bottom 20 and the side wall 24. The outer edge portion of wall 24 is provided with a ring-shaped rim 28 having a slight chamfer 30 on the inner edge thereof. A plurality of pockets 32 are circumferentially spaced in the rim 28 and are each defined by a wall 34 and a bottom 36 which is offset to provide entry grooves 40 for the pockets. The bottom 36 of each pocket is formed with a projection 42 providing a shoulder 44. The surface 46 in the pocket forms another shoulder adjacent to shoulder 44. Pocket 32 is not provided with an inside wall and opens into the cavity 16.

Lower section 14 is formed to provide a bottom portion 50 having an inner annular shoulder 52, a plurality of circumferentially spaced gas ports 54, an upstanding side wall 56, and inner walls 58 and 59 providing a pipe-receiving socket 60. Wall 59 has a plurality of breathing ports 64 therein and is provided with a pair of rivet-type projections 66 passing through apertures 68 in a metal spring member 70 and headed over by any suitable plastic fusion technique at 72 to firmly secure the spring 70 thereto. The walls 58 and 59 may be formed with integrally molded strengthening ribs 74 positioned as desired thereon. Wall 58 is slightly tapered and provides the socket 60 with an entry end 76 slightly larger than the inner portion 78 so that a breather pipe 80 will be frictionally received by the socket 60 and clamped between the socket wall 58 and the spring 70 to retain the housing section 14 firmly thereon. The wall 56 of section 14 is provided at its rim 82 with a plurality of circumferentially spaced radially extending lugs 84 providing shoulders 86 on the bottoms thereof adapted to engage the shoulders 46 on the section 12. The edge portions 88 of the lugs 84 engage the inner edges 44 of the projections 42 when the lugs are in their locked position within the pocket 32.

The filter element 18 may be of many well known types, for example, the pleated paper type filter. The bottom end 89 of the filter element or cartridge 18 has a resilient plastic material 90 such as a vinyl plastisol molded thereon and the top 91 of the cartridge has another resilient plastic piece 92 molded thereon and having an overhanging peripheral portion 94 which in its normal undeformed position extends in about the same plane as the rest of piece 92. The cartridge is properly located on section 14 by means of the annular shoulder 52.

In assembling the cap sections 12 and 14 and the filter element 18, the element as aforesaid is properly located in the section 14 and the section 12 is then placed over the top of the filter element and is pressed downwardly thereover to deform the peripheral portion 94 of the seal 92 and cause the rim 82 to slide under the chamfered portion 30 of the rim 28 to nest rim 82 therein. Simultaneously the chamfered portion 98 of the lugs 84 slide into the grooves 40 until the rim 82 abuts the lower edge 100 of section 12. Section 12 is then rotated in a clockwise direction to move the projections 42 underneath the lugs 84 until the shoulders 86 of the lugs are properly positioned directly over the shoulders 46. The section 12 is then released and the resilient caps 90 and 92 and especially the resilient portion 94 cause the section 12 to spring upwardly to engage lugs 84 with shoulders 44 and 46. It is seen that the resilient portion 94 allows

the vertical distance between the rims 82 and 100 to be taken up during the assembly of the cap sections without losing any of the sealing effect of the resilient caps 89 and 92. The housing sections are disassembled by reversing this manipulation.

The walls 24 and 56 of sections 12 and 14 respectively are formed with slight outward tapers as are the inside and outside of walls 34 of the pockets 32 so that these sections may be readily removed from the plastic mold.

During engine operation air or fumes may be readily transferred between the atmosphere and the crankcase across element 18 by passage through the ports 54 and 64 and also through the pockets 32. The location of ports 54 allows any large size or heavy particles of dust entering the breather cap from the atmosphere to drop back out of the cap and thereby prevent a serious buildup of any dust or other contaminant in the cap. Moreover, the location of these ports causes the air flow into the breather cap to pass through the entire height of the cartridge rather than through a limited portion thereof such as might occur if these ports were located near the top of the cap. In this manner the entire cartridge is utilized to its fullest advantage.

It is readily seen, therefore, that the present invention provides a breather cap which is easy to assemble and disassemble for replacement or cleaning of a cartridge, and also provides a cap having extremely simple construction so that it may be economically produced.

While it will be apparent that the embodiment of the invention hereindisclosed is well calculated to fulfill the objects of the invention, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In a filter cap assembly for a transmission breather pipe, a filter housing comprising first and second generally cup-shaped shell sections defining a filtering cavity, said first shell section having an angularly extending annular face portion on one end thereof and a plurality of circumferentially spaced pockets formed around the outer periphery thereof, said second shell section having a central recessed pipe-receiving portion and a plurality of circumferentially spaced radially extending lugs formed around the outer periphery thereof and adapted to be inserted within said pockets, a pleated paper filter element in said cavity, said second shell section having a plurality of air ports spaced radially inward and outward from said filter element, and a pair of resilient annular rings, one of which is interposed between said filter element and said first shell section and the other of which is interposed between said filter element and said second shell section, said annular face portion on said first shell section being operable to engage the adjacent of said resilient annular rings to maintain said lugs within said pockets to preclude the separation of said first and said second shell sections.

2. In a filter cap assembly, a pair of molded shell sections having interengageable means on their adjacent edges, one of said sections having a central recess formed therein for receiving one end of a transmission breather pipe, means including friction means in said recess for engaging said breather pipe to secure said filter cap assembly thereto, said friction means including a tapered surface formed around said recess for engaging the outer periphery of the end of a transmission breather pipe and spring means on one of said shell sections adapted to frictionally engage the inner periphery of the breather pipe, a filter element within said shell sections, and resilient means interjacent at least one of said shell sections and said filter element operable to resiliently maintain said interengageable means secured together.

3. In a filter cap assembly for a transmission breather pipe, a filter housing comprising first and second generally cup-shaped shell sections defining a filter cavity therebetween, each of said shell sections being fabricated of a molded plastic material, said first shell section having an angularly extending annular face portion on one end thereof and a plurality of circumferentially spaced and radially extending shoulder portions on the outer periphery thereof, said second shell section having a central recessed breather pipe receiving annulus and a plurality of circumferentially spaced radially extending shoulder portions on the outer periphery thereof, said shoulder portions on each of said first and second shell sections comprising a bayonet type locking device, a pleated paper filter element in said filtering cavity, said second shell section having a plurality of air ports spaced radially inward and outward from said filter element, friction means on one of said shell sections for engaging the breather pipe to secure the cap thereto, said friction means including a tapered surface formed around said annulus for engaging the outer periphery of the breather pipe and spring means on said one shell section adapted to frictionally engage the inner periphery of the breather pipe, and a pair of resilient annular rings disposed one interjacent each of said shell sections and the adjacent end of said filter element, said annular face portion on said first shell section being adapted to engage the adjacent of said resilient annular rings to resiliently maintain said shoulder portions on said outer peripheries of said first and second shell sections connected together.

4. In a filter cap assembly for a transmission breather pipe, first and second shell sections forming a filtering cavity, said first shell section having a ring-shaped rim portion defining a plurality of circumferentially spaced pockets each of which defines a retaining shoulder portion, said second shell section including a plurality of circumferentially spaced lugs each of which is formed with a retaining shoulder portion, said shell sections adapted to be detachably secured to one another by inserting each of said lugs within one of said pockets, a filter element in said cavity, a resilient annular end cap compressed between one end of said filter element and the adjacent of said shell sections urging said shell sections axially apart whereby to tightly engage said shoulder portions of said pockets and said lugs, and friction means on one of said shell sections for engaging the breather pipe to secure the cap thereto, said friction means including a tapered annular recess in one of said shell sections adapted to engage the outer periphery of the end of the breather pipe and spring means on said one shell section adapted to frictionally engage the inner periphery of the end of the breather pipe.

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