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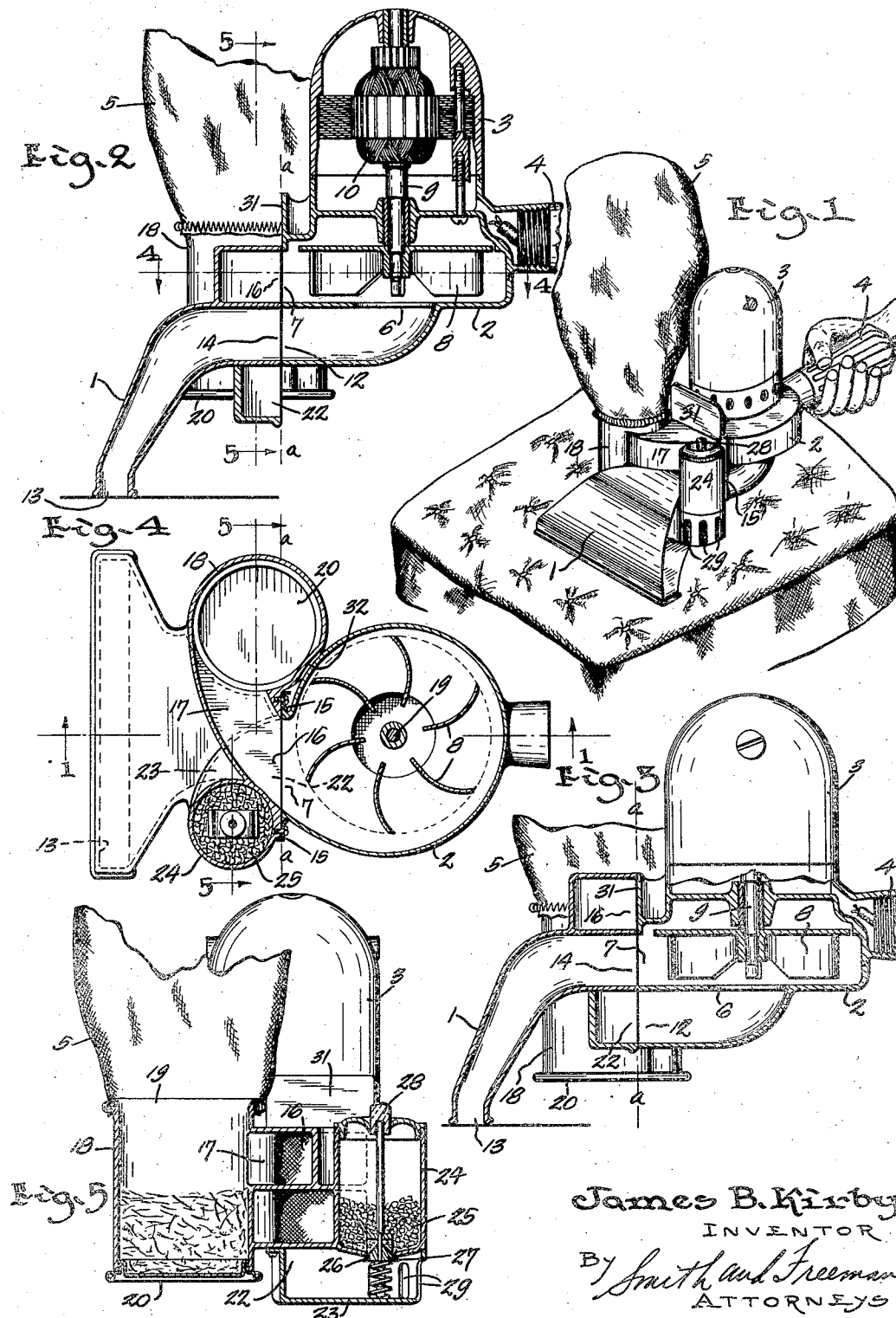
J. B. KIRBY

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PNEUMATIC CLEANER

Filed Jan. 19, 1931

2 Sheets-Sheet 1



James B. Kirby
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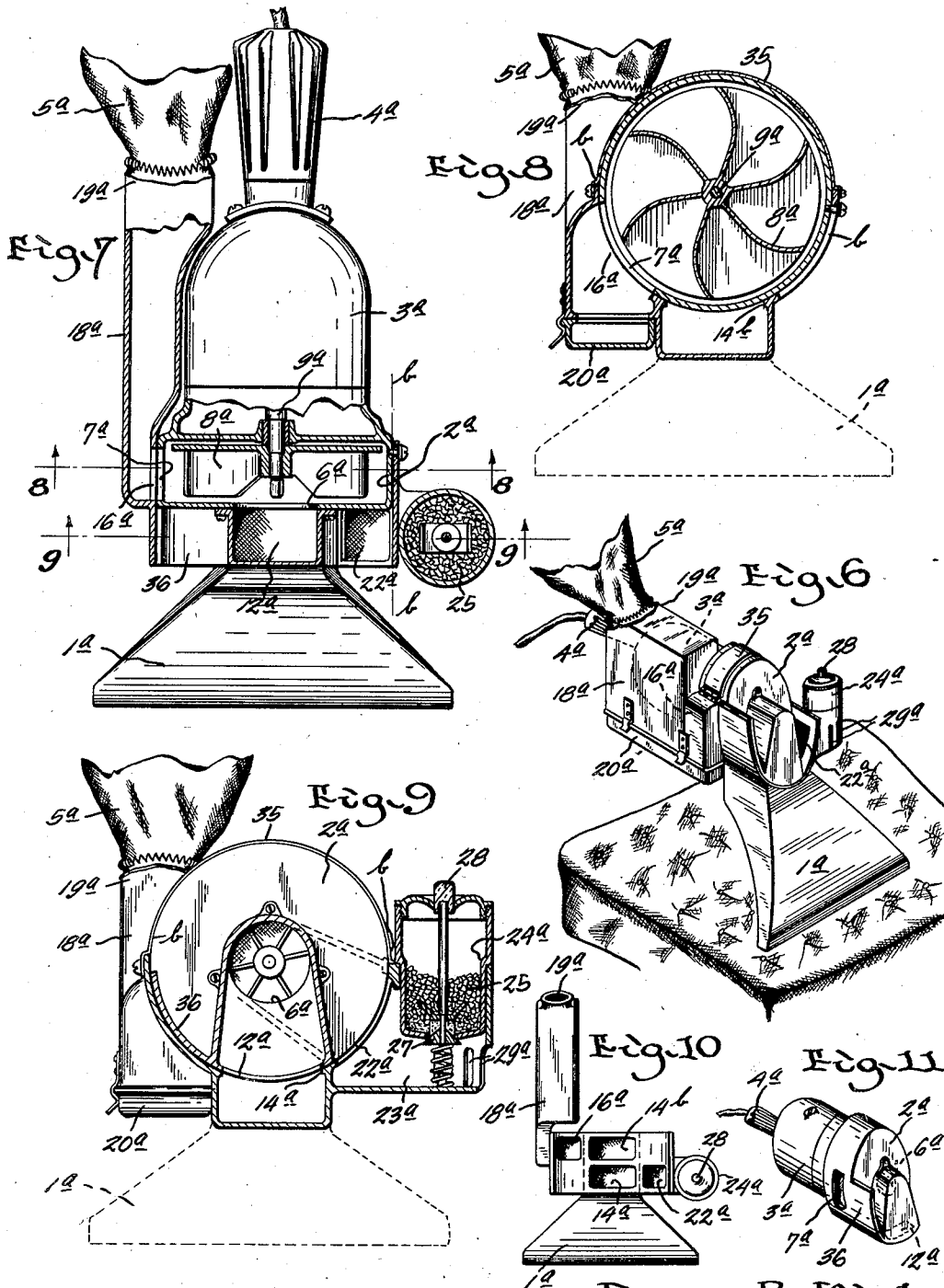
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UNITED STATES PATENT OFFICE

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PNEUMATIC CLEANER

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Application January 19, 1931, Serial No. 509,861

19 Claims. (Cl. 15—9)

This invention relates to the class of devices often known as vacuum cleaners and has for its principal object the provision of simple expedients whereby the air movement in the main nozzle can be reversed so as to blow instead of sucking, in order to dislodge lint and dust from inaccessible places such as the corners, tufts, and crevices of upholstered furniture, mattresses and the like. Another object of the invention is the provision of new and improved means for collecting and evacuating the dust and litter collected during the suction operation; the provision of simple and convenient means for impregnating the air-stream with insect-destroying substances during the blowing operation; the provision of simple and effective means for controlling the different air streams; the embodiment of the above described features in a simple and compact device; while further objects and advantages of the invention will become apparent as the description proceeds.

In the drawings accompanying and forming a part of this application I have shown my improvements as embodied in certain small-sized cleaners designed to be carried and manipulated in one hand, although it will be understood that my improvements are not limited to use with this size of machine, and that in general these drawings are intended merely to be illustrative of the principles of my invention, and not restrictive in any manner.

Fig. 1 is a perspective view of one type of cleaner comprising my improvements, showing the same in use upon an upholstered cushion; Fig. 2 is a vertical, longitudinal, sectional view showing the parts in position for the suction operation; Fig. 3 is a view similar to Fig. 2 but showing the parts arranged for the blowing operation; Fig. 4 is a horizontal sectional view corresponding to the line 4—4 of Fig. 2; Fig. 5 is a vertical sectional view corresponding to the line 5—5 of Figs. 2 and 4; Fig. 6 is a perspective view of a second type of cleaner embodying my improvements; Fig. 7 is a top-plan view of the cleaner shown in Fig. 6 with certain of the parts shown in horizontal section; Figs. 8 and 9 are vertical sectional views corresponding to the lines 8—8 and 9—9 respectively of Fig. 7; Fig. 10 is a top-plan view of the nozzle portion of the machine shown in Fig. 6, the pump and motor being removed; and Fig. 11 is a perspective view of the pump and motor element separate from the nozzle.

The type of device illustrated in Figs. 1 to 5 inclusive is known as the vertical type or "vertical

motor type" and is characterized by the location of the driving motor with its axis more or less vertical, that is, perpendicular to the plane of the inlet mouth with which the nozzle is formed, though it will be understood that in use it may assume any one of a great number of different positions, especially when the machine is used on draperies or hangings. The casing of my improved cleaner comprises a nozzle 1, fan-casing 2, motor-housing 3, operating-handle 4, and dust-bag 5. The fan-casing comprises a chamber having an inlet opening 6 and outlet opening 7, located the former opposite the face and the latter opposite the edge of a centrifugal fan 8 carried by the shaft 9 of an electric-motor-armature 10 which is located inside the motor-housing 3. According to my invention provision is made whereby the nozzle 1 may be readily connected either to the inlet 6 or to the outlet 7, certain related dispositions of other elements being preferably made at the same time to accomplish certain desired ends. One way of effecting this result is to make the casing in two parts, one movable relatively to the other. A good way to do this is to make the casing in two separate parts separated along the vertical plane *a—*a** shown in Figs. 2, 3, and 4, the nozzle and dust-bag being carried by the one part and the fan-casing and motor-housing by the other part, the handle 4 being here shown as perpendicular to the plane *a—*a** and also to the motor axis 9. The inlet-opening 6 communicates with a port 12 which opens through the wall defined by the meeting surface *a—*a** and is located directly below the fan-chamber-outlet port 7. The nozzle 1, which is preferably flared laterally and downwardly to terminate in a downwardly facing mouth 13, which is narrow and elongated with its maximum dimension arranged cross-wise of the handle 4, communicates with a port 14 which opens through the opposite wall defined by the plane *a—*a**. The two parts of the casing are slidably secured together in any suitable manner as by the metal guide rails 15—15 carried by the one part and engaging flaring lips carried by the other part.

Formed in the nozzle-part immediately above the port 14 is a port 16 from which a conduit 17 leads horizontally to one side and discharges into a vertical receptacle 18 having an unobstructed top 19 about which is fastened the lower end of the bag 5. The bottom end of the receptacle 18 is closed by a removable plate 20. When the port 14 communicates with the port 12, the port 55

16 communicates with the outlet port 7 and the device works like a common suction cleaner.

Beneath the port 14 is a port 22 which communicates with a horizontal conduit 23 which leads laterally to the side of the cleaner opposite the receptacle 18 and beneath a dispensing chamber 24 adapted to contain insecticide indicated at 25. The insecticide ordinarily employed in this device is a dry crystalline substance, several of which are known on the market, and of these camphor and naphthalene may be taken as examples. I have shown the bottom of the receptacle 24 as formed with an aperture 26 ordinarily closed by a spring-pressed valve 27 and adapted to be opened on occasion by a push-button 28. The conduit 23 is formed beyond the valve with suitable air-inlet apertures 29. When the two parts of the casing are slipped past each other to bring the port 14 into register with the port 7 as shown in Fig. 3, the port 22 comes in register with the port 12, and the direction of air movement in the nozzle 1 is reversed, the necessary air entering through the holes 29. At this time the port 16 is preferably presented to an imperforate surface 31 formed on the upper part of the machine in order to seal the dust receptacle against the chance escape of any of its contents. The friction of the rails 15 is ordinarily sufficient to hold the parts in the position desired. The range of movement may be defined in any convenient manner, as by causing the edge of the fan casing 2 to project into a recess 32 of appropriate vertical extent formed in the wall of the receptacle 18.

No support is necessary for the bag 5 since the distending effect of the air holds it erect. All dust and litter collected thereby falls into the receptacle 17 whence it is conveniently removed by displacing the plate 20.

The type of device illustrated in Figs. 6 to 11 inclusive is known as the "horizontal type". The casing comprises a collecting nozzle 1^a, fan casing 2^a, motor housing 3^a, handle 4^a, and dust-bag 5^a, but in this type of machine the motor axis is substantially parallel to the plane of the air-mouth wherewith the nozzle is formed. This casing, as before, is preferably made in two parts, one movable relatively to the other so as to enable the nozzle 1^a to be put in communication with either the suction or pressure side of the fan. The fan-casing is provided as before with an inlet opening 6^a and outlet opening or port 7^a, the former located in front of and the latter at the edge of the fan 8^a, which is connected to the motor-shaft 9^a. The inlet-opening communicates with a port 12^a. The two parts of the casing in this embodiment of the invention meet upon a surface of revolution defined by the line b—b of Figs. 7, 8, and 9. The nozzle 1^a communicates with two ports 14^a and 14^b located one in front of the other. Formed at one side of one of these ports, as 14^b, is a port 16^a which communicates with a dust receptacle 18^a located at one side of the motor-housing and formed at its upper part with an open neck 19^a for the reception of the dust-bag 5^a and at its lower part with a removable closure 20^a by which the collected litter can be evacuated. Formed at the opposite side of the other port 14^a is a port 22^a which communicates with a conduit 23^a extending beneath the insecticide receptacle 24^a and as before is formed with air inlet openings 29^a. The ports 7^a and 12^a also open through the same surface of revolution b—b, and the two parts of the casing are held together in any suitable manner as by the metal

band 35 secured to one member and embracing part of the other. When the fan casing is turned so as to cause the ports 12^a, 14^a to register, air is sucked into the nozzle and discharged into the dust receptacle by the ports 7^a, 16^a. When the members are rotated one relative to the other to cause the port 7^a to register with the port 14^b the dust receptacle is cut off, and the fan exhaust is blown through the nozzle 1^a, the fan inlet being now connected to the port 22^a, and the port 14^a being meanwhile closed by a lip 36 movable with the fan casing and provided for this purpose. A dispensing valve 27 and push button 28 are shown as before.

With this device the user can with a single operation remove dust and lint from accessible surfaces, blow dust and lint out of inaccessible crevices, and impregnate both crevices and fabric with insecticide material to any extent desired. The device can be made very light so as to be inexpensive and easily manipulated and the shift of the nozzle can be made without the necessity of stopping the operation of the motor.

It will be understood of course, that a great many changes in form, shape, arrangement, and mode of operation can be made in addition to those herein shown and I do not limit myself in any wise except as specifically recited in my several claims which I desire may be construed each independently of limitations contained in other claims.

Having thus described my invention what I claim is:

1. A manually carried and manipulated pneumatic cleaner comprising a casing having a fan chamber with an inlet and an outlet opening located in a vertical plane and a working tool communicating directly with said fan chamber and forming an adjustably fixed part of said casing, a fan in said fan chamber, an electric motor operatively connected to said fan and a handle for operating said casing and thereby presenting said tool in operative relation to the working surface, and means including a passageway having an opening in the plane of the openings of said fan chamber operative upon the adjustment of said tool for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough.

2. A manually supported and manipulated pneumatic cleaner comprising a casing having a fan chamber with an inlet and an outlet opening and a working tool communicating directly with said fan chamber and forming an adjustably fixed part of said casing, a fan in said fan chamber, an electric motor operatively connected to said fan, a dust receptacle, and a handle for operating said casing and presenting said tool in operative relation to the working surface, in combination with means including a passageway having an opening adapted to be connected to one of the openings of said fan chamber operative upon the adjustment of said tool for establishing connection between said tool and the inlet of said fan chamber and simultaneously establishing connection between said dust receptacle and the fan chamber outlet, or selectively establishing communication between said tool and the outlet of said fan chamber and connecting the inlet thereof to another source of supply, said dust receptacle being carried by said working tool at the end or the cleaner remote from said handle in a position where it will not interfere with the ordinary use of the cleaner.

3. A pneumatic cleaner comprising a casing

having a fan chamber and a working tool which communicates directly with said fan chamber, a fan in said chamber, an electric motor operatively connected to said fan, a dust receptacle, an insecticide dispenser having controllable means for discharging measured quantities of insecticide and a handle for operating the cleaner in combination with means for establishing communication between said tool and the fan chamber inlet and simultaneously connecting said dust receptacle to the fan chamber outlet or selectively establishing free and unobstructed communication between the fan chamber outlet and the atmosphere without removing said dust receptacle and supplying in a controllable manner predetermined quantities of insecticide material to the fan chamber inlet whereby the operator can direct and control the discharge of insecticide from the cleaner.

4. In a suction cleaner, a nozzle, a litter receptacle, a casing having a pump and an electric motor operatively connected to said pump, said pump having a single inlet and a single outlet located in one and the same plane; means adjustably securing said nozzle and said receptacle to said casing for connecting said nozzle either to the inlet or outlet of said pump selectively in direct communicating relation, and means operative during the connection of said nozzle to the pump inlet for connecting the pump outlet to said litter receptacle, said means including passageways formed in said nozzle and having openings adapted for selective connection with the inlet and outlet of said pump.

5. In a cleaning device, a casing having a dust separator, an insecticide dispenser effective for dispensing solid particles of an insecticide material, a pump, an electric motor connected to said pump, a handle, and a nozzle, said pump having an inlet and an outlet, and valve means for connecting said nozzle in direct communicating relation with either said inlet or said outlet selectively, said valve means serving to connect said pump outlet to the dust separator at the same time that said nozzle is connected to the pump inlet, and also to connect the pump inlet to the insecticide-dispenser at the same time that said nozzle is connected to the pump outlet.

6. Pneumatic cleaning apparatus comprising an element having a pump formed with an inlet port and an outlet port located in a vertical plane and an electric motor operatively connected to said pump, a dust bag normally connected to the outlet port of said pump, a second element adjustable with respect to said first element and comprising a cleaning tool and having a port communicating therewith, and means for connecting said elements together with said last port in direct communicating relation with either of said first two ports selectively and for connecting and disconnecting said dust bag with respect to said outlet port, said cleaning tool defining separate passageways one in communication with said dust bag and the other terminating in the port of said cleaning tool whereby the aforesaid connections with the ports of said pump are effected.

7. Pneumatic cleaning apparatus comprising a casing having a suction chamber formed with a single inlet and a single outlet located in one plane, a dust receptacle, a nozzle continuously secured to said casing and adjustable with respect thereto, means for adjusting said nozzle for establishing communication selectively between said nozzle and either inlet or outlet of said suc-

tion chamber, and means for connecting said dust receptacle to said outlet when said nozzle is connected to said inlet and for disconnecting said dust receptacle from said outlet when said tool is connected thereto, said nozzle defining separate passageways adapted for selective communication with the nozzle by way of the suction chamber of said casing when the nozzle is adjusted to different positions.

8. A pneumatic cleaner comprising a casing having a fan chamber with a single inlet opening and a single outlet opening, a rigid nozzle defining a working tool communicating with said fan chamber and adjustably secured thereto, a dust bag normally connected to the fan chamber outlet opening of said casing, a fan in said fan chamber, a vertically arranged electric motor operatively connected to said fan and rigidly secured to said casing, and means for relatively shifting said casing and tool in a plane parallel to the axis of said motor for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, said dust bag being disconnected from said fan chamber by said means when said tool is connected to said fan chamber outlet.

9. A pneumatic cleaner comprising a casing having a fan chamber with inlet and outlet openings, a working tool communicating with said fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, means for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, an insecticide dispenser, means effective for discharging solid particles of an insecticide material from said dispenser in a controllable manner, and means for connecting said dispenser in operative relation with the inlet of said fan chamber while at the same time connecting the outlet of said fan chamber with said tool.

10. A pneumatic cleaner comprising a casing having a fan chamber with inlet and outlet openings, a working tool communicating with said fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, means for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, and means effective for supplying particles of an insecticide material to said tool in a controllable manner when in the blowing position.

11. A pneumatic cleaner comprising a casing having a fan chamber with inlet and outlet openings, a working tool communicating with said fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, means for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, and controllable means effective for supplying particles of an insecticide material by way of said fan chamber to said tool when in the blowing position.

12. A pneumatic cleaner comprising a casing having a fan chamber with inlet and outlet openings, a working tool communicating with said fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, means for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, and a valved container for supplying particles of an insecticide material to said tool when in the blowing position.

13. A manually supported and manipulated pneumatic cleaner comprising a casing having a

fan chamber with a single inlet opening and a single outlet opening, a rigid nozzle defining a working tool communicating with said fan chamber and adjustably secured thereto, a dust bag normally connected to the fan chamber outlet opening, a fan in said fan chamber, an electric motor operatively connected to said fan, a handle for operating said casing and thereby presenting said tool in operative relation to the working surface, said tool, motor and handle being arranged one behind the other with said dust bag occupying a position intermediate said tool and handle where it is not apt to interfere with the manipulation of the cleaner, and means operative by a movement of said handle with respect to said tool for shifting and connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, said dust bag being disconnected from said fan chamber by said means when said tool is connected to said fan chamber outlet.

14. A pneumatic cleaner comprising a casing having a fan chamber with inlet and outlet openings, a working tool communicating with said fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, means for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, and manually operable means carried by said cleaner for supplying in a controllable manner an insecticide to said tool when in the blowing position.

15. A pneumatic cleaner comprising a casing having a fan chamber with inlet and outlet openings, a working tool communicating with said fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, means for connecting said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough, means including an insecticide container carried by said cleaner, and means associated therewith for controlling the supplying of a solid insecticide to said tool when in the blowing position.

16. A pneumatic cleaner comprising a casing having a fan chamber with adjacent inlet and outlet openings located in one and the same plane, a working tool communicating with said fan chamber by way of an opening located in the plane of the openings of the fan chamber, a fan in said fan chamber, an electric motor operatively connected to said fan, and means for connecting the opening of said tool selectively either to the outlet or the inlet of said fan chamber so as either to blow or suck therethrough.

17. Pneumatic cleaning apparatus of the port-

able type comprising a casing having a suction chamber formed with an inlet opening and an adjacent outlet opening one above the other and facing forwardly of the casing, a dust receptacle, a rigid hollow working tool continuously and adjustably secured to said casing and having a rearwardly presented opening adapted for registry with one or the other of the openings of the suction chamber, means for shifting said tool for establishing direct communication selectively between the opening of said tool and either of the two openings of said suction chamber, and means including a separate passageway formed in said working tool and terminating at one end in a rearwardly presented opening adjacent to the rearwardly presented opening of the working tool for connecting said dust receptacle to said outlet when said nozzle is connected to said inlet, the adjacent openings of said passageway and working tool being located one above the other.

18. A small portable manually carried and manipulated pneumatic cleaner comprising a casing having a nozzle with a downwardly presented working mouth, a dust trap, and a fan chamber having an inlet communicating with said nozzle and an outlet communicating with said dust trap, a fan in said fan chamber, a motor for driving said fan, a handle for said cleaner, a substantially upright dust filter connected to the upper end of the dust trap of said casing in position to discharge its contents into said trap, and a removable cover for the bottom of said dust trap for emptying the contents thereof, said filter and trap being carried from a point between said nozzle and fan chamber and in front of said handle so as not to interfere with the ordinary use of the cleaner.

19. A small portable manually carried and manipulated pneumatic cleaner comprising a casing having a nozzle with a downwardly presented working mouth, a dust trap, and a fan chamber having an inlet communicating with said nozzle and an outlet communicating with said dust trap, a fan in said fan chamber, a motor for driving said fan, a handle for said cleaner, a substantially upright dust filter connected to the upper end of the dust trap of said casing in position to discharge its contents into said trap, and a removable cover for the bottom of said dust trap for emptying the contents thereof, the dust trap being located between the nozzle and the fan chamber of said casing so as to support said bag in a position where it does not interfere with the ordinary use of the cleaner.

JAMES B. KIRBY.

CERTIFICATE OF CORRECTION.

Patent No. 2,053,563.

September 8, 1936.

JAMES B. KIRBY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 72, claim 2, for "or" read of; page 3, first column, line 7, claim 3, after "cleaner" insert a comma; page 4, first column, lines 40 and 41, claim 15, strike out "means including"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of December A. D. 1936.

Henry Van Arsdale

Acting Commissioner of Patents,

(Seal)