

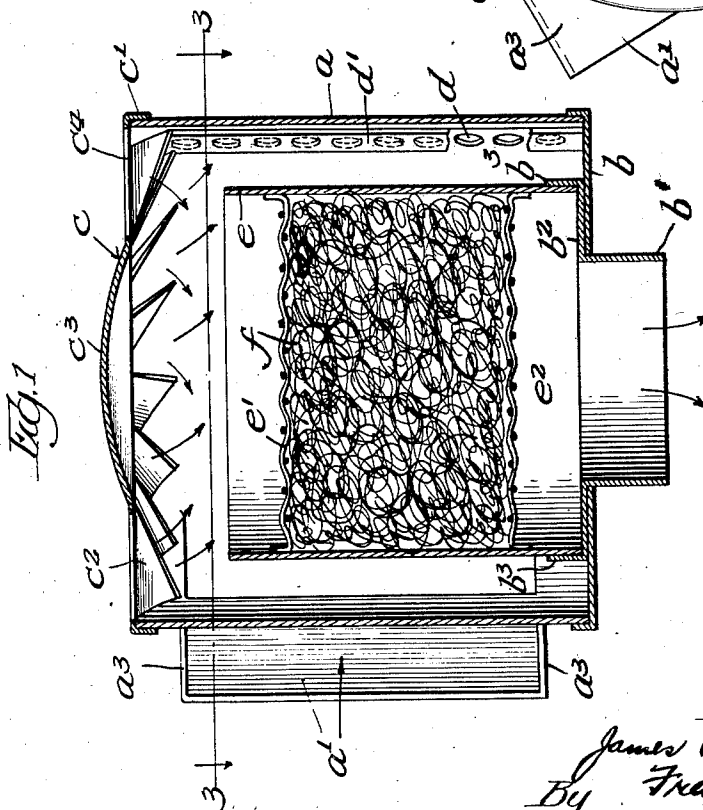
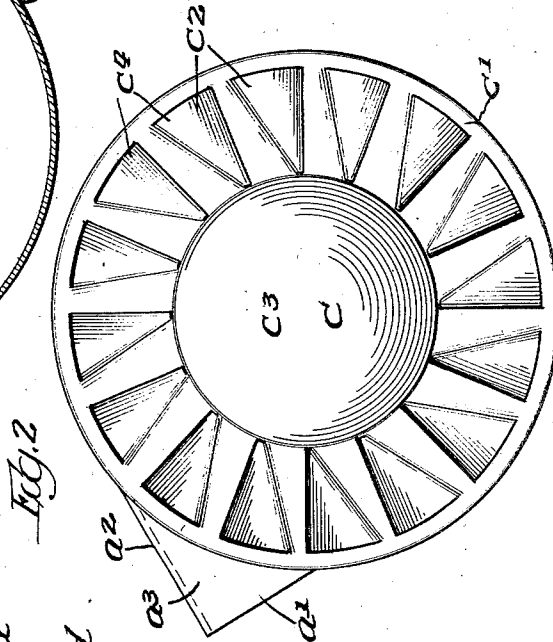
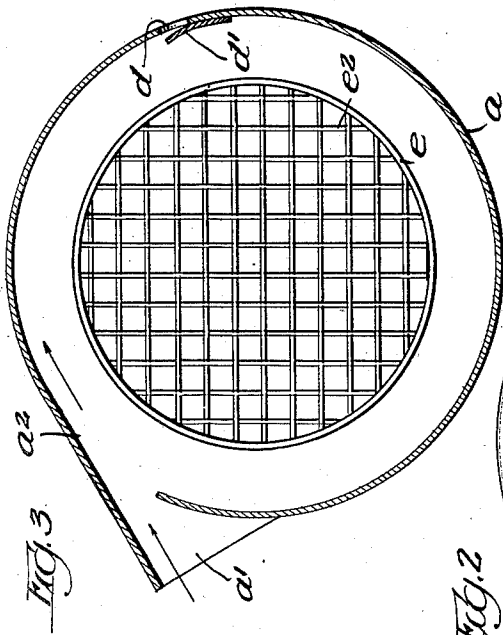
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AIR CLEANER

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AIR CLEANER

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The invention relates to air cleaning devices of the type used for automobiles or traction engines.

In practice it has been found that air-cleaning devices of the centrifugal type, in which helical blades at one end of the casing are provided to project the dirt and particles of dust in the air outwardly by centrifugal force, are not highly efficient in cleaning the air, because the whirling motion imparted to the air does not sufficiently subject the particles to centrifugal force to completely clean the air supplied to the engine.

One object of the invention is to provide an air cleaning device in which the air entering one end of the casing is given a whirling motion by helical blades, and is additionally whirled or accelerated by a confluent stream of air entering the casing tangentially through its periphery, to subject the dirt and dust particles to sufficient centrifugal force to attain more efficient cleaning.

Another object of the invention is to provide an air cleaning device of the centrifugal type with supplemental means, such as a filter mass of suitable material, such as metallic wire, for eliminating the finer particles of dust which are not separated by centrifugal force.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features hereinafter set forth, and more particularly defined by claims at the conclusion hereof.

In the drawing: Fig. 1 is a longitudinal section of an air cleaner embodying the invention. Fig. 2 is a plan. Fig. 3 is a section on line 3—3 of Fig. 1.

The invention is exemplified in a stationary casing preferably formed of sheet metal, and comprising a cylindrical body or wall a , a head b at one end of the body and a head c at the other end of the body. The outer portion of head c has formed therein helical blades c^2 which extend into the casing and are shaped to impart a whirling motion to the air entering the casing through the inlets c^4 between the blades. The central portion c^3 of the head c is imperforate or closed so

that air will pass through the head c only near and around the wall a . The head b is provided with a tubular extension b' which forms an axial clean-air outlet and is adapted for connection to a pipe or conduit leading to the air-intake of the carburetor, so that air will be drawn through the casing of the air-cleaner by suction produced in the engine, as well understood in the art, and so the casing will be supported in a fixed position. The extension b' is formed on a ring b^2 which is secured to the head b . The head c is provided with a flange c' and is held on the other end of the body a . This exemplifies a casing in which an axial clean-air outlet is located at one end and the helical blades for imparting a whirling motion to the entering air are disposed at the other or opposite end of the casing. An air-inlet opening a' is formed in the cylindrical wall a and this wall is extended tangentially from the periphery of the casing, as at a^2 , to form with the wall portion at the other side of inlet a' a convergent passage for directing a stream of air tangentially into and around the inner periphery of the casing. Peripheral inlet a' extends substantially from end to end of the casing, and walls a^3 are provided at the top and bottom of the opening a' between the wall a and the extension a^2 to form an air inlet through which a stream of air will be drawn tangentially into the casing adjacent its inner periphery and given a whirling motion confluent with and to flow in the same direction as the air which has entered through head c . The confluence of the tangential stream entering through the periphery and the whirling air entering from blades c^2 through the head c produces greater centrifugal force and more efficient separation of the dust, than that which results from either stream alone. This construction exemplifies a casing provided with blades at one end for imparting a whirling motion to the air entering the end of the casing and with a peripheral longitudinally extending inlet for conjointly imparting a whirling motion to the air around the inner periphery of the casing to effectively separate the par-

articles of dust and dirt from the air by centrifugal force.

A longitudinal series of round holes d is formed in the wall a of the casing. A strip
5 of metal d' has one of its margins secured to the inner periphery of the casing and its other laps the holes and is bent inwardly slightly to deflect the dust particles outwardly through the holes and cause the dust to be
10 discharged from the casing.

A cylindrical wall or shell e , concentric with the wall a , is secured in a vertical flange b^3 of ring b^2 , extends longitudinally from the head b , and terminates some distance
15 from the head c to leave a longitudinal space or chamber below the imperforate portion c^3 of the head c from which cleaned air can pass into the shell. The upper end of this shell e is open so the air, after it has been subjected
20 to centrifugal force to discharge the dust and dirt from the casing, will pass longitudinally through the shell to the clean air outlet b' in head b .

A fibrous filter mass f of material which
25 will not densify or pack, such as fine crinkled metal wire, is confined in the shell e between wire screens e' , e'' of wide mesh, the margins of which are secured by welding or solder to shell e . Screen e'' is longitudinally spaced
30 from the head b . This mass f is preferably dipped in a suitable oil to cause fine particles of dust to adhere to the wire in the mass. This exemplifies a filter mass between the space at one end of the casing and the clean
35 air outlet through which the air which has been subjected to centrifugal force and from which the heavier particles of dust have been removed, must pass in its flow to the clean
40 air outlet b' , so that the air, after it has been centrifugally cleaned, will be further cleaned to remove any residual particles which have not been or are too fine to be removed by centrifugal force. The shell e
45 forms a holder for the filter-mass and leaves an annular chamber at the inner periphery of the casing for the air stream that enters the casing through the inlet opening a' .

The air cleaning device herein disclosed may be manufactured at a comparatively low
50 cost by virtue of the fact that it embodies but a small number of parts. Inasmuch as a tangential air stream is utilized to accelerate the swirling of the main body of air, the device operates in an extremely efficient
55 manner.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the
60 spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. An air cleaner of the centrifugal type
65 comprising a cylindrical stationary casing

provided at one end with means for admitting and imparting a whirling motion to the entering air around the inner periphery of the casing to separate the dust by centrifugal force, an inlet in the periphery of the casing
70 for admitting and directing a stream of air tangentially into the casing confluent with the whirling air from said end, and an outlet for clean air from the central portion of the casing.
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2. An air cleaner of the centrifugal type comprising a cylindrical stationary casing provided at one end with a marginal annular series of stationary helical blades and openings
80 for admitting and imparting a whirling motion to the entering air around the inner periphery of the casing, an inlet in the periphery of the casing for admitting and directing a stream of air tangentially confluent with the whirling air from said end, a peripheral
85 dust discharge opening, and an axial clean air outlet in the other end of the casing.

3. An air cleaner of the centrifugal type comprising a cylindrical stationary casing provided at one end with means for admitting and imparting a whirling motion to the entering air around the inner periphery of the casing, an inlet in the periphery of the casing for admitting and directing a stream
90 of air tangentially into the casing confluent with the whirling air from said end, an axial clean air outlet in the other end of the casing, and annular means in the casing for preventing air adjacent to the inner periphery of the casing from passing directly to said outlet.
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4. In an air cleaner, the combination of a stationary cylindrical casing provided with heads at its ends, an axial clean air outlet connected to one of said heads, a series of helical blades with openings therebetween,
100 in the other head, for imparting a whirling motion to the entering air around the inner periphery of the casing, a tangential air inlet connected to the periphery of the casing to direct air around the inner periphery of the casing confluent with the air from the end, the central portion of the head being provided with the blades being closed, and a peripheral dust discharge orifice open to the atmosphere.
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5. An air cleaner of the centrifugal type comprising a cylindrical casing provided with means at one end for admitting air and imparting a whirling motion thereto around the inner periphery of the casing to separate
110 dust from the air by centrifugal force, a peripheral inlet for directing a stream of air tangentially into the casing confluent with the air entering said end, a clean air outlet connected to the casing, and a filter mass confined in the casing, through which the air passes after it has been subjected to centrifugal force and in transit to the outlet.
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6. In an air cleaner, the combination of a cylindrical casing provided with heads at its
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ends, an axial clean air outlet in one of said heads, a series of helical blades around the outer portion of the other head with openings therebetween for imparting a whirling motion to the entering air around the inner periphery of the casing, a tangential air inlet connected to the periphery of the casing to direct air around the inner periphery of the casing confluent with the air entering through the head, the central portion of the head provided with the blades being closed, a peripheral dust discharge orifice open to the atmosphere, and a filter mass confined in the casing and through which air passes to the clean air outlet.

7. In an air cleaner, the combination of a cylindrical casing provided with heads at its ends, an axial clean air outlet in one of said heads, a series of inlets in, and helical blades around the outer portion of the other head for admitting air and imparting a whirling motion to the entering air, a longitudinally extending air inlet connected to the periphery of the casing for directing a stream of air around the inner periphery of the casing confluent with the air entering said end of the casing having said air inlets, the central portion of the end provided with the blades being closed, and an annular wall in the casing extending from the head having the air outlet and terminating longitudinally inwardly of the inlet-head.

8. An air cleaner comprising a cylindrical casing having heads at its ends, and provided with an axial clean air outlet in one head, the other head having air inlets and a series of helical blades for imparting a whirling motion to the entering air around the inner periphery of the casing, and having its central portion closed, a dust discharge orifice, an annular wall in the casing extending from the head with the air outlet and terminating longitudinally inwardly of the other head, and a filter mass confined in the space inside of said wall and through which air passes from the central portion of the casing to the outlet.

9. In an air cleaner, the combination of a cylindrical casing provided with heads at its ends, an axial clean air outlet in one of said heads, a series of inlets in and helical blades around the outer portion of the other head for admitting air and imparting a whirling motion to the entering air, a longitudinally extending air inlet connected to the periphery of the casing for directing a stream of air around the inner periphery of the casing confluent with the air entering one end of the casing, the central portion of the end provided with the blades being closed, an annular wall in the casing extending from the head having the air outlet and terminating longitudinally inwardly of the inlet-head, and a filter-mass confined

within said wall and through which the air passes to the outlet.

10. An air cleaner including a casing having a wall at one end thereof and an outlet for cleaned air adjacent the other end thereof, said casing having a substantially empty region adjacent said wall with an entrance thereto arranged to impart a whirling action to entering air, filter means between said empty region and said outlet, and said wall having another inlet therein to said region and arranged to impart a whirling action to incoming air, whereby the maximum whirl is maintained nearer said wall than said filter means.

11. An air cleaner including a casing having a wall at one end thereof and an outlet for cleaned air adjacent the opposite end thereof, said casing having a substantially empty region therein adjacent said wall with an inlet thereto arranged to impart a whirling action to entering air, said casing having an outlet from said empty region for the discharge of foreign particles separated from the air by said whirling action, filter means between said region and said outlet for removing finer foreign particles from the air, said wall having inlet means to said region arranged to impart a whirling action to incoming air in the same direction as does the other said inlet, whereby the maximum whirl is maintained nearer said wall than said filter means, and a baffle between said region and said filter means for preventing heavier foreign particles contacting the latter.

12. An air cleaner including a casing having a plurality of inlets in different planes arranged to impart a whirling action to entering air, and said casing having an outlet in the same plane as certain of said inlets for the discharge of foreign particles separated from the air by said whirling action, and said casing having an outlet for cleaned air.

Signed at Chicago, Illinois, this 24th day of February, 1930.

JAMES P. QUAM.