May 7, 1929. H. J. J. M. DE R. DE BELLESCIZE 1,711,926

HIGH SPEED RELAY

Filed Aug. 17, 1922

Fig. 1

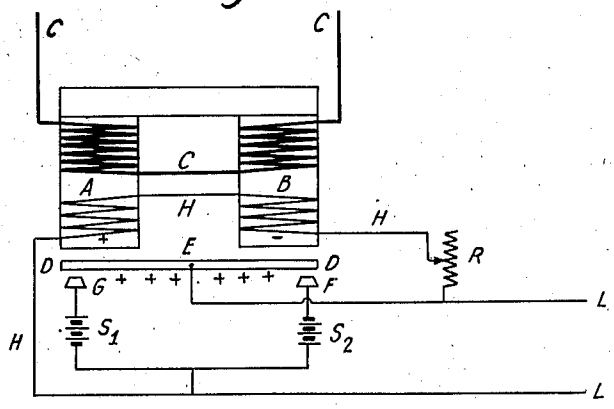


Fig. 2

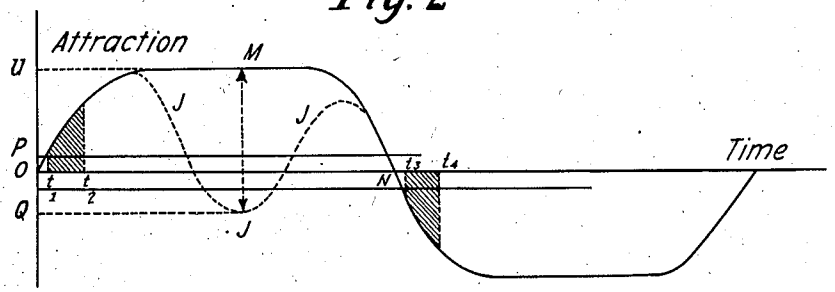
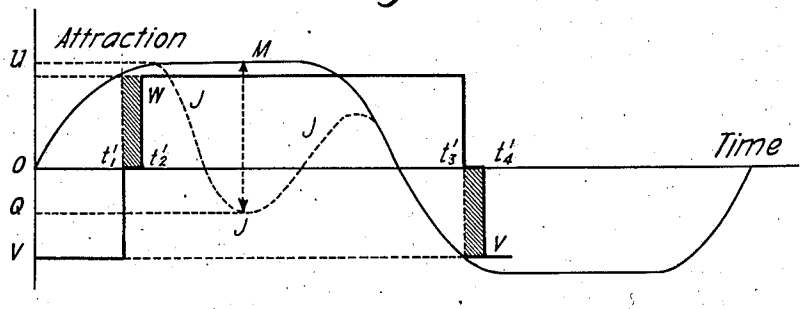


Fig. 3



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UNITED STATES PATENT OFFICE.

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HIGH-SPEED RELAY.

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The present invention relates to relays, such as telegraph relays, having a winding that is traversed at one time by operating currents, and at another by normal currents of opposed direction to the operating currents. An armature is provided between two buffers or contacts, and is attracted by the operating current against the active contact and by the normal current against the passive contact.

It is the object of this invention to increase the speed of this relay and to render it less sensitive to disturbances which are accidentally superposed on the normal currents.

Fig. 1 shows a relay operating in accordance with the Baudot principle which is modified in accordance with the present invention.

Fig. 2 is a curve showing the operation of a relay without an auxiliary winding.

Fig. 3 is a curve showing the operation of a relay with an auxiliary winding according to my invention.

The relay is provided with the following usual elements: Two soft iron cores A B are energized by the main winding C C traversed in opposite directions by the normal and operating currents. An operating current causes, for example, a positive magnetization of the free end of core A, and a negative magnetization at the end B, and vice versa for a normal current.

An armature DD is provided and is, e. g., positively polarized by a permanent magnet not shown in the drawing. The armature is pivoted on a shaft E and its movement is limited by the contacts G F. As above stated, an operating current attracts the armature against contact G.

The arrangement is completed by two sources S^1 S^2 from which line LL is supplied with current the direction of which depends on the position of the armature.

This normal relay may be arranged in any suitable manner and carries an auxiliary winding HH which, depending on whether the contact G or F is engaged, is supplied with current from source S^1 or S^2. The direction of this winding is such that the additional magnetization always tends to maintain the armature on the contact on which it is resting. Due to this arrangement, before an operating or normal current can move the armature, it must produce an attractive force that is slightly superior to the force of the additional magnetization. The latter is adjusted to a suitable value by means of a resistance R.

The operation is as follows:

Let us assume first that there is no auxiliary winding. Let the armature be on passive contact F and let an operating current be sent out. The attraction of this current is represented in function of time by the curve OMN. At time t_1, the value of this attraction is OP which is sufficient for balancing the passive resistances (friction, attraction of the permanent magnetism) whereby the armature is moved. At time t_2, the armature engages the active contact after having acquired the amount of movement represented by the shaded surface. In case of a normal current following the operating current, the same phenomena occur in the reversed sense at times t_3 and t_4.

The armature leaves the passive contact at time t_1, moves during the time t_1—t_2, engages the active contact from t_2 to t_3, etc.

If it is desired to operate the relay at high speed, the force to be communicated to even the lightest armature is of relatively great importance. For this reason, attractions must be developed of an amplitude OU which may be ten times higher than the amplitude OP that is absolutely necessary for obtaining the slow movement. Due to this arrangement, the armature will respond to atmospherics to the extent that the intensity of these exceeds the value of the signaling currents. In Fig. 2 it is clearly shown that the atmospheric accidentally attains an amplitude UQ (UO+OQ, OQ being > OP), whereby the armature momentarily leaves the active contact. As a result of this, the disturbance is transmitted into the line controlled by the relay.

This situation is fortunately modified by the auxiliary winding.

Applying the above described operations to Fig. 3, we find that the armature engages the passive contact and is held against this contact by the auxiliary force OV. The main winding is now traversed by an operating current.

At time t'_1 the two opposing forces are balanced and the armature leaves the passive contact. The armature will engage the active contact at time t'_2 for which the amount of movement represented by the shaded portion is sufficient. The auxiliary attraction will be first annulled at time t'_1,

then reversed at time t'_2, and attains the amplitude W opposed to the preceding. The reverse movements occur at t'_3 and t'_4.

The armature does not respond to disturbances such as JJJ the amplitude of which does not attain a value equal to the sum of the signaling current and the auxiliary current. This sum may almost be equal to double the signaling current.

The auxiliary current has the following effect:

It produces a certain displacement (t'_1—t_1) in the movements of the armature. This displacement has no importance.

It increases the speed of the armature. As a matter of fact, the mean amplitude of the shaded part being greater in Fig 3, the same amount of movement is obtained during a shorter time.

It maintains the armature in engagement with the contacts and prevents therefore the rebounding that might result from the speed.

And mainly, it renders the relay unresponsive to even strong disturbing currents.

Having described my invention, what I claim is:

1. In a relay having an armature, the combination of a single operating winding, an auxiliary winding adapted to maintain the armature against the contact on which it rests and means for reversing the direction of current flow in the auxiliary winding upon reversal of the armature position.

2. In a relay having an armature, a single main winding for moving the armature, means for resisting the influence of the main winding on the armature during the early part of a signal impulse, and means for eliminating the effect of said first-mentioned means as the armature moves from its initial position.

3. In a relay having an armature, a single main winding for moving the armature, an auxiliary winding for resisting the influence of the main winding on the armature during the early part of a signal impulse, means for eliminating the effect of said auxiliary winding as the armature moves from its initial position, and means for regulating the current in the auxiliary winding.

4. In a relay having an armature, the combination of an operating winding and an auxiliary winding and means for causing the auxiliary winding to resist the influence of the operating winding on the armature in its initial position, said auxiliary winding being without effect during movement of the armature, and finally assisting the operating winding to attract the armature as it reaches its final position.

5. In a relay having an armature and field magnets, an operating winding, an auxiliary winding, said auxiliary winding forming part of an unbroken conducting circuit when the armature rests on either contact, means for graduating the current through the auxiliary winding and means for reversing the direction of current flow in the auxiliary winding upon reversal of the armature position.

6. In a neutral relay having an armature, field magnets having single operating winding and an auxiliary winding, said auxiliary winding forming part of an unbroken conducting circuit when the armature rests on either contact, and means for reversing the direction of current flow in the auxiliary winding upon reversal of the armature position.

7. In a relay having an armature and field magnets, means for producing magnetization of the field magnets, additional means for producing a secondary magnetization of the field magnets, said secondary magnetization operating at first to maintain the armature in its initial position upon reversal of the magnetization of the field magnets by said first means, but ceasing during movement of the armature and again operating to attract the armature when it reaches final contacting position.

8. In a relay having an armature, an operating winding, an auxiliary winding forming part of an unbroken conducting circuit in either of the contact positions of the armature, means to graduate the current flow in said auxiliary winding, said graduating means consisting of a variable resistance interposed between the auxiliary field winding and the armature, means for reversing the direction of current flowing in the auxiliary winding upon the reversal of the armature position, and means for maintaining the armature in its final contacting position.

9. In a relay having an armature, field magnets having an operating winding and an auxiliary winding, said auxiliary winding forming part of an unbroken conducting circuit in either of the contact positions of the armature, means for reversing the direction of current flowing in the auxiliary winding upon the reversal of the armature position, and means for maintaining the armature in its final contacting position.

10. In a relay having an armature, the combination with field magnets, of a main winding traversed at one time by operating currents and at another by normal currents of opposed direction to the operating currents for moving the armature from one contact to another, a main line having one conductor connected to the armature and another conductor connected to both contacts, and an auxiliary winding associated with said field magnets connected in parallel with said main line.

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