

Oct. 10, 1933.

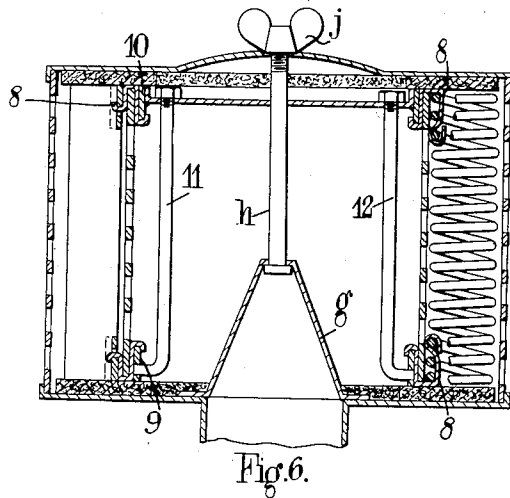
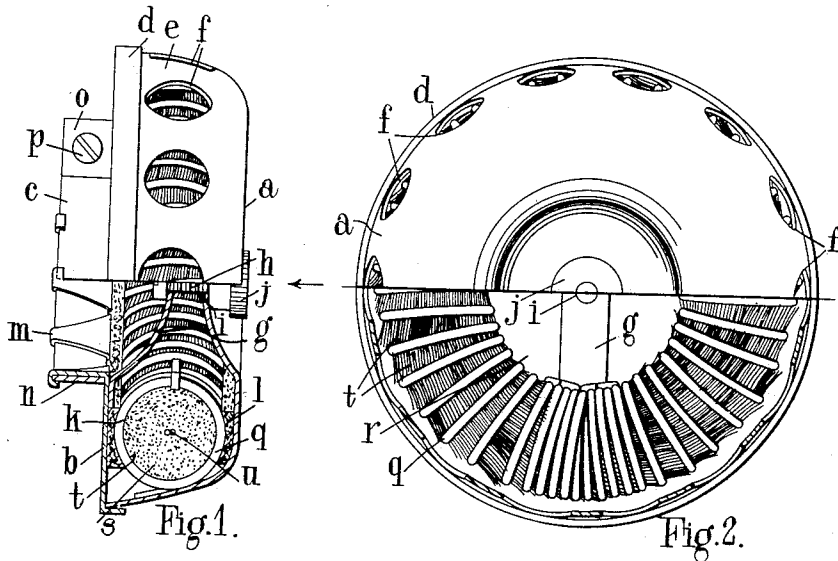
F. HEATHER

1,930,357

AIR CLEANER

Filed May 25, 1932

2 Sheets-Sheet 1



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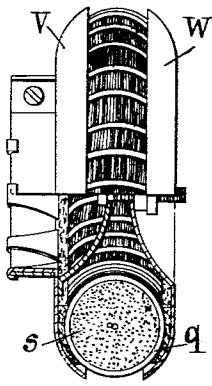


Fig. 3

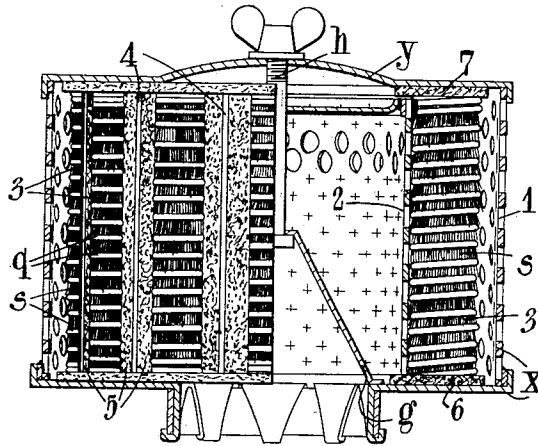


Fig. 4.

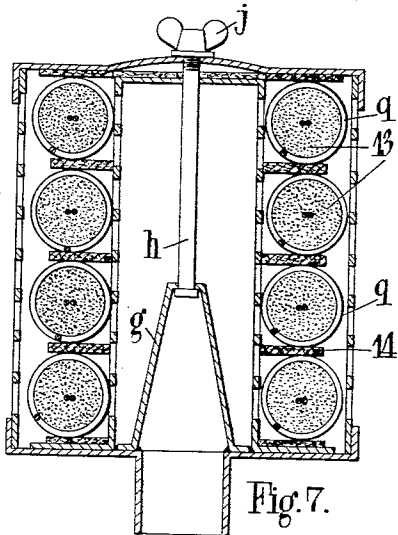


Fig. 7.

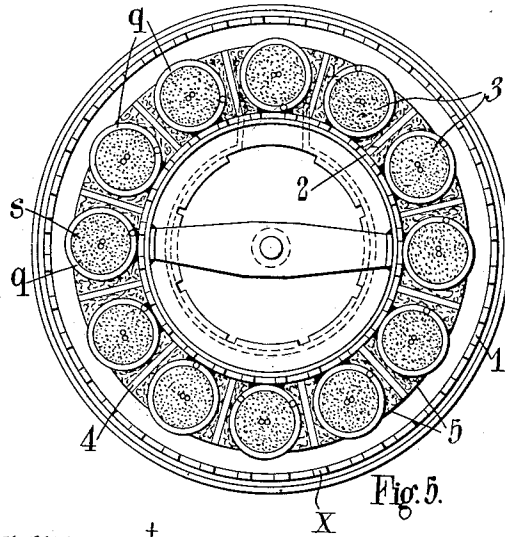


Fig. 5.



Fig. 8.

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UNITED STATES PATENT OFFICE

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AIR CLEANER

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and in Great Britain May 26, 1931

3 Claims. (Cl. 183—49)

This invention relates to air cleaners for the removal of dust and other particles of foreign matter from the induction air of internal combustion engines.

The invention may also find useful employment with other apparatus where it is desired that air or gas flowing to the apparatus be freed from foreign matter.

The object of the invention is to provide an air cleaner which will efficiently remove the foreign matter, and which at the same time is compact, composed of but few parts, and which can be readily assembled together.

The invention consists in an air cleaner comprising a casing provided with an inlet and an outlet for the air, and having therein one or more elements comprising filling material which will retain foreign matter located within and surrounded by a support which permits passage of the air to the material.

More specifically the cleaner, according to the invention, may comprise a box or container having an inlet and an outlet for air, and provided internally with a helical element or elements having a filling of hair, the arrangement being such that the air entering the box or container through the inlet flows between the coils of the helical element or elements and in contact with and through the filling before passing to the outlet.

Referring now to the accompanying drawings in which like reference characters indicate similar parts throughout the several views:

Figure 1 is a side elevation, partly in section, of an air cleaner constructed according to the invention.

Figure 2 is a side elevation partly in section looking in the direction of the arrow Figure 1.

Figure 3 is a view similar to Figure 1 of a modified form.

Figures 4 and 5 are sectional elevation and plan views respectively of a further modification.

Figures 6 and 7 are sectional elevations of still further modifications, and

Figure 8 is a detail view in elevation of brush material employed as the filling as hereafter described.

Referring now to Figures 1 and 2 there is provided a flat box or casing *a*, preferably of circular form, which is closed at its open side by a detachable cover *b* which is provided with a centrally extending tubular portion *c*, for attaching the device to the induction pipe for example of an internal combustion engine, and a flange *d* adapted to fit over the margin of the casing *a*.

The peripheral wall *e* of the casing *a* is provided with a row of perforations *f* for the passage into the apparatus of air to be cleaned.

An arched bridge piece *g* is secured centrally to the inner side of the cover *b* and has secured to it a screwed stud *h* adapted to extend through an aperture *i* in the central part of the side wall of the casing *a* whereby the two parts of the casing can be secured together by a nut *j*. The cover and casing may be covered on their interior surfaces with felt or other soft material so as to prevent noise occurring due to vibration of the cleaning element to be described hereafter. In the example now described the cover and casing are each provided with a ring (*k*, *l*) of felt which bears on either side of the cleaning element to be hereafter described. The casing and cover portion are preferably formed by stamping or pressing from sheet metal, it being understood that the perforations will be drilled or punched in the sheet metal prior to the pressing or stamping operations. The tubular portion *c* is preferably produced during stamping of the cover by providing slots extending radially towards the centre of the part to form the cover and pressing the triangular portions *m* outwardly so that they stand at right angles to the face of the cover. A length or strip *n* of thin metal is then bent around the outer surfaces of the triangular projections *m* and the ends of the latter bent over the outer edge of the strip as shown. The strip *n* is also provided with apertured lugs *o* for a bolt *p*, whereby to secure the apparatus with the extension in gripping relation to the intake, for example, of an internal combustion engine.

Within the box or container there is provided a support consisting of a helical compression spring element *q*, the diameter of which is such that it will fit between the sides of the box and the cover when placed within the latter in the manner now to be described.

The spring is placed in position within the box by bending it into circular form so as to bring its ends into abutting relation, and then inserting it into the box, it being understood that the spring will lie round the interior of the box and will tend to open out but will be prevented from so doing by engagement with the inner surface of the peripheral wall. If desired, the end coils of the spring may be provided with a clip to hold the spring in circular form. A central space *r* will be left into which the gas flows after passing between the coils of the spring before passing out through the outlet *c*.

The individual coils each lie substantially in a radial plane, thus leaving spaces between the adjacent coils which gradually narrow from the upper part of the spring to the central portion thereof. Within the spring there is provided a core or filling which may be of cotton wool, rubber sponge, for example material known as Sorbo, or any other suitable yielding material which will have the effect of gathering the dust and foreign matter from the air flowing in contact with it. The coils of the spring element may be covered with absorbent material as by employing a spring having its coils wound with cotton wool or cotton thread. It is preferred, however, that the core or filling consist of brush material composed of horse hair bristles *t* or fine metal wire carried by wires *u* twisted together as shown in Figure 8, the spring being of an internal diameter so that when the length of brush material is inserted in the spring, which is effected by pushing it endwise into the spring, the outer portions of the bristles lie longitudinally and are confined in a substantially cylindrical layer against the inner surface of the spring.

Referring now to the form shown in Figure 3, the casing comprises a pair of somewhat dome-shaped plates *v*, *w* but otherwise the construction is the same as that described with reference to Figures 1 and 2. The air flows into the apparatus through the annular space between the edges of the plates as indicated by the arrows.

Referring now to Figures 4 and 5, a cylindrical casing *x* is employed open at one end and provided with a cover *y* which is constructed and secured to the casing in a similar manner to the cover described with reference to Figures 1 and 2. The peripheral wall of the casing is perforated as indicated at 1 for the inflow of air.

Within the casing there is provided a perforated metal cylinder 2, of a diameter substantially equal to the outlet and having secured to its outer periphery a number of elements 3 consisting of helical springs having a filling as above described. The springs are secured in place by soldering their end coils to the cylinder 2. In the spaces between the springs there are provided partitions of sheet metal 4 covered on each side with felt 5 or other suitable material and rings of felt 6 and 7 are also provided on the inner face of the end wall of the container and cover.

The form shown in Figure 6 is similar to that described with reference to Figure 5, except that the springs are held in position by means of hooks 8 which fit over the edge of the perforated metal cylinder 2 and rings 9 and 10. The ring 10 is provided with a cross bar through apertures in which extend studs 11 and 12 carried by the ring 9, the studs being provided with nuts for holding the rings securely in place.

Figure 7 illustrates a modification in which between the peripheral wall of the casing and the inner tubular member there are provided a plurality of cleaning elements 13 of circular formation as described with reference to Figures 1 and 2 and arranged one above the other. Rings of felt 14 are provided between each ring and the next.

Assuming that the apparatus is attached to an internal combustion engine inducing pipe, the action is as follows:

The air enters the casing through peripheral openings in the box or container and flows between the coils of the spring element or elements into contact with and through the filling material therein which gathers or collects any dust, moisture or other foreign matter. The air eventually passes to the centre of the box into the space unoccupied by the spring and then flows in a clean condition through the tubular portion to the induction pipe.

The spring elements as described with reference to Figures 1, 2, 3, and 7, are preferably such that when in non-tensioned condition, that is, before being placed in the casing, a few of the coils at each end are spaced apart more widely than at the central portion so as to provide for greater compression of the end portions to facilitate insertion of the spring into position within the container and also to securely hold the spring in position within the container.

The apparatus can be readily disassembled for cleaning or renewal of the filling of the helical elements by removing the nut, taking off one part of the casing and removing the brush elements or absorbent material.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. An air cleaner comprising a casing provided with an inlet and an outlet for the air and having therein an element consisting of a helical spring support and bristles of hair longitudinally arranged relatively of said support and the bristles constituting filling material for the support which will retain foreign matter strained from the air but which permits passage of the air through the material.

2. An air cleaner as claimed in claim 1, in which the bristles of hair are supported by wires twisted together and inserted within the helical support, the bristles being of such dimensions that the outer ends thereof lie in a substantially cylindrical layer within the cleaner.

3. An air cleaner as claimed in claim 1 in which the casing is cylindrical and has an axial outlet and is provided with an opening admitting air into the casing through its periphery.

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