No. 792,860. PATENTED JUNE 20, 1905.

A. SUNDH & D. L. LINDQUIST.

ELECTROMAGNET SWITCH.

APPLICATION FILED OCT. 27, 1904.

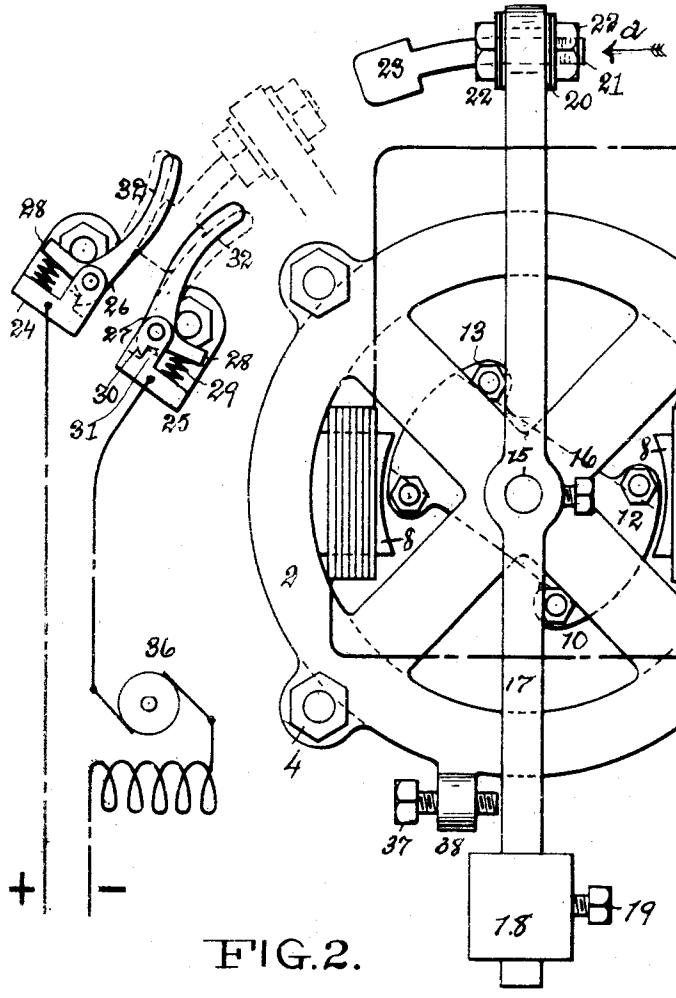

FIG. 1.

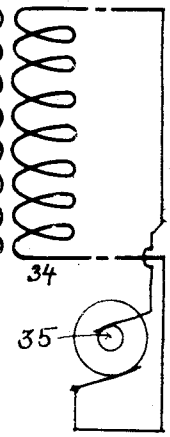

FIG. 2.

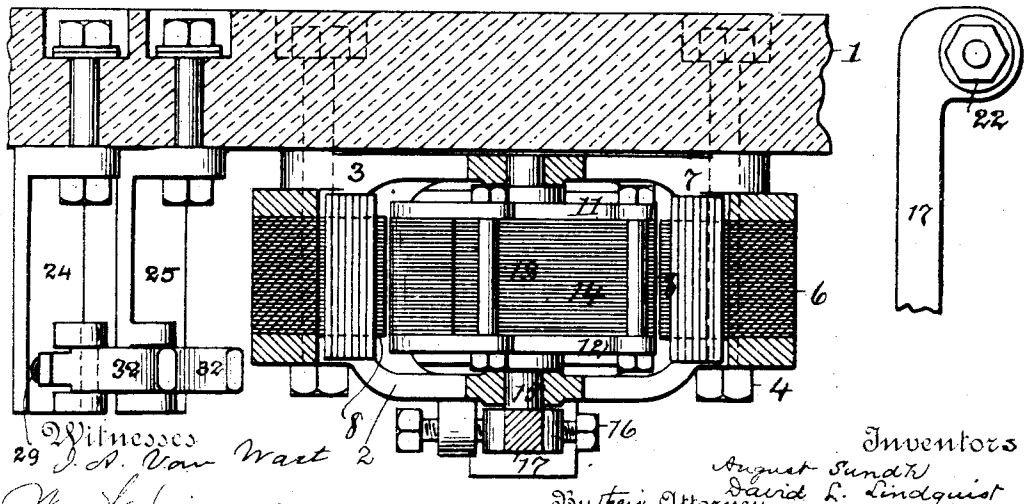

FIG. 3.

Witnesses
J. R. Van Wart
Wm. H. Siggman

Inventors
August Sundh
David L. Lindquist
By their Attorney
Carl Benjamin

No. 792,860. Patented June 20, 1905.

UNITED STATES PATENT OFFICE.

AUGUST SUNDH AND DAVID LEONARD LINDQUIST, OF YONKERS, NEW YORK.

ELECTROMAGNET-SWITCH.

SPECIFICATION forming part of Letters Patent No. 792,860, dated June 20, 1905.

Application filed October 27, 1904. Serial No. 230,268.

To all whom it may concern:

Be it known that we, AUGUST SUNDH and DAVID LEONARD LINDQUIST, of Yonkers, Westchester county, New York, have invented a new and useful Improvement in Electromagnet-Switches, of which the following is a specification.

The invention relates to an electromagnet-switch constructed to be operated by a single-phase alternating current without hammering or chattering of the armature being produced.

In another application for Letters Patent, Serial No. 230,266, simultaneously filed herewith, we have described and broadly claimed the combination, with a source of alternating current, of an electromagnet-coil energized thereby, an armature therefor constructed to be moved into a position of magnetic equilibrium, a circuit-closing device controlled by said armature, and a resilient abutment constructed to absorb the vibrations of said armature when in said equilibrated position due to current alternations in said coil.

Our present invention consists more particularly in the construction hereinafter set forth, whereby the resilient abutment aforesaid is at the circuit-terminal with which the circuit-closer or the armature makes contact; also, in the rotary armature and circuit-closer carried thereby; also, in the construction of the core, holding-frames, and armature; also, in the combinations pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of our device, the supporting base-plate being omitted and electrical connections being indicated diagrammatically. Fig. 2 is a transverse horizontal section. Fig. 3 shows the upper end of the armature-lever seen in the direction of the arrow *a*.

Similar numbers of reference indicate like parts.

1 is the supporting base-plate. 2 and 3 are circular frames secured thereto by bolts 4, passing through lugs 5. Between said frames is held a circular core 6 of laminated magnetic metal, having oppositely-placed concave pole-pieces 8, carrying electromagnet-coils 7. The armature 10 consists of two **I**-shaped plates 11 and 12, which by means of the bolts 13 clamp between them the laminations 14. The ends of the armature conform to the curvature of the pole-pieces 8, and the entire armature is supported on the shaft 15, which is journaled in the frames 2 and 3. The shaft 15 extends beyond the outer frame 2 and has secured to it by a clamping-screw 16 a lever 17, which at its lower end carries a weight 18, which may be moved along said lever and fastened in adjusted position by the set-screw 19. The upper end of the lever 17 is turned at right angles, as shown in Fig. 3, and the turned portion is internally threaded to receive the threaded sleeve 20. Through said sleeve passes a threaded rod 21, secured by nuts 22. Said rod is curved to conform to the circular path of movement of the lever end and at its extremity 23 is somewhat enlarged.

Fastened on the base-plate 1 is a spring contact-clip composed of the two brackets 24 25, each of which carries a pivoted bell-crank 26 27. Between the brackets and the lateral arms 28 of the bell-cranks are interposed helical springs 29, which operate normally to throw a toe 31 on each bell-crank against fixed stops 31 on the brackets, by which toes and stops the normal space between the inner convex surfaces of the long arms 32 of the bell-cranks is determined.

The electromagnet-coils are connected in series with a secondary coil 33, the primary 34 of which communicates with any suitable source 35 of alternating current. The brackets 24 and 25 are connected in any desired circuit, as indicated by the + and — conductors shown and the source of current 36 therein.

The operation of the device is as follows: The armature 10 is arranged to stand in an inclined position, as shown in Fig. 1, when there is no current in the coils, this being caused by the weight 18 on the lever 17. When alternating current is established in the coils, the armature is rotated to a horizontal position, and the lever 17 is thus swung to bring its circuit-closing extremity 23 between the arms 32 of the spring contact-clip, as shown in dotted lines, Fig. 1. The effect is to separate said arms against the resiliency of the springs 29.

It will be apparent, however, that by reason of the curvature of the inner surfaces of said arms and the extent of movement of the circuit-closing extremity 23 into the space between them said extremity may be drawn out for a considerable distance without breaking contact with said arms, the springs 29 causing said arms to close in upon said extremity despite its change of position. As a consequence, although the alternating current may cause a certain small oscillation of the armature and a resulting movement of the extremity 29, the arms 32 will be caused by their springs nevertheless to maintain contact with said extremity.

The adjustable stop 37, arranged in a lug 38 on frame 2, serves to limit the movement of the armature-lever and also to adjust the normal inclination of the armature to the longitudinal axis of the pole-piece.

Particular attention is called to the fact that the armature never comes in contact with either magnet-pole and when in attracted position does not come in contact with any rigid or unyielding abutment. On the contrary, its only abutment is then the yielding arms 32, which are controlled by the springs 29, so that the springs ultimately receive the thrust of the armature due to the magnetic pull and also absorb the vibrations of said armature due to current alternations in the magnetic coil.

We claim—

1. A source of alternating current, an electromagnet-coil energized thereby, an armature pivoted in the field of said coil and rotatable thereby to a position of magnetic equilibrium, a resilient body wherewith said armature establishes contact when rotated to said position, and a circuit-closer controlled by said armature; the said resilient body being constructed to take up the vibrations of said armature due to current alternations in said coil.

2. A source of alternating current, two electromagnetic coils energized thereby, an armature pivoted between the polar extremities of said coils and rotatable on the pivot to a position of magnetic equilibrium, a spring circuit-terminal and a circuit-closer carried by said armature and establishing circuit with said terminal when said armature is rotated to said equilibrated position; the said spring-terminal being constructed to take up the vibrations of said armature due to current alternations in said coils.

3. A source of alternating current, an electromagnet-coil energized thereby, an armature movable by said coil into a position of magnetic equilibrium, a circuit-closer carried by said armature, two circuit-terminals disposed in the path of said circuit-closer and receiving the same between them to close circuit, and resilient bodies combined with said terminals and constructed to hold the same in contact with said circuit-closer and to take up the vibrations of said armature due to current alternations in said coil.

4. A source of alternating current, two frames of magnetic material, a laminated core between said frames having oppositely and inwardly facing pole-pieces, electromagnet-coils on said pole-pieces, an armature, a pivot-shaft journaled in said frames and supporting said armature between said pole-pieces, a lever carried by said shaft, a circuit-closer carried by said lever, a circuit-terminal and means for retaining said circuit-closer in contact with said terminal independently of the movement of said circuit-closer due to armature vibrations produced by current alternations in said magnet-coils.

5. A source of alternating current, two frames of magnetic material, a laminated core between said frames having oppositely and inwardly facing pole-pieces, electromagnet-coils on said pole-pieces, an armature, a pivot-shaft journaled in said frames and supporting said armature between said pole-pieces, a lever carried by said shaft, a weight carried by said lever and adjustable thereon, a circuit-closer carried by said lever, a circuit-terminal and means for retaining said circuit-closer in contact with said terminal independently of the movement of said circuit-closer due to armature vibrations produced by current alternations in said magnet-coils.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

AUGUST SUNDH.
DAVID LEONARD LINDQUIST.

Witnesses:
WM. H. SIEGMAN,
I. A. VAN WART.