H. A. LEWIS.

REVERSING SWITCH.

APPLICATION FILED MAY 22, 1911.

1,155,157. Patented Sept. 28, 1915.

Fig. 1.

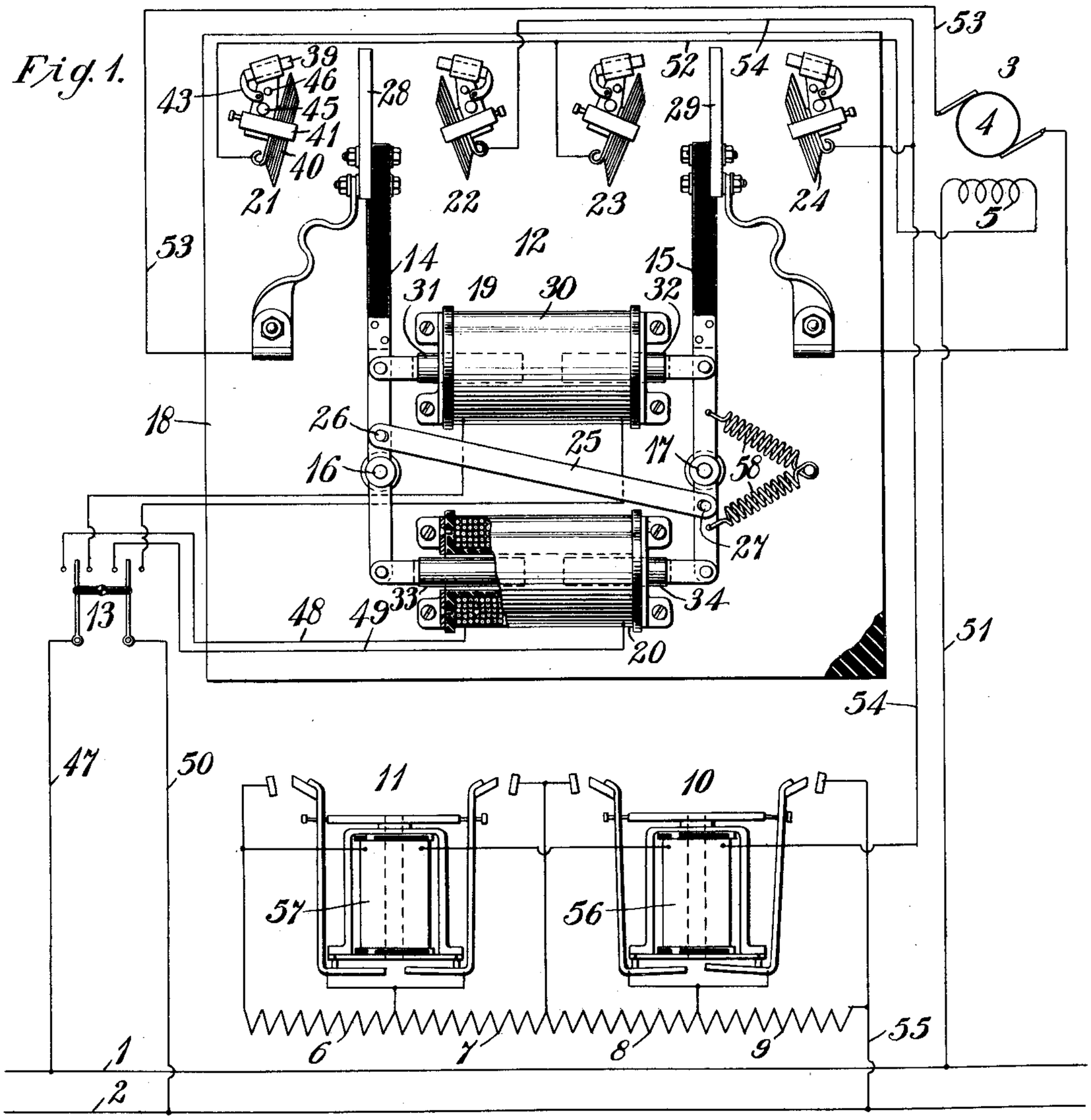


Fig. 2.

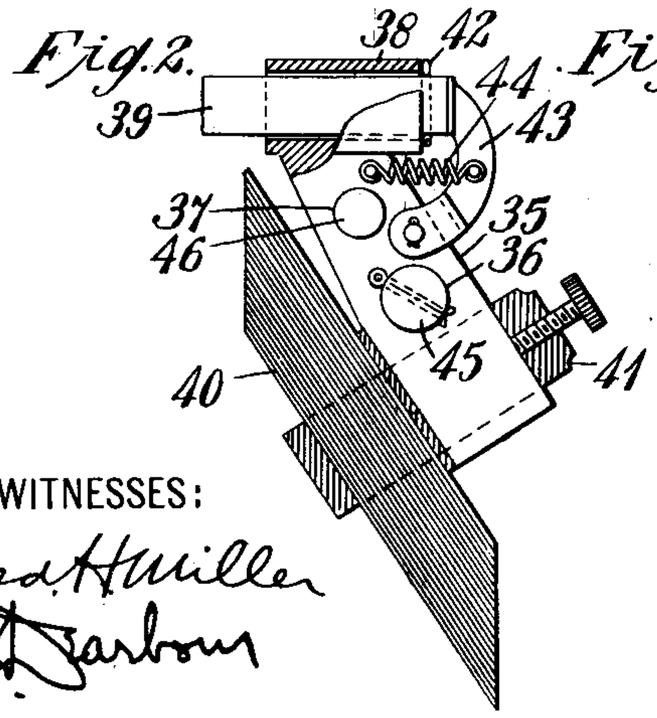
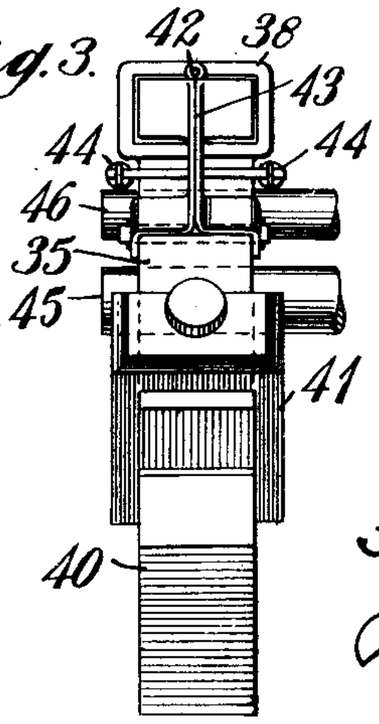


Fig. 3.



WITNESSES:

Fred. H. Miller

R. F. Barbour

INVENTOR

Harry A. Lewis

BY

Harley & Barr

ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY A. LEWIS, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

REVERSING-SWITCH.

1,155,157. Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed May 22, 1911. Serial No. 628,735.

To all whom it may concern:

Be it known that I, HARRY A. LEWIS, a citizen of the United States, and a resident of Norristown, in the county of Montgomery and State of Pennsylvania, have invented a new and useful Improvement in Reversing-Switches, of which the following is a specification.

My invention relates to electric circuit switching devices and controllers and it has special reference to reversing or directional switches which are adapted to govern the direction of rotation of electric motors.

The object of my invention is to provide a device of the class above indicated that shall be simple and durable in construction and that shall embody specially advantageous stationary switch contact members.

It has been my aim to produce a reversing switch or controller which may easily be mounted upon a switchboard panel and comprise particularly simple and durable moving parts.

In order to accomplish these results without impairing the operating characteristics of the device, I provide stationary switch contact members comprising a sliding carbon brush which makes contact first as the switch is closed and is disengaged from the moving contact member last as the switch is opened and a laminated brush contact member which carries the current under normal conditions.

The laminated brush contact member is reversible in its socket whereby its life may be materially prolonged, and the frame or holder for the brush contact member and the carbon contact brush is so mounted upon outwardly projecting studs that it may be easily removed and replaced.

Figure 1 of the accompanying drawings is a diagrammatic view of a control system embodying the reversing switch of my invention which is shown in a partially sectional elevation. Figs. 2 and 3 are, respectively a front elevation, partially in section, and a side view of the stationary switch contact member constructed in accordance with my invention and forming a part of the reversing switch of Fig. 1.

Referring to the drawings, electric current is supplied from any suitable source of energy through conductors 1 and 2 to an electric motor 3 having an armature 4 and a field magnet winding 5. The acceleration of the motor is governed by resistor sections 6, 7, 8 and 9 and magnet switches 10 and 11, and the direction of motor rotation is determined by a reversing switch 12 and a master switch 13.

The reversing switch 12 comprises a pair of contact-bearing arms 14 and 15 that are pivotally mounted, intermediate their ends, upon pins or studs 16 and 17 which extend outwardly from an insulating slab or base 18, actuating electromagnets 19 and 20 and stationary contact members 21, 22, 23 and 24.

The arms 14 and 15 operate synchronously by reason of a link 25 that is pivotally connected to the arms at points 26 and 27 which are at opposite sides of the pins 16 and 17 and are equally spaced therefrom. Movable contact members 28 and 29 are secured to corresponding ends of the respective arms 14 and 15 and are adapted to coöperate with the stationary contact members, as hereinafter pointed out.

The electro-magnet 19 comprises a coil 30, a pair of movable plungers or core members 31 and 32 which are drawn together at the center of the coil when the coil is energized. The electro-magnet 20 is similar to the magnet 19 but its movable core members 33 and 34 are pivotally connected to the lower ends of the arms 14, while the core members 31 and 32 of the magnet 19 are pivotally connected to the arms at corresponding points on the opposite sides of the pins 16 and 17.

The stationary contact members 21 to 24 are substantially alike, the members 21 and 22 being associated with the movable contact member 28 and the members 23 and 24 being associated with the movable contact member 29. One of the stationary contact members is shown on a larger scale in Figs. 2 and 3, to which reference may now be had.

The contact member here shown comprises a current-conducting arm or body member 35 having transverse holes 36 and 37 of unequal size, a hollow rectangular projection 38 constituting a box in which a carbon brush 39 is located and a laminated brush contact member 40 which is secured to the arm 35 by means of a clamp 41. The carbon brush 39 is provided with a cross pin 42 which limits its movement in the box 38 in one direction, and a pressure finger 43, which is pivotally mounted on the arm 35 and is forced against one end of the carbon brush by means of springs 44. The pin 42 is so

placed that the contact end of the brush 39 is materially beyond the contact end of the brush 40 and is yieldingly held in this position by means of the springs 44.

The switchboard panel or base 18 on which the parts of the reversing switch are mounted is provided with outwardly projecting pins or studs 45 and 46 which are so located as to be received by the holes 36 and 37 and support the stationary contact members in proper positions relative to the movable contact members.

By making the studs and the holes in the arms of unequal size, it is difficult to improperly mount the contact members on the switchboard, while, at the same time, the contact members may all be made interchangeable.

The accelerating switches 10 and 11 may be of any suitable structure and form no part of my present invention. Those illustrated constitute the subject-matter of my co-pending application, Serial No. 628,733, filed of even date herewith.

The operation of the reversing switch may best be explained in connection with the control system as a whole, and, assuming that the parts occupy positions shown in Fig. 1 of the drawing, if master switch 13 is moved to the left into circuit closing position *a*, a circuit will be established from line conductor 1 through conductor 47, one blade of master switch 13, conductor 48, coil of electro-magnet 20, conductor 49, the other blade of master switch 13 and conductor 50 to opposite line conductor 2. When energized, the electro-magnet 20 draws the lower ends of the reversing switch arms 14 and 15 toward each other and moves the contact members 28 and 29 in opposite directions into engagement with the stationary contact members 21 and 24. The motor circuit is then established from line conductor 1, through conductor 51, field magnet winding 5 of motor 3, conductor 52, contact members 21 and 28, conductor 53, armature 4 of motor 3, contact members 29 and 24, conductor 54, series coils 56 and 57 of magnet switches 10 and 11, resistor sections 6, 7, 8 and 9, and conductor 55 to line conductor 2.

The characteristics of the switches 10 and 11 are such as to automatically delay their action and cause them to gradually operate to successively short circuit the resistor sections 6, 7, 8 and 9. If the master switch 13 is moved to the right into circuit closing position, the coil 30 of magnet 19 is energized, instead of the corresponding coil of the magnet 20. Under these conditions, the contact members 28 and 29 will be moved toward each other into engagement with stationary contact members 22 and 23 and the motor circuit will be established as before, except that the current will traverse the motor armature 4 in the opposite direction. When the contact member 28, for example, moves into engagement with the stationary contact member 21, it first makes contact with carbon brush 39 and forces it backwardly in opposition to the spring 44 and finally engages the brush contact member 40. When the coils of the reversing switch magnets are deënergized, the arms 14 and 15 will be returned to the intermediate position in which they are shown in Fig. 1 of the drawings, by means of centering springs 58. In the separation of the stationary and movable contact members, since the movable contact member 28, for example, is disengaged from the brush contact member 40 prior to its disengagement from the member 39, no electric arcs are produced at this point and both contact members are maintained in good operating condition for an indefinite length of time. Finally, after the carbon brush 39 has followed the moving contact member until it reaches its limit of movement in this direction, as defined by the engagement of the pin 42 with the box 38, the circuit is interrupted between the contact members 28 and 39. In order to reduce the arcs at this point, blow-out magnets or some other suitable means may be employed, but as these devices are well known in the art, and form no part of my present invention, I deem it unnecessary to illustrate them.

My invention is not limited to the specific details illustrated in the drawing, and I desire that only such limitations shall be imposed as are indicated in the appended claim.

I claim as my invention:

A reversing switch comprising two sets of stationary contact members, a pair of pivotally mounted arms having contact members, means for insuring synchronous operation of said arms, centering means for the movable arms, an electro-magnet for moving the arms toward each other to effect engagement of their contact members with one set of stationary contact members, and an electro-magnet for moving said arms away from each other to effect engagement of their contact members with the second set of stationary contact members.

In testimony whereof, I have hereunto subscribed my name this 17th day of May, 1911.

HARRY A. LEWIS.

Witnesses:
G. CARROLL HOOVER,
R. W. MCGARREY.