Feb. 20, 1940. L. W. COOK 2,191,339

COMBINED CONNECTOR AND SWITCH

Filed Aug. 19, 1937

Fig. 1.

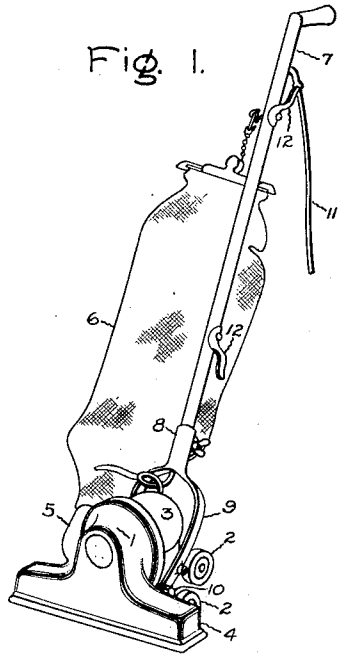


Fig. 2.

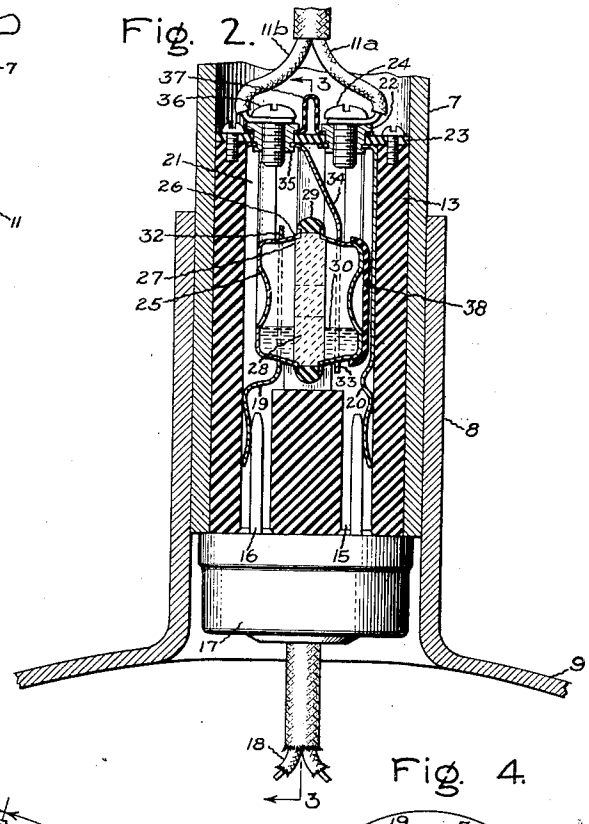


Fig. 3.

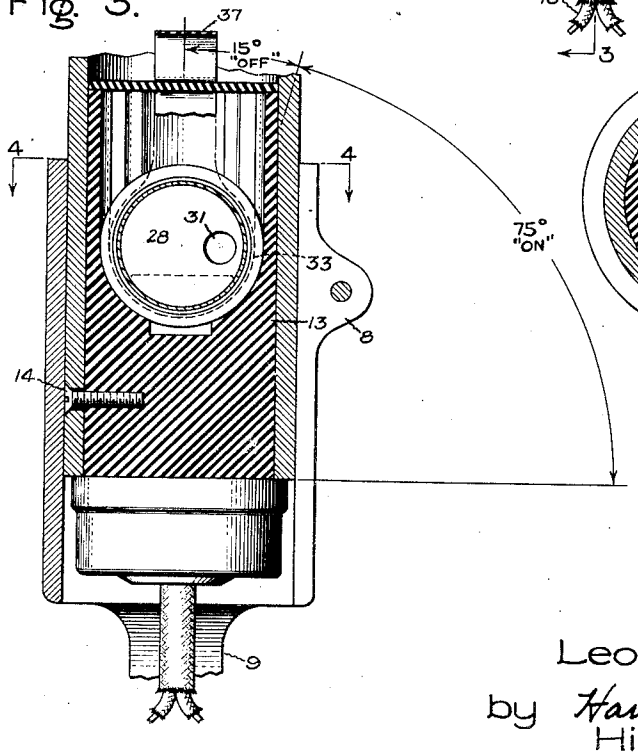
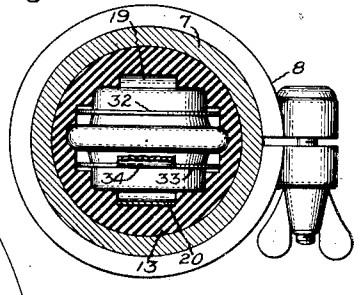


Fig. 4.



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2,191,339

COMBINED CONNECTOR AND SWITCH

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Application August 19, 1937, Serial No. 159,903

4 Claims. (Cl. 200—51)

The present invention relates to a connector having a liquid contact circuit closer for controlling the circuit through the connector in accordance with its position. One use for connectors of this type is in handles for electric appliances, such as vacuum cleaners, the connector being mounted in the handle so as to control the circuit to the appliances in accordance with the position of the handle.

An object of my invention is to provide an improved construction and arrangement in connectors of this type. Another object of my invention is to provide an improved handle for electric appliances. For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the accompanying drawing, Figure 1 is a perspective view of a vacuum cleaner having a handle equipped with a combined connector and switch embodying my invention; Figure 2 is an enlarged sectional elevation of the lower end of the handle taken through the connector; Figure 3 is a sectional view taken on line 3—3 of Figure 2; and Figure 4 is a sectional view taken on line 4—4 of Figure 3.

Referring to the drawing, there is shown a vacuum cleaner having a casing 1 carried on front and rear supporting wheels 2. At the rear of the casing is a horizontal electric motor 3 which drives a fan located within the casing producing a suction which draws the dirt through the suction nozzle 4 and discharges it through a discharge outlet 5 into a bag 6. The upper end of the bag is suspended from a tubular handle 7, the lower end of which is fixed in a clamp 8 at the upper end of a fork 9 pivoted at 10 on the cleaner casing. The pivotal mounting of the fork 9 permits the handle to be pivoted to positions between the horizontal and vertical.

The power supply for the vacuum cleaner is obtained through a conductor cord 11 which extends through an opening in the upper end of the handle 7 down through the handle. When the cleaner is not in use the conductor cord may be coiled around hooks 12 on the handle. In the lower end of the handle is a combined connector and switch which has a housing or body portion 13 of suitable molded insulating material held therein by a set screw 14. In the lower end of the housing are rectangular openings 15 for receiving the blades 16 of an attachment plug cap 17. The blades are connected by conductors 18 to the motor 3. The blades cooperate with strip contacts 19 and 20 positioned in the openings 15. The contact strip 20 extends from the opening 15 along the side walls of a recess 21 and is fixed at its upper end to a contact 22 carried by a plate 23 of insulating material which is secured to the upper end of the housing and forms the top wall of the recess 21. One of the line conductors 11*a* of the conductor cord 11 is connected to the contact 22 by means of a binding screw 24 threaded therein. Within the recess 21 is a liquid contact circuit closer of the type shown in Patent 2,102,092 Payne. This circuit closer has an envelope comprising two opposed cup-shaped metal terminals 25 having outwardly projecting flanges 26 which butt against annular shoulders 27 in a ceramic diaphragm 28. The closure of the envelope is completed by a bead 29 of glass which is sealed to the flanges 26 and to the outer edge of the diaphragm 28. Within the envelope is a small quantity 30 of mercury which completes the circuit between the terminals when the circuit closer is positioned so that the opening 31 in the diaphragm is submerged in the mercury. When the opening 31 in the diaphragm is above the mercury the circuit between the terminals is interrupted by the diaphragm 28. The circuit closer is preferably filled with hydrogen at a pressure of one or more atmospheres to increase its interrupting capacity. The circuit closer is connected in series with the contact 19, one of the terminals 25 being fixed to a ring-shaped portion 32 at the upper end of the contact 19 and the other terminal being fixed to a similar ring-shaped portion 33 at the lower end of a contact strip 34 fixed to a contact 35 of the same construction as the contact 22. The circuit closer is, therefore, supported within the recess 21 by the contacts 19 and 34. Conductor 11*b* of the conductor cord 11 is connected to the contact 35 by means of a binding screw 36 threaded therein. Between the binding screws 24 and 36 is a barrier 37 of insulating material which is secured to the plate 23 by the contacts 22 and 35. The barrier prevents short circuit between the bared ends of the conductors 11*a* and 11*b*. Short circuit between the contacts 20 and 34 is prevented by an intermediate fibre washer 38 on the right-hand circuit closer terminal.

The operation of the circuit closer is shown in Figure 3. When the handle is in a vertical position, as shown in Figure 3, the opening 31 in the diaphragm 28 of the circuit closer is raised above the mercury and the circuit to the motor 3 is therefore broken. When the handle is moved to a position approximately 15 degrees from the vertical, the opening 31 is submerged in the mercury

completing the circuit to the motor. The circuit to the motor remains completed while the handle is moved between this last position and the horizontal. The 75 degree range in which the motor circuit is completed covers the range of movement of the handle during normal use of the cleaner. When the cleaner is not in use the handle is normally returned to the vertical position and the motor is automatically stopped. If the cleaner is inverted or turned on its side, for the purpose of making adjustments or repairs, the mercury flows to a position interrupting the circuit to the motor. The vacuum cleaner motor is therefore automatically started only when the handle is in its normal position for use. In addition to providing a simple control, the combined connector and switch simplifies the wiring, it only being necessary to connect the line conductors to the line terminals **22** and **35**.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an electric appliance or the like having a movable handle, a combined connector and switch in circuit to the appliance carried in fixed relation to said handle comprising a unitary housing having line terminals for connection with line conductors, contacts for connection with a separable attachment plug, a liquid contact circuit closer in said housing having an envelope including opposed cup-shaped terminals, contact strips respectively connected at one end to one of said contacts and one of said line terminals and at the other end fitting over and connected to one of the cup-shaped terminals of the circuit closer for supporting the circuit closer, and means connecting the other of said contacts and the other of said line terminals, the circuit closer being positioned so that the circuit to the appliance is controlled in accordance with the inclination of the handle.

2. In a combined connector and switch, a unitary housing having line terminals for connection with conductors, contacts for connection with a separable attachment plug, a liquid contact circuit closer in said housing having an envelope including opposed cup-shaped terminals, contact strips respectively having one end fitting over one of said cup-shaped terminals and having the other ends respectively connected to one of said contacts and one of said line terminals for supporting the circuit closer, and means connecting the other of said contacts and the other of said line terminals, and means for movably supporting the housing, the circuit closer being positioned so that the circuit to said contacts is controlled in accordance with the position of the housing.

3. In an electric floor tool or the like, a tubular handle movably mounted at its lower end and having a hand grip portion at its upper end, a conductor cord extending into the upper end of and down through the handle, and a combined connector and switch comprising a housing recessed within the lower end of the handle, said housing having terminals for connection with the conductor cord, contacts for connection with a separable attachment plug connected to the floor tool, and a liquid contact circuit closer within the housing and connected in circuit between one of said contacts and one of said terminals for controlling the circuit between said contacts and terminals in accordance with the position of the handle.

4. In an electric floor tool or the like, a tubular handle movably mounted at its lower end and having a hand grip portion at its upper end, a conductor cord extending into the upper end of and down through the handle, and a combined connector and switch in circuit between said conductor cord and floor tool comprising a housing having terminals for connection with conductors, contacts for connection with a separable attachment plug, and a liquid contact circuit closer within the housing and connected in circuit between one of said contacts and one of said terminals for controlling the circuit between said contacts and terminals, said housing being connected to the handle so that the circuit closer controls the circuit in accordance with the position of the handle.

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