M. H. SPIELMAN.

VACUUM CLEANER SWITCH OPERATING MECHANISM.

APPLICATION FILED SEPT. 8, 1919.

1,380,163. Patented May 31, 1921.

2 SHEETS—SHEET 1.

Fig. 1

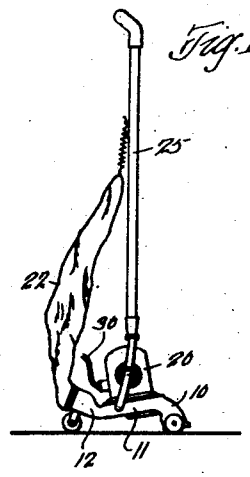


Fig. 2

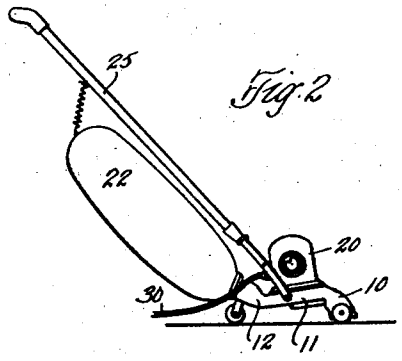


Fig. 9

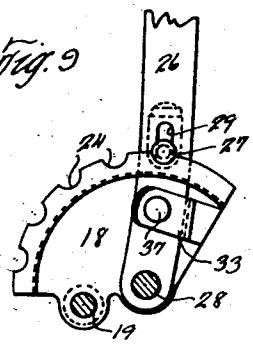


Fig. 10

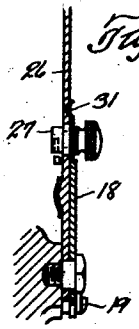


Fig. 11

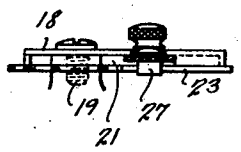


Fig. 8

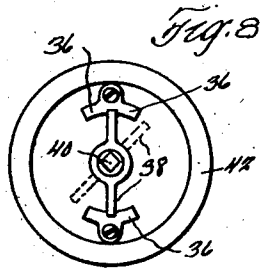
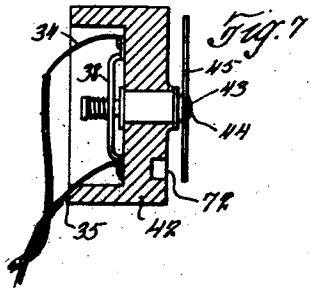


Fig. 7



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2 SHEETS—SHEET 2.

Fig. 3

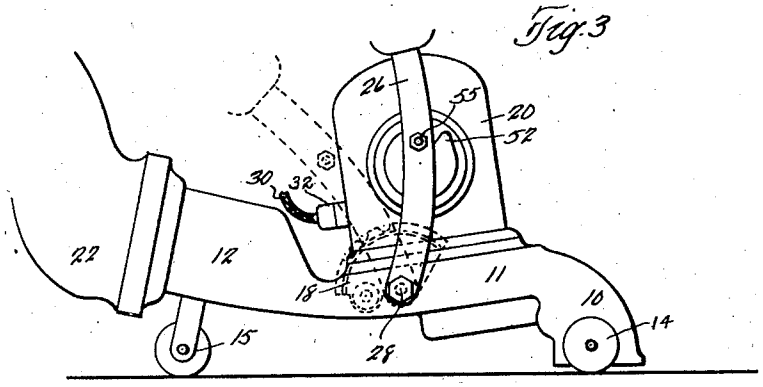


Fig. 4

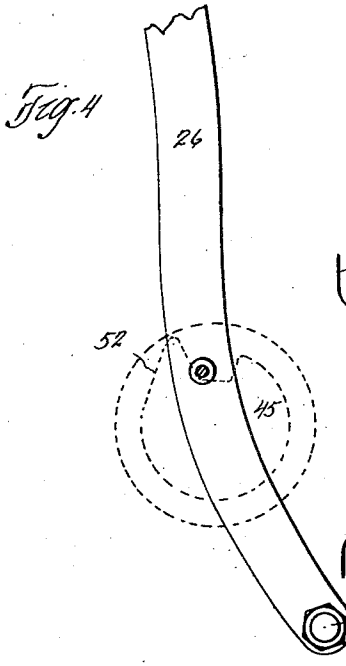
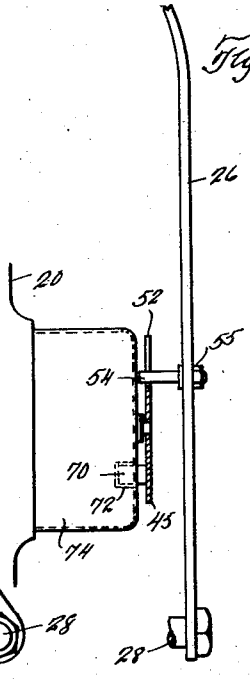


Fig. 5



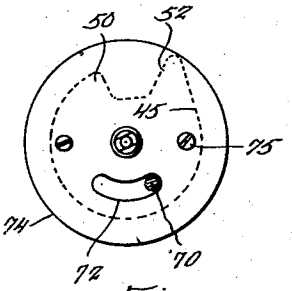


Fig. 6

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UNITED STATES PATENT OFFICE.

MILTON H. SPIELMAN, OF CLEVELAND, OHIO, ASSIGNOR TO THE DOMESTIC ELECTRIC COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

VACUUM-CLEANER SWITCH-OPERATING MECHANISM.

1,380,163. Specification of Letters Patent. Patented May 31, 1921.

Original application filed December 26, 1916, Serial No. 138,758. Divided and this application filed September 8, 1919. Serial No. 322,594.

To all whom it may concern:

Be it known that I, MILTON H. SPIELMAN, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Vacuum-Cleaner Switch-Operating Mechanisms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates particularly to mechanisms for operating the controlling switch of electrically driven portable devices. The essential object of the invention is to provide a simple, efficient mechanism for operating a switch for such a device. A more specific object is to so arrange such mechanism that the switch may be automatically closed to start the motor when the handle of the device is brought to a position for operating it, and be automatically opened to stop the motor when the handle is brought to a position of rest.

My switch operating mechanism is adapted for various portable devices of the character mentioned. A common illustration of such device is an electrically driven portable vacuum cleaner. Such a vacuum cleaner is ordinarily provided with a handle for moving the cleaner about the surface to be operated upon, the handle being usually pivoted to the frame and adapted to be swung from a vertical to a substantially horizontal position. Devices are provided for latching or otherwise holding the handle in its vertical position where it may stand when the cleaner is not in use, and when in use the handle is swung downwardly and operated at angles varying from a horizontal position to approximately seventy or eighty degrees.

Features of my invention are that no attention need be given to the stopping and starting of the motor of the device, for the current is automatically shut off when the handle is brought to its substantially vertical position, at which the device is normally idle, and as soon as the handle is brought to a slight angle from the vertical, at which the device may be operated, the current is sent through the motor by the first movement of the handle closing the switch.

The switches for controlling the motors of portable vacuum cleaners, for example, are usually manually operable and are mounted at some point on the handle which requires that the handle carry wires running up and down the same, and, as the handles are usually provided with a metal cap, there is considerable danger of the operator receiving electric shocks, whereas, with my device, the switch may be mounted directly on the motor casing, and the handle may be entirely free from the electric wiring.

My invention is hereinafter more fully described in connection with the accompanying drawings, having its embodiment in a portable vacuum cleaner, and the essential characteristics are summarized in the claims.

In the drawings, Figure 1 is a side elevation of a suction cleaner equipped with my invention, showing the parts in their idle position; Fig. 2 is a side elevation of the same illustrating the operative position; Fig. 3 is an enlarged side elevation of the frame of such a cleaner showing the switch and operating device in position; Fig. 4 is a section on a still larger scale showing the means on the handle bail for operating the switch; the latter being indicated in dot and dash lines; Fig. 5 is an edge elevation of the operating mechanism and switch; Fig. 6 is a section on the same plane as Fig. 4 looking in the opposite direction from that figure, showing the switch member in dot and dash lines; Fig. 7 is an axial section through the switch and its operating member; Fig. 8 is a detail view showing the switch removed; Fig. 9 is a sectional detail showing the device for latching the handle in different positions; Fig. 10 is a vertical section of the same; Fig. 11 is a horizontal section through the handle bail looking down on the latching device.

Referring to the drawings by the use of reference characters, 10 indicates the suction nozzle, 11 the fan chamber and 12 the exhaust spout integrally connected and forming the cleaner frame which is mounted on wheels 14 and 15. At 20 is indicated the motor housing mounted above the fan chamber, and at 22 is shown the dust bag connected with the exhaust spout and suitably attached at its opposite end to the handle 25.

The handle 25 is secured at its lower end to a U-shaped bail 26 normally straddling the motor housing 20 and pivoted by bolts 28 to the sides of the frame of the cleaner, whereby the handle may swing about the

axis of the bolts 28 from a substantially vertical position, where it is normally at rest, to varying operating positions, being frequently brought as low as a horizontal position to move the cleaner under furniture.

On one side of the cleaner frame is provided a device for latching the handle in various positions which is shown as comprising a segmental plate 18 held in position by one of the screws to which the handle is pivoted, and by a second screw 19 extending into a suitable lug. This segmental plate is provided with an offset portion through which is provided a slot 21, the plate extending upwardly at 23 adjacent to the slot and being notched, as at 24, to receive a latching pin 27 carried by the bail. The pin 27 extends through the bail and is vertically slidable in the slot 29 being held in the position given it by a flat spring 31. At 33 is provided a leaf spring secured to the segmental plate at its inner side and shown as provided with a depression 37 adapted to engage a corresponding projection pressed from the handle bail.

To accomplish the object of this invention and cause the cleaner to start by starting the motor as soon as the handle is brought into operative position, I have provided the following switch operating device: Current is led to the motor within the housing 20 by wires in a suitable cable indicated at 30 which is connected through a suitable plug or snap terminal 32 at the side of the motor with wires 34 and 35 leading to switch terminals indicated at 36, current passing through one of the wires named and being passed through the motor by suitable terminal connections arranged preferably within the housing 20. A suitable switch member is provided for connecting the terminals 36 and is indicated at 38 as comprising a bridge mounted on an extension of a rotary member 40 and having its ends adapted to bear against the terminal plates 36. The member 40 is shown as rotatably mounted in a switch block 42 made of suitable insulating material. At the outer end of the rotatable member 40 is provided a non-circular stud or projection 43 which carries a disk 45 secured in place by a screw 44 extending into the member 40.

The disk 45 is provided with a notch 50 adjacent which is an upwardly extending finger 52. An operating pin 54 carried by one side of the bail 26 and preferably secured by a nut 55 normally projects into the notch 50, whereby the swinging of the bail about the screws 28 causes a partial rotation of the disk 45 which turns the connecting bridge 38 from the position indicated in dot and dash lines in Fig. 8 to that shown in solid lines, closing the circuit through the motor and starting the same.

The details of the switch construction and specific mechanism for operating the same are shown, described and form the subject matter of the claims of my copending application, No. 138,758, filed December 26, 1916, which resulted in Patent No. 1,356,663, granted Oct. 26, 1920, on a switch operating mechanism, and of which application the present application is a division.

The disk 45 is shown as carrying an inwardly projecting finger 70 engaging a slot 72 in the switch block, limiting the oscillating movement of the disk. The switch block is shown as covered by a metallic casing 74 which is secured to the motor housing 20 by screws, the heads of which are indicated in Fig. 6, at 75.

The operation of my device is as follows: When not in operation the cleaner normally stands with the handle 25 in an upright substantially vertical position as shown in Fig. 1. To start cleaning the operator grasps the upper portion of the handle and lowers the same rearwardly, to push the cleaner about the surface to be operated upon, and this lowering movement swings the operating pin 54 rearwardly, engaging the rear side of the notch 50 turning the disk 45 which turns the connecting bridge 38 to close the circuit, thus starting the motor and cleaning operation begins. Further downward movement of the handle causes the finger 70 to come to the end of its arcuate slot, whereupon the operating pin 54 passes out of the notch 50, while the disk stands as thus turned where it may receive the pin on its return.

Upon stopping the cleaning operation either momentarily or otherwise, the handle is merely raised to its upright position where the spring 33 latches it, allowing it to stand at rest. In this raising movement the operating pin 54, as it comes toward the disk 45, engages the projecting finger 52 of this disk, swinging the finger forwardly and turning the disk to move the bridge 38 off from its contact plates, breaking the circuit through the motor and stopping the same. If it is desired to firmly latch the handle in its upright position so that it may not be inadvertently dropped and result in closing the switch, the pin 27 is moved downwardly to engage the proper notch 24 causing the secure latching of the parts, as the spring 31 engages the notch in the bail. The other notches 24 in the segment plate may be used for latching the handle in other positions when desired.

It will be seen from the foregoing description that there are no unsightly wires on the handle 25; the switch mounted on the motor housing may be made very artistic; the operation is entirely automatic and needs no attention; the cleaning operation being started by merely grasping the handle and bringing it to operative position; the device is simple and effective; it has no parts

liable to get out of order and is capable of being cheaply manufactured. The switch mechanism shown is merely illustrative of any form of switch which may operate by turning in one direction to close the circuit; while turning in the reverse direction opens the circuit.

Having thus described my invention, what I claim is:

1. The combination with a portable device, of a pushing handle therefor having a number of inclined operative positions and one substantially upright non-operative position, a switch carried by the portable device, and mechanism between said switch and said handle for opening the switch when the handle moves from its highest operative position to its non-operative position and for closing the switch when the handle makes its reverse movement.

2. The combination, with a portable device, of a pushing handle therefor movable in opposite directions and adapted to be held in various angular pushing positions or to be raised into a non-pushing position, a switch on said portable device adapted to be operated by turning in opposite directions, an oscillating member for actuating the switch, and means moved with the handle in either direction, causing an operation of said member to actuate the switch after a previous idle motion of said means.

3. The combination, with a portable device, of a pushing handle therefor, means for supporting said pushing handle in various inclined operating positions, said handle being also movable to an approximately vertical position, an electric switch mounted on the portable device and having an operating member, a projection carried by the handle and adapted to move the operating member when the handle moves from its highest operating position to its substantially vertical position, and in its reverse movement to move said member in the reverse direction and then clear the member, further downward movement of the handle being independent of said member.

4. The combination of an electric switch mounted on a portable device, an operating handle member movably connected with said portable device, means for operating said electric switch including an oscillating member adjacent to the path of a portion of the handle member, a projection extending from one of said members and adapted to engage the other, whereby a movement of the handle through said path will cause said member to be engaged to actuate the switch.

5. The combination with a portable suction cleaner, of a handle for moving the same, pivotally connected to the frame thereof, a switch mounted on said frame, said switch having an operable member, and means carried by the handle and adapted to engage and operate the operable member.

6. The combination with a portable suction cleaner having an electric motor and a pivoted operating handle, a switch mounted on a frame and adapted to be operated in opposite directions, an oscillating member for operating the switch, and means on the handle for engaging and moving said oscillating member whereby the switch may be opened when the handle is in one position and closed as the handle is moved to another position.

7. In combination, a portable cleaning device, a pushing handle therefor adapted to be moved to occupy a plurality of inclined operating positions and a substantially upright non-operating position, a switch carried by said device, and means whereby movement of the handle from any of its various operating positions to its non-operating position opens the switch, and from its non-operating position to any of its operating positions closes the switch, said means comprising coacting members attached to the switch and handle.

8. A vacuum cleaner having a swinging propeller handle arm thereon and an electric switch therein, coöperating means between the arm and the switch for closing the switch when the arm is swung to propelling position and for opening the switch when the arm is swung to non-propelling position.

9. A vacuum cleaner having a swinging propeller handle arm thereon and an electric switch therein, a rotatable cam plate operatively connected with the switch, and a detent on the arm for rotating the plate alternately in opposite directions.

In testimony whereof, I hereunto affix my signature.

MILTON H. SPIELMAN.