Nov. 7, 1933. C. S. KEGERREIS ET AL 1,934,311

AIR CLEANER

Filed Dec. 12, 1927

Fig. 1.

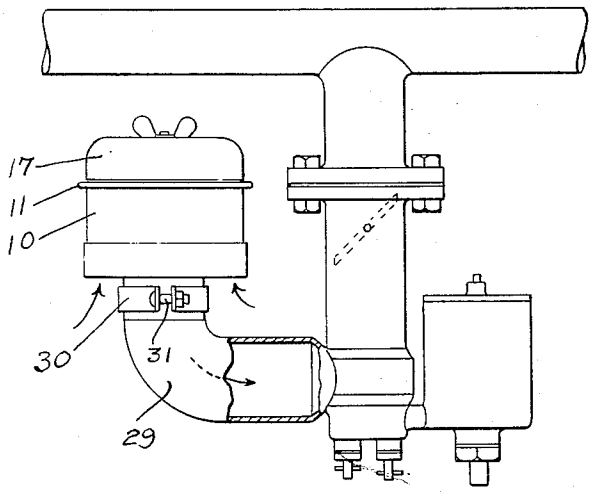


Fig. 2.

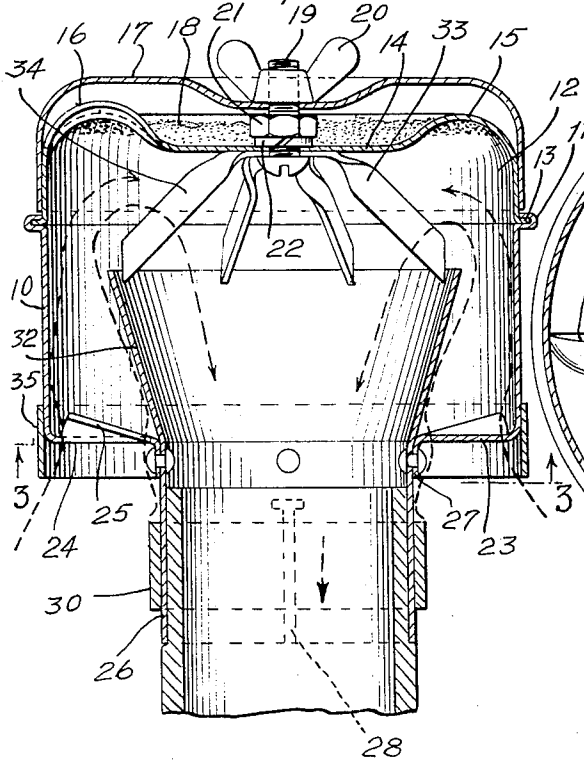
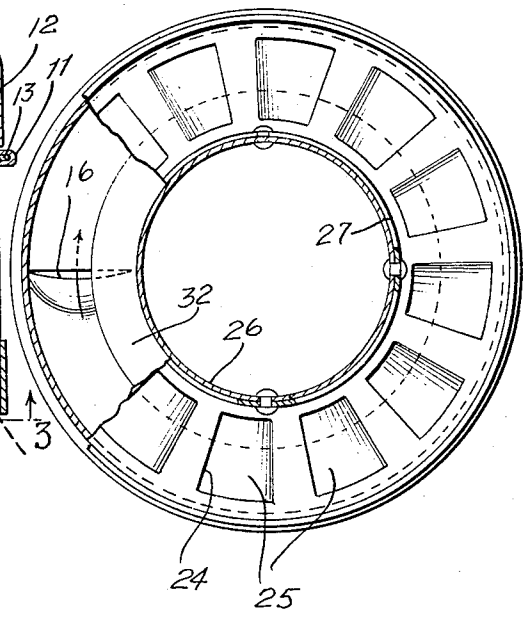


Fig. 3.



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Patented Nov. 7, 1933

1,934,311

UNITED STATES PATENT OFFICE

1,934,311

AIR CLEANER

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Application December 12, 1927
Serial No. 239,528

8 Claims. (Cl. 183—91)

This invention relates to air cleaners, and particularly to the type of air cleaners used in connection with the charge forming devices on automotive internal combustion engines.

One of the objects of the invention is to provide a small compact air cleaner having relatively large air capacity.

Another object of the invention is to provide an air cleaner in which the pressure loss of the air passing through the cleaner is reduced to a minimum.

Another object of the invention is to provide an air cleaner in which the danger of fire due to gasoline soaked dust particles is practically eliminated.

Other objects of the invention and objects relating particularly to economies of manufacture will be apparent from the description to follow of one embodiment of the invention which has been shown in the accompanying drawing for the purpose of illustration, and in which

Fig. 1 is a side elevational view of the improved air cleaner shown connected to a carburetor;

Fig. 2 is a sectional elevation through the air cleaner; and

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

The air cleaner comprises a cylindrical casing 10 having a flange 11 at its upper end by which a cup-shaped member 12 is adapted to be attached. The cup-shaped member 12 has a flange 13 which bears against the flange 11 on the casing 10, and which may be welded thereto or which may be attached to the flange 11 by having a portion of the latter bent over it as shown. The cup-shaped member 12 has a circularly disposed central portion 14 which is adapted to receive dust particles introduced thereto and between this central portion and the outer edge of the member 12 is a rounded portion 15 which forms an inverted curved channel adapted to act as a guide for the dust particles which are separated out of the air by the cleaner, and in which is cut an opening or louver 16 through which the dust particles are adapted to pass from the inside of the casing 10 and member 12. A cup-shaped cap 17 shaped somewhat similar to the cup-shaped member 12 is adapted to fit over the latter and the lower edge of which is adapted to contact with the flange 11 of the casing 10. The cylindrical portion of the cup-shaped member 17 is deep enough to provide a clearance space or dust pocket 18 between the members so that particles of dust may accumulate therein. The cap 17 is held in place by a bolt 19 which passes through a hole in the depressed portion 14 of the cup-shaped member 12 and upon the threaded end of which a wing nut 20 is adapted to be placed and screwed down against the top of the cup 17. The bolt 19 may be held firmly in place at the center of the depressed portion 14 by a lock nut 21 and suitable washer 22.

The lower end of the casing 10 is bent inwardly to form a flange 23 in which is cut a series of openings 24, one side of each of which is bent upwardly to form a fin 25 which fins are adapted to impart a whirling motion to the air as it enters the cleaner.

A tubular member 26 adapted to form an air outlet for the cleaner is disposed within the opening formed by the flange 23 in the casing 10 and may be attached to the flange 23 by a second turned down flange 27 to which the tubular member 26 may be riveted as shown or attached in any desired manner. The lower end of the tubular member 26 is split as shown in dotted lines at 28 so that it may be slipped over the air inlet pipe 29 of a carburetor, and held thereupon by the usual split ring 30 secured by a bolt 31. The tubular member 26 thus forms a support for the air cleaner. The upper part of the tubular member is expanded to form a funnel or inverted cone-shaped member 32 which extends upwardly inside of the casing 10 to a point adjacent the top thereof.

An air diffuser 33 having a plurality of legs 34 is attached to the under surface of the cup-shaped member 12 by the bolt 19, the legs 34 of the diffuser being turned through an angle and bent downwardly to form a plurality of radial fins, the planes of which are parallel to the axis of the cleaner and the lower ends of which terminate adjacent the upper edge of the funnel-shaped member 32.

The operation of the air cleaner is as follows: Air enters the cleaner at the lower end of the casing 10 as indicated by the arrows, passes through the openings 24 and is given a whirling motion by the fins 25. Due to centrifugal force, dust particles are thrown out of the air and continue to whirl around adjacent the inner side of the casing 10. The air continues to move upwardly and its velocity continues to increase as it approaches the top of the funnel shaped member 32. Thus the speed of the dust particles thrown against the casing 10 is increased, and these particles tend to continue upwardly along the inner side of the casing 10 and cup-shaped member 12 until they reach the channel 15 in the upper part of the member 12. As the air passes the edge of the funnel-shaped member

32, the size of the passage is suddenly and materially increased so that in turning to enter the funnel-shaped member 32, the pressure of the air is not appreciably decreased. In other words, the parts of the air cleaner as constructed form what is known as a low pressure elbow.

As the air turns, more dust particles are thrown out toward the side of the cup-shaped member 12 and the channel 15 therein. At this point the air contacts with the diffuser legs 34 and the whirling motion of the air is thereby broken up so that as the air enters the funnel-shaped member 32, it passes in substantially straight lines through the tubular member 26 toward the inlet of the carburetor. This sudden stoppage of the whirling motion of the air tends to change the velocity head which the air has acquired into pressure head and thereby increases the pressure in the outlet side of the air cleaner which tends to materially decrease any loss of pressure that the air may have sustained in the inlet side of the air cleaner.

The dust particles carried by their own momentum rotate in the channel 15 of the cup-shaped member 12 until they come to the louver 16 whereupon they are carried through this opening by centrifugal force and their own momentum into the dust pocket 18 provided to receive them.

In many of the air cleaners now in use or heretofore used, the pocket for receiving the dust has been located at a point below the air outlet of the dust cleaner. With this construction, gasoline or oil may accumulate on the walls of the air cleaner outlet and has a tendency to find its way into the dust pocket where it soaks into the dust accumulated therein. This results in two very pronounced disadvantages, first, the sides of the cleaner especially adjacent the openings to receive the dust become sticky and gummy and tend to prevent dust from passing therein so that the dust accumulates in a gummy mass around the dust receiving opening and eventually clogs the same up to prevent more dust from entering, thus absolutely destroying the cleaning properties of the cleaner; secondly, it produces a pocket of inflammable material which upon becoming overheated or from other causes may ignite and cause a serious fire, thus endangering the automobile and the occupants thereof. With the air cleaner of the present invention, there is no possibility of either of these things happening, as the dust pocket is at the top of the cleaner where it will be impossible for any oil or gasoline to drain therein so that the louver 16 is always open and free to receive dust and so that there is absolutely no danger of the dust soaking up oil and producing a fire hazard.

In the device illustrated in the drawing, six air diffuser legs 34 have been shown, but it is evident that a larger or smaller number may be used. We prefer to use enough, however, to insure that the whirling action of the air is broken up. The air cleaner, however, may be used without the air diffuser 33, but we have found that with it the air cleaning efficiency of the cleaner is increased considerably and the pressure loss therethrough is decreased.

The present invention also contemplates a structure in which the extension 32, either flared or straight may be eliminated, the louvers or fins 25 directing the air to cause the separation of dirt therefrom in conjunction with the arrangement of the casing 10 and end head 12 with or without the diffuser 33.

At the lower end of the casing 10 we have found it desirable to place a sleeve 35 which may be attached to the casing 10 in any desired manner such as by welding. This sleeve 35 forms an inlet for the air which is larger in diameter than the openings 24 through the flange 23 of the casing 10. Thus, in effect, a Venturi passage is formed as indicated by the arrows and a greater amount of air is admitted to the cleaner than if this sleeve were omitted.

From the above, it will be evident that we have provided an air cleaner which has a large air capacity and yet takes up a minimum of space on the automobile, therefore making it particularly desirable as it will fit into a limited space between other accessories of the engine, and which will thoroughly clean the air, at the same time creating no appreciable decrease in pressure of the air through the cleaner.

We have also found that our construction in any of its modifications may be arranged longitudinally instead of vertically as illustrated in Fig. 1 and satisfactory results nevertheless obtained.

Many changes and modifications of the device shown and described, however, may be resorted to without departing from the spirit of the invention, and we do not, therefore, desire to limit ourselves to the specific construction shown, but to interpret the invention broadly within the scope of the appended claims.

Having thus described our invention, what we desire to claim is:

1. In an air cleaner, an inlet air passage; an outlet air passage communicating therewith; means to impart a whirling motion to air passing through said inlet passage; means to increase the velocity of said air at the outlet end of said inlet passage; the parts being so arranged as to cause the air to turn abruptly to enter said outlet passage; means including a plurality of radially disposed fins to stop the whirling action of said air as it enters said outlet passage; and means to catch dust particles thrown outwardly by centrifugal force as said air turns to enter said outlet passage.

2. In an air cleaner, a casing having an air inlet and an air outlet; means to impart a whirling motion to the air entering said inlet; means to stop the whirling action of said air, said last mentioned means comprising a plurality of radially disposed fins, and a dust pocket positioned so as to receive particles of dust thrown out by centrifugal force from said air due to the whirling action thereof.

3. In an air cleaner, an annular air passage having its axis substantially vertical; a tubular passage communicating therewith; means to impart a whirling motion to the air entering said annular passage; the parts being so arranged as to cause said air to reverse its general direction of motion as it passes from said annular passage to said tubular passage; a plurality of fins radially positioned in the entrance to said tubular passage and adapted to stop the whirling action of said air; and a dust pocket above said tubular passage and adapted to receive dust particles thrown out of said air by the action of centrifugal force.

4. In an air cleaner, a casing having an air inlet and a centrally arranged air outlet passage; means to impart a whirling motion to the air as it enters said casing, and means comprising a plurality of radially disposed fins positioned outside of said air outlet passage for stopping the whirling motion of the air.

5. In an air cleaner, a casing having an air inlet and a centrally arranged air outlet, said air outlet having an enlarged entrance; means to impart a whirling motion to the air as it enters the casing; and means including a plurality of radially disposed fins arranged adjacent the entrance of said air outlet tending to reduce the whirling motion of the air.

6. In an air cleaner, a casing; a closure for one end of said casing having a peripheral air inlet and a centrally arranged air outlet; means to impart whirling motion to the air as it enters the casing; and means comprising a plurality of fins secured to the other end of said casing to stop the whirling motion of the air before it enters said air outlet.

7. In a device of the character described, a casing through which air may be passed, means for imparting a whirling motion to air in said casing to cause the separation of foreign substances from the air, said casing having an opening adjacent the rear portion thereof through which said foreign substances may be discharged, means for taking the whirl out of the central portion of said whirling air to provide substantially a dead air space, and means providing an exit passage for said central portion of air adjacent said first means and spaced from said second said means.

8. In a centrifugal air cleaner, a casing, means for imparting a whirling action to air passing through said casing, said casing having an outlet for foreign substances carried by incoming air, a curved blade in said casing for quieting the central portion of said whirling air, and an outlet conduit for clean air communicating with said central portion of air and spaced from said blade.

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