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(71) Applicant: **VULCAN METALS COMPANY (US)**
ROBINSON LESTER L (US)
(72) Inventor: **ROBINSON LESTER L (US)**

(54) **VACUUM CLEANER**
(54) **NETTOYEUR PAR LE VIDE**

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S P E C I F I C A T I O N.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, LESTER L. ROBINSON, a citizen of the United States, residing at Los Angeles, in the County of Los Angeles and State of California, United States of America, have invented certain new and useful Improvements in

VACUUM CLEANERS

of which the following is a specification.

My invention relates to vacuum cleaners, and refers particularly to an improved form of tool which is adapted to be used with any suitable suction line.

The object of this invention is to improve the tools which are employed in vacuum cleaning apparatus and by the tool I mean the movable device comprising the nozzle, the suction inlet pipe, the suction outlet pipe which is connected by a flexible hose to suitable vacuum producing apparatus, preferably an aspirator or water jet, and an interposed dirt receptacle or separating chamber. Such a tool for purposes of convenience and economy, must be of few and simple parts easily handled and sufficiently flexible to adapt it to pass over the surfaces to be cleaned; capable of containing a considerable amount of dirt; so constructed as to permit the easy discharge of the separated particles, and preferably so constructed that the operation of separating the dust from the air can be observed. These several advantages I accomplish in the device shown in the accompanying drawings, in which:

Figure 1 is a side elevation of my improved vacuum cleaner;

Figure 2 is a vertical longitudinal section through the dirt receptacle, showing the entrance and exit pipes associated therewith;

Figure 3 is a bottom plan and partial transverse section, taken on the line 3-3 of Figure 2; and

Figure 4 is a sectional view taken on the line 4-4 of Figure 2.

10 represents the suction head or nozzle having an elongated orifice of the usual type. Leading from the head 10 is the pipe 11, which projects axially into the dirt receptacle or separating chamber 12. As most clearly shown in Figure 2, the dirt chamber 12 is closed by a lower end portion 13, in the form of a cap having an orifice 14, the pipe 11 passing through the lug 15, preferably made integral with the end member of cap. If desired, the entrance pipe 11 may be longitudinally adjustable with respect to the dirt chamber 12, but in any event its open end is located preferably above the mid-length of the chamber. Between the end member 13 and the opposite end member 16 of the dirt chamber is provided the glass casing 17, preferably of cylindrical shape, the gaskets 18, of rubber or other suitable material, being provided between the edges of the casing 17 and the end members 13 and 16. The end members and the casing 17 are fastened together by means of the rods 19, which are fastened to the lugs 20 on the end members by any of the wellknown methods.

The exit pipe 21 leads from the end member 16, and is connected with a suction line in any suitable manner. The exit pipe 21, if desired, may be made in a plurality of sections which may be joined together in any suitable way. This pipe is also rigid and serves as a handle for manipulating the tool when using the same.

In the upper end of the dirt chamber 12 and covering the end of the exit pipe 21 I provide the dirt arrester or dust-separating device 22, which, as shown in Figures 1 and 2, is of frusto-conical shape and provided with perforations through its sides. The dirt is held in rigid position by means of its flange 23 located between the gasket 18 and the end chamber 16. The lower end 24 of the dirt arrester is imperforate and is preferably of concave shape. the center of this deflecting surface being located opposite the upper end of the pipe 11.

The aperture 14 in the end cap 13 is normally covered by the rotatable valve plate 25 mounted on the lug 15, and held in position by the leaf spring 26 and the nut 27, the latter having threaded engagement with the lug 15. A rubber gasket 28 is inserted between the valve plate 25 and the end member 13 so that leakage of air is prevented.

Having thus described the construction of the various parts used in my invention, the operation of the same may now be readily understood: The exit pipe 21 being connected with a suction line, air is exhausted from the dirt chamber 12, the pipe 11, and the head 10, thereby causing a current of air to pass through the tool. The dirt and air passing through the entrance pipe 11 strikes the concave deflecting surface of the dirt arrester 22. The particles of dirt all except the finest, drop by gravity into the receptacle and pass to the lower end thereof, the sudden expansion of the air within the chamber lowering its pressure and facilitating the separation. The air freed from the heavier particles will, owing to its lighter specific gravity, tend to continue its course through the implement, and owing to the shape of the arrester the air striking the imperforate part of the body will flow out-

wardly and over the annular free edge or lip 22^a, where a further separation takes place. The air passes through the perforated or foraminous wall 22, and owing to the outwardly tapering form of the latter, finds ready escape, while any light particles carried in suspension will be arrested. An object in having the entrance pipe 11 project for a considerable distance within the dirt receptacle 12 is to provide a relatively large chamber below the exit orifice in which the air expands and in which the dirt settles, the size of this chamber permitting a comparatively large quantity of dirt to build up in the bottom of the receptacle outside of the path of the current and without the necessity of frequently emptying the chamber.

When it is desired to remove the dirt from the dirt receptacle 12, the plate valve 25 is rotated so that the aperture 14 is uncovered. A gentle shaking of the receptacle will throughly remove all accumulated dirt therefrom. The valve 25 is then moved back into position, and the tool may be again used.

I have found it desirable to locate the dirt receptacle at a point comparatively near the cleaner head 10, so that the weight of the dirt receptacle may be utilized, in order to cause the cleaner head to engage the surface of a carpet or the like with the proper pressure, and, second, in order to have the air pass for only a comparatively short distance before the dirt is removed therefrom.

It will also be noted that the pipe 11 is of small diameter compared with the diameter of the chamber 12, the effect being that a strong suction is exerted at the nozzle and in the pipe 11, thus assuring the thorough removal of dirt from the surface to be cleaned and the delivery of the

dirt with force against the arrester, while the sudden expansion of the current permits its separation and deposit.

Any particles of dirt light enough to be carried with the current will be arrested by the reticulated body of the arrester which is of such area and shape as to permit the free passage of the air current through the perforations thereof while any light particles of dust carried in suspension and small enough to pass the meshes of the screen will be carried out of the tool into the suction line and deposited, and any flocculent particles, such as hair, threads, etc., will also be arrested by the screen within the chamber 17. It is obvious therefore that the general passage of the air current is axial of the chamber and the inlet and outlet pipes with only such deflection of the air current as serves to attenuate the pressure sufficiently to permit the separation of the dust or dirt. It is further to be noted that there are a succession of separations, the first being purely mechanical and caused by the concave walls of the arrester; second, a gravity separation at that point where the air current is deflected over the edge of the arrester; and third, upon the surface of the reticulated strainer. Such a tool will operate more efficiently than one wherein the entire body of the air with the dust carried thereby is deflected into a separator at one side of the part of movement of the air current.

I am aware that it is not broadly new to provide a dust chamber forming a part of the tool and interposed between the dust inlet and the dust outlet of the tool. I am also, aware that it is not new to make the walls of such operating chamber transparent but so far as I am aware no one has provided a tool of the construction and operating in

the manner above described.

In connection with the foregoing it is to be noted that by mounting the dirt arrester 22 in the location and manner described the baffle-plate 24 is positioned remote from both the inner end of the delivery pipe 11 and also from the inner end of the suction pipe 21. This, therefore, establishes a laterally-unobstructed clearance space at the inner end of the delivery pipe for the free expansion of the dust-laden air within the dirt chamber C to facilitate separation of the dust particles therefrom, and also permits free flow of the air between the baffle-plate and the suction pipe. In the latter condition the air after passing the perforated walls of the arrester, has nothing to impede its progress to the mouth of the suction pipe.

I CLAIM:

1. In a hand implement for vacuum cleaners, the combination with a dirt chamber having inlet and outlet openings in axial alignment with each other, of a delivery pipe arranged in the inlet opening of said chamber and projected into the latter a sufficient distance to provide a settling space at the base of the dirt chamber, a suction pipe connected to the outlet opening of the dirt chamber and serving as a handle for manipulating the implement, and a dust-separating device located in the dirt chamber adjacent to the outlet opening, said separating device including a concave imperforate baffle-plate positioned remote from both the inner end of the delivery pipe and from the inner end of the suction pipe, whereby to establish a laterally-unobstructed clearance space at the inner end of the delivery pipe for the free expansion of the dust-laden air within the dirt chamber, and also to permit free flow of the air between the baffle plate and the suction pipe, said separator also including perforated walls connected to the edges of said baffle-plate and surrounding the inner end of the suction pipe to strain the air as it passes from the dirt chamber to said suction pipe.

2. A hand vacuum cleaning tool, comprising an elongated dirt chamber having oppositely-disposed heads one of which is provided with an inlet opening and the other with an outlet opening in axial alignment with said inlet opening, a delivery pipe arranged in the inlet opening and projected into the dirt chamber a sufficient distance to provide a settling space at the base of the latter, a suction pipe connected to the outlet opening of the dirt chamber and in axial alignment with the delivery pipe and serving as a handle for manipulating the tool,

and a dust-separating device located within the dirt chamber and interposed between the inner end of the delivery pipe and the suction pipe, said separating device including a concave imperforate baffle-plate positioned remote from both the inner end of the delivery pipe and from the inner end of the suction pipe, whereby to establish a laterally-unobstructed clearance space between the inner end of the delivery pipe and the baffle-plate for the free expansion of the dust-laden air within the dirt chamber, and also to permit free flow of the air between the baffle plate and the suction pipe, said separating device also including perforated walls connected to the edges of said baffle-plate and surrounding the inner end of the suction pipe and strain the air as it passes from the dirt chamber to said suction pipe.

3. A hand vacuum cleaning tool, comprising an elongated dirt chamber having its ends perforated to provide axially aligned openings, a suction pipe connected to the opening in one of said ends and providing an exhaust for said dirt chamber, said suction pipe also serving as a handle for manipulating the tool, a dust-separating device rigidly held in relation to the exhaust end of the dirt chamber and including inwardly-tapering perforated walls spaced from the sides of the dirt chamber and enclosing the inner end of the suction pipe to strain the air as it passes from the dirt chamber to said suction pipe, and a concave imperforate baffle-plate connected to and surrounded by the inner ends of said perforated walls and sustained by the latter at a point remote from the inner end of said suction pipe, whereby to permit free flow of the air between the baffle-plate and the suction pipe, the baffle-plate being arranged in line with the suction pipe to prevent direct flow of the air to the suction pipe, and a delivery pipe arranged in the opening of the other end of the dirt chamber and projected into the latter a sufficient distance to provide a settling space at the base of the dirt chamber, the delivery pipe being in

axial alignment with the suction pipe and arranged to discharge into the concavity of the dust-separating device, the inner end of the delivery pipe terminating at a point remote from the dust-separating device, whereby to establish a laterally-unobstructed clearance space between the inner end of said delivery pipe and the baffle-plate of the dust separating device for the free expansion of the dust-laden air within the dirt chamber.

4. A hand vacuum cleaning tool, comprising an elongated dirt chamber having its ends perforated to provide oppositely-disposed openings, a rigid tubular handle element connected to the perforation of one of the ends of said dirt chamber and also adapted to be connected to a suction line to exhaust the air from the dirt chamber, a dust-separating device arranged within the dirt chamber and rigidly held upon that end of the latter to which the handle element is connected, said dust-separating device including perforated walls spaced from the sides of the dirt chamber and surrounding the inner end of the tubular handle element to strain the air as it passes from the dirt chamber to said handle element, and a concave imperforate baffle-plate connected to and supported by the inner ends of said perforated walls at a point remote from the inner end of said handle element, whereby to permit free flow of the air between the baffle-plate and the tubular handle element, and a delivery pipe arranged in the perforation of the other end of the dirt chamber and projected into the latter a sufficient distance to provide a settling space at the base of the dirt chamber, the inner end of said delivery pipe terminating opposite to but remote from the concavity of the baffle-plate, whereby to establish a laterally-unobstructed clearance space between the inner end of the said delivery pipe and the baffle-plate for the free expansion of the dust-laden air within the dirt chamber.

5. A hand vacuum cleaner tool, comprising a rigid tubular handle adapted for connection to a suction line, a dirt chamber supported by said handle at one of its ends with the interior of which the handle is in communication, a dust-separating device arranged at the interior of said dirt chamber and rigidly supported by the end of the dirt chamber to which the tubular handle is connected, said dust-separating device including perforated walls surrounding the inner end of the tubular handle to strain the air as it passes from the dirt chamber to said handle, and a concave imperforate baffle-plate connected to and supported by the inner ends of said perforated walls at a point remote from the inner end of said tubular handle, whereby to permit free flow of the air between the baffle plate and the handle, and a delivery pipe extending into the dirt chamber through the end thereof opposite to that to which the tubular handle is connected, said delivery pipe being in alinement with the tubular handle, the inner end of the delivery pipe being opposite to the concavity of the baffle-plate but terminating at a point remote therefrom, whereby to establish a laterally-unobstructed clearance space between the inner end of the delivery pipe and the baffle plate for the free expansion of the dust-laden air within the dirt chamber.

Fig. 1

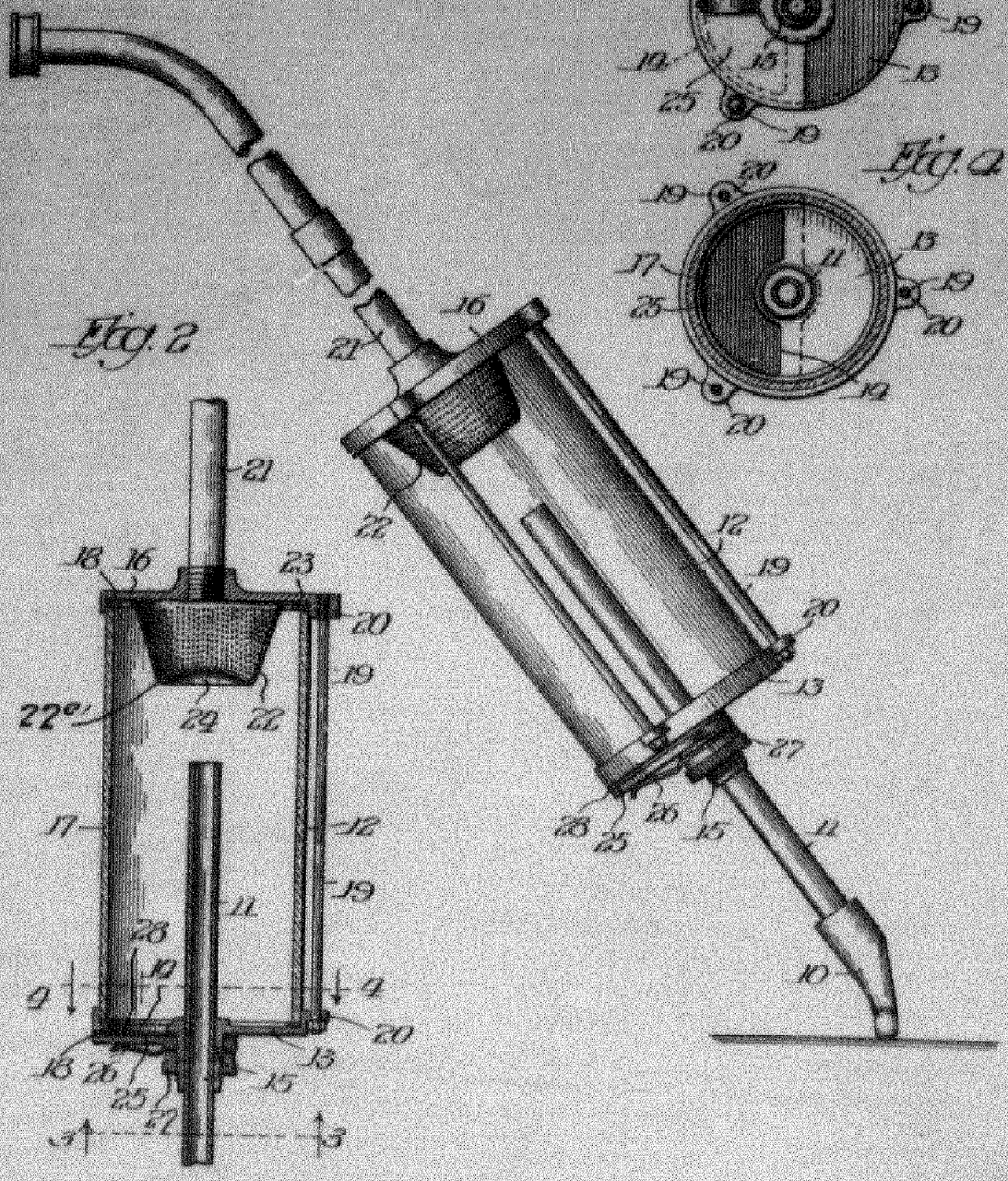


Fig. 3

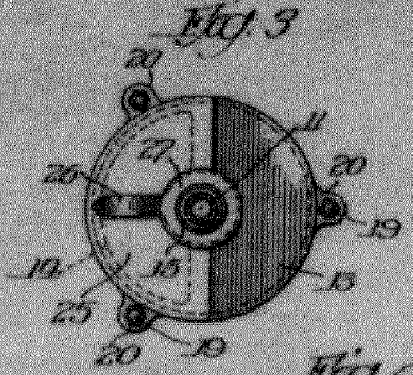


Fig. 4

Fig. 2

Certified to be the drawing referred to in the specification hereunto annexed.

Witnesses:
E. L. Harris
Ethel F. Greig

Chicago Ill Oct 9 1914

Inventor
Lester L. Robinson
By C. L. Parkinson
Atty

Dyson Ex1015
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