Sept. 6, 1927.

F. A. DONALDSON

1,641,746

AIR CLEANER

Filed April 29, 1926

2 Sheets-Sheet 1

Fig. 1

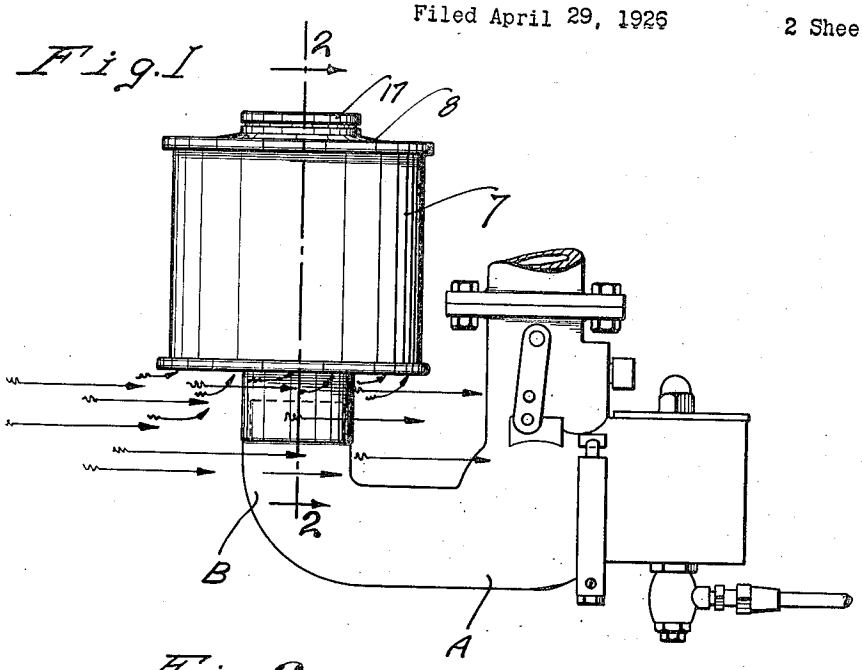


Fig. 2.

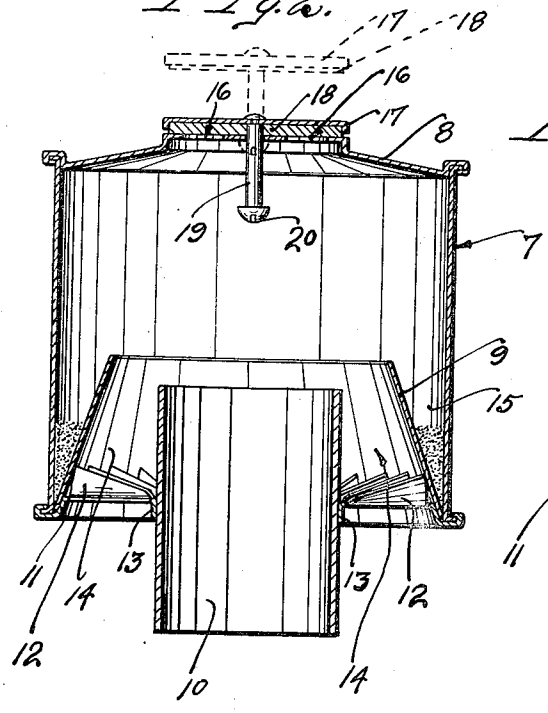
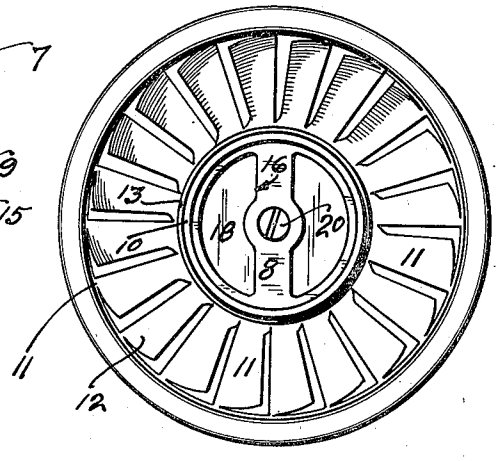


Fig. 3



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Fig. 4

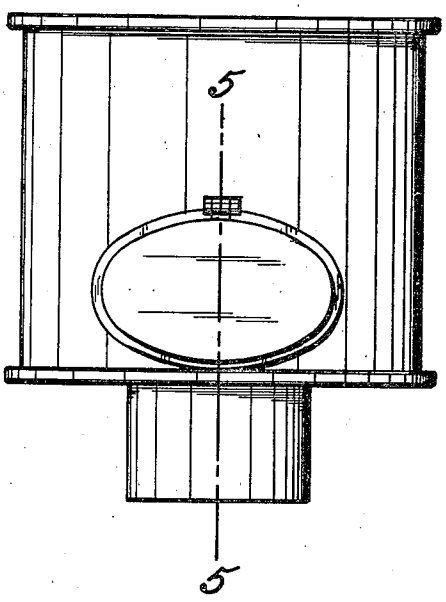


Fig. 5

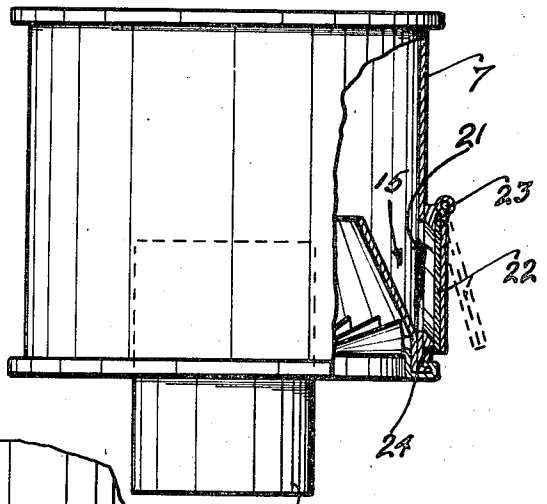
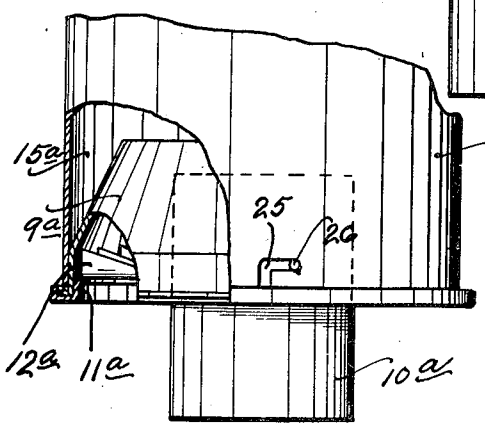


Fig. 6



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Patented Sept. 6, 1927. 1,641,746

UNITED STATES PATENT OFFICE.

FRANK A. DONALDSON, OF MINNEAPOLIS, MINNESOTA.

AIR CLEANER.

Application filed April 29, 1926. Serial No. 105,443.

My present invention provides an extremely simple and highly efficient air cleaner especially adapted for use to deliver clean air to carburetors used in connection with internal combustion engines and, generally stated, the invention consists of the novel construction, combinations and arrangement of parts hereinafter described and defined in the claims.

A commercial form of the device and slight modifications thereof are illustrated in the drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a side elevation showing the air cleaner applied to the air intake of a commercial carburetor, the latter being diagrammatically indicated;

Fig. 2 is a section through the cleaner taken on the line 2—2 of Fig 1;

Fig. 3 is a bottom plan view of the carburetor;

Fig. 4 is a front elevation showing a slight modification of the air cleaner;

Fig. 5 is a side elevation of the carburetor shown in Fig. 4, some parts being sectioned on the line 5—5 of Fig. 4; and

Fig. 6 is a fragmentary side elevation with some parts sectioned, illustrating a still further modified form of the air cleaner.

The commercial carburetor illustrated is indicated as an entirety by the character A and its upturned air intake is indicated by the character B. The body of the cleaner is preferably in the form of a sheet metal cylinder 7 provided with a secured top or cover 8. Located within the lower portion of the cylindrical shell 7 is an annular baffle 9 preferably of sheet metal and of truncated conical form, the large lower edge portion thereof being rigidly secured to the lower edge of the shell 7. Leading axially upward through the lower end of the shell 7 and preferably terminated slightly below the upper edge of the baffle 9 is a large clean air delivery tube 10 which, as shown, is telescoped onto the upturned air intake B of the carburetor. This clean air tube 10 is spaced from the baffle 9 by an annular member 11, preferably of sheet metal, that is stamped or pressed or otherwise formed with circumferentially spaced oblique vanes or deflecting blades 12. In the particular construction here illustrated, the outer portion of the annular member 11 is bent and clinched around the lower edge portions of the shell 7 and baffle 9, and the inner portion of said member 11 is formed with a down-bent flange 13 that is secured to the clean air tube 10 by solder or any other suitable means. The arrangement just described is such that an annular air intake passage 14 is formed between the clean air tube 10 and the baffle 9, and an annular dust chamber 15 is formed between said baffle 9 and the surrounding lower portion of the shell 7.

As a means for removal of collected dust from the cleaner, its top plate 8 is shown as formed with ports 16 normally closed by a valve plate 17. This valve plate 17 is shown as provided with a pad 18 of felt, leather or other suitable material that is adapted normally to tightly close the ports 16. To guide said valve in its opening and closing movements and to normally hold the same positioned to close the ports 16, it is shown as provided with a depending axial stem 19 that works through an axial opening in the top plate 8 and at its lower end has a head 20 that affords a stop.

The structure just described, applied as indicated in Fig. 1, illustrates the preferred arrangement and embodiment of the cleaner. In this arrangement, under advance movement of an automobile, the dust-laden air that comes to the cleaner will move under the cleaner and along substantially horizontal lines, so that the heavier dust will pass completely under and to the rear of the cleaner, while the air drawn upward into the cleaner by suction will carry only lighter portions of the dust; and this dust-laden air will be drawn into the cleaner through the annular air intake passage 14. This dust-laden air, as it is drawn upward into the annular passage 18, will, by the oblique vanes or blades 12, be caused to take up a whirling motion so that centrifugal force will throw the dust against the baffle 9 and the dust is moved upward against the said baffle with a spiral whirling action until it reaches the upper edge of said baffle and then, under the action of centrifugal force, will be instantly thrown outward toward or against the wall of said shell 7 and will fall into the annular dust chamber 15. The clean air entering the shell 7 must completely reverse itself and move downward through the clean air tube 10 to the carburetor, and the reversal of the direction of the air further insures separation of the dust from the air.

The separation of the dust from the air is accelerated to a considerable extent by the conical or upwardly tapering form of the baffle 9, for this form of the baffle increases the tendency of the dust to cling thereto ready to be thrown radially outward by the action of centrifugal force upon reaching the upper edge of said baffle; and, moreover, the cross section of the annular air passage 14 is decreased from its lower toward its upper portion so that the velocity of the whirling air increases as it moves upward through the cleaner with a resulting increased centrifugal action tending to throw the dust outward.

It will thus be seen that the arrangement of the annular or endless baffle spaced from the shell so as to form an intervening dust chamber and spaced from the clean air outlet tube to form an annular air intake passage with means in said air intake passage for setting up a whirling motion of the dust-laden air, accomplishes highly important results and that further improved results are accomplished by making the said baffle conical or upwardly tapered.

In the arrangement just above described, to remove collected dust from the cleaner, it is necessary to lift the cleaner off from the carburetor and to turn the same upside down so that the ports 16 will be opened by movement of the valve 17 away from the same. In Fig. 2, the said valve is thus moved away from the said ports, but it will be understood that to perform such a movement, the cleaner should be turned upside down.

The cleaner illustrated in Figs. 4 and 5 differs from that just above described only in that the cleaner is provided with a dust-cleanout port 21 located in one side of the shell 7 adjacent to the dust chamber 15. This port 21 is normally closed by a valve 22 shown as pivoted at 23 to an annular seat 24 secured to the shell 7 and surrounding the cleanout port 21. Normally, this valve 22 will be held closed by gravity and by partial vacuum that is maintained in the cleaner when the engine is in operation.

The construction illustrated in Fig. 6 differs from that illustrated in the other views in that the shell 7^a is telescoped onto the cylindrical lower portion of a baffle 9^a, which latter, at its lower edge, is rigidly secured to the clinched marginal flange of the annular spacing member 11^a, which latter has the before described oblique deflecting blades 12^a and is rigidly secured to a clean air outlet tube 10^a. Also, as here shown, the shell 7^a is interlocked to the baffle 9^a by one or more bayonet joints made up of L-shaped slots 25 and cooperating studs 26. In this arrangement, the dust from the chamber 15^a will be discharged when the shell 7^a is lifted from position.

From what has been said, it will be understood that the invention illustrated in the drawings and above described is capable of various modifications, all within the spirit thereof as herein exemplified and as defined in the claims.

What I claim is:

1. An air cleaner of the kind described comprising a casing, a baffle connected at its outer edge to the open end of said casing and with its inner edge spaced from said casing to form therewith a dust-collecting chamber, a clean air outlet tube extended axially into said casing but spaced from said baffle to form a surrounding air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing.

2. An air cleaner of the kind described comprising a casing set on a vertical axis, an annular baffle secured to the lower edge of said casing but spaced therefrom to form an annular dust-collecting chamber within said casing, a clean air outlet tube extended axially downward from within said casing but spaced from said baffle to form a surrounding annular air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing.

3. An air cleaner of the kind described comprising a casing, a baffle connected to the open end of said casing and spaced therefrom to form a dust-collecting chamber, a clean air outlet tube extended axially into said casing but spaced from said baffle to form a surrounding air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing, said baffle having a truncated conical form whereby said air intake passage is contracted in cross section in a direction from the receiving toward the delivery portion thereof.

4. An air cleaner of the kind described comprising a casing set on a vertical axis, an annular baffle secured to the lower edge of said casing but spaced therefrom to form an annular dust-collecting chamber within said casing, a clean air outlet tube extended axially downward from within said casing but spaced from said baffle to form a surrounding annular air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing, said baffle having a truncated conical form whereby said air intake passage is contracted in cross section in a direction from the receiving toward the delivery portion thereof.

5. An air cleaner of the kind described comprising a casing, a baffle connected to the open end of said casing and spaced therefrom to form a dust-collecting chamber, a clean air outlet tube extended axially into

said casing but spaced from said baffle to form a surrounding air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing, said casing having a normally closed dust-discharge port adapted to be opened for the discharge of the collected dust.

6. An air cleaner of the kind described comprising a casing set on a vertical axis, an annular baffle secured to the lower edge of said casing but spaced therefrom to form an annular dust-collecting chamber within said casing, a clean air outlet tube extended axially downward from within said casing but spaced from said baffle to form a surrounding annular air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing, said casing having a closed top and a dust-discharge port equipped with a normally closed valve.

7. An air cleaner of the kind described comprising a casing set on a vertical axis, an annular baffle secured to the lower edge of said casing but spaced therefrom to form an annular dust-collecting chamber within said casing, a clean air outlet tube extended axially downward from within said casing but spaced from said baffle to form a surrounding annular air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing, said casing in its top plate having a dust-discharge port and a gravity-seated valve normally closing said dust-discharge port.

8. An air cleaner of the kind described comprising a casing, a baffle connected to the open end of said casing and spaced therefrom to form a dust-collecting chamber, a clean air outlet tube extended axially into said casing but spaced from said baffle to form a surrounding air intake passage, and means within said air intake passage for setting up a whirling motion of the air drawn into said casing, said baffle extending into said casing beyond said clean air outlet tube and said outlet tube extending from said casing beyond said baffle.

9. An air cleaner of the kind described comprising a cylindrical casing, closed at one end, an annular baffle secured to the open end of said casing and extending into the same but spaced therefrom to form an annular dust chamber, a clean air outlet tube extended axially from said casing through the open end thereof but spaced from said baffle to form a surrounding annular air intake passage, and an annular member connected to said casing and air outlet tube and formed with circumferentially spaced oblique vanes arranged to set up a whirling motion of the air drawn into said casing through said annular air intake passage.

10. An air cleaner of the kind described comprising an upright cylindrical casing closed at its top and open at its bottom, an annular baffle of truncated conical form tapered upward and connected at its lower edge to the lower edge of said casing and spaced therefrom to form an annular dust chamber within said chamber, and a clean air outlet tube extended axially through the open lower end of said casing but spaced from said baffle to form therewith an upwardly tapered annular air intake passage, and an annular metallic member connected to the lower edge of said casing and to said air outlet tube and formed with circumferentially spaced oblique vanes arranged to set up a whirling motion of the air drawn into said casing through said air intake passage.

In testimony whereof I affix my signature.

FRANK A. DONALDSON.