No. 868,230. PATENTED OCT. 15, 1907.

L. H. THULLEN.

ELECTROMAGNETIC DEVICE FOR USE IN CONNECTION WITH RAILWAY APPLIANCES.

APPLICATION FILED MAR. 18, 1905. 2 SHEETS—SHEET 1.

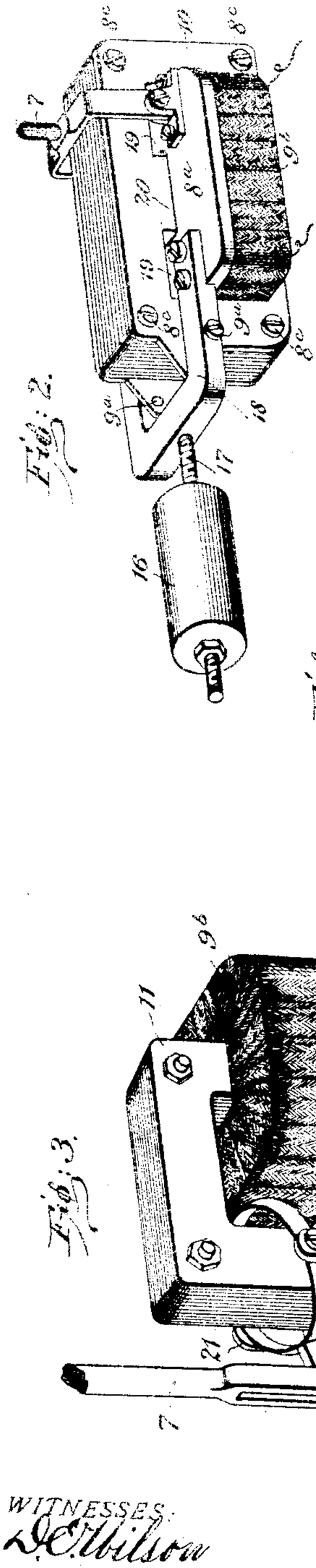

Fig. 2.

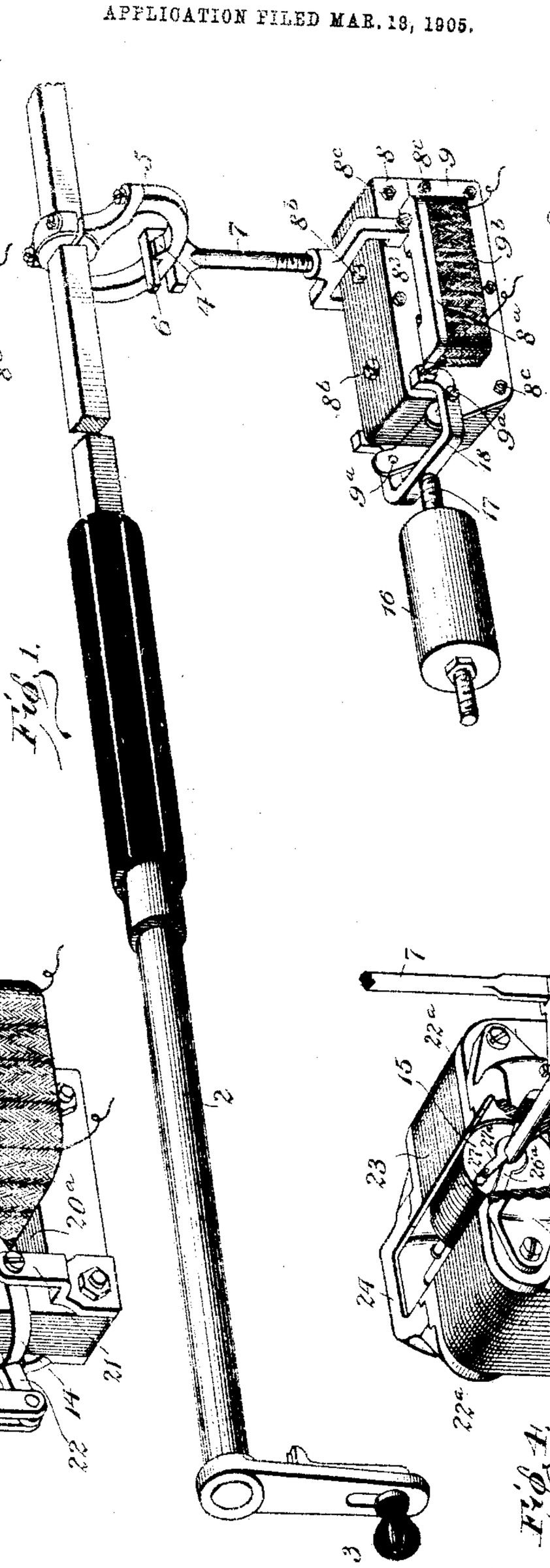

Fig. 1.

Fig. 4a.

Fig. 3.

Fig. 4.

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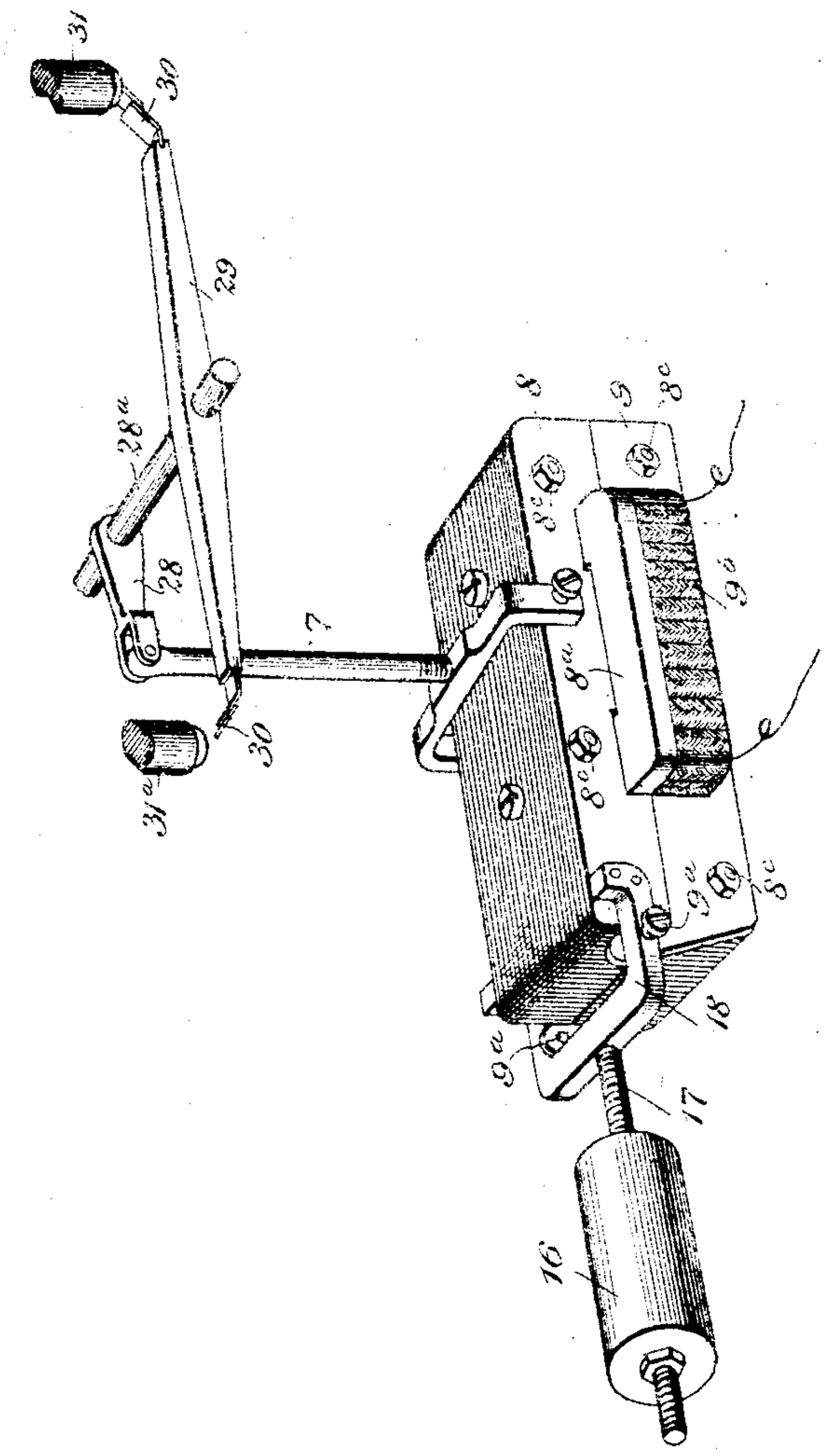
Fig. 5.



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ELECTROMAGNETIC DEVICE FOR USE IN CONNECTION WITH RAILWAY APPLIANCES.

No. 868,230. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed March 18, 1905. Serial No. 250,759.

To all whom it may concern:

Be it known that I, LOUIS H. THULLEN, of Edgewood Park, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electromagnetic Devices for Use in Connection with Railway Appliances, of which the following is a specification.

My invention relates to electro-magnetic devices for use in connection with railway appliances.

In the drawings I have shown two applications of my invention, one in connection with a lever of an interlocking machine and the other in a relay device. In the application of the invention to a lever of an interlocking machine, it is comprised in the "indication mechanism." As is well known, these levers control apparatus for governing the passage of cars or vehicles along a railroad. The said apparatus may be of any of the ordinary or usual types, which employ an electric motor, the supply of current for the electric motors being controlled from the levers of the interlocking machine which is generally arranged within a cabin or tower located at a distance from the apparatus. As stated, each of the levers is provided with a mechanism known in the art as "indicating mechanism." Each "indicating mechanism" is actuated when required to release its lever so as to permit the lever to be moved to a final position, and release, through what is known as "mechanical interlocking," another lever or levers which control other apparatus for operating other signal devices or switch rails. Each lever has a preliminary movement, whereby the circuits controlled thereby are arranged to supply current to the switch or signal apparatus to have it move the switch rails or signal into proper position. The preliminary movement of the lever is limited and when the switch rails or signal shall have been fully moved current is supplied to the "indicating mechanism" to have it release its lever so that the lever may be moved to its final position. It is desirable and advantageous, that the current employed for operating the motor of the switch or signal apparatus be of one character and that a current of a different character be employed for operating the indication mechanism, in order that false indication may be avoided, due to possible crosses between the operating or other wires, or to other and extraneous causes. In the present instance, unidirectional current is preferably employed for the motor of the switch or signal operating mechanism, and an alternating current derived from any convenient source of supply is used for affecting the operation of the indication mechanism.

I will describe an indication mechanism embodying my invention, together with several variations or modifications thereof, and then point out the novel features in the claims.

In the accompanying drawings, Figure 1 is a perspective view of one of the levers comprised in an ordinary interlocking machine, said lever being removed from the machine and having an indicating mechanism embodying my invention. The interlocking lever is shown in locked position after a preliminary movement. Figs. 2, 3 and 4 are respectively, perspective views of modified forms of an indicating mechanism embodying my invention, the interlocking lever being omitted. Fig. 4^a is a detail perspective view of the movable part of the indication mechanism shown in Fig. 4, partly broken away to show its construction clearly. Fig. 5 is a perspective view of an electromagnetic device embodying my invention and embodied in a relay device. The form of device shown is substantially the same as the form of device shown in Fig. 1.

Similar reference numerals indicate corresponding parts in all the figures of the drawing.

Referring to said drawings: 2, designates a "lever" of an interlocking machine usually employed in connection with motor operated apparatus for switches and signals. It is provided at one end with a suitable handle 3, whereby it is given rotation in either direction. This lever has connected to it the various and usual adjuncts (not shown) such as contact springs, connections with the mechanical interlocking. As shown in Fig. 1, the lever 2 has been turned to the limit of its preliminary movement, bringing a stop or projection 4 on the quadrant 5, into engagement with a yoke 6, provided on the end of a rod or stem 7, the latter forming the "lock" of the indicating mechanism. The quadrant 5, is adjustably secured to the lever 2, and the lever is held from movement by the projection 4 and yoke 6 (the "lock") until the switch rails or signal have fully completed their movement and the indication current energizes the electro-magnetic device of the indication mechanism, thereby causing it to lift the yoke 6 above the stop or projection 4 (actuate the "lock") to permit of the further and final movement of the lever 2.

The electro-magnetic device of the indication mechanism shown in Fig. 1, comprises a core and two coils, 9^b and 8^a, one of which, 9^b, I term the energizing coil, and the other the movable coil. The core is made up of two sets of substantially E-shaped laminations 8 and 9 pivotally connected together at one of their ends as represented at 9^a, so as to permit them to move away from, and close in upon each other during the presence in, or absence of current in the coil 9^b. The E-shaped laminations are oppositely arranged to form what may be termed two end legs and a middle leg. The core may be made from a single set of laminations 10, 11 or 12, as shown in Figs. 2, 3 and 4. The middle leg of one set of laminations (9) is inclosed by

the coil 9^b properly insulated therefrom, while the middle leg of the other set of laminations (8) is surrounded by the movable member which preferably comprises a copper ring 8^a forming a closed circuit. The ring 8^a may be secured to the lamination 8, by suitable screws 8^b or in any other desired or convenient manner, and the laminations themselves may in each instance be secured together by means of the transverse bolts and fastening nuts 8^c as shown—or otherwise. The rod or stem 7 is connected to one or the other lamination 8 or 9 according to which direction it is desired to impart positive movement to the stem 7.

During the absence of current in the coil 9^b, the laminations 8 and 9 will close upon each other by gravity, and the stem or rod 7, which is pivotally secured to the upper member 8, will keep the yoke 6 in position to be engaged by the stop 4, on the quadrant and thus prevent a final movement of the lever. An alternating current traversing the coil 9^b produces an alternating magnetic flux through the core which in turn induces a current in the ring 8^a, and the current induced in the ring 8^a produces an alternating flux in the core which is in opposition to the flux produced by the coil 9^b, and these two opposite fluxes act to repel each other and thus cause the laminations 8 and 9 to separate or move apart. A counter-balance may be provided as shown, for the purpose of compensating for the weight of the stem or rod 7 and core member 8, so that when an alternating current is flowing in the core 9^b less resistance will be offered to the separation of the laminations 8 and 9 and the upward movement of the yoke will be the more easily accomplished. This counter-balance takes the form of a weight 16, which is adjustably secured to a rod 17, the latter, which projects from, and may form part of, a yoke 18, is fastened to the upper core [illegible], and pivotally secured to the lower core member 9, the pivot thereof forming appropriate hinges upon which said core members swing.

In Fig. 2 the construction is very much similar to that just described, except that the core is not made up of separate members but is formed out of a single set of laminations having openings 19 therein to receive the coil 9^b, which is wound around the middle leg 20, between the openings 19 in the laminations. The ring 8^a is free of the core and moves relatively to the coil 9^b when the latter is energized. The counter-balance which is similar in every respect to that just described with reference to Fig. 1 is fastened directly to the annulus 8^a, being likewise pivotally secured to the laminations, as represented at 9^a. The stem 7 is pivotally connected with the annulus 8^a. When an alternating current is induced in the annulus 8^a and a field is produced thereby, in opposition to the field produced by the coil 9^b, the annulus, which is free to move on its pivots, will lift the stem 7. The yoke will thus be lifted above the stop 4, and a final movement of the lever permitted.

In Fig. 3 the core is also made up of a single set of laminations having a centrally disposed opening 20^a. The coil 9^b, as shown, is wound around one leg of said core. The movable member in this form of the invention is here shown as a ring 14, which surrounds the leg opposite that on which primary 9^b is wound, being pivotally secured thereto, or to suitable brackets 21, as shown. An arm or extension 22, on the ring 14 connects with the lower end of the stem or rod 7, and during the absence of current the ring will normally assume an inclined position. The current induced in the ring 14 by the flux in the core 11, produces a field of opposite polarity to that in the core, and causes the ring 14 to assume a horizontal position. In moving to its horizontal position the stem or rod 7 would thus be lifted and the yoke 6 raised above the stop 4, on the quadrant 5, thereby permitting of a final movement of the lever.

In Fig. 4 the movable member is rotatively mounted between plates. The core laminations 23 of the core 12 are C-shaped to form poles between which the movable member is mounted. This mounting is accomplished by means of brackets 24, in which latter the shaft carrying the movable member is journaled. The coil 9^b is placed on the core as shown. The movable member comprises a cylinder or drum 15, through which rods 26 and 27, are passed in a lengthwise direction, which, project sufficiently beyond the ends of the drum or cylinder to receive connecting bars 26^c and 27^a that cross each other, the bars 26^a connecting the rods 26 together and the bars 27^a connecting the rods 27 together. In this manner closed copper circuits are formed. These rods are so disposed with relation to the primary core that when in their normal position—or during the absence of current in the coil 9^b they will lie in a position equi-distant from an imaginary line struck from the center line of the shaft at an angle of 45 degrees, or approximately 45 degrees. They are moved to this position through the medium of the weight of the stem 7, which is pivotally connected to the free end of an arm 15^a, secured to the shaft carrying the drum 15. The yoke 6, at the upper end of the stem or rod 7, is thereby kept in its lowermost position, directly in the path of travel of the stop 4, on the quadrant—and the lever is in consequence prevented from being given a final movement.

An alternating current flowing in the coil 9—7 produces an alternating flux in the core, which passing through the movable drum 15 induces an alternating current in the closed circuits. The flux generated by the induced currents in the closed circuits tend to set themselves at right angles to the flux in the core. Thus the drum 15 will be given limited rotation, and during this rotative movement the stem 7 will be lifted to remove the yoke 6, from the path of travel of the stop 4 on the quadrant, and thus permit of a final movement of the lever.

The construction shown in Fig. 5 is similar to that shown in Fig. 1, but stem 7 is pivotally connected to an arm 28, secured to a rock shaft 28^a, which supports an armature plate 29, the latter having at each end suitable contacts 30, adapted to engage and disengage the respective poles 31, 31^a, of the relay magnets during the absence or presence of current in the primary and secondary cores of the controller device. As the operation, in this instance, is practically the same as that of Figs. 1 and 2, it need not be further or more specifically described, and as the current for operating the indication device may be derived from any source, I have also deemed it unnecessary to go further into the details thereof as any appropriate source of supply may be used with any of the constructions shown.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An indicating mechanism for a lever of an interlocking machine, comprising a core, a coil designed to be traversed by an alternating current, a movable member inclosing a portion of said core and a stem connected with said movable member.

2. An electro-magnetic device for railway appliances comprising a core, a coil for said core designed to be traversed by an alternating current to produce an alternating flux in said core, a closed magnetic circuit mounted to be cut by the flux of said core and to have one position relatively to said core when said coil is deënergized and a different relative position when the coil is energized, and a part connected with said closed circuit and adapted to be moved upon a movement of said closed circuit.

3. An electro-magnetic device for railway appliances comprising a core, an energizing coil therefor designed to be traversed by an alternating current, a closed conductor pivotally mounted with respect to said core and adapted to have induced in it an alternating current by the alternating flux produced in the core by the coil, and a stem connected with said closed conductor.

In testimony whereof I have signed my name to this specification in the presence of two subscribed witnesses.

LOUIS H. THULLEN.

Witnesses:
W. L. McDaniel,
James Chalmers, Jr.