No. 875,900. PATENTED JAN. 7, 1908.

A. C. EASTWOOD.

REVERSING SWITCH.

APPLICATION FILED APR. 19, 1906.

Fig. 1.

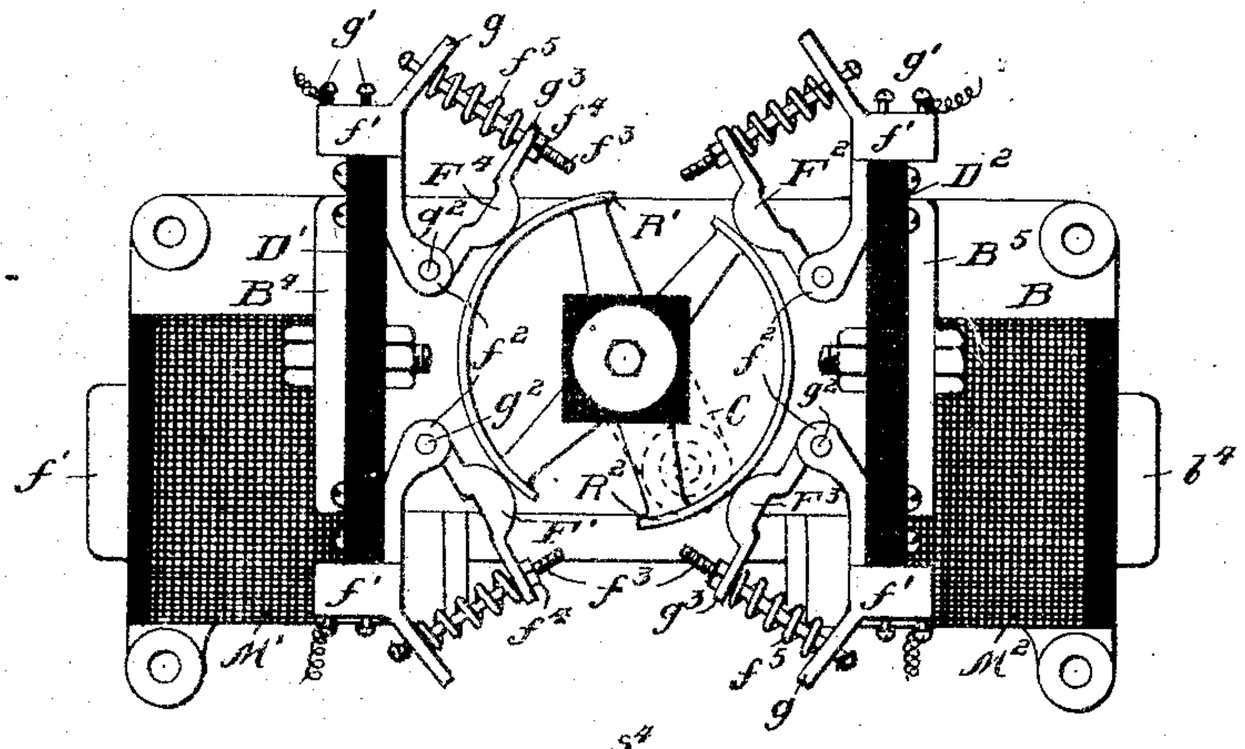


Fig. 2.

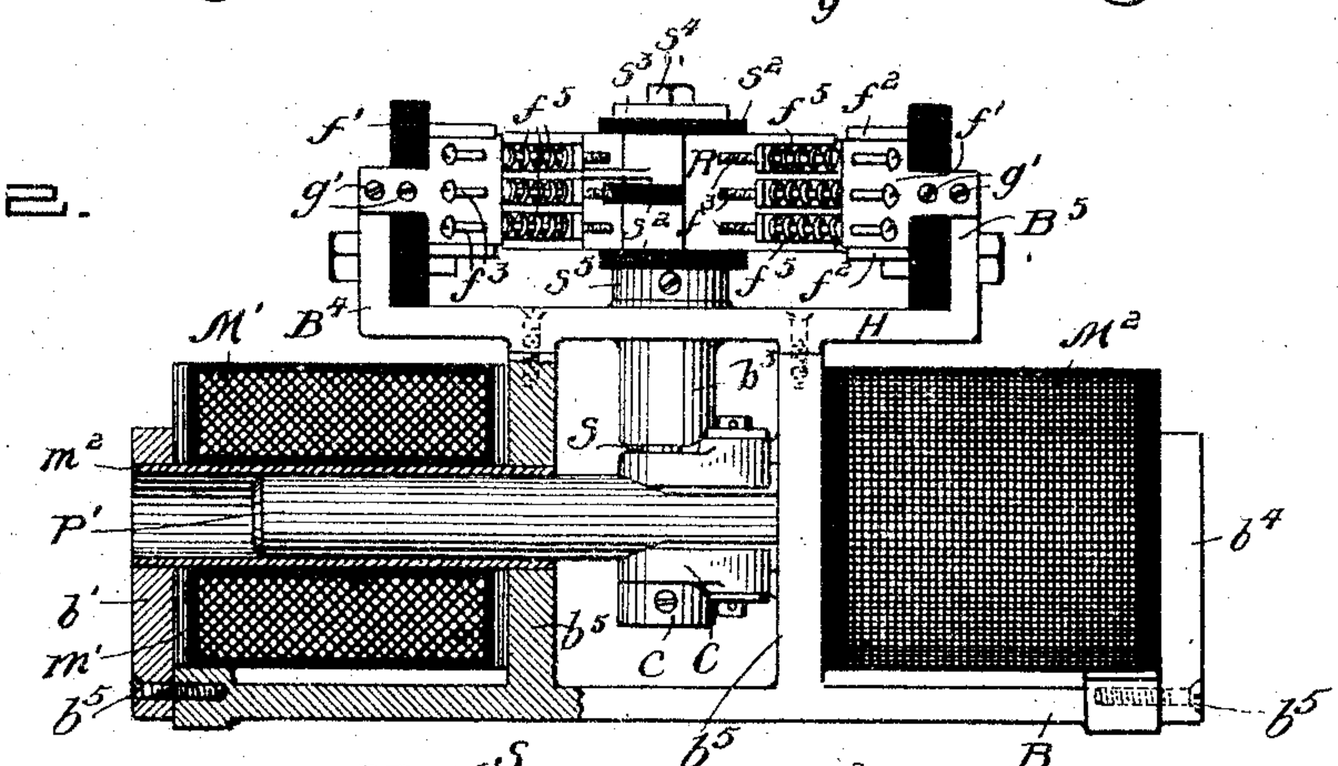


Fig. 3.

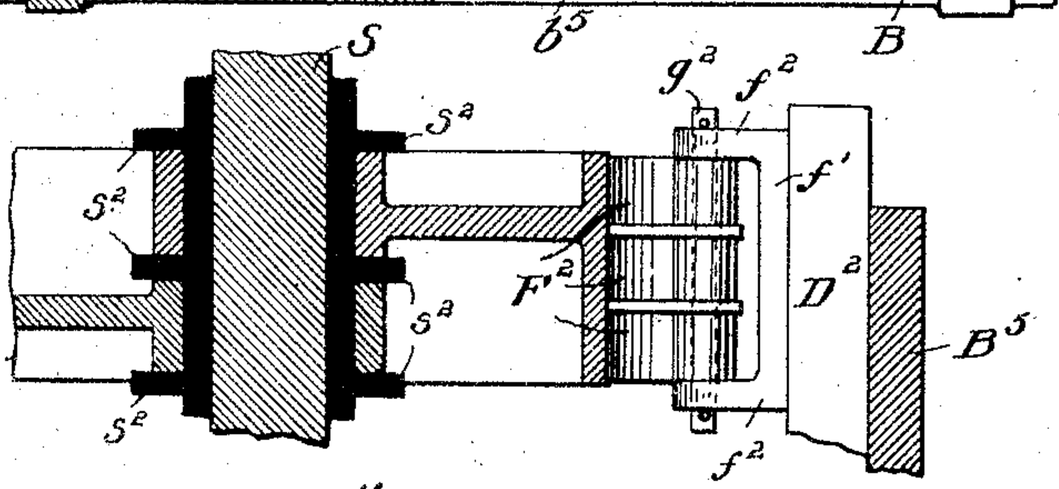
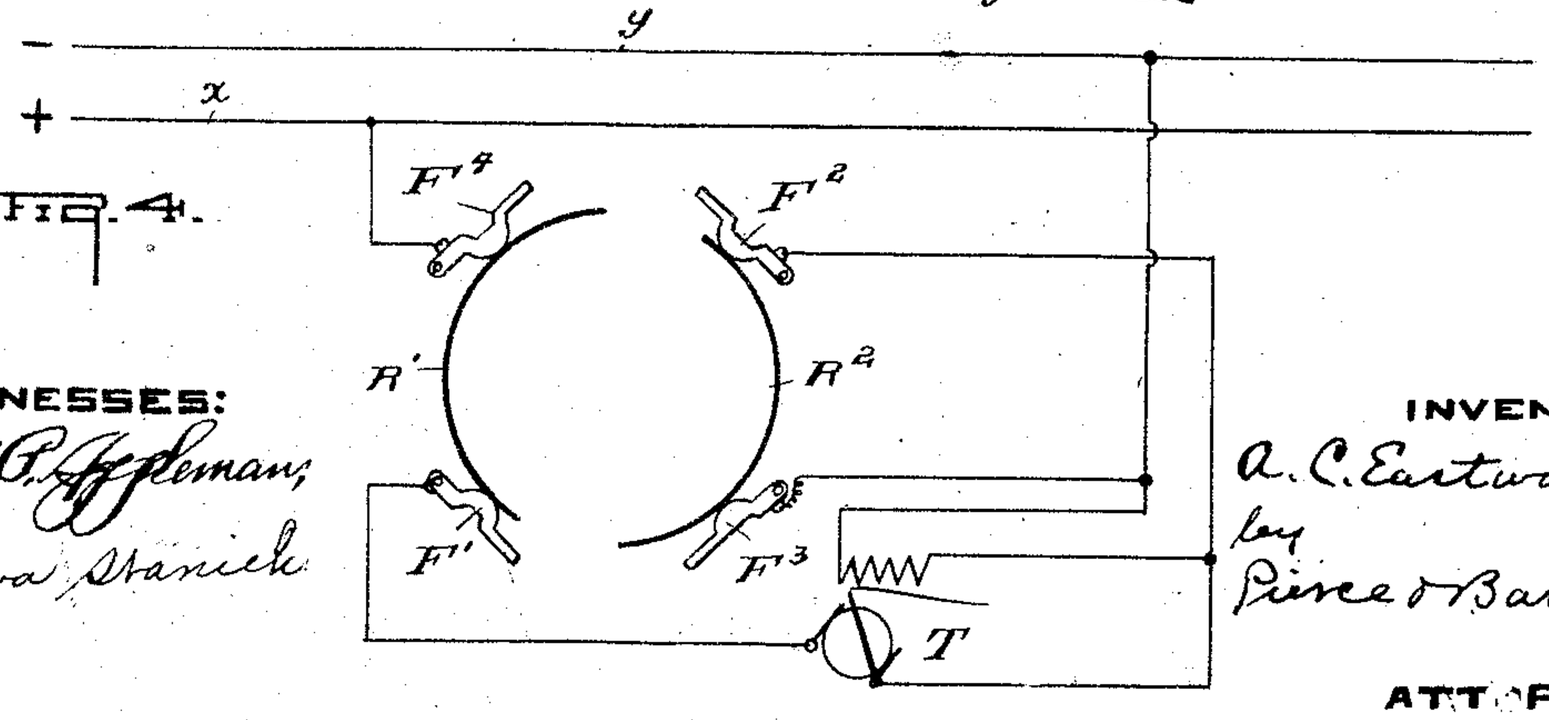


Fig. 4.



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ARTHUR C. EASTWOOD, OF CLEVELAND, OHIO.

REVERSING-SWITCH.

No. 875,900. Specification of Letters Patent. Patented Jan. 7, 1908.

Application filed April 19, 1906. Serial No. 312,613.

To all whom it may concern:

Be it known that I, ARTHUR C. EASTWOOD, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented or discovered new and useful Improvements in Reversing-Switches, of which the following is a specification.

My invention relates to a new and improved form of reversing switch, which may be advantageously used for reversing the direction of current flow through one of the elements of an electric motor, thereby reversing the direction of rotation of its armature, and which may be also employed with advantage for reversing the direction of current flow through other forms of translating devices.

The objects of my invention are to produce a reversing switch, which will be extremely simple in construction and operation; which will be so arranged that all of the switch members will be active when controlling the flow of current in either direction through the translating device in connection with which the reversing switch may be used; which will have a movable member of small inertia; in which parts differing in potential will be thoroughly insulated from one another; in which the various parts will be accessible for inspection and repair.

Referring to the accompanying drawings which illustrate a preferable form of my invention, Figure 1 is a top plan view; Fig. 2, a side elevation, showing in section one of the operating electro-magnets; Fig. 3, a vertical section through the central shaft and contact rings, portions being broken away; and Fig. 4, a diagram of the wiring for my switch.

On the drawings, F^1, F^2, F^3, and F^4 are groups of relatively stationary contact fingers, each group in the switch being made up of preferably a plurality of fingers, as shown in Fig. 2. The fingers in each group are carried in a metallic finger holder f^1, which is provided with a terminal lug g and two set-screws g^1 for receiving a connecting wire, and provided with eyes f^2, between which are pivoted the contact fingers carried upon a pin g^2 passing through the two eyes f^2. The contact fingers are each provided with an extension g^3 at their outer ends, through which passes an adjusting screw f^3, provided at its outer end with a nut f^4. The groups of contact fingers are arranged approximately 90° apart. Spiral springs f^5 press the fingers outward producing a yielding contact with the contact rings which coöperate with the fingers. It will be seen that the nut f^4 limits the motion of the contact fingers toward the axis of the rings.

The finger holders together with the contact fingers, which they carry, are mounted upon two plates D^1 and D^2 of insulating material, parallel with each other and with the shaft S, which carries the rotatable member of the reversing switch. The insulating plates D^1 and D^2 are carried by projecting lugs B^4 and B^5, which project from the iron framework H of the switch, and are preferably made of slate and so constructed that they afford excellent insulation between the various groups of contact fingers, at the same time serving to support the finger holders rigidly.

Two contact rings R^1 and R^2 are carried by the central shaft S, the periphery of these rings coöperating, as the shaft is revolved, with the contact fingers F^1, F^2, F^3, and F^4. These rings are light in construction, as illustrated in the drawings, each being made up of a central hub which surrounds an insulating sleeve s^1 on the shaft S and is provided with spokes supporting a rim which forms the contact surface of the ring.

As will be seen in Fig. 3, the peripheral face of one of the rings projects downward with reference to the central hub while that of the other projects upward, thus alining the contact faces of the two rings so that they will properly coöperate with the same contact fingers. The hubs of the contact rings are insulated from the shaft S (which is preferably of square section in that portion of it which is embraced by the hubs of the contact rings) by an insulating sleeve s^1 and the hubs are insulated from each other by insulating washers s^2. The hubs are clamped between a collar s^5 and the washer s^3, both on the shaft S, by means of the cap screw s^4, the hubs being insulated from these parts by the washers s^2.

The shaft S works in a bearing b^3 carried by the upper framework H of the reversing switch, the portion of the shaft S which enters the bearing being, of course, of round

section. A crank C is keyed or pinned to the lower end of the shaft S, the other end of this crank being connected with the plunger p^1 working in axial openings in the two electro-magnets M^1 and M^2. The crank is pivotally connected to the plunger between the magnets. The shaft S and the contact rings carried thereby may be readily removed from the bearing b^3 by merely removing or releasing the crank C, which may be readily accomplished after the collar c has been removed from the lower end of the said shaft. Each of these electro-magnets consists of a magnetizing coil m^1 mounted upon a tube m^2 of non-magnetic material, which lies between one of the outer standards b^1 and b^4 and one of the central standards b^5 to which the framework H is secured, these standards projecting from the base B of the switch. These standards as well as the base B are of magnetic material and form a portion of the magnetic circuits of the electro-magnets. The standards b^1 and b^4 are detachably secured to the base B by the screws b^5, so that the outer standards b^1 and b^4 may be readily detached to permit the removal of the coils of the electro-magnets without disturbing the other parts of the apparatus. It will be readily understood that the position of the plunger p^1 will be shifted by energizing one or the other of the electro-magnets M^1 or M^2, and, that this in turn will shift the position of the contact rings R^1 and R^2, carried by the shaft S. It will also be readily seen that by detaching the crank from the plunger, the plunger may be readily removed endwise through one of the tubes m^2.

In Figs. 1 and 2 of the drawings, the parts are shown in the relative positions which they would occupy, were the electro-magnet M^2 energized. It will be seen from inspection of Fig. 1 that in this position the contact ring R^1 connects the contact fingers F^1 and F^4, while the contact ring R^2 connects the contact fingers F^2 and F^3. When the electro-magnet M^1 is energized the position of the plunger p^1 will be shifted and will rotate the shaft S so that contact ring R^1 will connect fingers F^4 and F^2, while contact ring R^2 will connect contact fingers F^3 and F^1. In either position, the contact ring R^1 is always in contact with the finger F^4 and contact ring R^2 is always in contact with the diametrically opposite finger F^3.

If the two wires x and y from a source of current-supply be connected to two of the diametrically opposite fingers, such, for instance, as F^3 and F^4, and two wires leading to the translating device be connected to the diametrically opposite fingers F^1 and F^2, as shown in Fig. 4, and if the position of the contact rings is shifted by one of the electro-magnets, the connections of the supply lines to the lines leading to the translating device T, shown as a motor will be reversed, thereby reversing the direction of current flow through the translating device.

While I have shown the reversing switch actuated by two electro-magnets which may be energized from a suitable source of current by means of any suitable type of switch, it is evident that the reversing switch could be operated by hand by simply eliminating the electro-magnets M^1 and M^2 and attaching a suitable crank for rotating the shaft S by hand. I have also illustrated the reversing switch in a form which would be adapted to reversing the direction of current flow in a single translating device or motor T, such for instance, as the armature A thereof. It is evident that the direction of current flow through two or more translating devices might be controlled by the single pair of electro-magnets M^1 and M^2 by simply extending the shaft S and duplicating for each translating device the contact rings R^1 and R^2 carried thereby, at the same time extending the insulating plates D^1 and D^2 and duplicating the contact fingers carried by them. The contact fingers in each group may be more or less than three.

I claim as my invention—

1. In a reversing switch the combination of a rotatable shaft, a collar, or shoulder on said shaft, segmental contact rings carried by and insulated from said shaft above said shoulder, a bearing for said shaft below said shoulder, and a crank removably attached to said shaft below said bearing, the parts being so disposed that the shaft and contact rings which it carries may be readily removed when said crank is detached from said shaft.

2. In a magnetically operated reversing switch the combination of a shaft, contact rings carried thereby, a crank attached to said shaft, a plunger common to two electro-magnets attached to the free end of said crank, said electromagnets being open at both ends of their bore so that by detaching the crank from said plunger the plunger may be readily removed.

3. In a magnetically operated reversing switch the combination of a base plate of magnetic material, two standards of magnetic material extending at right angles to said base plate to either side of its middle point, a detachable standard of magnetic material at either end of said base plate, and two electro-magnets each mounted upon a central tube, the end of said tubes being supported in the standards carried by said base plate, whereby either of said electro-magnets may be removed by detaching the corresponding end standard without disturbing other parts.

4. In a reversing switch, the combination

of a rotatable shaft, contact rings carried thereby, and four groups of stationary contact fingers, coöperating with said rings, said stationary contact fingers being carried by two plates of insulating material, parallel with each other and with said rotatable shaft.

Signed at Cleveland, Ohio, this 16 day of April, 1906.

ARTHUR C. EASTWOOD.

Witnesses:
C. PIRTLE,
C. W. COMSTOCK.