

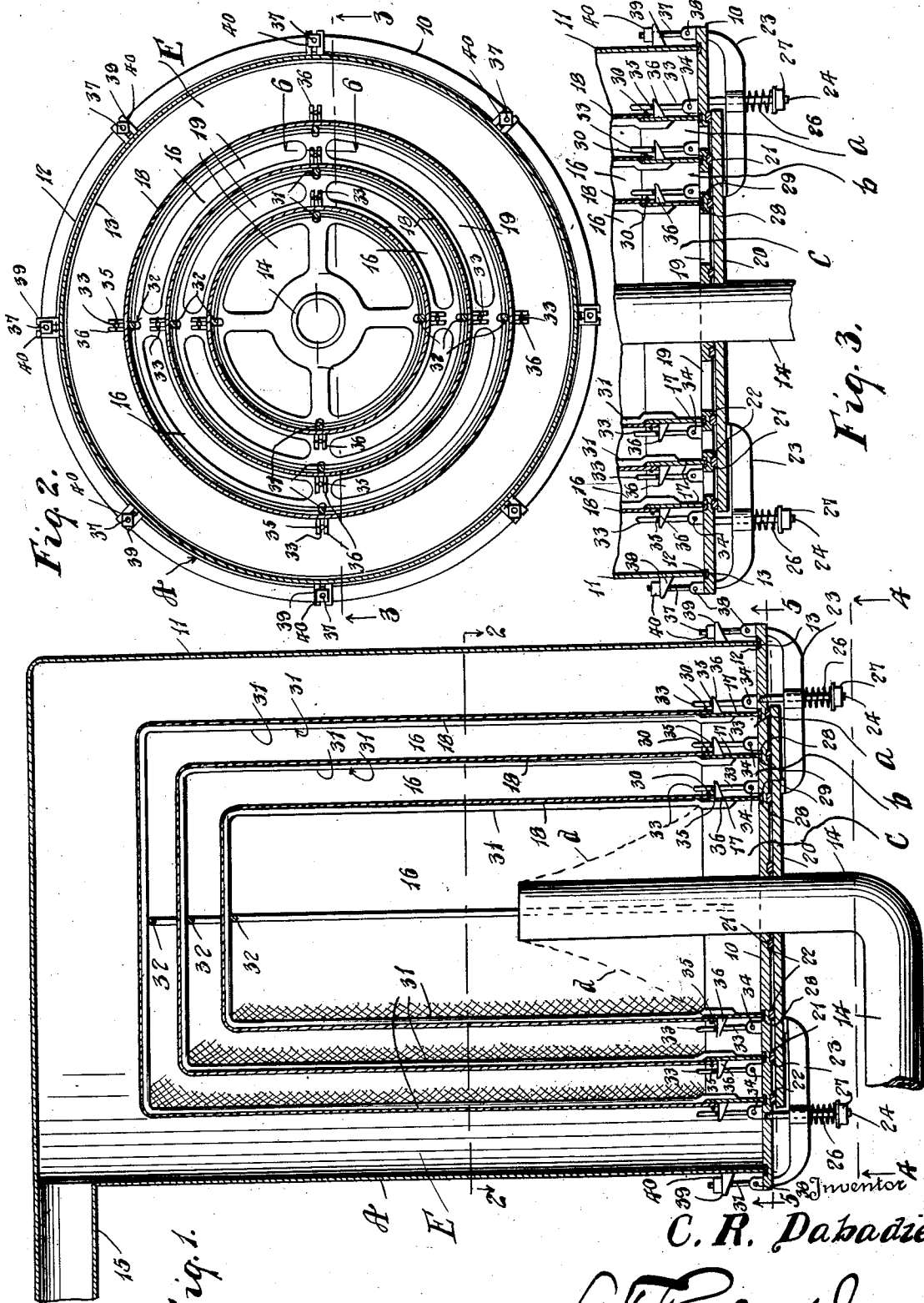
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1,968,016

AIR CLEANER

Original Filed Aug. 18, 1932 2 Sheets-Sheet 1



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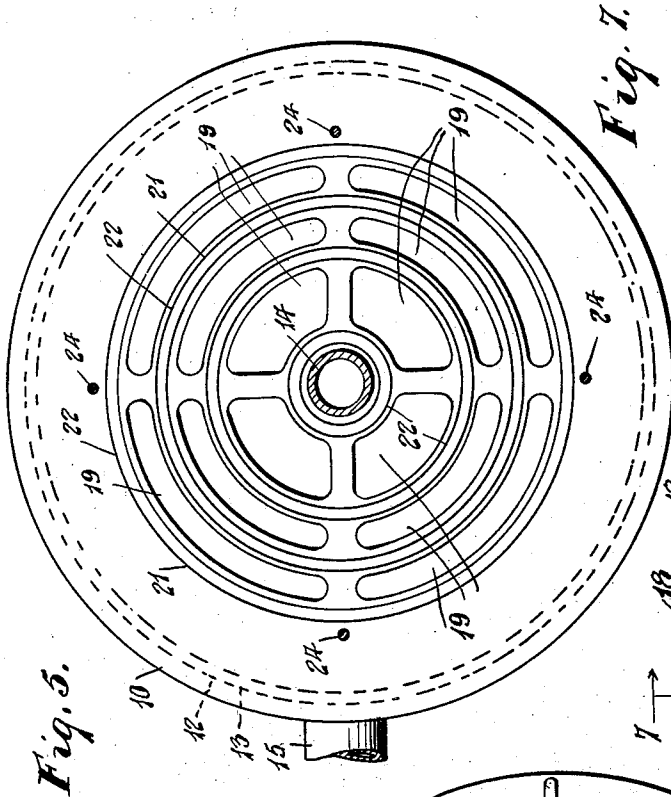


Fig. 5.

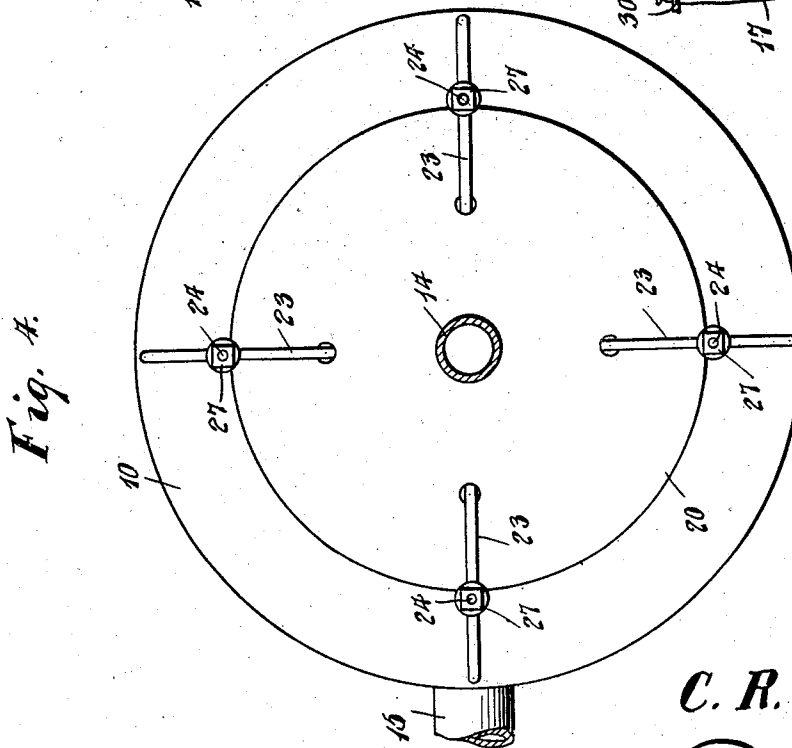


Fig. 6.

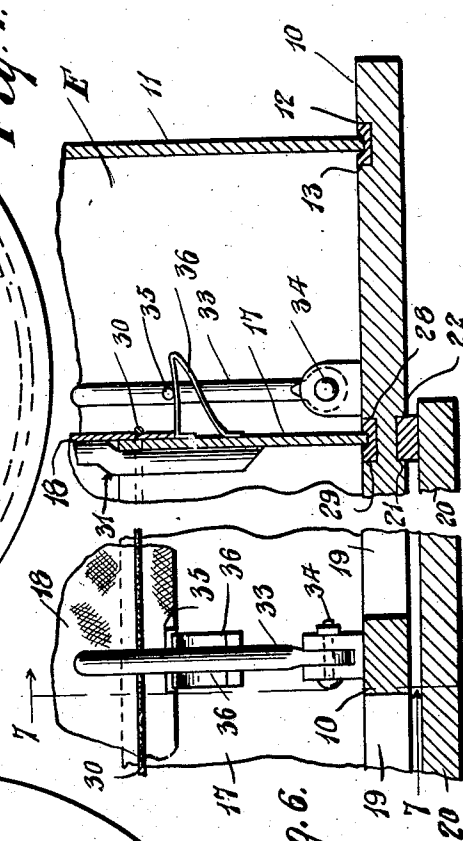


Fig. 7.

Fig. 6.

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UNITED STATES PATENT OFFICE

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AIR CLEANER

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14 Claims. (Cl. 183—73)

This invention relates to an air cleaner and particularly to a construction adapted to clean or remove or precipitate foreign matter from the air which is admitted into the fuel line of an internal combustion engine for admixture with gasoline or the like.

It is particularly aimed to provide a novel construction which may be disassembled and in which the dust may be removed very rapidly and expeditiously, and also a construction wherein there is dead air in the cleaning compartment to the end that the air will not be circulated by the suction of the engine to enhance the dust collecting function.

The more specific objects and advantages will become apparent from a consideration of the description following taken in connection with accompanying drawings illustrating an operative embodiment.

In said drawings:—

Figure 1 is a substantially central vertical sectional view through the improved cleaner,

Figure 2 is a horizontal sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 2,

Figure 4 is substantially an inverted plan view of the cleaner taken on the line 4—4 of Figure 1,

Figure 5 is a cross sectional view taken on the line 5—5 of Figure 1,

Figure 6 is a detail sectional view taken on the line 6—6 of Figure 2, and

Figure 7 is a sectional view taken on the line 7—7 of Figure 6.

Referring specifically to the drawings, a suitable casing is provided as at A consisting of a base 10 and an inverted bell-shaped section 11 removably disposed thereon and engaging a rubber or other gasket 12, of annular form, located in a suitable groove 13 in the upper surface of base 10. Air to be cleaned enters the pipe 14 which extends through the base 10 and it leaves in a clean condition through a discharge pipe 15. The pipe 15 is connected in the fuel line of the internal combustion engine to the carburetor of which the air is supplied for admixture with the gasoline or other fuel, and hence the air is drawn through the pipe 14 and the entire device and discharged by the suction of the engine.

Within the casing are provided any desired number of cleaning compartments 16. Said compartments 16 are defined by rigid annular walls or rings 17 arranged in concentric relation as shown in combination with bags 18. Bags 18 are

made of a suitable cloth or foraminous material as for instance muslin. Such bags may be of different size meshes, if desired, and for instance with the meshes of the respective bags progressively decreasing in size from the smaller or innermost bag to the outer or larger bag. The precipitated dust or foreign matter will collect in the compartments 16 on the base plate 10 and the same is adapted to be removed or to fall therefrom through openings 19 provided through said base plate 10. Normally such openings 19 are closed by a closure or plate 20 which is removably clamped against the under surface of the plate 10, engaging rubber or other gaskets at 21, preferably of annular or endless form, and disposed in grooves 22 in the base 10, and between the openings of the respective compartments or chambers 16, and another between the innermost row of openings and pipe 14. Swivel clamps or bars 23 engage the plate 20 to normally hold it air-tight in place but which plate may be lowered by sliding movement along the pipe 14 to enable discharge of dust or foreign matter. Such clamps 23 are pivoted on rods 24 depending from the base plate 10 and are held in place through the tension of springs 26 on such rods, held in place by nuts 27 which are adjustable to vary the tension of such springs. The clamps 23 of course are slidable longitudinally of the rods 24 against the tension of the springs 26 in the lowering of the closure plate 20.

The connection of the walls 17 to the base 10 and of the bags to the said walls is effected in an air-tight manner, so that there will be dead air in the chambers or compartments 16, as shown at *a*, *b*, and *c*.

The dead air chambers *a* and *b* extend upwardly from the upper surface of base 10, to a point even with the upper edges of members 17.

The dead air chamber *c* extends downwardly and outwardly from the top of pipe 14 to the upper edge of the innermost member 17 as shown by dotted lines *d*. Thus it will be seen that all of said chambers co-act in unison as receptacles, to receive the deposit and precipitation of the foreign matter. To this end, the lower edge of each wall 17 is removably seated on an annular rubber or other gasket 28, disposed in a groove 29 of the base 10, such gasket being grooved, as shown, if desired, to receive the wall. The lower or open end of the bags 18 telescope over the exterior of the walls 17 and the air-tight connection is made by a cord 30 of textile material or the like, such cord and the adjacent portion of each bag being fully impregnated with shellac

or equivalent sealing material. A skeleton supporting frame is disposed within each bag and the same may consist of crossed U-shaped rods 31 and 32 whose lower or free ends are secured to walls 17, by riveting, soldering, or in any other preferred manner.

Each bag and wall 17 is removable as a unit and is secured in place through the action of hold-down levers 33 pivoted to the base plate 10 as at 34, or by other suitable fastenings, not shown. Such levers carry lugs 35 which engage spring lugs 36 carried by the walls 17. The levers 33 and lugs 35 serve as latches to engage the lugs 36, the spring action of the latter enabling them to yield and then to expand to hold the latches in locked position as shown in Figure 7 and also urge the members 17 into air-tight relation with the gasket 28.

The base 10 and bell 11 may be secured together in any suitable manner as by means of toggle bolts 37 pivoted at 38 on the base plate 10 and engaging in U-shaped lugs 39 on the bell 11, which are engaged by the nuts 40 of such bolts.

In operation we will assume that pipe 15 of the cleaner has been previously connected to the induction pipe of an internal combustion motor and that the motor has been set in motion. Due to the pumping action of the engine pistons, a stream of air will be caused to flow through the cleaner's inlet pipe 14 into the innermost bag 18, thence the air will slowly filter through the meshes of said bag into the space between it and the adjacent bag; the larger portion of any dust or foreign matter which may have been drawn into the inner chamber with the incoming air will have been filtered out by the action of the meshes of the inner bag upon the air while it was passing therethrough, the foreign matter thus filtered out of the air stream falls by gravity into chamber c where it will remain until it is removed manually.

After the air stream has passed through the innermost bag 18 into the space between it and its surrounding bag, it is drawn through the next bag and is further subjected to a cleaning action while passing through said bag into the space between said bag and the outermost bag. The action of the meshes of the last mentioned bag further removes some of the dirt from the air stream, which settles through the space between said bags, into the dead air space b from whence it may be manually removed.

The air stream then is drawn through the outer bag and a further filter cleaning effect is effected by the meshes of this outermost bag, the meshes of which, if desired, may be smaller than the meshes of the other mentioned bags, and thus be effective in removing the finest particles of dust from the air stream, this dust thus finally removed will also find its way by the action of gravity into the dead air chamber a. It will be further noted that due to the larger space E between the outermost bag and its enclosing bell 11, the air stream which has successively passed through the filter members will be slowed down and a further and final cleaning of the air stream will take place by the action of gravity, and to such a degree that the air as delivered to the engine cylinders will be fit to use therein.

The construction enables the ready and expeditious removal of the extracted dust and foreign matter simply by removing or lowering the closure 20, the dust or foreign matter falling

through the openings 19. Also, all of the parts of the device may be readily disassembled through actuation of the various latches, clamps or the like.

From the foregoing it will be noted that I have provided an air cleaner that employs a series filtering principle in combination with a gravity settling action principle. I am aware that air cleaners have been used in combination with internal combustion engines, but I am not aware that air cleaners employing the structure disclosed in my drawings has been used before me.

I am also aware that many changes can be made in the details of construction without departing from the spirit and scope of my invention, and accordingly, I wish my claims to be limited only by the state of the art to which they pertain.

I claim as my invention:—

1. An air cleaner comprising a base member, an annular wall disposed thereon, a cleaning bag connected to and extending from the wall, latch means between the base member and said wall removably securing the latter to the base member, said base member having an opening there-through for the discharge of foreign matter, and a closure member normally covering said opening and displaceable to permit the removal of foreign matter therethrough.

2. An air cleaner comprising a base member, an annular wall disposed thereon, a cleaning bag connected to and extending from the wall, latch means between the base member and said wall removably securing the latter to the base member, said base member having an opening there-through for the discharge of foreign matter, a closure member normally covering said opening and displaceable to permit the removal of foreign matter therethrough, said bag being connected air-tight to said wall, and a sealing gasket between said wall and said base member.

3. An air cleaner comprising a base member, an annular wall disposed thereon, a cleaning bag connected to and extending from the wall, latch means between the base member and said wall removably securing the latter to the base member, said base member having an opening there-through for the discharge of foreign matter, a closure member normally covering said opening and displaceable to permit the removal of foreign matter therethrough, clamp members holding said closure member in closed position, and means resiliently mounting said clamp members on the base member and enabling movement of the same away from the closure so that it may be displaced.

4. An air cleaner comprising a base member, an annular wall disposed thereon, a cleaning bag connected to and extending from the wall, latch means between the base member and said wall removably securing the latter to the base member, said base member having an opening there-through for the discharge of foreign matter, a closure member normally covering said opening and displaceable to permit the removal of foreign matter therethrough, spring urged means maintaining said closure in place, and gaskets between the closure and between the openings of the different cleaning compartments.

5. An air cleaner comprising a base member, annular walls disposed thereon, cleaning bags connected to and extending from the walls, latch means between the base member and said walls removably securing the latter to the base member, said base member having openings there-

through for the discharge of foreign matter, a closure member normally covering said openings and displaceable to permit the removal of foreign matter therethrough, spring urged means maintaining said closure in place, gaskets between the closure and between the openings of the different cleaning compartments, a bell disposed on said base over said bags, means removably securing the bell to the base, an inlet pipe extending through the base, and a discharge pipe extending from the bell.

6. In an air cleaner in combination a bell-shaped casing, an outlet pipe in the vertical portion of said casing, a base member acting as a closure for said casing, an inlet pipe in the base member having its discharge end positioned well above the upper surface of said base, a plurality of arcuate openings in the base member, a multiplicity of nested, radially spaced vertical walls removably secured to the upper surface of said base, a bag secured to the upper edge of each of said walls, and a yieldingly latched displaceable closure member normally closing the openings in the base member, said openings being in register with the spaces between said vertical walls.

7. In an air cleaner, a bell-shaped casing having an opening in a wall thereof, a removable base member having openings therein, for closing the open end of said casing, a battery of nested, spaced-apart, annular vertical walls mounted on said base member and forming dead air pockets between said walls, a bag extending from each of said walls, and a closure member normally closing said openings in said base member.

8. An air cleaner comprising in combination a multiplicity of nested dead air pockets having walls extending upwardly from the floor thereof, filter bags secured to the upper edges of said walls, openings in the floors of said pockets, a cover member for said openings, and a bell-shaped apertured casing enclosing said bags and said pockets.

9. An air cleaner comprising a battery of nested cylindrical filter bags having tubular metal extensions thereon, a perforated base member to which said extensions are removably attached, a unitary cover means for said perforations, and an apertured bell-shaped closure removably attached to said base.

10. An air cleaner comprising an inverted bucket-shaped member, a tubular opening in said

bucket, a lid for said bucket having a tube extending axially therethrough, a plurality of spaced holes in said lid, a cover means for said holes, a plurality of nested spaced-apart filter members secured to the inner surface of said lid and removable therewith from the bucket.

11. An air cleaner comprising an inverted bucket-shaped member, a lid member for said bucket, hinge-bolt means to secure said lid to the open end of the bucket, a pipe extending axially through said lid and far into the bucket, a series of spaced, concentric, cylindrical vertical walls extending upwardly from the inner side of the lid, a filter member attached to each of said walls, openings in said lid in register with the spaces between said walls, and a cover for said openings.

12. In an air cleaner, the combination of a bell-shaped member, a tube mounted in the wall of said member, a perforated base member having a tube mounted therein, latch means on said base adapted to secure the bell-shaped member thereto, a multiplicity of nested, spaced-apart cylindrical vertical walls removably secured to the upper surface of said base member, an individual filter bag secured to the upper edge of each of said walls, normally covered openings in said base member, and arch-shaped means within each of said bags to support the same.

13. An air cleaner comprising in combination; a base member having a multiplicity of openings therein, a tube mounted in one of said openings, a unitary removable cover plate adapted to cover the remaining openings, a multiplicity of cylindrical, spaced-apart vertical walls mounted upon the upper surface of said base, a unitary bag mounted upon the upper edge of each of said walls and an apertured bell-shaped casing adapted to enclose the bags and said walls, removably secured to said base.

14. An air cleaner comprising a bell-shaped casing having an opening in one of its walls, a base member to which casing is removably attached, concentric pockets formed by nested cylindrical walls and the upper surface of said base, a bags attached to and extending from the said cylindrical walls, openings in said base in register with said pockets, a closure means normally covering said openings, a tube member extending through said base and terminating above the upper portion of said cylindrical walls.

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