Nov. 5, 1935. M. A. JOHNSON 2,020,146

TRAIN REPORTING MECHANISM

Filed July 26, 1933 2 Sheets-Sheet 1

Fig. 1.

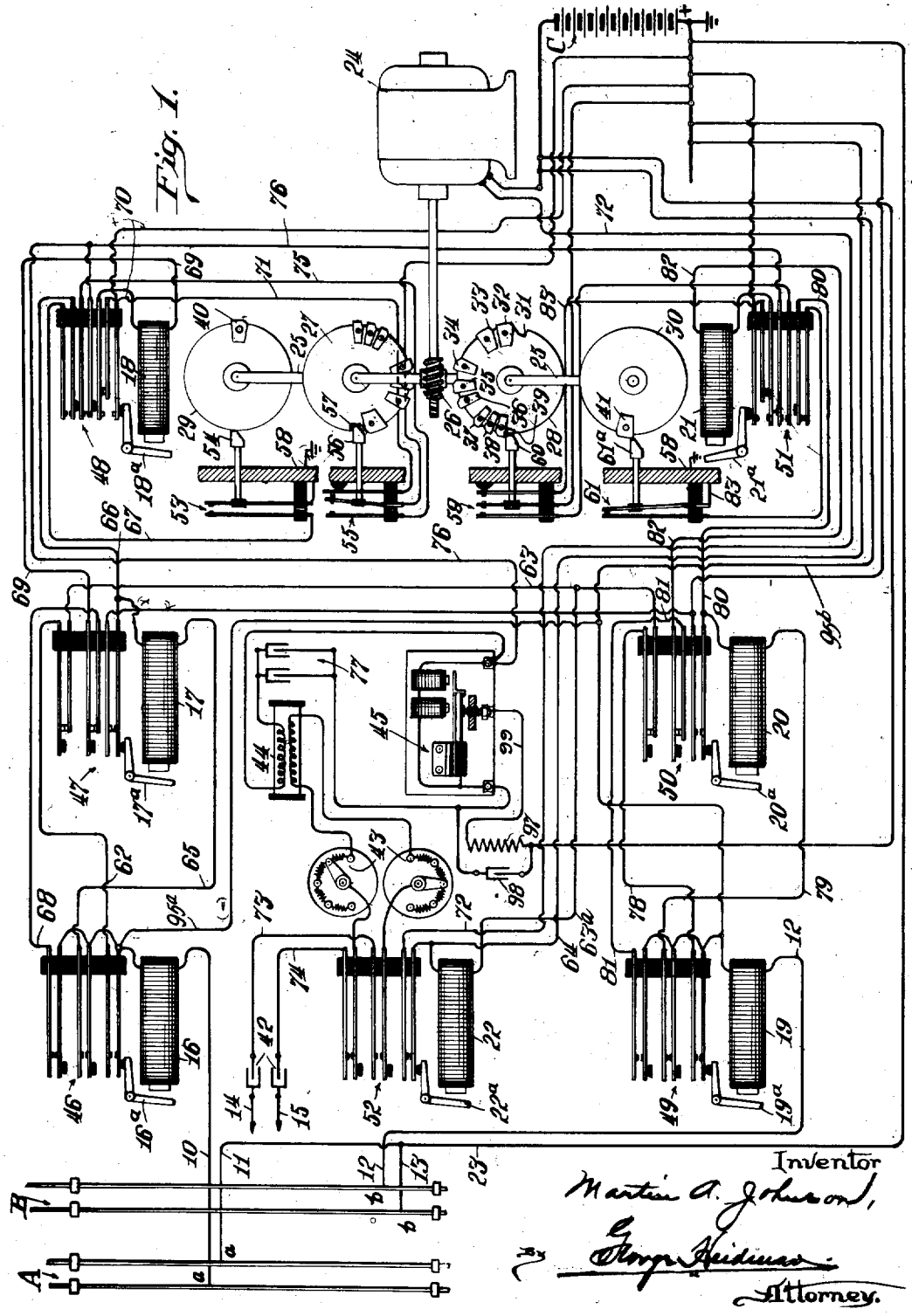

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Fig. 4.

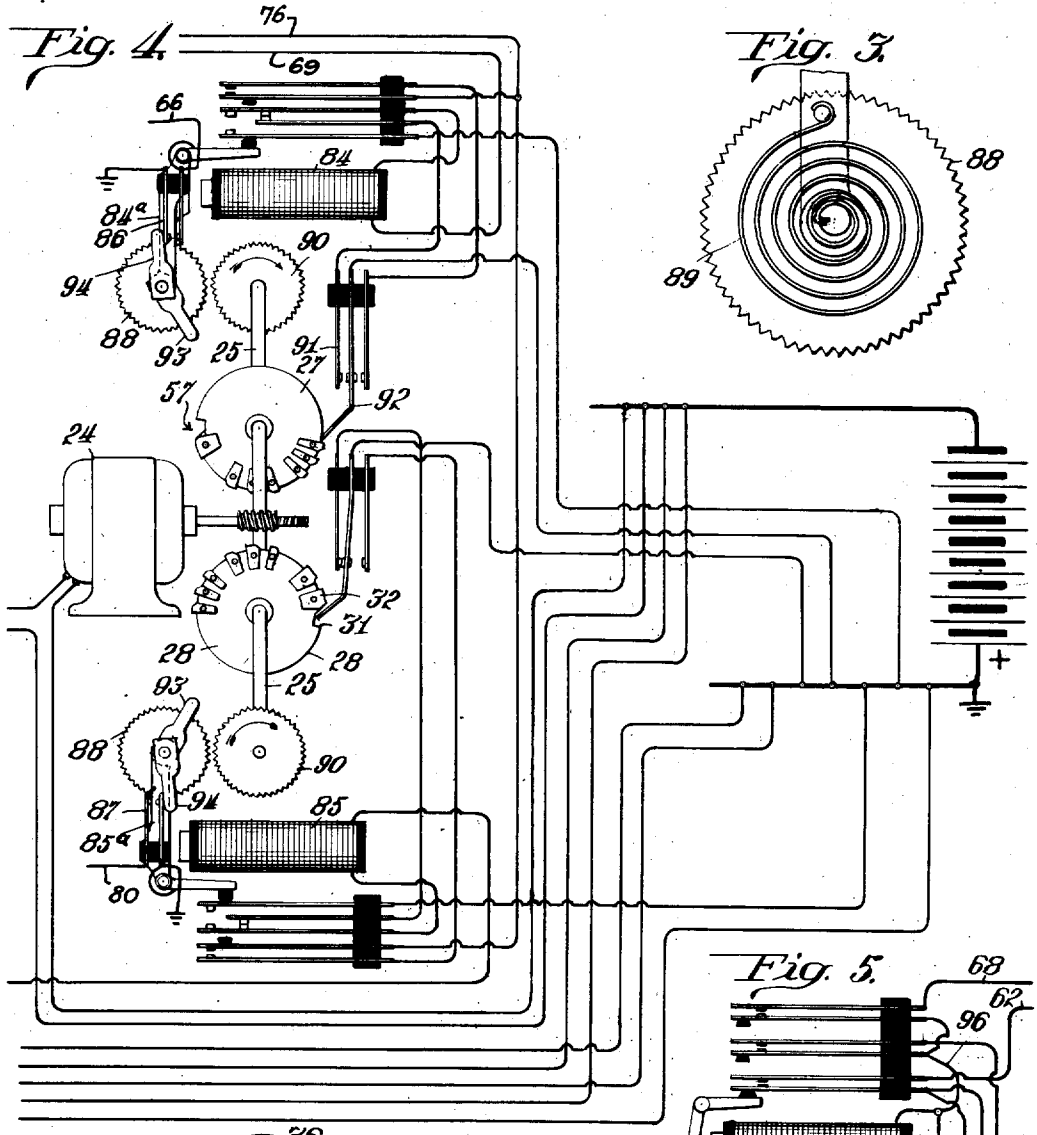
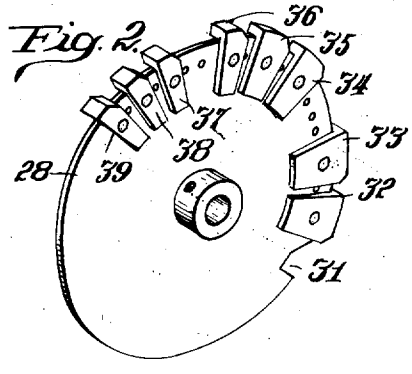


Fig. 3.

Fig. 5.

Fig. 2.



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UNITED STATES PATENT OFFICE

2,020,146

TRAIN REPORTING MECHANISM

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Application July 26, 1933, Serial No. 682,251

8 Claims. (Cl. 246—124)

My invention relates to mechanism which will automatically operate when a train reaches preselected points or stations along the right-of-way and will provide a predetermined signal,—both as to direction and location,—in the train dispatcher's office at a point remote from the location of the train, under normal train operation where trains are generally run in one direction on a given track.

My invention is to be used on railroads where east and west bound or north and south bound tracks are used and equipped with automatic block signals and where the operating rules refer to them as such. With this in view, it is all that I claim by the expression directional.

On most double track railroads where direction of travel is reversely to normal, the automatic signals and operating rules are against the train movement, but this is accounted for and regulated by the train dispatcher who would likewise associate the opposite signal from my device if and when such train movement is warranted.

The invention involves mechanical and electrical means whereby the train dispatcher, or party interested in the location and movement of trains, will be informed, by means of an established electrical communicating line, of the direction of movement and the location of the train.

Primarily, the mechanism is intended to automatically report the passing and direction of trains at points along the right-of-way and intermediate of stations where station agents are located who are therefore capable of notifying the train dispatcher.

The invention more specifically stated involves the shunting of a relay in a track signal circuit by means of the car wheels, which action in turn closes a contact of a second circuit which involves a motor and other signal producing elements and connects it to the dispatcher's telephone circuit, the mechanism being adapted to provide buzz signals—preferably in Morse code—which will indicate the direction in which the train is going and the station or point the train is passing; each station or point having a previously assigned signal.

The invention also has for its object the provision of means whereby the reporting mechanism will automatically be shut off after a reporting operation although the train is still in the block and whereby separate train reporting operations induced by two trains on separate tracks, will be successively performed.

The objects and advantages of my invention and the structural characteristics will be readily comprehended from the following detailed description of the drawings, wherein:

Figure 1 is a diagrammatic view of my improved mechanism.

Figure 2 is a detail perspective view of the signal inducing element.

Figure 3 is a detail view in side elevation of a circuit breaking element.

Figure 4 is a diagrammatic view of a portion of my mechanism illustrating a modification.

Figure 5 is a detail diagrammatic view of a modified method of wiring the first control relay in the mechanism.

In Figure 1, a pair of tracks with insulated rail joints are represented at A and B intended for trains operating in opposite directions; and these tracks are electrically connected into the system; the two rails of track A by means of wires 10 and 11; and the rails of track B by means of wires 12 and 13.

In the particular embodiment of my invention it will be noted that there are three pairs of wires to be connected to outside sources or outside of the device itself; namely the two pairs connected to the rails A and B and a third pair indicated at 14 and 15 which are intended to connect into the train dispatcher's telephone circuit. The wires 10, 11 and 12, 13 represent the circuit control wires for operating the mechanism from tracks depending upon track conditions, as, for example, single or double and whether signal operated, viz.: First, if the railway consists of a double track with east bound trains operating on one track only and west bound trains operating on the other with no automatic block signal operating through the rails, the insulated joints will be installed in the four rails and wires 10, 11 and 12, 13 connected to said sections, as shown at *a*, *a* and *b*, *b*.

The mechanism in the specific embodiment illustrated in Figure 1, involves a number of relays, namely the seven relays indicated at 16, 17 and 18 which are controlled by the train movements along track A; and the relays 19, 20 and 21 which are controlled by movement of trains along track B; while the relay 22 is a line and motor control relay that operates from either or both track relay circuits which are shown connected by wire 23 with a source of electrical energy or battery indicated at C.

The mechanism involves a motor 24, preferably a 12 volt direct current reduction gear type, which, when in operation and through the medium of a worm on its armature, rotates shaft 25 by means

of worm gear 26; shaft 25 being operated at a speed of five revolutions per minute, when the motor is set in operation; time being regulated to suit.

Fixedly secured to shaft 25 are combination wheels or discs 27, 28, 29 and 30 which constitute signal impulse providing means and circuit interrupting means.

The discs or wheels 27 and 28 are of predetermined diameter and preferably are formed with smooth perimeters, as more clearly shown in Figure 2 (a perspective view of wheel 28), except for a notch 31 cut in a prearranged manner and at a predetermined point relative to the direction of rotation of the wheel. The wheels 27 and 28 are each provided with cam action surfaces preferably in the form of segments which are removably secured to the discs or wheels at predetermined points and in prearranged groups. The cam elements are shown at 32, 33, 34, 35, 36, 37, 38 and 39, and as they are intended to be arranged on one-half the circumference they are preferably of the sectoral type shown in order that they may be more closely arranged; and these elements are shown removably secured in place by screws; the discs or wheels throughout one-half the circumference may be provided with closely placed screw receiving holes which will permit a rearrangement and different number of elements when desired.

The elements at the perimeter of the wheel have portions which extend transversely of the perimeter of the wheel. The wheels with the cam elements control the buzzes on the dispatcher's line which will indicate direction and location.

Discs or wheels 29 and 30, located on the same shaft 25, are each provided with a cam action element 40 and 41, preferably also removably secured to the wheels and each arranged on the respective wheel at a preselected point relative to the last cam element on either wheel 27 or wheel 28 relative to the direction of rotation.

The mechanism as exemplified involves two small capacity condensers 42, and two variable resistances at 43. These condensers and resistances are arranged in the dispatcher's line or circuit and insure no trouble to the dispatcher's telephone. The mechanism also involves an induction coil 44; a vibrator indicated at 45 and the various contact points associated with the relays heretofore mentioned and controlled by the movements of the pivoted armatures of these relays; together with contact points controlled by the contour of the perimeters of wheels 27, 28, 29 and 30. That is to say, the armature 16a of relay 16 controls the group of contact points 46; armature 17a of relay 17 controls the group of contacts 47; armature 18a of relay 18 controls the group of contacts 48; armature 19a of relay 19 controls group of contacts 49; armature 20a of relay 20 controls the group of contacts 50; armature 21a of relay 21 controls the group of contacts 51; and armature 22a of relay 22 controls the group of contact points 52.

It is understood that all of the armatures are swingingly mounted and are preferably pivoted intermediate of their ends so that when the relays are energized to attract one end of each armature, the other end will force certain of the contacts into contact with others and other contacts out of contact with still others; the contacts being of the well known flat spring type to permit ready flexing and also to cause the contacts to spring back to normal position; while the armatures also automatically swing back to inoperative positions as soon as the respective relays are de-energized.

Located adjacent wheel 29 is a pair of contacts 53, one of which is shown provided with a pin provided with an enlarged end or head as at 54. The head of this pin is intended normally to be disposed adjacent to the perimeter of wheel 29; and as wheel 29 is intended to rotate in clockwise direction as viewed in Figure 1, the end of cam element 40 is shown slightly beveled as is also the head of pin 54, so as to permit the cam 40 to move pin 54 away from the wheel and allow wheel 29 to continue its rotation. It is apparent that when pin 54 is moved to the left in Figure 1, the two contact points of group 53 will be in contact with each other and close the circuit in which these contacts are located. The contacts are, of course, made to automatically break contact and move back to normal as soon as the cam 40 has passed. 55 represents a group of three contacts, the intermediate one of which is provided with a pin having an enlarged end or head as shown at 56. The lower end of the contact with the pin or plunger 54 of group 53 is shown grounded to a portion of the frame shown at 58.

The intermediate contact spring of group 55 is made to normally move to the right in Figure 1 as shown, but such movement is prevented by the head of plunger or pin 56 being in contact with the perimeter of wheel 27. This wheel, at a predetermined point, namely just in advance of the first segment or cam element, is provided with a beveled notch at 57; the pin-head being shown in the notch in Figure 1, which allows the points of intermediate contact and the right-hand contact to contact with each other as shown and complete the circuit. When the head of pin 56 rides on the smooth perimeter of wheel 27, the intermediate contact will be in neutral position. On the other hand, when wheel 27 begins rotation, the segments or cam elements will successively be brought into contact with the pin-head and thereby force the intermediate contact spring to move to the left where its contact-point will contact with the contact-point of the contact spring at the left end of the group and thereby close another electrical circuit; it being understood that this contact or circuit is successively broken as the pin-head rides into the spacing between the respective cam elements or obtrusions on the perimeter of the wheel 27.

At 59 a group of contact springs, similar to group 55, is shown with the intermediate contact spring, like in the group 55, provided with a plunger or pin 60, which is shown riding on the perimeter of the wheel or disc 28 and therefore the intermediate contact spring is out of contact with the right hand contact spring.

Controlled by the cam element 41 on disc or wheel 30 is a pair of contact springs 61, similar to 53, with the right hand spring provided with a plunger or pin 61a which is still in engagement with cam action element 41. As a result the contacts of this pair 61 are in contact and that portion of the circuit is closed; the right hand spring of group 61, like that of group 53, being grounded to a part of the housing frame 58.

In the exemplification there are three pairs of wires to be connected to outside sources; one pair, 14 and 15, connects to the dispatcher's telephone circuit, while the other two pairs 10—11 and 12—13 connect to the back contacts of east and west, or north and south, track relays at any semaphore or direct to a track circuit, depending

on the location desired. For purposes of description, we will assume that A represents the west bound track and therefore the portion of the circuit involving relays 16, 17 and 18 with their correlated contacts and wiring and the motor driven control and impulse producing discs or wheels 29 and 27 in reality constitute that part of the reporting mechanism which becomes active or into play—(together with relay 22, its contact springs, the vibrator mechanism and current supply or battery) when a train reaches a certain block or preselected point on west track A. On the other hand, the relays 19, 20 and 21 with their correlated contacts and the motor driven control and impulse producing discs or wheels 30 and 28 constitute the reporting mechanism (in conjunction with relay 22, its contact springs, the vibrator mechanism and current supply or battery) when a train on the east bound track B reaches a certain block or preselected point.

In the particular embodiment as illustrated in Figure 1, the operation of the reporting mechanism will be as follows when a train is on track A and the circuit of my mechanism is closed through the car-wheels and axle, viz.:

The circuit being closed by a car on track A, relay 16 is energized and operates causing the three pairs of contacts to close due to the movement of the relay armature. In view of lack of space on the drawings the respective contacts of relay 16 and of all the other relays cannot properly be identified by reference characters and therefore I will speak of them as first, second, etc., reading upwardly or in a direction away from the main portions of the relays. The contacts of relay 16 are normally open; while the two upper pairs, namely the third-fourth and fifth-sixth contacts of relay 17 are normally closed.

The first contact will apply negative battery to the second contact and thence by wire 62 to the upper or sixth contact of relay 17 and as the sixth and fifth contacts of relay 17 are closed the circuit is carried through wire 63 to relay 22 and through its coil to positive side of battery C by means of wire 64, thereby operating relay 22. With the third-fourth contacts of relay 16 having been closed, a negative battery charge is carried to the coil of relay 17 by means of wire 65, through this coil to the first contact of relay 17, which is normally open, and by means of wire 66 to the sixth contact of relay 18. The uppermost or seventh contact of relay 18 is connected by wire 67 with the left hand contact of group 53.

The fifth and sixth contacts of relay 16 having been closed as previously described, negative battery charge is carried to the third contact of relay 17 by means of wire 68, thence through the fourth contact of relay 17 to the coil of relay 18 by means of wire 69, thence through the coil of relay 18 by wire 70 to the third contact of relay 18 and back through the second contact of this relay 18, by means of wire 71 to the right hand contact of group 55 and which may be termed the "sender" means.

At this point, relay 16 has operated; relays 17 and 18 are unoperated, while relay 22 has operated; that is to say, the armatures of relays 16 and 22 have been actuated and the respective contact points affected.

Relay 22 having operated, the closing of the first and second contacts started motor 24 through wire 72; and as the third-fourth and fifth-sixth contacts are also closed, my improved reporting mechanism is connected to the dispatcher's line—14—15—through the medium of wire 73 from the fourth contact and wire 74 leading from the sixth contact.

As before described, the motor 24 is set in operation thus causing the discs or wheels 27, 28, 29 and 30 all mounted on the same shaft 25, to turn in the same direction, namely clockwise in Figure 1. When the notch 57 in wheel 27, reaches the head or enlarged end of plunger or pin 56, the head of the plunger 56 enters the notch as shown, thus allowing the intermediate contact spring of group 55 to spring into contact with the right hand contact of group 55.

It will be recalled that the right hand contact of group 55 is completing a circuit through the coil of relay 18 because relay 16 is operated by virtue of a train being on the block. The intermediate contact of group 55 being connected to positive battery, relay 18 operates when plunger 56 falls into notch 57 as wheel 27 revolves. Impression might be left that relay 18 operates and releases due to plunger 56 leaving notch 57 as wheel 27 revolves, but this is not true for the reason that contact 1 of group 48 has positive battery connection and as soon as the armature 18a causes contact 1 to engage contact 3 relay 18 is locked and contact 2 is open. This locked position of relay 18 closes the fourth and fifth contacts to complete the circuit through wire 75 from the left hand contact of group 55 of what is called the "sender" to the vibrator indicated at 45, through the medium of wire 76. The circuit continues through the vibrator coils, the vibrator reed, out of vibrator 45 through center binding post by way of wire 99 and resistance 97 to the negative side of battery C. The resistance 97 is inserted in the vibrator circuit in conjunction with the condenser 98 so that the condenser will absorb the spark that would arise on contact of the vibrator reed when it vibrates and is used for that purpose only.

The wheels 27 and 28 are provided with the segments or cam action elements, which, as previously described, are of predetermined widths and arranged in predetermined relation so as to provide desired Morse designations. The segments on these wheels 27 and 28 regulate the buzzes produced by vibrator 45 on the dispatcher's line and which at the dispatcher's office may be repeated by a loud speaker.

As wheel 27 continues to revolve, "sender" contact with plunger 56 engages the respective segments or cam action elements on wheel 27 causing the intermediate contact to contact with the contact at the left. As the intermediate contact of group 55 is connected to the positive side of the battery C, the circuit through the vibrator as explained above is operative. As the vibrator reed is in motion, the coils of the vibrator naturally are electrically charged and discharged. The kick or magnetic flux is distorted to such a degree that the charge and discharge is absorbed by the condensers 77 and primary winding of the induction coil 44. This induction coil has a very low ohmage primary winding and high ohmage secondary winding which is connected through adjustable resistances 43, contacts 3, 4 and 5, 6 of group 52 through ¼ microfarad condensers to dispatcher's circuit by way of lines 14—15. The vibrator reed of vibrator 45 is adjusted to operate very fast, causing amplified signals through the induction coil to give a tone or audible signal.

The spacing of the segments or cam action elements determines the number of times the vibrator operates. For illustration,—the code set up

on wheel 27,—the first segment adjacent the end of plunger 56 will cause the vibrator 45 to produce one long buzz, which indicates westward movement of the train. This is followed by a pause as plunger 56 rides between the first segment and the next one; and as the plunger rides over the following segments, they will cause two long and one short buzz to be produced by vibrator 45, thereby indicating the letter "G" in Morse; then a short pause and three short buzzes indicating the letter "S" in Morse. The total operation or combined buzzes gives or suggests—"westward train passing GS"—which designates the point the train is passing. After wheel 27 has revolved far enough to have all its segments pass the plunger 56, wheel 29 with segment or cam element 40 will then be in position to engage plunger 54, causing the two contacts of group 53 to close and relay 17 to operate.

It will be recalled that during the first operation of relay 16, a negative battery current was provided in the first contact of group 47 of relay 17, also in the sixth contact of group 48 of relay 18. Relay 18 now having been operated, the circuit from the sixth contact through contact 7, via wire 67, is extended to the left hand contact of group 53. After wheel 27 has revolved far enough to have all its segments pass the plunger 56, wheel 29 with segment or cam element 40 will then be in position to engage plunger 54, causing the two contacts of group 53 to close and relay 17 to operate. Wheel 29 revolving allows cam element 40 to engage with plunger 54 only for an instant, therefore relay 17 has a locking feature similar to that of relay 18, viz.: positive battery on contact 2 of group 47 through contact 1 and coil of relay 17 via wire 65 to contact 4 of group 46 and relay 16 having been closed contact 4 of relay 16 engages with contact 3 which is connected to the negative side of battery C. This relay 17 remains operated, provided the circuit from the track is closed (that is if the train is still on the block).

Relay 17 having operated and locked itself, opens the third-fourth and fifth-sixth contacts on relay 17. The opening of the third and fourth contacts at this time opens the circuit to relay 18 and it releases its contact group controlling armature 18a; and the breaking of the fifth and sixth contacts of relay 17 opens the circuit to relay 22, causing motor 24 to stop; while breaking contact between the third and fourth and between the fifth and sixth contacts of relay 22, disconnects the reporter mechanism from the dispatcher's line 14—15.

It will be understood that the operation of the mechanism, in connection with a train passing along the east bound track B or track going in a direction opposite to that on track A, establishes a circuit between lines 12 and 13 through the wheel and axles of the train, relay 19 is energized and its armature 19a actuated causing the three sets of contacts of group 49 to be closed. The first contact, adjacent the relay, will supply negative battery current to the second contact and thence by wire 78 to the topmost or sixth contact of group 50 of relay 20. As the fifth and sixth contacts of relay 20 are normally closed, the current is carried to the coil of relay 22 by means of wire 63, thence through the coil to the positive side of the battery, causing relay 22 to close or operate which, of course, induces operation of its armature 22a and hence affects the various contacts of contact group 52.

The third and fourth contacts of relay 19, also having been closed, a negative battery charge is carried to the coil of relay 20 by means of wire 79, thence through this coil to the first contact of group 50 thence to the sixth contact of relay 21 by means of wire 80. With the fifth and sixth contacts of relay 19 closed, a negative battery charge is carried to the third contact of relay 20 by means of wire 81, thence through the fourth contact of group 50 to the coil of relay 21 by means of wire 82; thence through the coil of relay 21 to the third contact of said relay, namely group 51, back through the second contact of relay 21, by means of wire 83 to the right hand contact element of group 50 known as the "sender" group. Relay 22 having been operated, its first and second contacts were thereby closed and motor 24 put into operation. With the third and fourth and fifth and sixth contacts of relay 22 having also been closed, the mechanism is thereby connected into the dispatcher's line indicated at 14—15. The motor 24, as previously described, operates the shaft 25 containing wheel 28 and wheel 30. Wheel 28 corresponds to wheel 27 heretofore described in connection with a west bound train operation, except that it will be noted that the segments or cam action elements on wheel 28 are located on a different portion or half of the wheel from that on which similar elements on wheel 27 are located.

When the notch in the perimeter of wheel 28 reaches the end of plunger 60, the latter will drop into the notch, because the intermediate spring contact of group 59, like of group 55, is normally made to shift to the right, but is prevented from doing so by the normal perimeter of wheel 28. The end of the plunger dropping into the notch 31 of wheel 28 permits the intermediate and right hand contact springs to contact, thereby closing the circuit to relay 21. The right hand contact spring of group 61 is grounded to the frame or positive side of the battery by means of wire 83; and this contact spring is provided with plunger 62 which is adapted to be engaged by cam member 41 on wheel 30 which rotates in the same direction as wheel 28. The engagement of cam 41 with plunger 61a, it will be understood, takes place after the various segments or cam action elements of wheel 28 have actuated plunger 60 and caused a preselected code or number of buzzes to have been transmitted over the dispatcher's telephone line indicated at 14—15. It will be noted that wheel 28 not only differs from wheel 27 in the placing of the segments or cam action elements on the opposite side or half, but wheel 28 is provided with two broad faced segments or cam action elements 32 and 33 adapted to give two long buzzes which indicate east bound direction of train, instead of one long directional buzz as is provided with wheel 27. The construction of the wheel and cam action elements is more clearly seen in the detail view Figure 2, where it will be seen that in addition to the directional signals produced by segments 32—33, the wheel is provided with two long or wide segments and one narrow or short segment in the first group, as indicated at 34, 35 and 36.

These segments will provide two long buzzes and one short buzz indicating the letter "G" in Morse code and then followed by a pause which is succeeded by three narrow or short segments 37, 38, 39 which will give three short buzzes indicating the letter "S" in Morse; the total operation of wheel 28 transmitting a message in buzz form reading—"eastward train passing GS"—designating the point the train is passing.

It will be understood that the circuit in connection with track B through the respective contacts and relays is similar to that heretofore described in connection with the circuit controlled by track rails A and that further detailed description thereof need not be entered into.

In Figure 4 I illustrate a modification of what might be termed the "sender" end or portion of the mechanism, namely a modification of relays 18 and 21 and their armatures and contact elements shown in Figure 1, and a modification of the contact groups 53 and 61, and the controlling wheels 29 and 30. Instead of relays 18 and 21, relays 84 and 85 are substituted and the armatures 84a and 85a of these two relays are shown carrying a pair of contact springs 86 and 87 normally arranged in open position. One end of the armature 84a has a knurled wheel 88 journaled therein so as to be free to rotate and on one side of the wheel is a coil spring 89, one end whereof is fixedly secured to the axle of the wheel so as to wind thereabout while the other end is fixedly secured to the armature 84a.

The motor driven shaft 25 is provided with the segment carrying wheels 27 and 28, but instead of wheels 29 and 30 the shaft 25 is shown provided with knurled wheels 90, 90 which are adapted to rotate knurled wheels 88 when either one of the latter is brought into contact or mesh with its adjacent knurled wheel 90. This is accomplished through actuation of the armature, which carries the wheel 88, effected when the relays 84 and 85 are energized through operation of the preceding portion of the circuit of the mechanism in the manner heretofore described in connection with Figure 1.

With a train west bound on track A, the operation of relay 16 and relay 22 is as has been described in connection with Figure 1. Upon the closing of the contacts of relay 16, namely the third and fourth contacts, a negative charge is carried to the coil of relay 17 and its contact. The charge from the first contact of relay 17 is carried by wire 66 to the right hand contact carried by the armature 84a. Negative battery charge is also brought from the fourth contact of relay 17 and is carried by wire 69 to the coil of relay 84 and thence through the coil to the third contact (reading upwardly) of relay 84 and back through the second contact of this relay to the contact 91 of what may be termed the "sender".

With the wheel 27 rotating in clockwise direction, when the notch 57 reaches the tip of contact spring 92, the latter, by reason of its construction, will drop into the notch and thus cause contact spring 92 to contact with spring 91 and thereby close the circuit of the coil of relay 84 which causes the armature 84a to swing to the right in Figure 4.

This brings knurled wheel 88 into mesh with knurled wheel 90 so that the knurled wheel 88 will be rotated in a counterclockwise direction. Secured to the spindle or axle of the knurled wheel 88 are a pair of fingers 93 and 94 which are preferably adjustably secured to the axle so as to rotate with the knurled wheel 88. Finger 93 is so positioned relative to the relation between knurled wheels 88 and 90, that finger 93 will be brought into engagement with the contact springs carried by the armature 84a after the last segment or cam action element on wheel 27 has passed the point of spring contact member 92. Finger 93 of knurled wheel 88 having contacted with the right hand contact spring on armature 84a causes the two contact springs on the armature to close, thereby causing the coil of relay 17 to be energized which in turn actuates its armature and affects the various contact springs associated with said relay which in turn disrupts the circuit to the motor 24 and hence stops operation of the impulse producing means, namely operation of wheel 27 with its associated impulse producing surfaces. As soon as the two contact springs carried by armature 84a have been brought into contact with each other, the circuit through relay 84 is disrupted, causing armature 84a to swing back to normal position as shown in the drawings thereby moving knurled wheel 88 out of engagement with knurled wheel 90, at which time spring 89 comes into play and rotates knurled wheel 88 back to normal position which is determined by finger 94 coming into contact with one of the contacts 86 carried by the armature 84a and which contact may be of a stiff type so as to act as a stop for finger 94.

This prevents too far reverse rotation of knurled wheel 88.

It will be understood that the operation of the mechanism at the bottom of Figure 4 in connection with an oppositely moving train is the same as that just described, except that the impulses are produced by wheel 28 which, in this instance, is shown provided with two directional impulse producing segments or cam action surfaces, namely the segments at the right hand side of wheel 28; the disruption of the motor circuit in this instance being effected through finger 93 being brought into contact with one of the contact springs 87 which effects the same condition as recited in connection with contact springs 86.

It will be understood that when the contact springs carried by armatures 84a or 85a are closed, the circuit to motor 24 is not only interrupted but at the same time connection with the dispatcher's line is also interrupted and hence the dispatcher is not annoyed with unnecessary repetition of the signal impulses.

In Figure 5 I illustrate, diagrammatically, another method of wiring the first control or relay 16 in the one instance and relay 19 in the other instance. It will be noted that the time interval may be too short for proper operation of the mechanism on a short block or track circuit and therefore, in order to ensure the circuit of my mechanism to respond and to remain in operative condition until a complete signal has been given certain arrangements of wiring and of relay 16 (or 19) have been provided.

In this event, wire 11 carries positive battery to one side of the track or signal relay contact (just as shown in Figure 1). A train entering on the block closes a circuit and the positive battery current is established in wire 10, then to first contact of relay 16 (reading upwardly from relay) via wire 95 through coil of relay 16 to negative battery via wires 95a and 95b. This operates relay 16 and it will remain so operated irrespective of the condition of the contacts originating its operation because negative current from wire 95a through coil of relay 16 wire 95 to contact 1 of relay 16 will now pass through contact 2 (contact 1 engaged contact 2 when relay is closed) via wire 62 to contacts 6 and 5 on relay 17 via wires 63 and 63a to and through coil of relay 22 to positive battery via wire 64, thus holding the device in full operative condition until released by the closing of contacts in group 53. The outlet end of the relay coil is connected with the third and fifth contacts by means of wire 96 to furnish

negative battery for operation of relay 17 and operation of relay 18.

It will be noted that lead from the outlet end of the relay coil viz. 96, from the fourth contact point namely 65, as well as the leads from the second contact point, namely 62 and the leads of the sixth contact point namely 68, are as shown in Figure 1, thus enabling the arrangement shown in Figure 5 to take the place of control relays 16 and 19 when desired, without necessitating any further changes in the mechanism as previously described. With the arrangement shown in Figure 5, operation of the mechanism is ensured the moment a train reaches the block or preselected point in the track, even though the train should reverse its direction without having completely gone through a block. With the arrangement shown in Figure 5, the directional and station or location signals or signal producing impulses will be completely given as soon as the initial control relay when wired as shown, either 16 or 19, has been affected by a train reaching a prearranged point. The construction disclosed in Figure 5 provides means whereby the mechanism will be operated and a complete signal obtained regardless of the length of the track section and regardless of the train length and of the speed at which the train is traveling; relay 16 in reality becoming a "stick" relay whereby the mechanism is maintained in closed condition until the complete signal is given.

In order to prevent sparking at the contact points of the vibrator, I show the mechanism provided with the combination of a resistance at 97 and a condenser at 98.

For purposes of exemplification, I have illustrated my invention in connection with a pair of tracks, but it will be understood that the mechanism may be employed with a single track and adapted for separate operation by trains moving at different times in opposite directions; and while the drawings and specification are believed to present the best embodiments of the invention, certain modifications are possible and may be made without, however, departing from the spirit of my invention.

What I claim is:

1. Train reporting mechanism comprising, in combination with a pair of track rails, the telephonic portion of a dispatcher's circuit, an electric motor and a source of electrical energy, a plurality of relays, each having a plurality of contacts adapted to be controlled through movement of the armatures of the relays, one of said relays being energized and closed by a train on said track rails whereby current through a pair of normally closed contacts of a second relay is supplied and a third relay energized whereby the motor is placed in operation and the telephonic portion of the dispatcher's circuit established in inductive relationship with electric signal providing means, the closing of the first relay also causes a current charge through certain of its contacts, through a second set of normally closed contacts of the second relay and to the coil of a fourth relay and also supplies current charge from certain other contacts of the first relay to and through the coil of the second relay, to a certain contact of the second relay and also to a certain contact of the fourth relay, said electric signal providing means connected with certain contacts of the fourth relay and with the negative side of the source of electrical energy, members rotated by the motor and provided with prearranged surfaces, circuit controlling elements electrically connected with certain contacts of the fourth relay and with the positive side of the source of electrical energy and adapted to be controlled by said members whereby said fourth relay is closed and said signal providing means actuated in prearranged manner, and means actuated by the motor whereby the circuit of the second relay is closed and said relay operated whereby the circuits of the third and the fourth relays are opened and operation of the motor discontinued and the inductive connection with the telephonic portion of the dispatcher's circuit disconnected.

2. Train reporting mechanism of the character described comprising, in combination with track rails and the telephonic portion of a dispatcher's circuit, a source of electrical energy, electric circuits adapted to be established by trains on preselected sections of the rails, electrically operated circuit controlling elements, an electric motor adapted to be automatically controlled by said electric circuits, one portion of said elements being operated by trains on said track rails and adapted to control current flow to the motor and to establish an inductive connection with the telephonic portion of the dispatcher's circuit to transmit the indication directly to the dispatcher's receiving medium, impulse producing means rotated by the motor and provided with a preselected number and grouping of actuating surfaces, sound producing means electrically arranged for inductively transmitting the signals over said telephonic portion of the dispatcher's circuit and operative through a second portion of said elements, contact points adapted to be actuated by said actuating surfaces and electrically connected with said second portion of said elements and with the source of electrical energy, and means adapted to permit current flow to and through a third portion of said elements to actuate the same to thereby open the circuit to the motor and disconnect the inductive connection with the telephonic portion of the dispatcher's circuit after said rotating impulse producing means has rotated a predetermined degree independently of the condition of the circuit established by the train.

3. In train reporting mechanism of the character described, the combination of track rails and the telephonic portion of a dispatcher's circuit; an electric motor; a source of electrical energy; an electric circuit adapted to be established by trains on preselected sections of the track rails; a plurality of relays grouped so that certain of the relays are adapted to be electrically controlled from the rails of one track while others are grouped and adapted to be electrically controlled from the rails of the other track; said relays each having a plurality of contacts adapted to be controlled through movement of the armatures of the relays; one of the relays of each group being energized by a train on its respective track and its contacts closed to supply current to and through a pair of normally closed contacts of a second relay of said group and to energize a relay common to both groups to thereby place said motor in operation and automatically establish an inductive connection with the telephonic portion of the dispatcher's circuit; the closing of the contacts of the first relay also causes current flow through certain of the contacts of said relay and through a second set of normally closed contacts of the second relay of the respective group, thence to the coil of a

third relay of the respective group, and also supplying current through certain other contacts of the first relay of the respective group to and through the coil of the second relay of said group to a certain contact of the second relay and also to a certain contact of the third relay of said group, thereby preparing these relays for operation; sound producing means electrically connected with certain contacts of the third relay of each group and with the source of electrical energy; members arranged in said electric circuit adapted to be actuated by said motor to provide a preselected number of impulses; circuit controlling elements electrically connected with certain contacts of the third relay of each group and with the source of electrical energy and adapted to be actuated by said last mentioned members whereby said third relay of the respective group is closed and said sound producing means actuated in prearranged manner; and means actuated by the motor whereby the circuit through the second relay of the respective group is closed, its armature actuated to close certain of its contacts and to open its normally closed contacts thereby opening the circuit through the common relay and the third relay of the respective group, discontinuing operation of the motor and disconnecting the connection with the telephonic portion of the dispatcher's circuit.

4. A train reporting mechanism of the character described comprising a source of electrical energy; a plurality of relays, each provided with a plurality of contact points, said relays being operatively arranged in two groups whereby each group may be electrically controlled from a different track; a relay common to both groups, sound producing means common to both groups and adapted to be inductively connected to the telephonic portion of a dispatcher's circuit through the energization of the relay common to both groups; an electric motor adapted to be operated when the relay common to both groups is energized; separate impulse producing means for each group operated by said motor and electrically connected with the sound producing means through the control contacts of one of the relays of each group, the impulse producing means of the two groups being adapted to produce code signal impulses with the impulse producing means of both groups arranged to operate at spaced intervals in the operation of the motor when the relays of both groups are functioning; means electrically connected with a relay of each group and controlled through the operation of the motor whereby said relay of the respective group is energized and the circuit to the motor and to the sound producing means is opened, after the impulse producing means of said group has operated.

5. A train reporting mechanism comprising a source of electrical energy; a plurality of relays, each provided with a plurality of contact points, one of said relays being adapted to be electrically connected in a track circuit; signal producing means adapted to be inductively connected to the telephonic portion of a dispatcher's circuit through the energization of a second relay; an electric motor adapted to operate when said second relay is energized; impulse producing means operated by said motor and electrically connected with the signal producing means through the control contacts of a third relay; and means electrically connected with a fourth relay and controlled through the operation of the motor whereby said fourth relay is energized and the circuit to the motor and to the signal producing means is opened after the impulse producing means has operated regardless of the energized or deenergized condition of said first relay.

6. Signal operating mechanism comprising a source of electrical energy; a plurality of relays, each provided with a plurality of contact points, one of said relays constituting the starter relay; signal producing means adapted to be operatively connected to a communication circuit through the energization of a second relay which is adapted to be energized by said starter relay; a motor adapted to operate when said second relay is energized; impulse producing means operated by said motor and electrically connected with the signal producing means through the control contacts of a third relay which is adapted to be energized through operation of the motor; and means electrically connected with a fourth relay and controlled through the operation of the motor whereby said fourth relay is energized causing said second and third relays to be deenergized and the circuit to the motor and to the signal producing means thereby opened after the impulse producing means has operated regardless of the energized or deenergized condition of said starter relay.

7. Signal operating mechanism comprising a source of electrical energy; a plurality of relays each provided with a plurality of contact points, said relays being operatively arranged in separate groups; one relay of each group constituting the starter relay; a relay common to all groups; signal producing means common to all groups and adapted to be operatively connected to a communication circuit through the energization of the relay common to said groups and which is adapted to be energized by the starter relay of a group; a motor adapted to operate when the relay common to all groups is energized; separate impulse producing means for each group operated by said motor and electrically connected with the signal producing means through the control contacts of a second relay in the same group which is adapted to be energized through operation of the motor, the impulse producing means of the different groups being arranged to operate at spaced intervals in a continuous operation of the motor when the relays of the respective groups are functioning; and means electrically connected with a third relay of the respective group and controlled through the operation of the motor whereby said third relay is energized causing the second relay to be deenergized and the circuit to the motor and to the signal producing means of said group to be opened after the impulse producing means of said group has operated regardless of the energized or deenergized condition of the starter relay of said group.

8. Signal operating mechanism comprising a source of electrical energy; a plurality of relays arranged in operative groups and each provided with a plurality of contact points, one relay of each group constituting the starter relay; signal producing means common to all groups adapted to be operatively connected to a communication circuit through the energization of a relay common to all groups which is arranged to be energized by the starter relay of a group; a motor common to all groups adapted to operate when said common relay is energized; impulse producing means operated by said motor and electrically connected with the signal producing means through the control contacts of a second relay of the same group which is adapted to be ener-

gized through operation of the motor, said impulse producing means comprising a rotatable portion provided with preselected groups of actuating surfaces spaced to operate at different moments in a cycle of rotation; and means electrically connected with a third relay of the respective groups, controlled through operation of the motor and operative at the conclusion of operation of each group of actuating surfaces whereby the third relay of the respective group is energized causing the second relay of said group to be deenergized and the circuit through said group to the motor and to the signal producing means to be opened after the impulse producing means of said group has operated regardless of the energized or deenergized condition of the starter relay of said group.

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