

F. H. BUFFEHR.
ELECTRICAL SWITCH.
APPLICATION FILED MAY 3, 1909.

933,956.

Patented Sept. 14, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

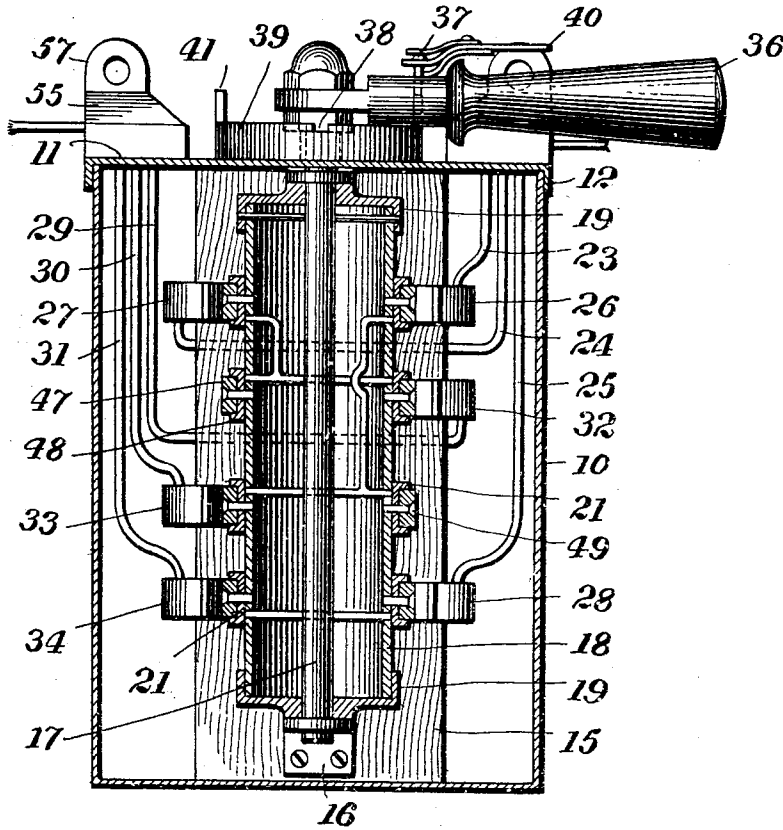
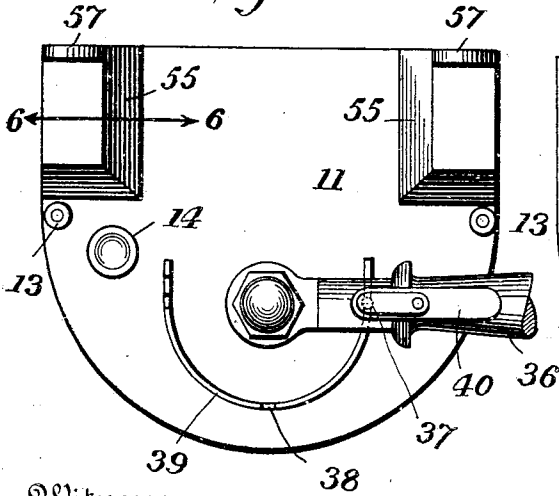


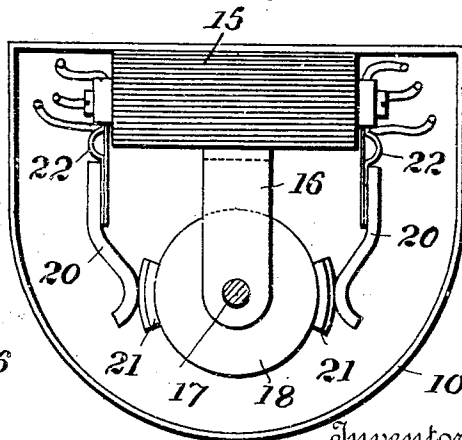
Fig. 2.



Witnesses

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J. J. McCarthy

Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

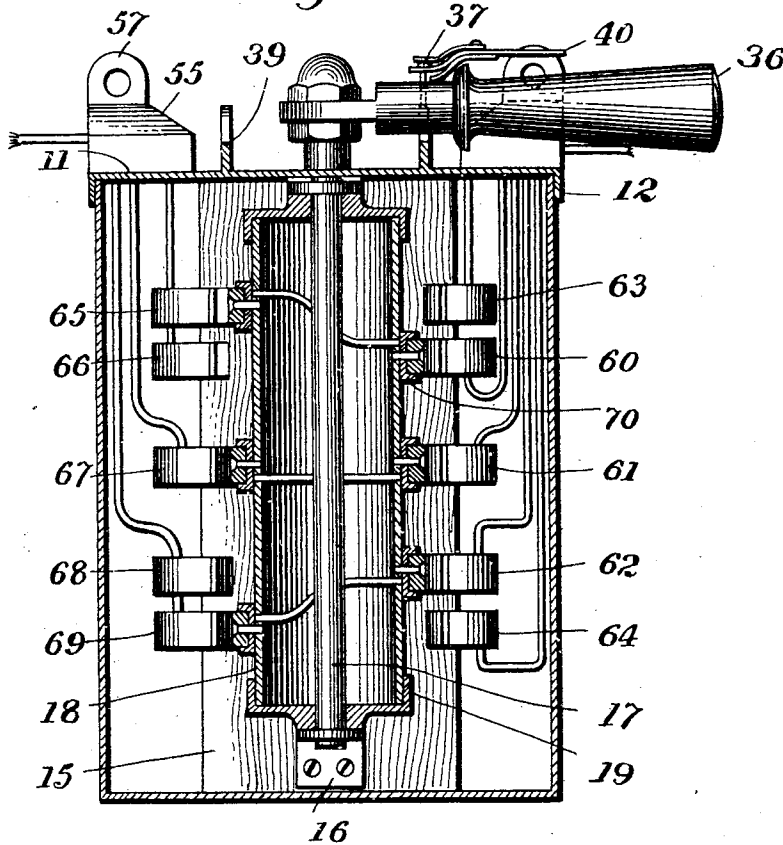
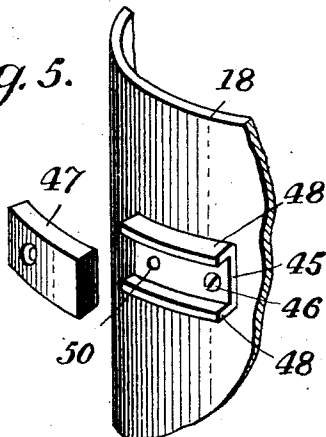
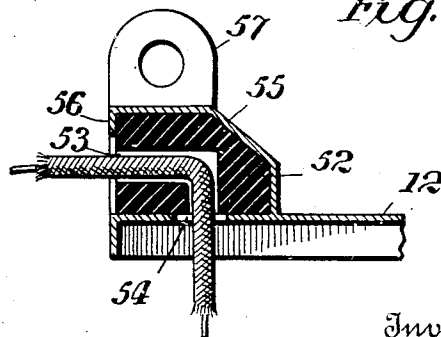


Fig. 5.



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Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK H. BUFFEHR, OF MILLERS, NEVADA.

ELECTRICAL SWITCH.

933,956.

Specification of Letters Patent. Patented Sept. 14, 1909.

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To all whom it may concern:

Be it known that I, FRANK H. BUFFEHR, a citizen of the United States, and resident of Millers, Nevada, have invented certain new and useful Improvements in Electrical Switches, of which the following is a specification.

This invention relates to electrical switches, and in particular to electrical switches adapted to be used for starting or reversing three-phase motors.

The objects of this invention are to provide a switch in which all the contact parts and electrical connections are mounted inside of a casing, thus avoiding all danger of contact with parts carrying electrical current, to reduce to a minimum the number of contacts required, and to provide a novel form of contact segment which is easily removable and replaceable.

In the drawings: Figure 1 is a vertical section through one form of switch; Fig. 2 is a plan view of the same; Fig. 3 is a plan view with the cover removed; Fig. 4 is a vertical section showing another form of switch; Fig. 5 is a detail view showing the construction of the contact segments; and Fig. 6 is a section on the line 6—6 Fig. 2.

Referring to the drawings, 10 designates a casing of metal constructed to form a vessel for receiving oil.

11 is a cover plate provided with overhanging flanges 12 for positioning the cover plate on the casing or vessel 10.

13, 13 are screws attached to the casing and provided with nuts for retaining the cover in place.

14 is a removable filling plug.

To the top of the casing is secured a base 15 of suitable insulating material. To this base are attached brackets 16, 16 forming bearing lugs for a vertical shaft 17 extending through the top of the cover. A drum 18 of suitable insulating material, having attached to it metallic ends 19, 19, is rigidly connected to the shaft 17 so as to turn therewith. Upon the base 15 are mounted a number of contact fingers 20, and upon the drum a number of contact segments 21, with which the contact fingers 20 cooperate. These contact fingers 20 are mounted so as to be yieldingly pressed in engagement with the contact segments 21 by means of springs 22. The line wires 23, 24 and 25 connect with

their respective contact fingers 26, 27 and 28. The motor wires 29, 30 and 31 enter the casing from the left-hand side and connect with the contact fingers 32, 33 and 34, respectively. The contact segments are interconnected in the manner shown in Fig. 1, that is the first and second contact segments on the left-hand side are connected with the second contact segment on the opposite side of the drum, and the first and third contact segments on the right-hand side of the drum are connected with the third contact segment located on the opposite side of the drum. The fourth contact segments on the opposite side of the drum are directly connected. A handle 36 is rigidly connected to the shaft 17 and is provided with a locking bolt 37 adapted to cooperate with recesses 38 on a flange 39, mounted upon the cover. A finger piece 40, pivoted upon the handle, is constructed to raise the bolt 37 out of its operating recess and allow the handle to be moved to rotate the drum 18 to its different positions. The flange 39 is provided with stop shoulders 41 to stop the handle 36 in its extreme positions.

The switch when in off position will be turned so that it will be in a position at right angles to that shown in Figs. 1, 2 and 3; that is to a position where the bolt 37 cooperates with the central notch or recess 38. The contact segments on both sides of the drum will then be out of contact with the fingers 20. In order to throw the switch to the forward position it is turned to the right to the position shown in Figs. 1, 2 and 3. In order to reverse the motor the handle is turned to the left extreme position until engaged, and stopped by the left stop shoulder 41.

By tracing the connections it will be noted that for the two extreme positions of handle 36 the connections of the wires 23, 24, to 29, 30 will be reversed; that is, while the switch is in the forward position 23 is connected to 30 and 24 to 29; when the switch is in reverse position 23 is connected to 29 and 24 to 30. In both cases however 25 is connected to 31. The connections to one of the phases of the motor will therefore be reversed while the connections of the wires 25 and 31 will remain the same. By positioning the segments 21 and the fingers 20 in this manner it will be seen that this switch

can be used for different types of motors; for instance to use the same with a direct current motor it will only be necessary to omit the connections to the lower contact fingers 28 and 34.

In order to adapt this switch for a two-phase motor having four wires, all that is necessary is to add another pair of oppositely disposed contact fingers and contact segments located below the contact fingers 28 and 34, and connect the segments directly, keeping in mind that in order to reverse a two-phase motor all that is necessary is to reverse the connections of one of the phases.

Referring to Fig. 5, which shows the removable contact segment, 45 designates a channeled member which is attached to the drum 18 by means of a screw or other fastening 46. The contact member 47 is constructed to be positioned between the flanges 48, 48 of the channeled member and secured thereto by means of a screw 49 engaging a tapped hole 50 in the channeled member 45. The conductors inside of the drum are connected to the channeled member 45 in any well-known manner, for instance by drilling a hole through the channeled member and by soldering or brazing the conductor in place. The member 45 will thus form a permanent part of the drum, while the member 47 may be removed and replaced when worn out. The side flanges 48, 48 form a convenient positioning means for positioning the segment 47.

Referring to Fig. 6, 52 designates a block formed of insulating material provided with openings 53, through which leading-in wires may be inserted, an aperture 54 being formed in the cover plate 12 for this purpose. Integrally secured to the cover 12 by soldering, or any other convenient manner, is a metallic hood 55. This hood completely covers the insulating block 52 and is beaded over, as shown at 56, to permanently secure the block in place. The attaching lug 57 forms one side of the hood. By means of this construction the leading-in wires from the motor and the line are covered and protected by a metallic shell, thus avoiding all danger from contact with the current carrying parts of the switch.

Referring to Fig. 4, which shows the starting switch, the contact fingers 60, 61 and 62 are connected to the line wires, while the fingers 63 and 64 are connected to the compensator used for starting the motor. The fingers 65 and 66 are connected to one of the motor wires, 67 to the second motor wire, and contact segments 68 and 69 to the third motor wire. It will be readily seen that the contact fingers 65 and 66 form in reality one contact finger and may therefore be replaced by a single wide contact finger if desirable. The same is true of the contact fingers 68 and 69. The connections to

the contact segments 70 are clearly shown in Fig. 4. The switch in the position shown in said figure is in running position and it will be noted that the motor wires are connected to the line wires 60, 61 and 62 of the three-phase supply.

In order to throw the switch to starting position the handle 36, which is of the same construction as the handle shown in Fig. 1, is moved to the left through 90° from off position, and in tracing out the connections it will be noted that the motor wires are now connected to the line wire 61 and the compensator wires 63 and 64. After the motor has been started the switch may be thrown 180° to the right to running position shown in Fig. 4. It will be noted that in this construction all line wires are connected to contact fingers located on one side of the drum, while all the motor wires are connected to contact fingers located on the other side of the drum. This is a very convenient arrangement and avoids all danger of short circuits. The construction of this type of switch is otherwise substantially the same as that shown in Figs. 1, 2, 3, 5 and 6.

It will be evident that various changes in details of construction and arrangement of the parts above described may be made without departing from the spirit of this invention, and it is therefore to be understood that this invention is not to be limited to the specific construction shown and described.

What I claim is:

1. In an electrical switch, the combination with contact fingers, a drum having contact segments thereon for cooperating with said fingers, one pair of contact fingers on opposite sides of the drum being in alinement and connected to the line, and the other set out of alinement and connected to the feeder circuit, said contact segments being suitably interconnected whereby when the drum is moved from one position to another position the connections to the feeder circuit are reversed.

2. In an electrical switch, a drum, a pair of alined contact fingers and a pair of unalined contact fingers on opposite sides of the drum, said drum having three pairs of contact segments thereon, one pair being in diametrical alinement with the first pair of contact fingers and adapted to simultaneously engage the same, and the other pairs in alinement with the unalined contact fingers, respectively.

3. In an electrical switch, a drum, a pair of alined contact fingers and a pair of unalined contact fingers on opposite sides of the drum, said drum having three pairs of contact segments thereon, one pair being in diametrical alinement with the first pair of contact fingers, and the other pairs in alinement with the unalined contact fingers, respectively, connections between one of the

contact segments of the first pair, and the second pair, and connections between the other contact segment of the first pair and the third pair.

4. In a reversing switch for three-phase motors, a drum mounted to rotate in bearings and provided with a plurality of contact segments on opposite sides thereof, an insulating base provided with a plurality of contact fingers coöperating with the contact segments, said contact fingers adapted to be connected to the line and feeder wires respectively, said fingers and segments being so constructed and connected that when the drum is rotated from one extreme to another extreme position the connections to one of the phases of the motor will be reversed.

5. In an electrical switch, a drum, a pair of alined contact fingers and a pair of unalined contact fingers on opposite sides of the drum, said drum having three pairs of contact segments thereon, one pair being in diametrical alinement with the first pair of contact fingers and adapted to simultaneously engage the same, and the other pairs in alinement with the unalined contact fingers respectively, a third pair of alined contact fingers, and a fourth pair of contact segments on the drum in diametrical alinement with the said fingers.

6. In an electrical switch, a drum, a pair of alined contact fingers and a pair of unalined contact fingers on opposite sides of the drum, said drum having three pairs of contact segments thereon, one pair being in diametrical alinement with the first pair of contact fingers, and the other pairs in alinement with the unalined contact fingers, respectively, a third pair of alined contact fingers, and a fourth pair of contact segments on the drum in diametrical alinement with the said fingers, line wires connected to the first pair of alined contact fingers, and one of the third pair, feeder wires connected to the second pair of contact fingers and the other of the third pair, and connections between one of the contact segments of the first pair and the second pair, connections between the other contact segments of the first pair and the third pair, and a connection between the contact segments of the third pair.

7. In a reversing switch for three-phase motors, a pair of line contact fingers adapted to be connected to two of the line wires, a third contact finger adapted to be connected to the third line wire, a rotatable drum, said first pair of contact fingers being located in alinement on opposite sides of the drum, a pair of contact segments on said drum adapted to coöperate with the first pair of contact fingers, a second pair of contact fingers located out of alinement on opposite sides of said drum and adapted to be connected to two feeder wires, a second and

third pair of diametrically alined contact segments on the drum adapted to contact with the contact fingers of the second pair respectively, a contact finger in alinement with the third contact finger and connected to the third feeder wire, a fourth pair of contact segments on the drum adapted to contact with contacts for the third line and feeder wires, said contact fingers being suitably interconnected so that the connections to one of the phases of the feeder circuit may be reversed by a movement of the drum.

8. An electrical switch comprising a casing, a cover for said casing, a base mounted on said cover provided with a plurality of contact fingers, bearings on the base, a drum mounted in the bearings and provided with a plurality of contact segments, the cover being provided with an aperture for the terminal wires, and a metallic covering for the terminal wires.

9. An electrical switch comprising a casing, a cover for said casing, a base mounted on said cover provided with a plurality of contact fingers, bearings on the base, a drum mounted in the bearings and provided with a plurality of contact segments, an operating handle connected to the drum outside of the cover, the cover being provided with an aperture through which the terminal conductors extend, and a metallic hood extending over the aperture.

10. An electrical switch comprising a casing, a cover for said casing, a base mounted on said cover provided with a plurality of contact fingers, bearings on the base, a drum mounted in the bearings and provided with a plurality of contact segments, an operating handle connected to the drum outside of the cover, the cover being provided with apertures on opposite sides for the terminal conductors, and metallic hoods extending over the openings.

11. An electrical switch comprising a casing, a cover for said casing, a base mounted on said cover provided with a plurality of contact fingers, bearings on the base, a drum mounted in the bearings and provided with a plurality of contact segments, an operating handle connected to the drum outside of the cover, the cover being provided with apertures upon opposite sides for the terminal conductors, insulating blocks over the openings through which the terminals pass, and metallic protecting hoods connected to the cover, and covering the blocks.

12. In an electrical switch, a casing, a cover therefor, said cover having an aperture therein for the terminal wires, and a metallic hood permanently connected to the cover and extending over the opening.

13. In an electrical switch, a casing, a cover therefor, said cover having an aperture therein for the terminal wires, an insulating block over said opening through

which the wires pass, and a hood permanently connected to the casing and covering the block.

14. In an electrical switch, a casing, a
5 cover therefor, said cover having apertures therein on opposite sides for the terminal wires, metallic hoods permanently connected to the cover, and extending over the openings, and attaching lugs connected to the
10 hoods and forming one side thereof.

15. An electrical switch, comprising a casing adapted to receive oil, a cover for said casing provided with an overhanging flange, an insulated supporting base carried by said

cover, a plurality of contact fingers carried 15
by said base, bearings on said base, a drum having a plurality of contact segments mounted to rotate in said bearings, and an operating handle mounted on said base, said parts being so constructed that all working 20
parts are carried by the cover and removable therewith.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK H. BUFFEHR.

Witnesses:

JOS. T. WOLFE,
W. C. CLEMENTS.