

June 14, 1932.

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1,862,773

RAILWAY SIGNALING FLASHER

Filed July 10, 1926

3 Sheets-Sheet 1

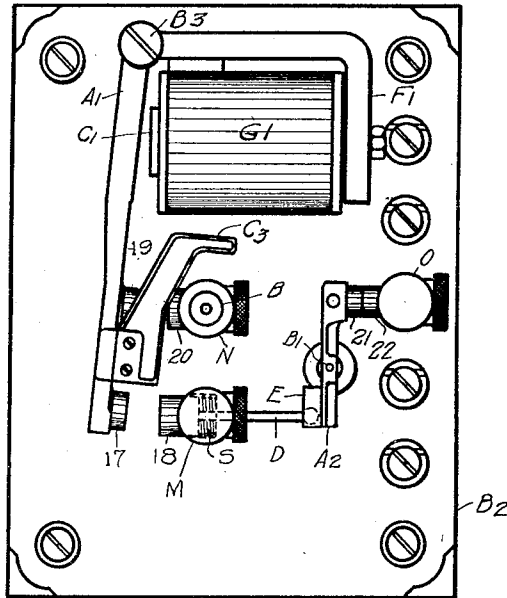


FIG. 2

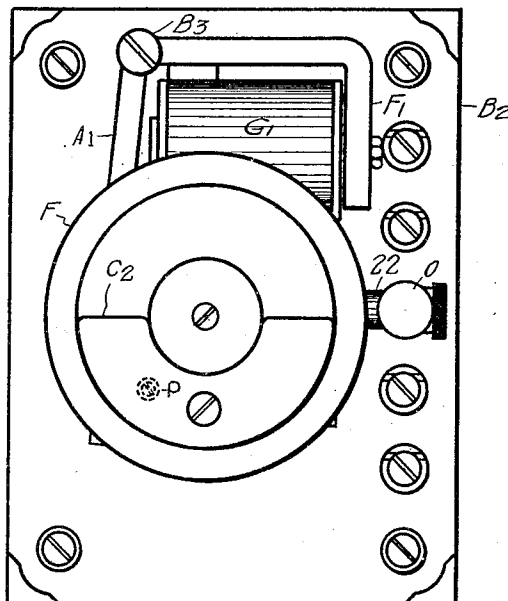


FIG. 1

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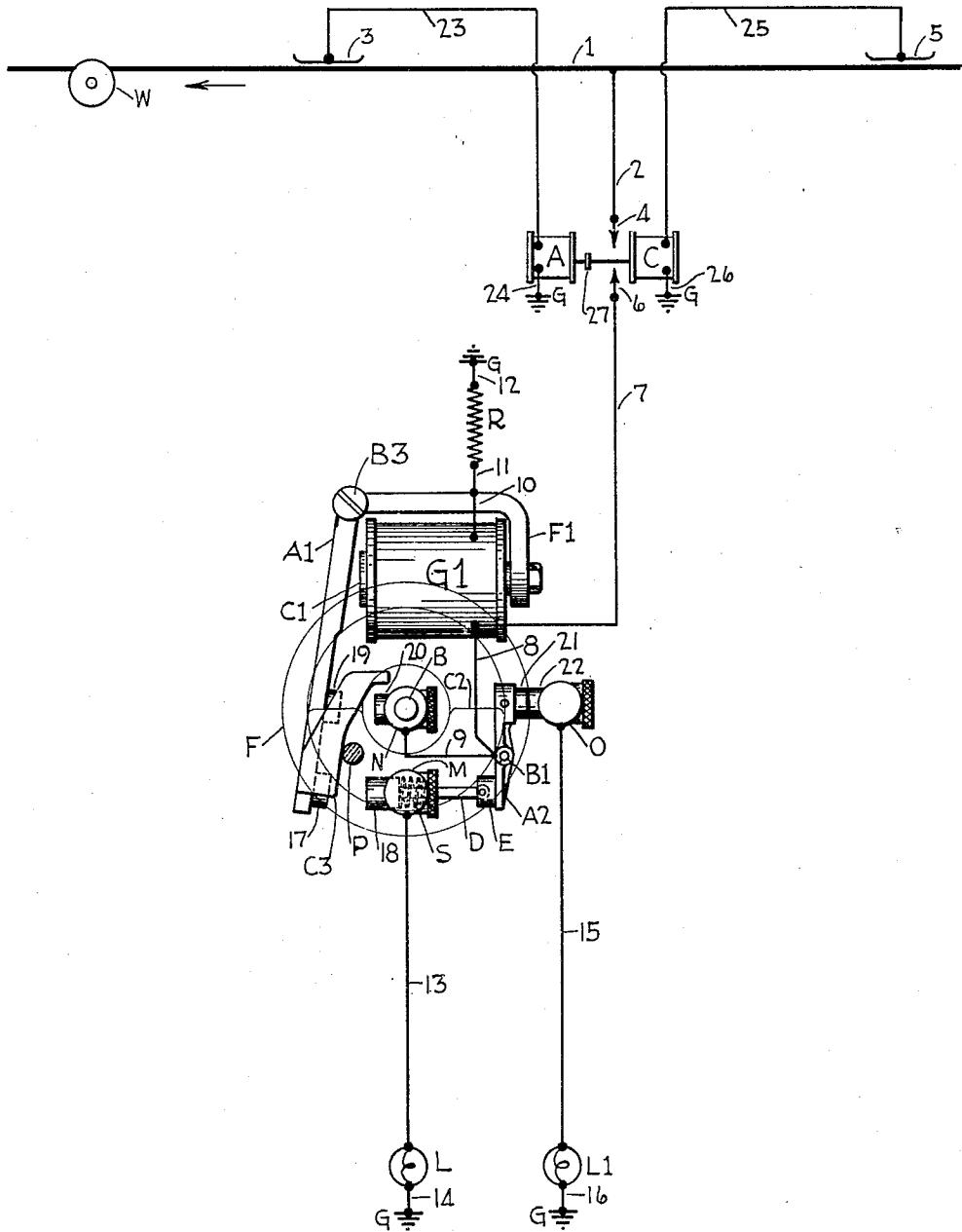


Fig. 3

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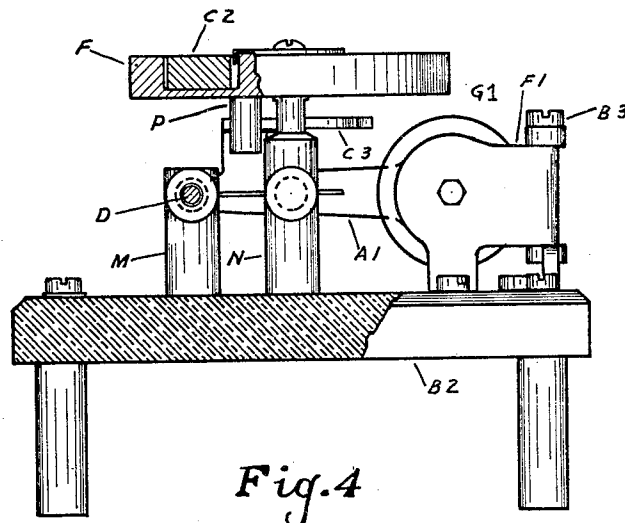


Fig. 4

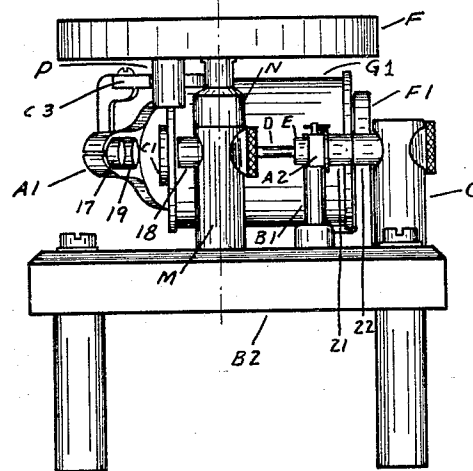


Fig. 5

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UNITED STATES PATENT OFFICE

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RAILWAY SIGNALING FLASHER

Application filed July 10, 1926. Serial No. 121,620.

My invention relates to devices for automatically and electrically controlling signal indications by a succession of electrical impulses of definite duration.

One of the objects of my invention is to provide a device which is substantial and rugged in construction and which will operate over a long period of time with the minimum of attention.

Another object of my invention is to provide a device which will be suitable for use with high voltage equipment, being equipped with contacts of sufficient size and operating through a wide range so that the large arcs usually encountered in high voltage equipment will be easily broken.

A further object of my invention is to utilize the periodic motion of an inertia device, preferably in the form of a counter-weighted fly wheel to effect the uniform timing of my device and thereby eliminate the use of the objectionable liquids and dash pots ordinarily employed in timing devices. The invention further comprises an improved construction and relation of parts which will be hereinafter fully described and shown in the drawings, in which—

Figure 1 illustrates the plan view of my improved signal mechanism showing the general relation and disposition of the magnetic structure and counter-weighted fly wheel.

Fig. 2 is a plan view of the device with the counter-weighted fly wheel removed to more clearly show the relation of the various controlling contacts.

Fig. 3 is a schematic drawing of my device showing the relation of the various parts while in a normal condition with the various connecting wires of the circuit of the system superimposed upon the parts to clearly indicate its electrical function.

Fig. 4 is a vertical side elevation of the device as viewed from the right side of Fig. 1.

Fig. 5 is an end elevation of Fig. 1.

With reference to Fig. 1, it will be noted that my improved mechanism is mounted on a suitable insulating base represented by the characters B2. The magnetic structure for

controlling the action of the counter-weighted fly wheel F consists of an operating coil G—1 which is mounted on a magnetic core C1 which is secured to a magnet frame F1. The armature A1 of the magnetic structure is pivotally supported in the magnet frame F1 on the bearing pin B3. The armature A1 carries movable electrical contacts 17 and 19 which make electrical contact engagement with stationary contacts 18 and 20. The armature A1 also carries a driving cam, represented by the characters C3. This cam has its contacting surface so designed that it will properly engage the insulated depending pin P, set in the lower side of the counter-weighted fly wheel F. With further reference to Fig. 2 it will be noted that the stationary contacts 18 and 20 previously mentioned, are flexibly mounted in their respective contact posts M and N. The stationary contact 18 is flexibly mounted in contact post M and is provided with a spring S for biasing the contact 18 to a normal position. The contact 18 is also provided with a driving rod D and is so arranged that the following through movement obtained by the contact engagement of the movable armature contact 17 will cause the contact arm A2 to disengage the contacts 21 and 22. The contact arm A2 is pivotally supported on the bearing post B1 and carries a movable contact 21. The contact arm A2 is also provided with an insulating block represented by the letter E and has one end of the driving rod mounted therein. The stationary contact 22 is likewise flexibly mounted in the contact post O in the same manner in which contact 18 is mounted in the contact post M. It will be noted in the structure previously described that when the spring S biases the contact 18 to its normal position it will likewise cause the contacts 21 and 22 to engage with sufficient contact pressure through the use of the connecting driving rod D and contact arm A2. The stationary contact 20 which makes contact engagement with the armature contact 19, is likewise flexibly mounted in its contact post N in the same manner as the previously mentioned stationary contacts 18 and 22. The contact post

N has its outer portion so arranged as to provide a suitable bearing surface for the fly wheel F. This portion is represented by the letter B. The fly wheel F which is carried on the bearing surface B of the contact post N is biased to a normal position through the counter-weight represented by the characters C2.

With reference to Figs. 4 and 5, the general relation of the various parts previously mentioned are clearly shown and it is believed that a lengthy description of these figures is not required.

With reference to Fig. 3 the numerals and characters employed in Figs. 1, 2, 4 and 5 have been employed to identify the mechanical and electrical parts previously described. It will also be noted that the various parts have been connected through suitable connecting wires to assist in the description of the electrical operation of the device. It will also be noted that a controlling relay is also shown governing the supply of operating current to the device. The controlling relay is provided with two operating coils A and C and a suitable contact arm 27 affected by the energization of the respective coils A and C for making and breaking electrical contact engagement with the stationary contacts 4 and 6. Since the device is primarily intended for use on an electric railway, the operating coils A and C are shown connected to suitable trolley contacting devices represented by the numerals 3 and 5. These contacting devices usually consist of a flexible contact member mounted adjacent the trolley wire in such a manner that a traveling current collector represented by the letter W will bridge the trolley wire and the flexible contacting member when passing thereover. It will be noted as the current collector W continues its course of travel it will first come into contact engagement with the trolley contacting device 5 and complete a circuit for the energization of the operating coil C of the controlling relay. This circuit will be completed from the trolley wire 1, through the current collector W, through the trolley contacting device 5, through wire 25, operating coil C, wire 26 to the ground G. This energization of the operating coil C will cause the contact member 27 to move into contact engagement with the stationary contacts 4 and 6 and thereby establish a circuit to cause the periodic signal controlling device to function. It can also be seen as the current collector W continues it will pass through another similar trolley contacting device and complete a circuit for the energization of the operating coil A of the controlling relay. This circuit will be completed from the trolley wire 1, through the current collector W, through the trolley contacting device 3, wire 23, through the operating coil A, wire 24 to the ground G. This energization of the operating coil A will

cause the contact member 27 to disengage the stationary contacts 4 and 6 and thereby open the current flowing to the periodic controlling device. With further reference to the circuit established through the contact engagement of the contact member 27 and the stationary contacts 4 and 6, it will be noted that a circuit was completed from the trolley wire 1, through wire 2, through the stationary contact 4, contact member 27 of the controlling relay, through the stationary contact 6, wire 7, operating coil G1, wire 10, wire 11, resistance unit R, wire 12 to the ground G. The completing of this circuit resulted in the operating coil G1 being sufficiently energized to affect its armature A1. It will be noted that the movement of the armature A1 will be impeded by the influence of the counter-weighted fly wheel, since the cam C3 of the armature A1 mechanically engages the depending pin P on the fly wheel F. It must also be noted that the contact 17 of the armature A1, will make contact engagement with the stationary contact 18 in advance of the contact engagement of the armature contact 19 and the stationary contact 20. This succession of contact engagements is very important in the function of the device as they govern the periodic energization and deenergization of the operating coil G1. It will be noted, as the armature contact 17 engages the stationary contact 18, the signal lamp L will be placed in multiple with the resistor R and since the lamp indication L is considerably lower in resistance than the resistor R, the operating current flowing thru the coil G1 will be considerably increased at this instant. The circuit for increasing the current flow in the operating coil G1 will be completed from the trolley wire 1, through wire 2, contact 4, contact member 27, contact 6, wire 7, operating coil G1, wire 10, magnet frame F1, through the bearing pin B3, through armature A1, through the armature contact 17, stationary contact 18, contact post M, wire 13, signal lamp L, wire 14, to the ground G. The action of the increased flow of current through the operating coil G1 will result in a greater force being delivered to the fly wheel F through the armature A1 at that instant, and thereby cause the fly wheel F to have a greater movement than the armature A1 through this accelerative force. Instant to this operation the armature A1 will bring the armature contact 19 into contact engagement with the stationary contact 20, thereby placing a short circuit across the terminals of the operating coil G1 resulting in an increased current flow thru the signal lamp L of sufficient value to cause the lamp L to burn at full brilliance. Instant to the contact engagement of contacts 19 and 20, the armature A1 will engage the magnet core C1 of the operating coil G1. The core C1 and armature

A1 are so arranged that they will register in such a manner as to have a very snug fit. This is very important since the armature A1 must retain this position until the depending pin P of the fly wheel F returns and strikes the cam C3 with such a force as to cause the armature A1 to disengage the core C1. Since the armature A1 and the core C1 are so arranged as to have a flush fit, and since no residual spacer is employed, the armature A1 will adhere to the core C1 through residual magnetism. This magnetic sticking is also increased through the proper selection of the materials employed in the magnetic circuit. As was previously mentioned the engagement of the contacts 19 and 20 placed a short circuit about the coil terminals of the operating coil G1 and also completed the circuit for the illumination of the lamp L. Since the movement of the fly wheel F is in excess of the movement of the armature A1, the fly wheel F will return after a predetermined time under the influence of gravity and cause its depending driving pin P to mechanically engage the cam C3, thereby resulting in the armature A1 rapidly disengaging the respective contacts previously mentioned and overcome the armature attraction brought about through the residual magnetism. The inertia of the counter-weighted fly wheel F will cause the armature A1 to move to such a position wherein the force brought about through gravity and the magnetic attraction of the operating coil G1 will overcome the inertia of the fly wheel and cause the armature to return in the same direction as previously described. Instant to the restoration of the armature A1 to its open position, the contact 18 of the contact post M was restored to its normal position through spring S, and as was previously mentioned the driving rod D, which is connected between the contact 18 and the contact arm A2, will cause the contacts 20 and 21 to engage. This normal contact engagement of contacts 21 and 22 will cause the signal lamp L1 to burn at full brilliance. This circuit being completed from the trolley wire 1, through wire 2, contact 4, contact arm 27, contact 6, wire 7, wire 8, contact arm A2, movable contact 21, stationary contact 22, contact post O, wire 15, signal lamp L1, wire 16 to the ground G. In each cycle of operation the contact 17 will engage the flexible contact 18 and cause the driving arm D to affect the arm A2 and thereby disengage the normally engaged contacts 21 and 22. It can, therefore, readily be seen that as the contact engagement is completed it will cause the signal lamp L to burn at full brilliance and disengage the contacts controlling the signal lamp L1. The shunting circuit of the operating coil G1 previously mentioned, brought about through the contact engage-

ment of contacts 19 and 20, can be readily noted by further reference to Fig. 3, since one coil terminal of the operating coil G1 is connected to the contact 20 through wire 8, wire 9, and contact post N, and the other coil terminal is connected to the magnet frame F1 through wire 10. As long as the operating current continues to flow to the device, the armature A1 will be periodically moved at a uniform rate to its two operable positions. One of its positions being referred to as its normal position, that is, the position being brought about through gravity by the counter-weighted fly wheel F, and the other position being referred to as its magnetically actuated position or the position in which the armature is retained by residual magnetism. To sum up the operation of the device, current is applied through a high resistance circuit to the operating coil G1 which in turn causes the armature A1 to move to the electrically actuated position impeded through the action of the counter-weighted fly wheel F. As the armature A1 nears the completion of this travel an acceleration of the armature A1 will be produced by increasing the magnetization of the operating coil G1, thereby delivering a force of sufficient magnitude to cause the fly wheel to travel in a movement in excess of that of the armature. While the armature is retained in the electrically actuated position by residual magnetism, one lamp circuit will be completed through engagement of the armature contacts and the other lamp circuit will be opened through the disengagement of the contacts 21 and 22 brought about through the driving rod D. As the force of the fly wheel is overcome by gravity, and it continues in its return course of travel, it will strike the cam C3 of the armature A1 with such a force as to cause the armature to leave the position retained by residual magnetism, and restore it to its normal position through the action of gravity and the inertia of the counter-weighted fly wheel. It can be readily seen that the fly wheel F will continue to oscillate uniformly in this manner as long as the operating current flows through the operating coil G1.

While I have shown and described an electric lamp as the signal device operated by my improved timing device, it will be very obvious to those skilled in the art that other forms of signal devices may be employed, such as a bell, a horn, or et cetera.

What I claim is:

1. In an apparatus of the class described, an electromagnet, an armature, means mounting the latter for movement to and fro with respect to the electromagnet including structure whereby the armature is held in its attracted position by residual magnetism when the electromagnet is deenergized, an inertia member, means mounting it for oscillating movement with respect to the armature, the

member being provided with a projection in the path of the armature to be engaged when the armature moves under the attraction of the electromagnet to force the inertia member to an extreme position in which the projection is carried out of contact with the armature, a stationary contact, a movable contact carried by the armature, the contacts being so located as to be in engagement when the armature is in its attracted position said apparatus also including means for increasing the attractive power of said electromagnet by increasing the current flow therethrough near the end of the travel of the armature and means for deenergizing said electromagnet at the end of the movement of its armature to its attracted position.

2. In an apparatus of the class described, an electromagnet, an armature, means mounting the latter for movement to and fro with respect to the electromagnet including structure whereby the armature is held in its attracted position by residual magnetism when the electromagnet is deenergized, an inertia member, means mounting it for oscillating movement with respect to the armature, the member being provided with a projection in the path of the armature to be engaged when the armature moves under the attraction of the electromagnet to force the inertia member to an extreme position in which the projection is carried out of contact with the armature, a resilient stationary contact, a movable contact carried by the armature, the contacts being so located as to be in engagement when the armature is in its attracted position said apparatus also including means for increasing the attractive power of said electromagnet by increasing the current flow therethrough near the end of the travel of the armature and means for deenergizing said electromagnet at the end of the movement of its armature to its attracted position, a resistance, a conducting path including said magnet and said resistance in series, a second conducting path in parallel with said first mentioned path including said armature and said contacts, a conducting path leading from said stationary contact, a lamp in said path, a second contact carried by said armature, a second stationary contact cooperating therewith having a conducting surface so located as to be engaged after the engagement of the first movable contact with the resilient contact, a conducting path between said stationary contact and said first named conducting path, whereby the magnet is short circuited when the second named contacts are in engagement.

3. The structure as set forth in claim 2; a fifth conducting path leading from said first mentioned path said fifth conducting path including a signal lamp, a stationary and a movable contact, said contacts being normally in engagement, means connecting said

last mentioned movable contact with said resilient stationary contact whereby said last mentioned contacts are separate when the first mentioned armature contact engages and depresses the resilient contact.

In testimony whereof I hereunto affix my signature.

SAMUEL S. STOLP.