

June 4, 1940.

J. E. HOLLEBONE

2,203,570

AIR CLEANING OR FILTERING DEVICE

Filed July 11, 1938

2 Sheets-Sheet 1

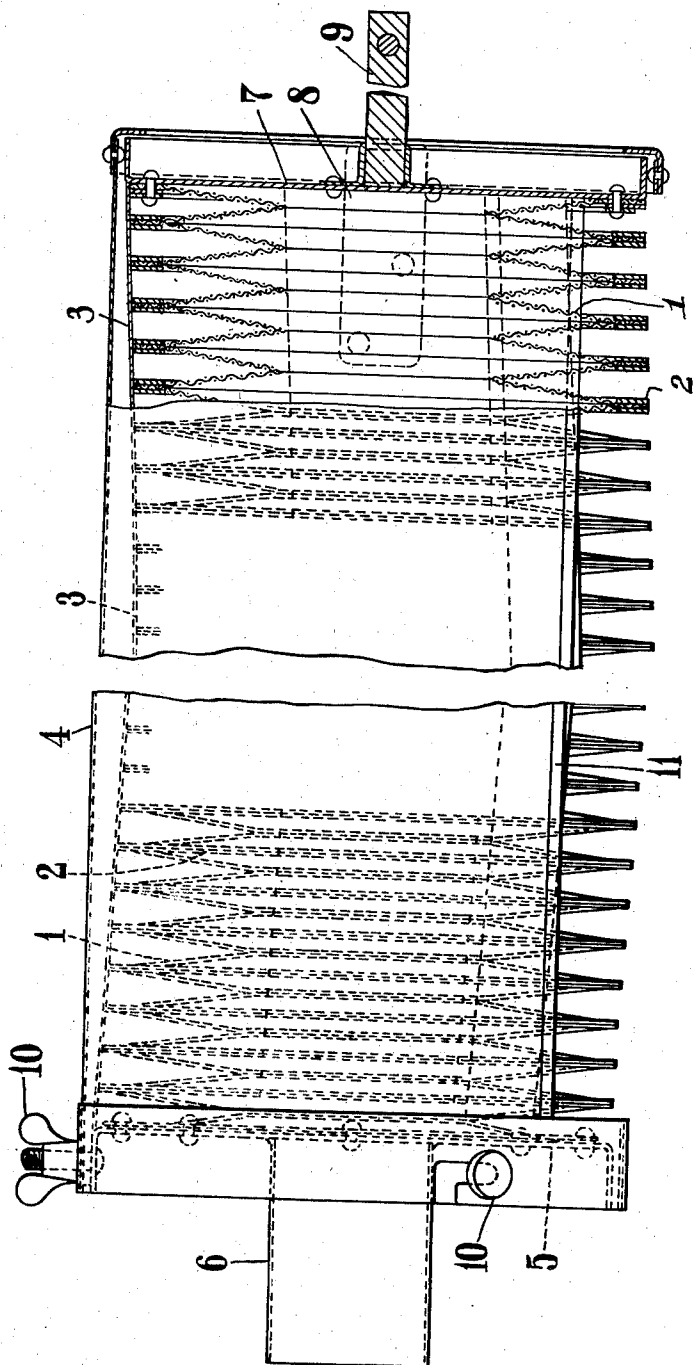


Fig. 1

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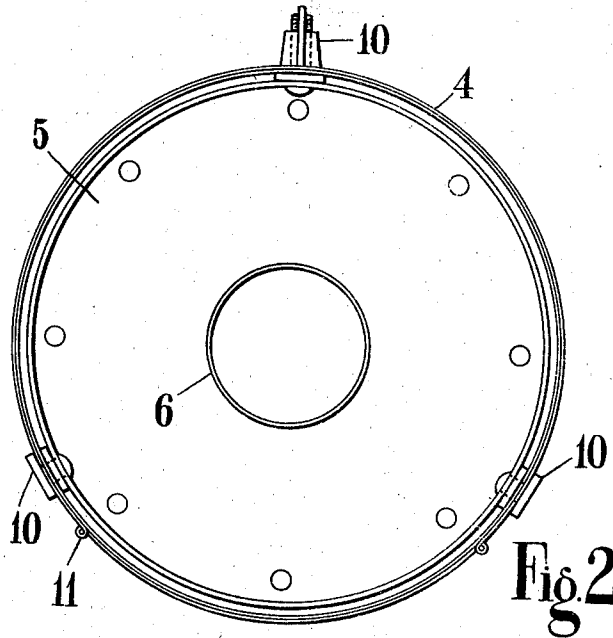


Fig. 2

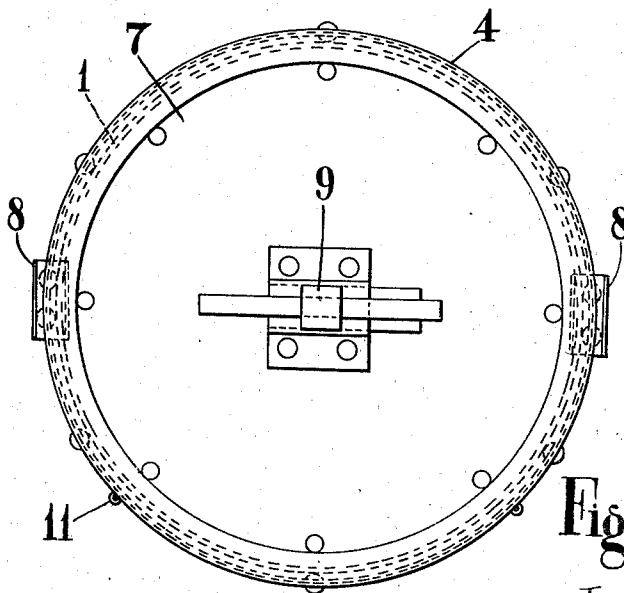


Fig. 3

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## UNITED STATES PATENT OFFICE

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## AIR CLEANING OR FILTERING DEVICE

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10 Claims. (Cl. 183—71)

This invention relates to air cleaning or filtering devices and particularly though not solely to air cleaning devices for use with internal combustion engines for filtering the air intake.

In air cleaning devices of this character which have before been proposed difficulties have arisen in removing particles of dust, etc., from the material of the cleaning element so as to maintain the cleaner in good and efficient working order.

According to the present invention an air cleaning device comprises a filtering element for cleaning air passing through it in one direction wherein means are provided whereby air may be caused to flow through the filtering element in the opposite direction whereby particles of dust, etc., may be ejected from the interstices and from the surfaces of the filtering element.

This filtering element preferably comprises a plurality of rings of felt or other suitable filtering material constructed in the form of a bellows and mounted within a substantially cylindrical casing having an outlet for connection to the engine carburettor and an inlet through which air may be drawn through the cleaner, means being provided whereby the bellows may be contracted and expanded within the casing when desired so as to eject any particles of dust or the like through said air inlet.

In order to facilitate this operation one end of the bellows may be attached to one end of the cylindrical casing while the other end of the bellows may be attached to a disc or the like slidably mounted within the cylindrical casing and provided with means whereby it may be detachably secured to the other end of the cylindrical casing.

The invention will be more completely understood from the following detailed description which is given in conjunction with the accompanying drawings in which:

Figures 1, 2 and 3 illustrate side and two end views respectively of an air cleaning device constructed in accordance with the invention.

Referring now to these drawings the air cleaner comprises a filtering element 1 composed of a number of rings of felt stitched together at their inner and outer edges alternately, thus forming a bellows similar to that used in a concertina. Metal rings 2 are placed in the fins of felt thus formed to prevent the collapse of the bellows under the effect of the depression formed inside it, when air is drawn through it from the outside to the inside. Three strips of webbing 3 are sewn to the outside of the element parallel to its axis and equally spaced round its circumference.

These strips ensure equal spacing of the folds of the element when extended, and at the same time permit it to be contracted and expanded for cleaning purposes. The element is housed in a cylindrical sheet metal casing 4, a portion of the periphery of which is cut away at 11 to form a rectangular or other suitably shaped opening for the ingress of air and for the rejection of dust. The ends of the element are secured to sheet metal plates, one of which 5 is secured across one end of the casing by three nuts and bolts 10 and embodies an outlet 6 suitable for connection to the carburettor air intake of the engine. The other sheet metal plate 7 forms a sliding fit in the cylindrical casing, and in the working position is secured to the casing by means of spring catches 8. A handle 9 is attached to the plate to facilitate the cleaning operation or a special tool may be provided for this purpose if desired.

In operation, air enters the casing through the opening 11 in the side of the cylinder, and is drawn by the suction of the engine through the material of the element, which is a highly efficient filter, the air thus being purified before reaching the carburettor. When it is desired to clean the element, the engine is stopped, the spring catches 8 securing the end plate 7 attached to the bellows are released and the plate 7 pushed inwards sharply by the handle 9 and slowly withdrawn several times causing a contraction and expansion of the bellows. This results in a reversal of the normal direction of the air flow through the element, and consequently in the rejection of dust which has collected in the interstices and upon the outer surface of the element, through the opening 11 in the casing which is normally used as the air intake.

It will thus be seen that by means of the invention, an air cleaner of the dry felt type is provided in which it is possible to reverse the air flow and thereby to effect a more thorough cleaning of the filtering element than is possible by other means.

Furthermore, this cleaning operation can be effected without dismantling the components of the air cleaner and without removing it from the position in which it is installed.

An air cleaner constructed in accordance with this invention also has the advantage that it is very compact, because the area of the filtering element is larger, in proportion to the overall dimensions of the filter, than that usually provided by other dry-felt air cleaners. Owing to the facility of the cleaning operation, this can be carried out more frequently without inconvenience.

Furthermore, an air cleaner constructed in accordance with the invention has the advantage of permitting the efficient sealing of possible leakage paths between the filtering element and the metal container without recourse to sponge rubber or other resilient media.

It is also to be understood that while in the arrangement described and illustrated the rings of filtering material forming the bellows are defined by two concentric circles, the term "rings" where used in the appended claims is intended to include not only annuli of this formation, but also annuli or other formation, such as, for example, square, rectangular or other non-circular outline or annuli defined by two eccentric circles.

I claim:

1. An air cleaning device comprising a filter element constructed in the form of a bellows from a plurality of rings of filter material and having relatively movable end pieces, a frame including members for defining the working positions of said end pieces of said filter element, quickly releasable catch means for securing one of said end pieces to one of said position defining members and gripping means whereby said end pieces may be reciprocated toward and away from one another.

2. An air cleaning device including a filter element constructed in the form of a bellows from a plurality of rings of filtering material and means embracing said filter element and defining a space within which said filter element lies when in operative position and within which it may be contracted for the purpose of ejecting particles of dust from the interstices and from the surface of said filter element, said embracing means guiding said element during such contraction.

3. An air cleaning device as claimed in claim 2 including quickly releasable catch means for securing at least one of the ends of said filter element to maintain said element in expanded condition within the space defined by said embracing means.

4. An air cleaning device comprising a filter element constructed in the form of a bellows from a plurality of rings of filtering material and having relatively movable end pieces, fixed relatively to each other and the working position of said end pieces, means embracing said filter element and spanning between said position defining fixed members to guide one of said end members during movement relative to the other of said end pieces and securing means whereby said end pieces of said filter element are secured in their working positions, at least one of said end pieces being releasably secured in its working position.

5. Air cleaning device comprising a substantially cylindrical casing having an outlet, and an inlet through which air may be drawn through the cleaner, a filtering element mounted within said casing between said inlet and said outlet, said filtering element comprising a plurality of

rings of felt constructed in the form of a bellows, one end of said bellows being attached to one end of said casing, and the other end of said bellows being attached to a member guided for sliding movement within said casing whereby the bellows may be contracted and expanded within said casing when desired so as to eject any particles of dust through said air inlet.

6. Air cleaning device comprising a substantially cylindrical casing having an outlet, and an inlet through which air may be drawn through the cleaner, a filtering element mounted within said cleaner between said inlet and said outlet, said filtering element comprising a plurality of rings of felt constructed in the form of a bellows, one end of said bellows being attached to one end of said casing and the other end of said bellows being attached to a disc, said disc being slidably mounted within said casing, and being provided with means for detachably securing said disc to the other end of said cylindrical casing.

7. An air-cleaning device comprising a filter element constructed in the form of a bellows from a plurality of rings of filter material and having relatively movable end pieces, an outlet connection for the passage of filtered air communicating with the interior of said filter element, and means for guiding one of said end pieces for movement to cause said filter element to be contracted and expanded.

8. An air-cleaning device comprising a filter element constructed in the form of a bellows from a plurality of rings of filter material and having relatively movable end pieces, means for detachably securing one of said end-pieces in a position such that said element is expanded, an outlet connection for the passage of filtered air communicating with the interior of said filter element and means for guiding said detachably secured end piece for movement relatively to said other end piece to cause contraction and expansion of said filter element.

9. An air-cleaning device comprising a casing having an inlet and an outlet, a filter element mounted within said casing and constructed in the form of a bellows from a plurality of rings of filtering material, one end of said filter element being attached to one end of said casing and the interior of said element being in communication with the outlet, a member slidably mounted in said casing, and secured to the other end of said element, and means for detachably securing said slidable member to the other end of said casing.

10. An air cleaning device comprising a filter element constructed in the form of a bellows from a plurality of rings of filter material, a member secured to one end of said element, means for slidably guiding said member for movement relatively to the remote end of said element and gripping means carried by said member for engagement by a tool for reciprocation of said member.

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