Nov. 12, 1929. A. C. J. GUÉNÉE 1,735,753

ELECTROMAGNETIC RAILROAD SWITCH OPERATING DEVICE

Filed March 9, 1928 2 Sheets-Sheet 1

Fig. 1

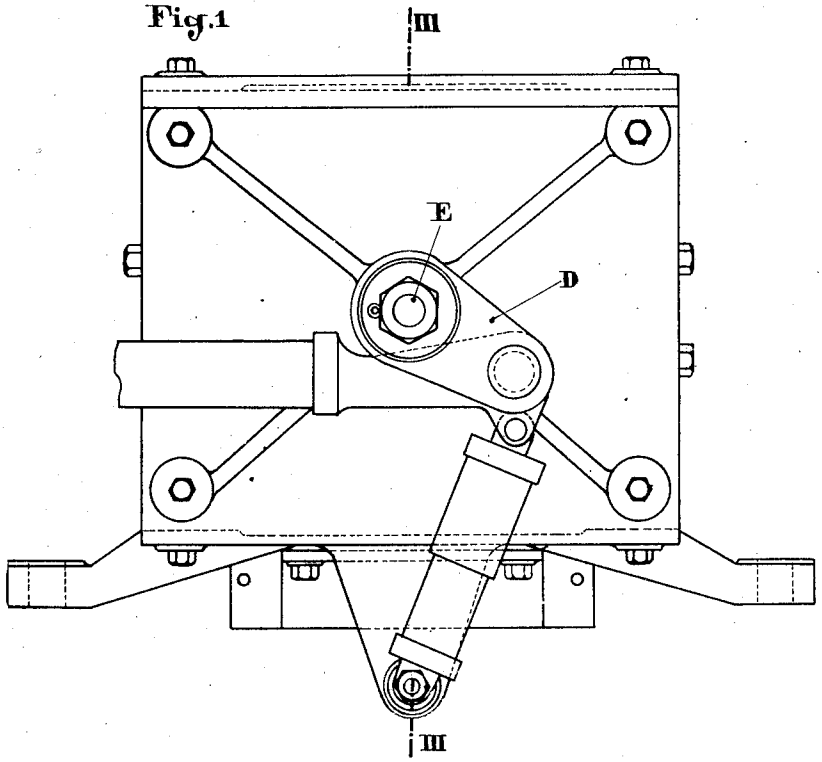
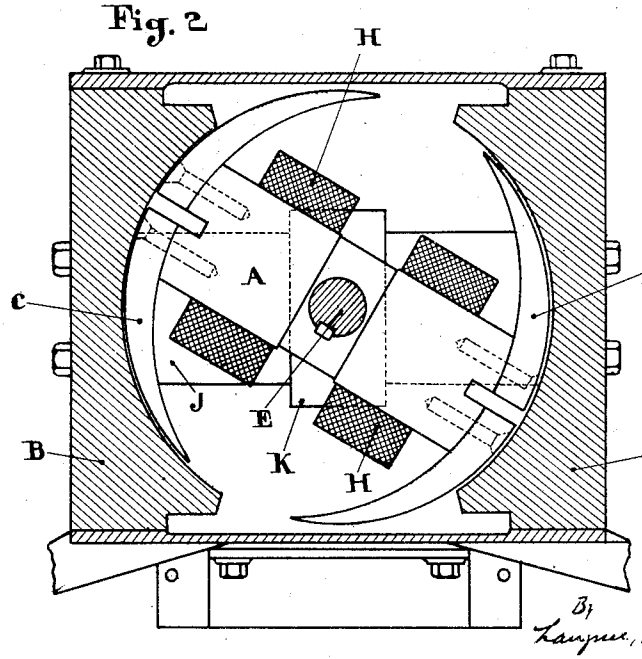


Fig. 2



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Fig. 3

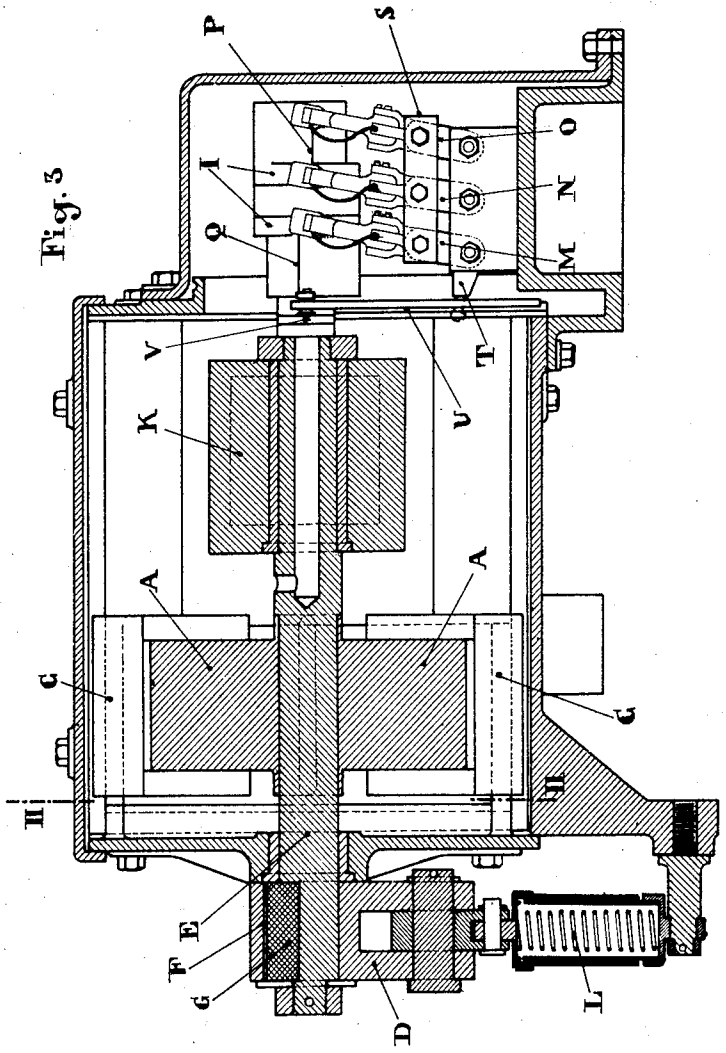
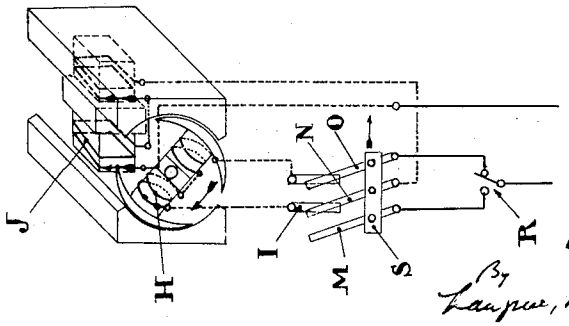


Fig. 4



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UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC RAILROAD-SWITCH OPERATING DEVICE

Application filed March 9, 1928, Serial No. 260,400, and in France March 11, 1927.

The present invention has for its object various improvements in electromagnetic railroad switch-operating devices. The improved device is very sturdy and simple in construction and can be manufactured at low cost.

The present device includes a stationary electro-magnet, the windings of which are energized by a current sent always in the same direction, and a rotatable electro-magnet, the windings of which are energized in one direction during one travel of the moving parts and in the reverse direction during the next travel, i. e. in reverse directions after each switching operation. This arrangement simplifies the apparatus as the same members are used to produce the movements in either directions.

The nucleus of the rotatable electro-magnet is keyed upon and rotates about a shaft and carries the windings through which passes the current, the direction of which is automatically reversed at the proper moments by the apparatus itself, which makes it possible to use a plain switch for operating the device. The apparatus as a whole works more or less as an electrical motor, but in the present case, the torque at every point of the rotation of the armature depends upon the shape of the iron of said armature, the maximum torque being obtained at the beginning of the rotation whatever its extent. This torque depends upon the particular shape of the armature, the result of this particular shape causing the degree of saturation of the iron of the rotating armature to vary at the different points of the rotation beyond the stationary poles.

This result can also be obtained by modifying the radial distance between the pole-shoes of the rotatable armature and the pole-shoes of the stationary field magnet, but the results are inferior to those obtained by the above mentioned contrivance.

The shaft, on which is keyed the rotatable armature operates a crank to actuate the operating rod of the railroad switch.

There is a certain lag between the movement of the crank and that of the shaft, so that the movement of the switch may end independently of the movement of the rotatable armature, in order that the circuit may be broken towards the end of the stroke.

The end of the rotation of the moving parts and consequently the end of the stroke of the point is ensured by means of a spring which at the same time acts as a locking device.

A current switch, adapted to effect automatically the necessary commutations for reversing the current in the winding of the rotatable armature, is provided with three contact brushes which are moved at the end of the rotation of the moving parts by a cam keyed upon the shaft of the apparatus, said cam being adapted to displace the group of the three contact brushes in order to change their position upon the two contact rings connected to the winding of the rotatable armature.

The current is broken smoothly and by simple arc-blowing in order to avoid great excesses of voltage at the terminals of the device. In order to avoid any damage of the contacts by the spark on opening, the outer contact brushes place themselves slightly closer to the axis of the moving parts at the same time as the contact is broken. The contact breaking surfaces are thus not the same as the operating contacting surfaces. A gradient allows the brush which is to work at the next switching to raise to the level of the ring that ensures the contact during the rotation.

During the whole time of the contact breaking the armature continues to rotate. At the end of this movement, there is a certain play between the crank and the driving shaft. When the current is started for the reverse working, the device works idle at first and then the key carries along the crank. There is a slight shock which suffices to overcome the resistances which may set in upon starting the displacement of the point.

The crank swings to such an extent that its obliquity in respect to the operating rod makes it possible to maintain the point at rest at the limit of its movement with a slight effort and to keep it nevertheless locked. Another result of this obliquity is to lessen the speed of the point and of the rotatable armature, and to damp thereby the shocks at the end of the stroke.

The accompanying drawings illustrate an embodiment of the improved device which is the object of this invention.

Figure 1 is a side view of said device.

Figure 2 is a section taken on the line II—II of Figure 3.

Figure 3 is a section taken on the line III—III of Figure 1, the moving parts being shown in a position where the projection of the axis of the spring falls in line with III—III.

Figure 4 is a connection diagram.

In the accompanying drawing, A is the iron core of the rotatable armature of the device, the ends of the cores having the shape of shoes C. The shoes of the field magnet are shown at B. The cross section of the shoes C is such, that the saturation of the iron being attained, the useful torque is determined by the relation of the derived flux to the saturated portion of the iron.

The core A of the rotatable armature is keyed upon a shaft E which carries a crank D on the outside of the casing. This crank is free to move to a certain angle about the shaft E, this angular displacement being limited by a notch F in which the key G fixed upon the shaft E is free to move to a certain angle. The winding H around the core A is connected to two rings I. The shaft E of the moving parts passes through the core K of the field magnet, this core being connected with the stationary pole-shoes B. The core K is provided with winding J.

The crank D is locked at the end of the travel by means of a spring L.

The contact levers M, N, O, which carry the brushes, form, with the two contact rings I, a commutator which reverses the current in the winding H. Of these three contact levers, the levers M and O alternately break the contact, while lever N effects the commutation proper.

The cams P and Q provided with a flat insulated portion are fixed alongside of the rings I upon the shaft E and have a gradient which brings the levers N and O back to the level of said rings I. The operation of the switch by the man in charge is effected by a single pole commutator R connected with one pole of the current supply, said commutator conveying the current either to the brush of lever M or to the brush of lever O. The other pole of the current supply is connected with the field winding J which is itself connected with the brush of lever N. The winding H is connected with the rings I.

The change of position of the three contact levers M, N and O carrying the brushes and pivoted at their lower end is effected by a small operating rod S pivotally connected with each of the levers, so that any movement of lever M effects also the same movement of the levers N and O. The lever M has at its end an extension T on which is pivoted a small connecting rod U. The upper end of this rod receives at the end of each travel of the rotatable armature a shock of a cam V or the like which is in rotating engagement with the shaft E.

The dimensions, sizes and arrangements of the different parts forming the device of which an embodiment has just been described may vary without departing from the scope of this invention.

What I claim is:

1. An electro-magnetic railroad switch-operating device, comprising, in combination with a stationary field magnet including pole shoes and which magnet is energized by a current of unchanging direction, and an electro-magnet mounted to rotate between said pole-shoes and energized by the same current as the stationary field magnet, the rotary electro-magnet embodying crescent shaped pole shoes whereby the iron of the core of the rotary magnet is completely saturated at the portions entering between the pole-shoes of the stationary magnet.

2. An electromagnetic railroad switch-operating device as claimed in claim 1, wherein a commutator provided with two rings is secured to the shaft of the rotatable electro-magnet and is connected with the winding of said electro-magnet, three pivoted brushes co-operating with said rings, and cams co-operating with the brushes to raise one of the three brushes to the level of the rings and to coact therewith at the end of the travel of the electro-magnet.

3. An electro-magnetic railroad switch-operating device as claimed in claim 1, including a switch, a crank keyed with play, upon the shaft of the rotatable electromagnet, and link means connecting the crank with the operating rod of the switch.

4. An electro-magnet railroad switch-operating device, comprising, in combinaton with a stationary field magnet including pole shoes and which magnet is energized by a current of unchanging direction, an electro-magnet mounted to rotate between said pole-shoes and energized by the same current as the stationary field magnet, the rotary electro-magnet embodying crescent shaped pole shoes whereby the iron of the core of the rotary magnet is completely saturated at the portions entering between the pole-shoes of the stationary magnet, a commutator including three pivoted brushes, a rod connecting said brushes, a connecting rod, one of said brushes being extended and hinged to said connecting rod, a cam fixed upon the shaft of the rotary electro-magnet, and rings upon the cam, the brushes coacting with the rings, the connecting rod having operative connection with the cam to rotate the same and the rings thereon.

5. An electro-magnet railroad switch-operating device, comprising, in combination with

a stationary field magnet including pole shoes and which magnet is energized by a current of unchanging direction, an electro-magnet mounted to rotate between said pole-shoes and energized by the same current as the stationary field magnet, the rotary electro-magnet embodying crescent shaped pole shoes whereby the iron of the core of the rotary magnet is completely saturated at the portions entering between the pole shoes of the stationary magnet, a switch, a crank, keyed with play, upon the shaft of the electro-magnet, link means operatively connecting the crank with the movable member of the switch, and a spring to lock the crank, linked with the movable member of the switch to hold the member in the limit positions of its movement.

In testimony whereof he has signed his name to this specification.

ALBERT CHARLES JAMES GUÉNÉE.