

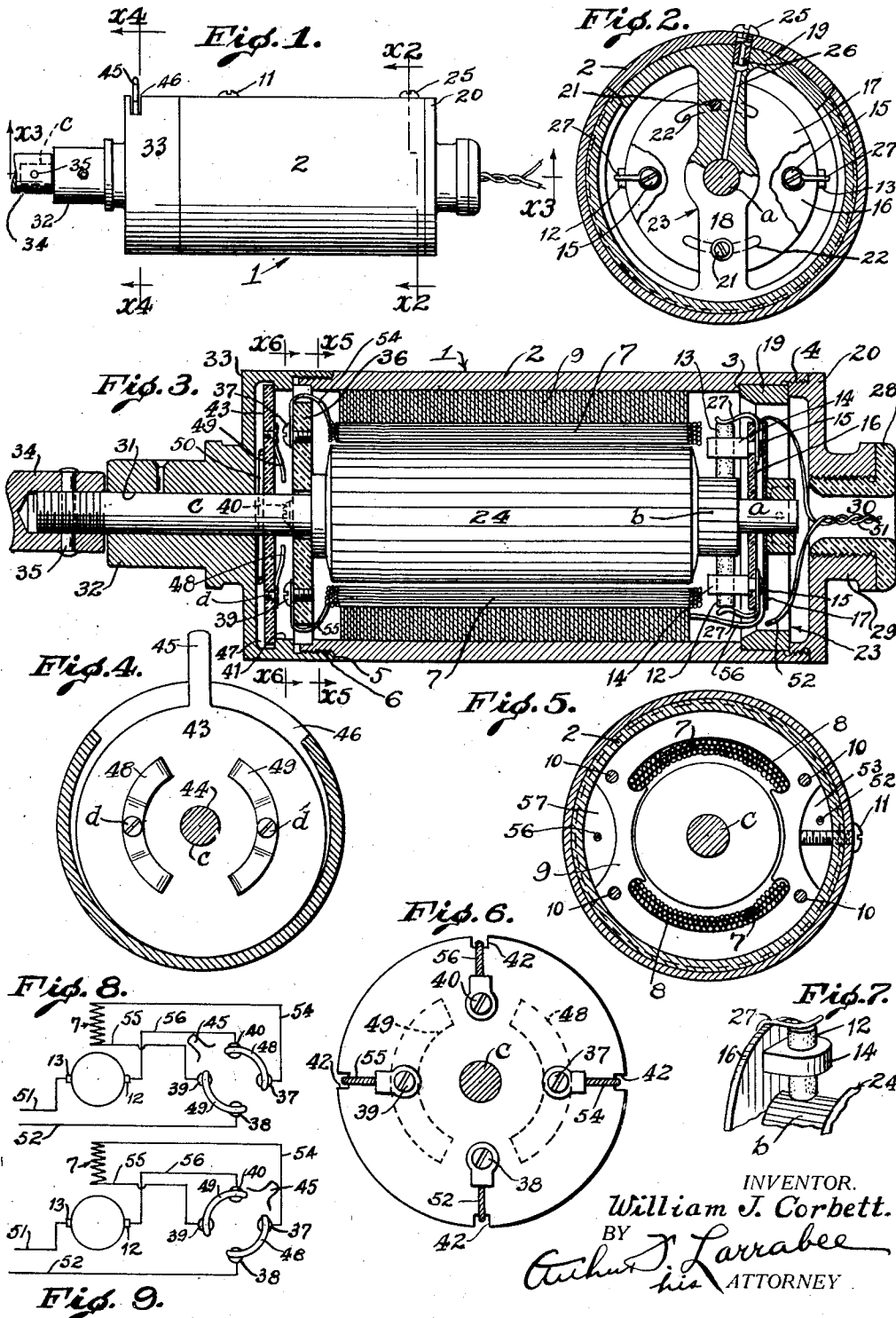
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REVERSIBLE ELECTRICAL MOTOR

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REVERSIBLE ELECTRICAL MOTOR.

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My invention relates particularly to novel means whereby the direction of rotation of an electrical motor may be easily and quickly reversed by the person using the same.

5 An object is to provide an electrical motor of small size that can be conveniently held in the palm of the hand when in use, thereby making such motor adaptable for use in combination with a rotary tooth brush, manicuring buffers, and the like.

An object is to provide a motor of this type in which likelihood of shorting of the circuit and resultant shocks are eliminated.

15 Another object is to provide novel switch means for a motor of the above character that may be carried by the motor and easily operated by the forefinger or thumb of the person using the motor and while the motor is in use.

An advantage gained by my novel switch is that the motor may be reversed by the operator with the same hand that holds the motor.

25 The invention includes the parts and combinations of parts more particularly hereinafter referred to.

Other objects, advantages and features of invention may appear from the accompanying drawing, the subjoined detail description and the appended claims.

The accompanying drawing illustrates the invention in a form I at present deem preferable.

35 Figure 1 is an elevational view of my novel reversible motor approximately full size.

Fig. 2 is an enlarged transverse section on irregular line x^2-x^2 , Fig. 1.

40 Fig. 3 is a longitudinal axial section on line x^3 , Fig. 1, looking in the direction of the arrows and on the same scale as Fig. 2.

Fig. 4 is a transverse section on line x^4 , Fig. 1, but on the same scale as Figs. 2 and 3 and showing the switch in neutral or open position.

45 Fig. 5 is a transverse section on line x^5 , Fig. 3.

Fig. 6 is a side view of the switch contact plate detached from the motor and on line x^6 , Fig. 3. Dotted lines indicate the position of the movable switch contacts when the switch is in neutral position.

Fig. 7 is a fragmentary perspective view showing the brush and brush holder and a 55 fragment of the commutator.

Fig. 8 is a diagrammatic wiring diagram showing the manner of connecting the line wires, switch, field and brushes.

Fig. 9 is a view analogous to Fig. 8 but with the switch moved to reverse the motor 60 from that shown in Fig. 8.

The motor 1 comprises a tubular shell 2 provided at one end with a shoulder 3 and an internally threaded portion 4 and is provided at its other end with a shoulder 5 and 65 an externally threaded portion 6.

The motor field windings 7 are mounted in the recesses 8 formed in the laminated field carrier 9 the laminations of which are secured together by transversely extending 70 pins 10. A set screw 11 secures the field carrier 9 in position in the shell 2.

Brushes 12 and 13 are slidably mounted in holders 14 that are secured by screws 15 to a fibre brush carrier plate 16. A strip 75 of insulating material 17, such as mica, is secured to the brush carrier plate 16 to prevent likelihood of shorting through the brush holder securing means. The brush carrier plate and brush holders mounted 80 thereon are adjustably secured to a web 18 that connects an annular ring 19 which abuts and is held firmly against the shoulder 3 by an end cap or closure member 20 threaded into the internally threaded end 4 of 85 shell 2. Screws 21 extending through the web 18 and arcuate slots 22 formed in the brush carrier plate 16 and mica strip 17, cooperate with nuts, not shown, threaded on said screws to hold the brush carrier plate 90 in adjusted position against the web 18. The web 18 and ring 19 comprise a bearing member 23 in which shaft a of armature 24 is journaled. A screw 25 secures the bearing member 23 against rotation in shell 95 2 and an oil hole 26 extends through screw 25 and a portion of web 18 to provide means to introduce oil to the shaft a journaled in bearing member 23.

Springs 27 are secured to the brush carrier 100 plate by the screws 15 and exert a tension against the brushes to maintain proper contact between the brushes and the commutator b of the armature.

A bushing member 28 of insulating material is threaded into an extension 29 on member 20 and is provided with an orifice 30 105 through which the line wires pass.

The shaft c of armature 24 is journaled in bearing 31 formed in an extension 32 of 110

end cap or closure member 33 that is threaded on the threaded portion 6 of shell 2. The end of shaft *c* is threaded to receive a coupling 34 of insulating material which is pinned thereto by means of pin 35.

My novel switch means comprises a stationary contact disk or plate 36 of fibre or other suitable insulating material and carries four stationary contacts 37, 38, 39 and 40. This disk 36 has a press fit in the shell 2 and is held in the shell 2 against shoulder 5 by a flange 41 that extends inwardly from the cap member 33 and engages said disk 36. The contacts 37-40 are connected to the field, brushes and line as will be more fully hereinafter set forth. The periphery of disk 36 is notched as at 42 to receive the wires that are connected to the contacts 37-40.

A movable switch member 43 comprising a disk of insulating material is provided with an eccentric orifice 44 through which shaft *c* extends and with a lever or projection 45 that extends through an elongate slot 46 formed in the end cap 33. The disk 43 is mounted in an annular recess 47 formed in end cap 33 and carries two arcuate spring or movable contacts 48, 49 that are secured intermediate their ends to disk 43 by screws *d* and the ends of contacts 48, 49 flare away from disk 43 as shown in Fig. 3 and are adapted for engagement with certain of the contacts 37-40. Spring means 50 interposed between the movable switch member 43 and the end cap 33 tends to hold the member 43 against one side of the flange 41 which spaces the movable switch member or disk 43 from the stationary switch member or disk 36.

In practice the lead 51 of the power line is connected to the brush 13 and the lead 52 of the power line is extended through an opening 53 formed between shell 2 and field carrier 9 and is connected to the stationary contact 38. The contact 37 is connected to one end of the field windings 7 by a wire 54 and the other end of such windings is connected to contact 39 by a wire 55. Contact 40 is connected to brush 12 by a wire 56 that extends through opening 57 which is opposite opening 53.

In operation the line wires or leads 51, 52 are connected in the usual way to a source of electrical energy not shown, and with the switch in the position shown in Fig. 4 the spring contacts will not engage any of the contacts 37-40 and the circuit will be broken. When it is desired to start the motor operating in one direction the lever 45 will be moved to one end or the other of slot 46 and in which position as shown in Fig. 8 the spring contact 49 will engage stationary contacts 38, 39 and spring contact 48 will engage stationary contacts 37 and 40 and thus close the circuit to operate

the motor in one direction. To operate the motor in a reverse direction the switch disk 36 may be moved to the opposite end of slot 46 and in which position, see Figure 9, the spring contact 48 will engage stationary contacts 37, 38 and spring contact 49 will engage contacts 39, 40 and thereby reverse the connections of the field windings to the line and the brush.

I claim:

1. In an electric motor, a shell; field windings in said shell; brushes mounted at one end of said shell; and switch means mounted at the other end of said shell adapted for reversing the flow of current through said field windings.

2. In an electric motor adapted to be held in one hand and controlled thereby and also adapted at one end to receive a tool to be operated by said motor; an armature; a shell; brushes at the end of said motor opposite said tool receiving end cooperating with said armature; field windings; stationary contacts at the tool receiving end of said motor; connections connecting said contacts to the power line, the ends of the field windings, and to one of the brushes; and movable contacts adapted in one position to engage said stationary contacts to close the circuit between the power line and one end of the field winding, and to connect the other end of the field winding with one of the brushes; and in another position to reverse the connection of the field windings with the power line and the brush and means extending through said shell adapted to be operated by the thumb or forefinger of the operator to move said movable contacts to control said motor.

3. In an electrical motor; switch means adapted to reverse the flow of current through the field windings of said motor comprising a disk; stationary contacts fixed to said disk; and a movable disk having spring contacts adapted to be moved into engagement with certain of said stationary contacts in one position and to be moved into engagement with certain others of said stationary contacts in another position, and to be moved out of engagement with said stationary contacts in a third position.

4. In an electric motor; a shell having a shoulder; field windings in said shell; an armature rotatably mounted in said shell; a member engaging said shoulder; a brush carrier plate adjustably secured by said member; brush holders; brushes slidably mounted in said holders; spring means normally urging said brushes toward the axis of said armature and against the commutator thereof; and means securing said holders and spring means to said plate.

5. In an electric motor; a shell having an elongate slot and a shoulder; an armature; brushes; field windings; a stationary con-

tact plate engaging said shoulder; contacts mounted on said plate; a movable contact plate having a lever extending through said elongate slot; spring contacts fixed to said movable plate and adapted to engage certain of the contacts on said stationary plate; and connections connecting said stationary contacts with the field windings, power line and brushes.

10 6. Switch means for electrical motors comprising a stationary contact plate having four contacts thereon; and a movable contact plate having a pair of spring contacts secured thereto, each of said spring contacts
15 being adapted in one position of said movable plate to engage a pair of said stationary contacts, and being adapted in another position to engage a different pair of said stationary contacts, and being adapted in a
20 third position to be moved out of engagement with all of said stationary contacts.

7. In an electric motor; a shell; an end member secured to said shell to close one end thereof and being provided with an
25 elongate slot; an inwardly extending flange in said end member that forms a recess between said flange and the closed end of the end member; a stationary disk carried by said shell; contacts on said disk connected
30 to the wiring of said motor; a movable disk having a lever extending through said slot and being mounted in said recess; and spring contacts on said movable disk adapted to engage certain of said stationary con-
35 tacts in predetermined positions of said movable disk.

8. In an electric motor; a shell; an end member secured to said shell to close one end thereof and being provided with an
40 elongate slot; an inwardly extending flange in said end member that forms a recess between said flange and the closed end of the end member; a stationary disk carried by

said shell; contacts on said disk connected to the wiring of said motor; a movable disk
45 having a lever extending through said slot and being mounted in said recess; spring contacts on said movable disk adapted to contact with certain of said stationary con-
50 tacts in predetermined positions of said movable disk; and spring means between the closed end of said end member and said movable disk to normally urge said movable disk toward said stationary disk.

9. In a motor of the character set forth,
55 a shell enclosing the motor; switch means comprising spaced disks of insulating material one of which extends through said shell and is movable therein and the other of which is stationary; contacts on said sta-
60 tionary disk connected to the wiring of said motor; and means on said movable disk adapted to close the circuit between predetermined contacts on said stationary disk.

10. In an electric motor; a shell enclosing
65 the motor and adapted to be held in the hand of a person; a reversing switch within said shell; and an operating part of said switch projecting through the forward end of said shell in position to be engaged while hold-
70 ing the shell in the hand, by the thumb and finger of the operator for reversing the motor.

11. In an electric motor; a shell enclosing
75 the motor; an end member closing the forward end of the shell and formed with a bearing for the motor shaft and through which bearing said shaft extends; and a reversing switch mounted in the forward end of the shell in position to be operated by the
80 thumb and finger of the operator while holding the shell in the hand.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this
22d day of July, 1926.

WILLIAM J. CORBETT.