Dec. 11, 1934. D. B. REPLOGLE 1,983,566

AIR METHOD CLEANER

Filed Feb. 11, 1932 2 Sheets-Sheet 1

Fig. 1.

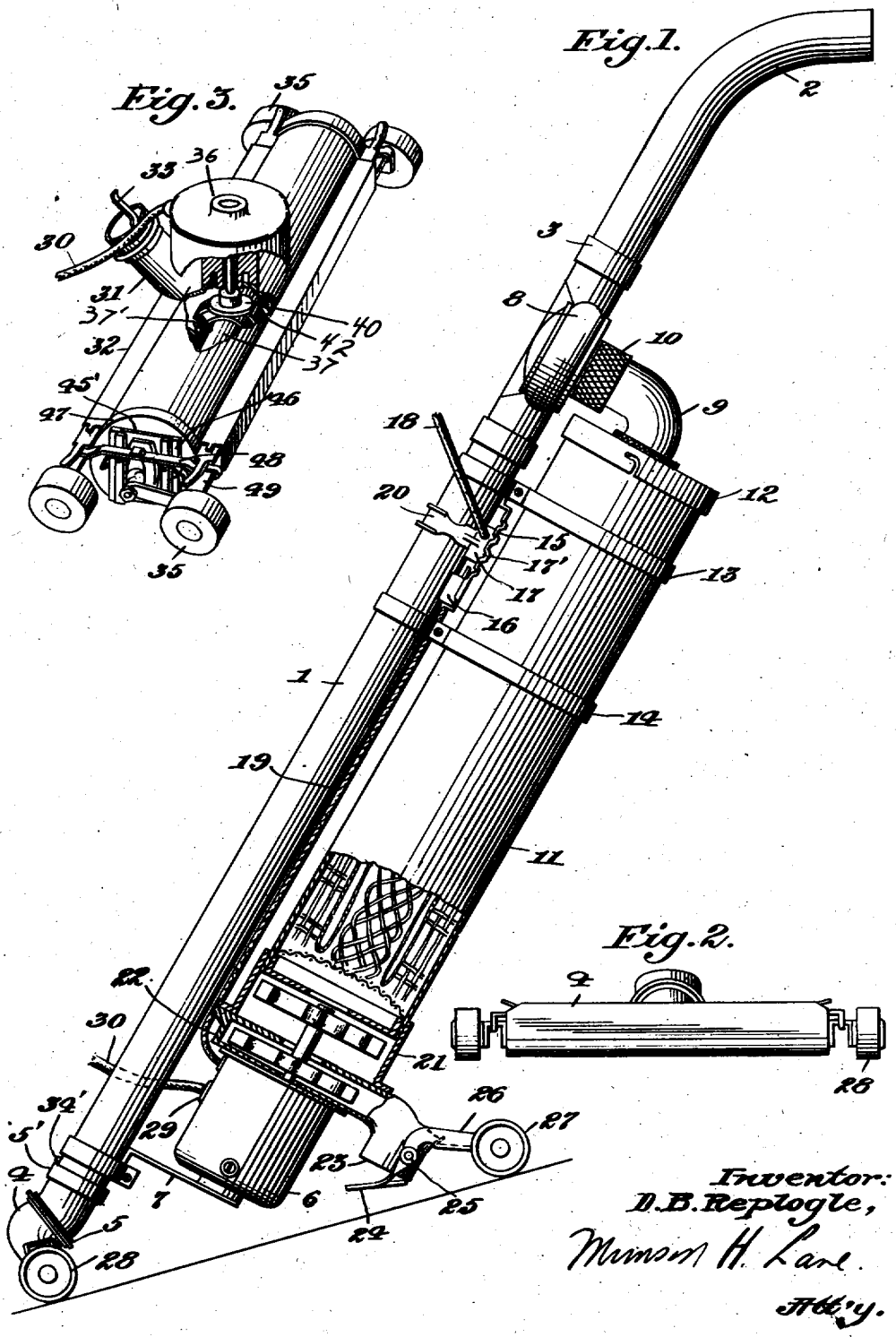



Fig. 3.




Fig. 2.




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Fig. 4.

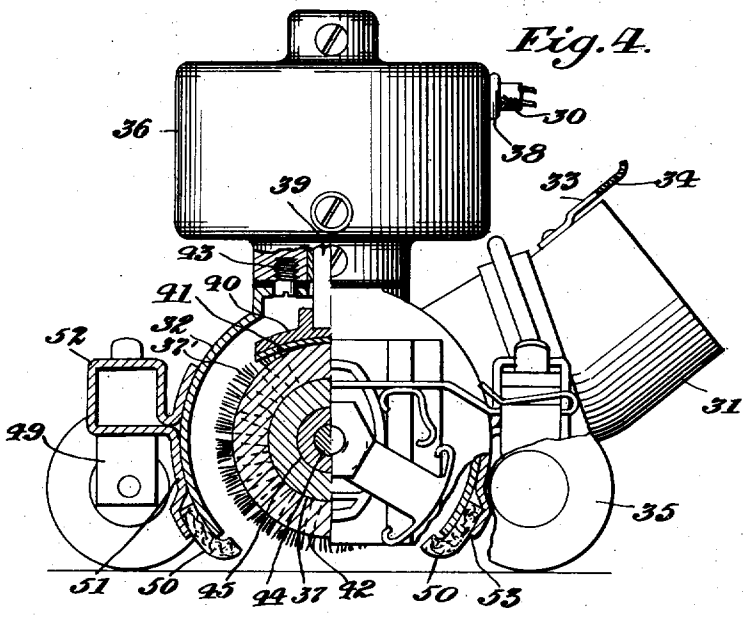



Fig. 5.

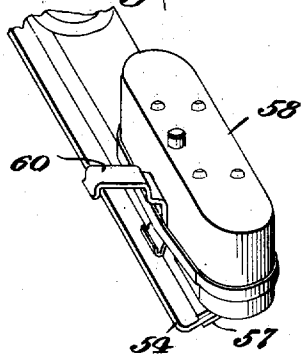
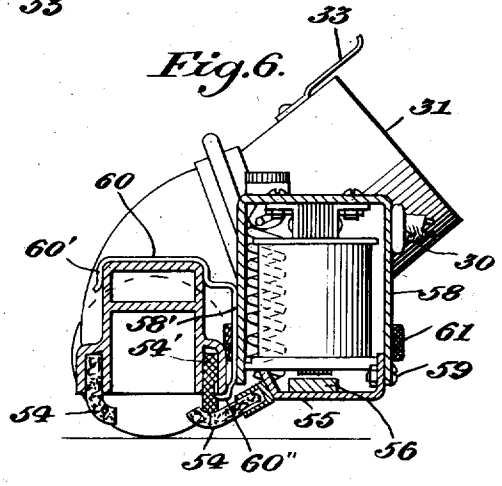



Fig. 6.




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Patented Dec. 11, 1934 1,983,566

# UNITED STATES PATENT OFFICE

1,983,566

## AIR-METHOD CLEANER

Daniel Benson Replogle, Berkeley, Calif., assignor to Citizens Trust Company of Toledo, Ohio, a corporation of Ohio, as trustee

28 Claims. (Cl. 15—8)

My invention relates to electrically operated cleaners of the type known commercially under the registered trade-mark "Air-Way", and more particularly to the motor connections, the location of the conductor which supplies energy to the motor and the connector or switch which completes or breaks the said circuit.

My invention also relates to the construction of the switch and its relation to the other parts of the cleaner.

My invention also relates to supplementary connections associated with the motor and motor supply circuit.

When a suction cleaner is being used, the wall or other opening from which the electric cord or cable extends is at one side of the cleaner unless there is a take-up reel for the cord; otherwise, the cord becomes entangled. The end of the cord is commonly attached to the cleaner with its axis extending in the direction of the length of the handle. This causes a bend in the cord near the cleaner when the latter is in use, and the back and forth movements of the cleaner result in a constant succession of flexing and torsional strains on the cord.

Also, an "Air-Way" cleaner of the type herein illustrated, being light and portable, is adapted to be picked up bodily or pushed around among pieces of house furniture and among boxes and barrels in stores. When the switch is located in an unprotected place on the cleaner, it is likely to be damaged, and, in turn, it may injure costly furniture. Also, if the switch operating handle projects upward or laterally from the handle of the cleaner, it is liable to strike obstructions. If below the handle, it is inconvenient for operation.

Again, the motor for driving the suction or blowing device is located at the forward end of and beneath the handle. For convenience of operation, the switch must be near the rear end. If the switch is placed on top of the handle, the intervening cord must wind halfway around the handle, where it is likely to be pinched or rubbed against objects in the room, or caught by projections and sharp corners, upsetting furniture or receiving violent jerks.

Finally, it is often necessary to operate other devices besides the fan. Such devices may take the form of brushes or agitating devices for loosening dirt from the floor or floor covering. If the fan operating motor is used to operate these devices, the additional load slows down the motor below its most effective speed.

My invention embraces novel features and combinations whereby all the above objections are avoided. It comprises severally and in various combinations a new and useful form of switch or circuit controller mounted upon and located below the handle, between it and the dust collector; an operating member for the switch, such member embracing the handle and accessible from the upper side thereof; a side outlet for said switch, a spring catch under the handle for the movable element of the switch serving as a guard or protection therefor; a connecting cord on the under side of the handle between the switch and motor; and a motor having an auxiliary outlet or connection for conductors leading to an independent motor or other current-consuming device connected in parallel with the fan motor. The auxiliary outlet may also be used to supply the motor with current from an independent source.

My arrangement, as well as the fibrous material of which the suction handle is made, completely protects the operator against stray currents. The conductors and other electrical parts, being beneath the handle, are not likely to be injured, but even if broken the exposed conductors cannot come into contact with the person of the operator, and leakage cannot take place along the fibre handle to the operator's hands. The dust bag and its casing are also commonly made of insulating material, providing a further safeguard against leakage.

The subject matter of the present application contains matter in common with my prior applications Serial No. 251,641, filed February 3, 1928, now Patent No. 1,887,600, November 15, 1932; Serial No. 283,585, filed June 7, 1928; Serial No. 297,969, filed August 7, 1928, now Patent No. 1,912,386, June 6, 1933; and Serial No. 551,023, filed July 15, 1931, now Patent No. 1,887,601, November 15, 1932.

In the accompanying drawings:

Figure 1 is a view in side elevation of my assembled cleaner in working position for sweeping a floor;

Figure 2 is a front view of a suitable "Air-Way" floor cleaning tool usable with the device;

Figure 3 is a perspective view, partly broken away, of a floor tool with a brush attachment for loosening dirt from the carpet and an auxiliary motor for driving the brush, said assembly being adapted to take the place of the floor tool shown in Figures 1 and 2 and the auxiliary motor to be energized by current from the fan motor supply.

Figure 4 is a side elevation of the same, partly in section;

Fig. 5 is a perspective view partly broken away

showing a unit consisting of a beater and electrically operated means for driving the beater, which unit is adapted to be detachably secured to a tool of the type disclosed in Figs. 1 and 2, and the driving means energized by current from the fan motor supply, and

Fig. 6 is a transverse section showing the beater attachment secured to the floor tool.

The same characters designate the same parts throughout the specification and drawings.

I will first describe the form shown in Figures 1 and 2.

The straight section 1 of the tubular handle is intermediately jointed to the curved section 2 thereof by slip joint 3. The floor tool 4 is arranged to turn on the swivel joint 5 so as to conform with the floor regardless of variations in the angle of the handle which is rigidly secured to the machine as a whole. The swivel joint is carried by a short section of tubing connected to tube 1 by a slip joint 5'.

The motor 6 is rigidly attached with its axis parallel to the handle by means of the brace 7, and the valve housing 8 which is aligned with the handle has the nipple piece connecting it with the L 9 by means of the knurled coupling screw 10. The other end of the L 9 connects with the body 11 by means of the cap 12.

Bands 13, 14 are used to further secure the body 11 to the handle 1, and they also support the ends of a bridge or truss 15 of flexible material carrying the terminals 16 and 17 of the electric conduction cords 19 and 18, respectively. The terminal 16 is rigidly held fast while the terminal 17 is arranged to be slid into and out of electric contact by means of the sliding ring 20, which encircles the handle. Projections 17' on the terminal 17 cooperate with notches in the bridge 15 to hold the terminal in its adjusted positions. The cylindrical extension 21 of the fan case 22 has fitted to it the lower end of the body 11.

The exhaust port 23 of the fan case is equivalent in design to the end of the handle tube 2, so that a hose pipe suitable for suction on the end of the handle may be attached to the exhaust 23 and used as a blower. Ordinarily, however, a deflector plate 24 stiffly hinged at 25 is arranged to throw exhaust air against the motor 6 for the purpose of cooling the same when in service.

A bracket 26, carrying a roller 27 similar to the rollers 28 of the floor tool, is also secured at the hinge 25 and serves to support the device as a whole in the working position. The bracket 26 and the deflector plate 24 may be formed integral or separately, as desired.

The device in operation is designed to be drawn back and forth over the floor with the rear rollers elevated ordinarily above the floor for general sweeping, but may be tilted over the edges of rugs and the like by dropping the handle straight down so as to fulcrum on the rear rollers when they reach the floor. For running under furniture, the handle and body are swung over sidewise, swivelling at the joint 5.

The floor tool being removable, the lower end of the pipe or handle 1 may be provided with any approved modern tools such as may be used for stationary cleaning systems, including such as may have independently electrically driven parts. An outlet 29 on the motor 6 is provided so as to connect electrically by means of a conductor 30 from any independent source, or to furnish extension of the current brought through the conduction cords 18, 19.

In addition to the operative connection made with the cleaning tools at the lower end of the handle, the outer end of the curved handle tube is adapted to connect with an extension hose pipe or any suitable cleaning tool.

Figures 3 and 4 show a floor tool with a brush and auxiliary motor for driving the brush. This assembly may be substituted for the floor tool shown in Figure 2 by uncoupling the slip joint 5' and coupling the stub handle 31 of the floor tool 32 to handle 1 by means of the spring connection 33, having an opening 34 to receive a projection 34' on the handle.

The floor tool may be mounted upon a plurality of rollers 35.

One of the important features of this device consists in providing a motor 36 separate from and independent of the suction producing motor 6. Suitable driving connections from the motor 36 operate a revolving brush member 37 having bristles 37'.

As shown, the motor 36 is mounted substantially over the center of the cleaner, so that the machine is balanced. A short connection between the motor and the tool is desirable in order that the motor will not interfere with the operation of the device when it is used to clean underneath some low object, as, for example, a bureau.

A socket 38 on the motor 36, permits a detachable connection between the two motors 6 and 36 by means of a cord 30. The particular form of connectors for attaching the ends of the cord to the motors is immaterial.

The same source of current may be used for both motors. With this arrangement, when the floor tool is to be removed from the suction handle the electrical connection between the two motors 6 and 36 is broken by merely removing one of the plugs attached to the cord 30 from its socket, so that there is no interference with the complete separation of the floor tool from the suction handle.

The shaft 39 of the motor extends through the housing of the floor tool 32 and carries at its lower end a member 40, the inner concave surface of which carries a concave friction lining 41, preferably of leather, which is tightly secured to the member 40 as by gluing. The shape of the inner surface of the member 39 is preferably a segment of a sphere.

The friction surface 41 of the rotating member 40 is adapted to coact with a ring shaped member 42, the outer surface of which is preferably in the form of a segment of a sphere, so as to smoothly engage the concave spherical surface 41. The ring member 42 is mounted upon the outside of the hollow brush 37 so that rotation of the ring will also rotate the brush.

It will be obvious that when the ring member 42 is directly under the center of the friction member 41, there will be no contact, and, consequently, no rotation of the ring member 42 and the brush carried thereby, even when the motor is in operation. When, however, the ring is at one side of the center, the ring 42 will contact with the surface 41, and will be rotated thereby, and its direction will depend on which side of the center the contact is made.

The motor is secured to the housing by means of screws, one of which is shown at 43 in Figure 4.

The rotatable brush 37 is provided with non-rotatable shaft 44, between which and the inner surface of the hollow brush, bearings 45 of im-

pregnated wood or other suitable material are provided.

The brush is detachably mounted within the housing of the floor tool 32, the ends of the shaft 44 of the brush being supported by removable plates 45' which fit in guides 46 carried by caps 47 on the ends of the housing. The plates are resiliently supported by spring yokes 48 carried by supporting arms 49 upon which are mounted the rollers 35. In this manner the cleaner tool is supported in such manner that the brush 37 and the lips or strokers 50 carried by the housing of the tool 32 are slightly above the surface of the floor when the tool is not in operation, but when pressure is exerted on the tool handle the roller supports and spring yokes 48 yield sufficiently to permit the strokers 50 and brush 37 to lightly engage the floor.

The roller supports may be of a type such as is set forth in my Patent No. 1,541,280.

Extensions 51 of the sheet hollow metal socket members 52 form with the tool housing, pockets 53 in which are carried the floor engaging strokers or lips 50.

Figures 5 and 6 show a floor tool similar to that shown in Figure 2, and an attachment therefor. The tool is provided with channels to hold strokers as 54 but when the present improvement is to be used, one of the strokers 54 is to be removed and mounted on the vibrator arm 55 carrying the armatures 56 and the channel socket 57, in the latter of which one of the strokers 54 is held securely and vibrated so that its lower lip portion shall buzz and beat the carpet which is sucked up against it by the in-rushing air. A rubber substitute strip 54' is placed in the channel of the floor tool from which the stroker has been removed and its lower edge is arranged to impinge on the upper side of the tilted stroker 54, making a seal against leakage, but being sufficiently resilient to permit sufficient small vertical vibrations of the stroker 54.

The vibrations are produced by the electromagnetic buzzers in the encasements 58, 58 at either end of the tool, carrying the common plate or vibrator arm 55, screwed to the encasement walls at 59, 59, etc. Either type, the current breaker or the alternating current type buzzer can be used, but the one here shown is an alternating current type buzzer. The arm 55 not only vibrates, but extends through under the pipe 3 the whole length of the device, so that clamps 60, which are welded to the sides of the encasements 58 at 58' will hold the entire device firmly in position when the hooks 60' are caught over the body of the tool and hooks 60'' of the clamps are caught under the edge of the tool channel, as shown. A rubber guard 61 surrounds the base of encasement 58.

The vibration of the arm 55 of the device is effected by current from the cord 30 which comes from the motor outlet 29.

The cleaner with the attachment in place is to be used by moving back and forth over the carpeted floor. As the in-rushing air lifts the carpet against the stroker, the buzzing or rapid vibrations of the movable lip or stroker 54 imparts its vibrations to the lifted carpet dislodging imbedded particles of dust which plain air currents will not effect. When the tool is pressed down upon the floor between the spring support rollers, the movable lip or stroker 54 will, of course, beat upon the flat lying carpet upon the floor.

Having thus described the invention and the operation in the present embodiment thereof, I do not wish to be confined to the details as shown, since many of them may be greatly modified without departing from the spirit of the invention.

What I claim is:

1. The combination of an elongated support with a circuit controller comprising a movable element slidably mounted on said support and wholly outside of the support, and an operating member for said movable element, said operating member comprising a band embracing and movable on said elongated support.

2. The combination with a cleaner having a handle, of a circuit controller having a conductor connection mounted on the under side of the said handle and wholly outside of the handle, and an operating member for said circuit controller, said operating member comprising a band embracing and movable on the handle and accessible for operating purposes from the upper side of the handle.

3. The combination of an elongated support with a circuit controller slidably mounted on said support and wholly outside of the support, and an operating member for said circuit controller comprising portions movable on said support and extending from said circuit controller around said support in both directions at least far enough to be hold firmly on said support.

4. A circuit controller comprising a slidable element and a member for moving said element comprising a band operatively connected thereto and enclosing a space whereby it is adapted to surround and move upon the support which carries the circuit closer, said slidable element being located wholly outside of the support.

5. A circuit controller comprising a slidable element and a member for moving said element comprising portions operatively connected to said element and extending therefrom in opposite directions, the opposite portions then bending so as to extend in the same direction, and finally bending toward each other, whereby the said member may be movably mounted upon a support which carries the circuit controller, said slidable element being located wholly outside of the support.

6. A circuit closer comprising a movable member having a conductor connection, a latch member adapted to adjustably retain said movable member, one of said members having a depression and the other having a cooperating projection, said depression and projection being relatively movable into and out of engagement with each other and means for operating said movable member comprising portions operatively connected thereto, said portions extending in opposite directions from said movable member and bending outwardly out of the limits of said member on the side opposite the latch member, and finally bending inward at least far enough to hold said operating means against withdrawal laterally from an object fitting within the opening formed thereby.

7. A circuit closer comprising a movable member and a spring member, a conductor connection carried by the movable member and a cooperating conductor connection carried by the spring member, one of said members having a depression and the other having a cooperating projection, said depression and projection being movable into and out of engagement with each other for engaging and disengaging said conductor connections according to the position of

said movable member, said spring being in the form of a bridge, the span of which is of spring material and the ends of which project from the span so that the bridge encloses the movable member on three sides when the parts are assembled.

8. An air-method cleaner having a handle, in combination with a circuit controller comprising a movable member mounted on the under side of said handle, and a combined guard and latch for said circuit controller, said latch comprising a spring plate mounted on said handle and extending under the circuit controller, said circuit controller and spring plate having conductor connections adapted to coact with each other in one position of the movable member.

9. An air-method cleaner having a handle, in combination with a circuit controller member mounted on the under side of said handle, an operating member for said circuit controller comprising a band embracing and movable on said handle, and a combined guard and latch for said circuit controller comprising a spring plate mounted on the lower side of the handle and extending under the circuit controller, said controller member and said latch having cooperating conductor connections adapted to coact with each other in one position of the movable member.

10. A cleaner comprising a tool, means for creating a current of air through said tool, an electric motor for driving said means, said motor having a conductor connection for current supply and an additional conductor connection for an independent current consuming device, an independent current consuming device cooperating with the tool and having means for detachable connection to the exterior of the tool, and a conductor for detachable connection to said additional conductor connection.

11. A cleaner comprising a tool, means for creating a current of air through said tool, an electric motor for driving said means, said motor having a conductor connection for current supply and an additional conductor connection for an independent current consuming device, said connections being in parallel, an independent current consuming device detachably connected to and cooperating with said tool and having a conductor cord detachably connected to said additional conductor connection.

12. In an air-method cleaner, the combination with electrically driven suction producing means, a dust carrying pipe handle and a dust collecting tool, of a cylindrical dust collecting body spaced from and parallel with said pipe handle, and an electrical conduction cord for said suction producing means, with connecting terminals secured in the space between the pipe handle and said body.

13. In an air-method cleaner including a dust carrying pipe handle, a cylindrical dust collecting body slightly spaced from and parallel to the pipe handle and operatively connected thereto, electrically driven means for producing suction within said suction handle and dust collector; the improvement which comprises a terminal carrying attachment extending into the space between the pipe handle and said body, electrical terminals carried by said attachment housed within the space between said pipe handle and said body, and connected to the electrical conduction cords for supplying current to said electrically driven suction producing means.

14. In a suction cleaner, the combination with electrically driven suction producing means, a dust carrying pipe handle, a dust collecting tool and a dust collecting body spaced from said handle; of an electrical conduction cord for said suction producing means, having terminals secured in the space between the pipe handle and said body.

15. An air-method cleaner having an unobstructed hollow handle, in combination with a motor mounted below said handle at its forward end, a circuit controller mounted below said handle rearward of said motor and wholly outside of said handle, a conductor between said motor and circuit controller below said handle, and an operating member for said circuit controller having a portion thereof extending over the upper side of the handle.

16. The combination of an elongated support with a circuit controller comprising a movable element mounted wholly outside of said support and having a conductor connection, and an operating member for said movable element, said operating member comprising a band embracing and movable on said elongated support.

17. The combination with a suction cleaner having a motor and an inlet mouth, of a motor circuit including a source of current, and connections leading to the motor, other connections to said circuit for open or closed relation thereto, said last-named connections being independent of said first-named connections and also leading to said motor, whereby the motor is unaffected by current consuming devices supplied through the second-named connections, an independent current consuming device detachably connected to and cooperating with the cleaner, and having a conductor detachably connected to one of the motor connections.

18. The combination with a cleaner having an unobstructed hollow suction handle, of a circuit controller having a conductor connection mounted on the under side of the said handle and wholly outside of the same, and an operating member for said circuit controller, said operating member comprising a band embracing and movable on the handle, and accessible for operating purposes from the upper side of the handle.

19. A cleaner having a handle, a dust collector body carried by said handle on the under side thereof, a circuit controller also mounted on the under side of said handle and wholly outside of the handle, and an operating member for said circuit controller comprising a band embracing and movable on said handle, and accessible for operating purposes from the upper side of the handle.

20. A cleaner as defined in claim 19, wherein the circuit controller is provided with a lateral connection extending at right angles to a plane defined by the common axis of the handle and the center of the dust collector.

21. In combination with a suction cleaner having a suction nozzle, means for creating a current of air through said nozzle, an electric motor for driving said means, an auxiliary unit, including an independent current consuming device, detachably secured to the exterior of said nozzle and cooperating with the nozzle, and a detachable electric conductor cord connecting said motor and said independent current consuming device.

22. A cleaner comprising a floor tool, means for creating a current of air through said tool, and an electric motor for driving said means, said motor having a conductor connection for current supply, and an additional conductor connection for an independent current consuming

device, in combination with an independent current consuming device cooperating with the tool and having means for detachably connecting the same to the floor tool, and a conductor cord adapted to be plugged into said additional conductor connection.

23. A suction cleaner having a suction handle, a floor tool detachably connected to said suction handle, a fan for producing suction within said handle, an electric motor for operating said fan, both the motor and fan being carried by said suction handle, a rotary brush carried by said floor tool, a motor separate from said fan motor, carried by said floor tool and operatively connected to said brush for rotating the same, a source of electrical current for operating the fan motor, and a detachable electrical connection between the fan motor and the brush motor, whereby when the floor tool is removed from the suction handle the electrical connection between the motors may be detached.

24. In an electrically operated suction cleaner provided with a rotary brush, means, including an electric motor, for producing suction, a second motor for rotating the brush, a single source of electrical energy for operating both motors and a detachable electric connector between the first motor and the brush motor.

25. In a suction cleaner having a suction handle, a floor tool detachably connected to the suction handle, a fan for producing suction within said handle, an electric motor for operating said fan, both the motor and the fan being carried by said suction handle; an independent current consuming device carried by and cooperating with said floor tool, a source of electric current for operating the fan motor, and a detachable connection between the fan motor and said independent current consuming device whereby when the floor tool is removed from the suction handle the electrical connection may be detached.

26. The combination with a suction cleaner having an electric motor for producing suction and an inlet mouth; of an agitating device mounted in operative relation to said mouth, electrically actuated operating means mechanically independent of the motor, operatively associated with and adapted to drive said device, a single source of electric current for energizing the motor and operating means, and a detachable electric connection between said means and said motor.

27. The combination with a suction cleaner having a suction nozzle and means, including an electric motor, for producing suction within said nozzle; of an independent electric current consuming unit cooperating with the nozzle and having means for detachably securing the same to the exterior of the nozzle, and a detachable conductor cord electrically connecting the current consuming device to the electric motor.

28. The combination with a pneumatic cleaner having a suction nozzle and means, including an electric motor, for producing suction within the nozzle, of an independent current consuming device carried by and cooperating with the suction nozzle in the cleaning operation, and a detachable conductor cord electrically connecting the current consuming device to the electric motor.

DANIEL BENSON REPLOGLE.

## CERTIFICATE OF CORRECTION.

Patent No. 1,983,566. December 11, 1934.

DANIEL BENSON REPLOGLE.

It is hereby certified that error appears in the heading to the printed specification of the above numbered patent requiring correction as follows: After line 5, insert the date of filing and serial number, Application February 11, 1932, Serial No. 592,392; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 12th day of February, A. D. 1935.

Leslie Frazer

(Seal) Acting Commissioner of Patents.

device, in combination with an independent current consuming device cooperating with the tool and having means for detachably connecting the same to the floor tool, and a conductor cord adapted to be plugged into said additional conductor connection.

23. A suction cleaner having a suction handle, a floor tool detachably connected to said suction handle, a fan for producing suction within said handle, an electric motor for operating said fan, both the motor and fan being carried by said suction handle, a rotary brush carried by said floor tool, a motor separate from said fan motor, carried by said floor tool and operatively connected to said brush for rotating the same, a source of electrical current for operating the fan motor, and a detachable electrical connection between the fan motor and the brush motor, whereby when the floor tool is removed from the suction handle the electrical connection between the motors may be detached.

24. In an electrically operated suction cleaner provided with a rotary brush, means, including an electric motor, for producing suction, a second motor for rotating the brush, a single source of electrical energy for operating both motors and a detachable electric connector between the first motor and the brush motor.

25. In a suction cleaner having a suction handle, a floor tool detachably connected to the suction handle, a fan for producing suction within said handle, an electric motor for operating said fan, both the motor and the fan being carried by said suction handle; an independent current consuming device carried by and cooperating with said floor tool, a source of electric current for operating the fan motor, and a detachable connection between the fan motor and said independent current consuming device whereby when the floor tool is removed from the suction handle the electrical connection may be detached.

26. The combination with a suction cleaner having an electric motor for producing suction and an inlet mouth; of an agitating device mounted in operative relation to said mouth, electrically actuated operating means mechanically independent of the motor, operatively associated with and adapted to drive said device, a single source of electric current for energizing the motor and operating means, and a detachable electric connection between said means and said motor.

27. The combination with a suction cleaner having a suction nozzle and means, including an electric motor, for producing suction within said nozzle; of an independent electric current consuming unit cooperating with the nozzle and having means for detachably securing the same to the exterior of the nozzle, and a detachable conductor cord electrically connecting the current consuming device to the electric motor.

28. The combination with a pneumatic cleaner having a suction nozzle and means, including an electric motor, for producing suction within the nozzle, of an independent current consuming device carried by and cooperating with the suction nozzle in the cleaning operation, and a detachable conductor cord electrically connecting the current consuming device to the electric motor.

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