Sept. 1, 1936. H. W. RICHARDS 2,052,581

TRAIN TRAFFIC CONTROL

Filed May 7, 1932 2 Sheets-Sheet 1

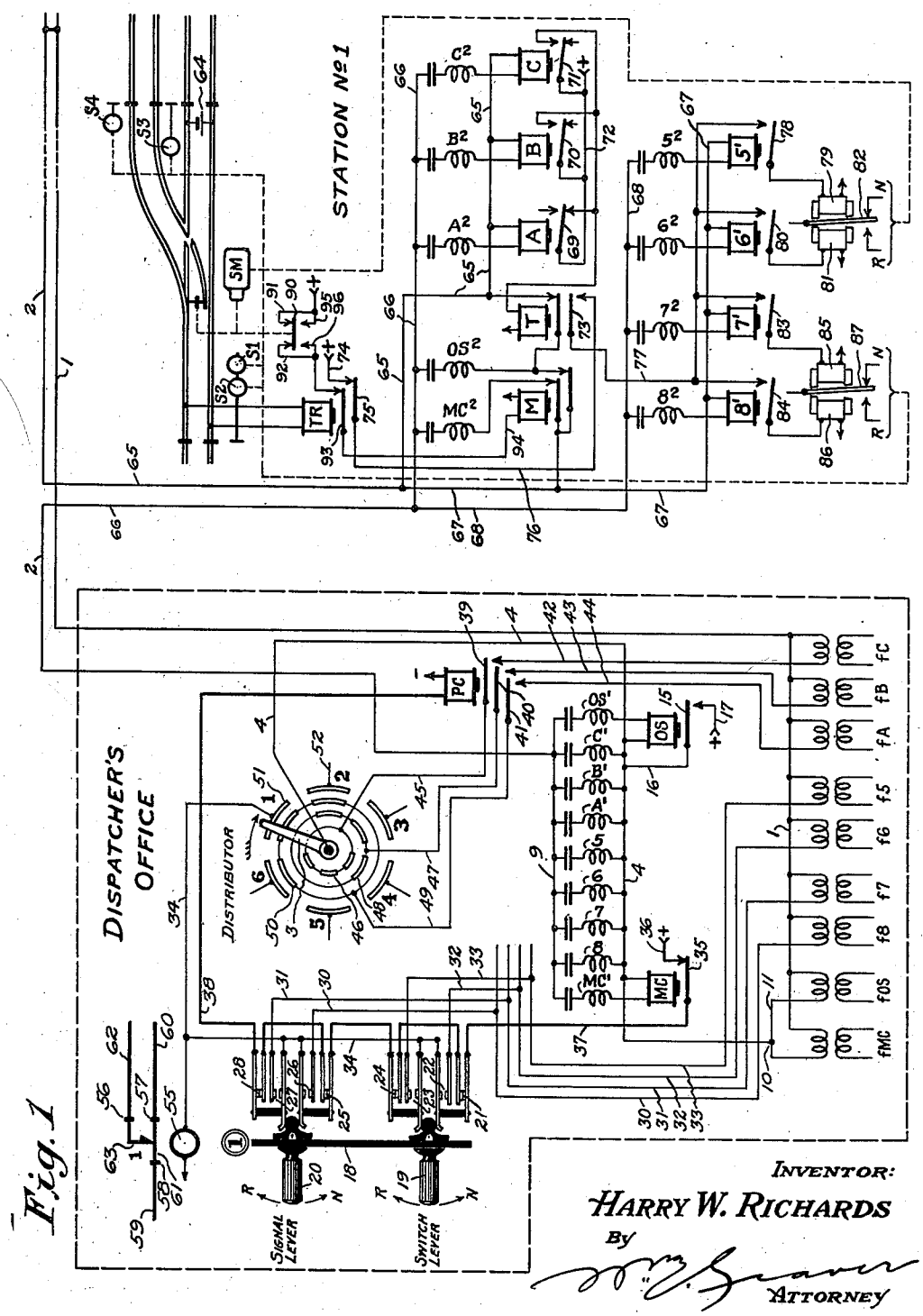

Fig. 1

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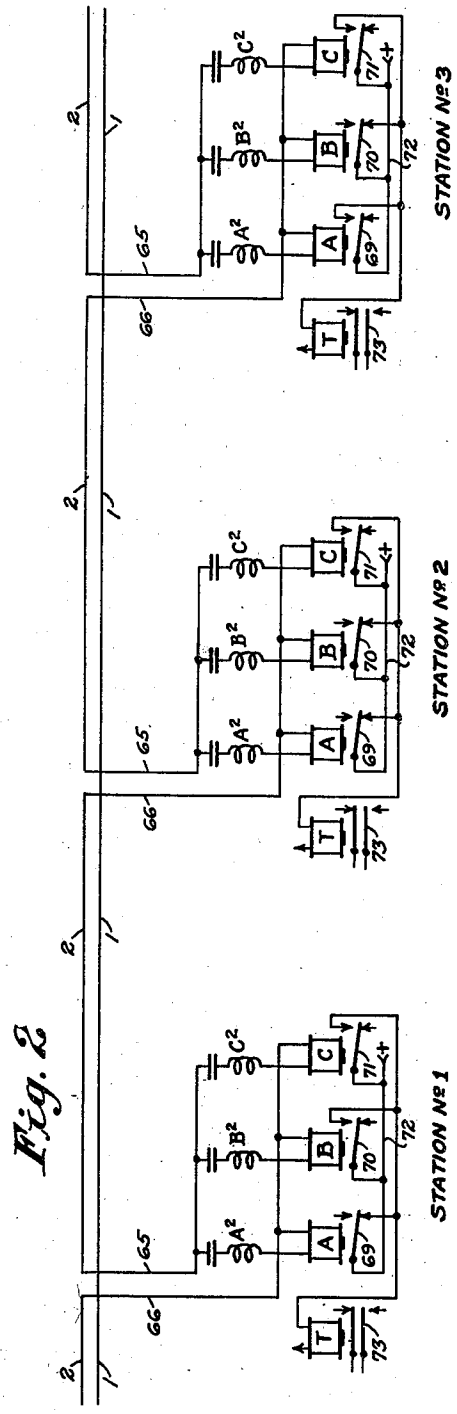

Fig. 2

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UNITED STATES PATENT OFFICE

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TRAIN TRAFFIC CONTROL

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17 Claims. (Cl. 246—3)

This invention relates to train dispatching systems and more particularly to the control, from a central point, of the signals, switches, etc. of the entire system, wherefore this invention is directed to a centralized traffic control. This control is accomplished through utilization of alternating current having variable frequencies, and combinations of frequencies, the frequencies operating selectively to control corresponding selective apparatus at a plurality of wayside stations. Also there is contemplated a particular frequency for a definite control purpose to the end that there may be a plurality of frequencies for as many controls as desired.

Another object of the invention is to provide a line current which will operate through the entire plurality of wayside stations whereby similar apparatus at these stations will be similarly affected by being tuned to the particular frequency of the line current at that time, and which frequency is selected in accordance with the desired control of the traffic.

A further object of this invention is to provide a normally closed line circuit by which the progress of trains, commonly called "OS indications", may be indicated at the dispatcher's office.

Referring to the accompanying drawings forming a part of this specification and in which like legends indicate like parts in all the views:—

Fig. 1 is a wiring diagram of a portion of a system to which this invention has been applied but in which only one wayside or control station is illustrated; and

Fig. 2 is a wiring diagram of the selecting relays disposed at a plurality of wayside stations.

The dispatcher's office, indicated in Fig. 1 diagrammatically by the continuous dashed line, receives current from a source not shown and which passes through the primaries of a plurality of transformers, each transformer receiving current of a different frequency. The secondaries of each transformer are connected on one side, in parallel relation, with the line wire 1 which constitutes the common return of currents supplied to the wayside stations. The other sides of said secondaries are connected to relays at said wayside stations by the closing of a contact in the dispatcher's office. Through a contacting device in the dispatcher's office the circuit will be completed from one or more of said transformers to the wire 2 forming the other side of the line circuit.

The contacting device may be in the form of a distributor so constructed that its constantly rotating member 3 may make consecutive contact with segments for closing the circuit of one or more transformers singly or in combination, and to control operation of relays A, B, and C at the wayside station. Further, said rotating member is permanently connected with a wire 4 connected in parallel to one end of a plurality of tuned circuits identified respectively as OS', C', B', A', 5, 6, 7, 8 and MC', the other end of said circuits being connected in parallel by the common wire 9. The wire 4 is continued to the point 10 which point is located on the wire 11 whose opposite ends are connected to one side of the secondaries of the transformers *f*OS and *f*MC.

Here it should be stated that the above mentioned tuned circuits are tuned to form paths of low impedance for the frequencies respectively of the transformers *f*OS, *f*C, *f*B, *f*A, *f*5, *f*6, *f*7, *f*8 and *f*MC. The tuned circuit OS' includes a relay OS, and the tuned circuit MC' includes a relay MC. The relay OS has an armature 15 connected as by the wire 16 to the aforementioned wire 4, the back contact of said relay being connected as by the wire 17 to any suitable source of current but for the purpose of simplicity in the drawings this wire 17 has been shown connected to the positive side of a battery.

In the dispatcher's office on a suitable panel 18 there is mounted a pair of keys similar to those used in telephone switchboards and by which contacts are made and broken by the movement of pivoted levers such as the switch controlling lever 19 and the signal controlling lever 20, these levers having three positions, up, down, and center at which they will stay when moved manually thereto. The switch lever 19 controls contacts 21, 22, 23 and 24 and the signal lever 20 controls similar contacts 25, 26, 27 and 28, said contacts so arranged that when the levers are in the central position, as shown, the contacts 21, 24, 25 and 28 will be closed; when an upward movement is given to said levers then contacts 21 and 25 will be opened while at the same time contacts 22 and 26 will be closed; and when a downward movement is given to said levers then contacts 24 and 28 will be opened and contacts 23 and 27 will be closed.

One side of the secondary of the transformer *f*8 is connected as by the wire 30 to one side of the contact 26; one side of the secondary of the transformer *f*7 is connected as by the wire 31 to one side of the contact 27; one side of the secondary of the transformer *f*6 is connected as by the wire 32 to one side of the contact 22; and one side of the secondary of the transformer *f*5 is connected as by the wire 33 to one side of the contact 23. The other sides of all of the lever

contacts just mentioned are connected to a segment of said distributor by the common wire 34.

The distributor has a constantly rotating arm or finger 3 the end of which successively passes over a plurality of arcuate segments each of which is adapted to be connected in one or more circuits, said segments being arranged in paths concentrically disposed about the axis of the distributor arm. The outer circular path in the drawings is composed of a series of six segments generally indicated by the numeral 51, there being one segment for each of the six wayside stations intended to be controlled, but it is to be understood that this number of six will be increased or diminished according to the number of said wayside stations and is always the same as the total number of said stations. Therefore, in this particular exemplification, the distributor has six active sections, one for each wayside station, and these sections have been identified in Fig. 1 by the heavy numerals 1, 2, 3, 4, 5 and 6.

The segment 51 in the outer path of the distributor for controlling wayside station No. 1 is shown connected to the wire 34 from the contacts of the control levers. The next adjacent segment in the outer circular path and associated with the section for controlling operations at wayside station No. 2 will be connected by a wire 52 similar to the wire 34 but leading to contacts of a duplicate set of levers for controlling current to wayside station No. 2; in a similar manner the next segment in the outer circular path of said distributor and in the successive sections or station groups 3, 4, 5 and 6 will be each connected by a wire similar to said wire 34 to additional pairs of levers which will respectively control current to wayside stations Nos. 3, 4, 5 and 6. Thus it will be seen that the segments of this outer circular path are each individually connected to the contacts of the respective wayside station control levers.

The relay MC in the tuned circuit MC' has an armature 35 whose front contact is connected to any suitable source of current which, for simplicity in the drawings, is indicated as the positive side of a battery. Said armature 35 is connected to the wire 37 which latter is adapted to convey current through contacts 21, 24, 25, and 28 serially connected, and thence the current will pass over the wire 38 to and through the relay PC back to source. The opening of any one of the contacts 21, 24, 25 or 28 by the up or down movement of either or both of the control levers 19 or 20, will cause an opening of the circuit containing the relay PC, and deenergization of PC may be caused also by the deenergization of relay MC which latter will cause its armature 35 to drop. Relay PC will in like manner be de-energized by the opening of similar contacts associated with the control levers for stations 2, 3, 4, etc. (not shown), all such contacts being serially connected and in circuit with the coils of relay PC.

The relay PC is normally energized so that its triple armatures 39, 40 and 41 will be held out of contact with their back contacts, which latter are respectively connected as by the wires 42, 43 and 44 with one side of the secondaries of the transformers *f*C, *f*B, and *f*A. As relay PC controls the flow of current of all station selecting frequencies to the distributor contact segments, the number of armatures and contacts on this relay will be in accordance with the number of selecting frequencies required for operating the required number of wayside stations, an armature being provided for the control of such frequency. The armature 39 is permanently connected to the wire 45 so that current may at times flow thereover to energize a series of connected segments, generally indicated by the numeral 46, arranged in a circular path on said distributor and adapted to be contacted by its rotating arm 3. In a like manner the armature 40 is permanently connected to the wire 47 so that current may at times flow thereover to energize another series of connected segments, generally indicated by the numeral 48, arranged in a circular path on said distributor and adapted to be contacted by its arm. In still further like manner, the armature 41 is permanently connected to the wire 49 so that current may at times flow thereover to energize still another series of connected segments, generally indicated by the numeral 50, arranged in a circular path on said distributor and adapted to be contacted by its arm. However, it should here be stated that the combination of the segments in any one station group on the distributor is different from the combination of segments in any of the remaining station groups.

This is done deliberately for two purposes, first to make possible the selection of a particular wayside station and, second, to control the operation of the desired switches, signals, etc. at that particular station. In Fig. 1 it will therefore be seen that the distributor arm will contact successively with segments in the outer circular path, such as 51, each adapted to select a wayside station, and while in contact with any one of such segments said arm simultaneously will connect in circuit a combination of the other segments 46, 48 and 50 in the remaining circular paths, which combination will be different from the combination of said last named segments found in any of the other distributor station control groups. Therefore, it will be appreciated that when the relay PC is deenergized its armatures will drop and cause current to flow from the transformers *f*C, *f*B, and *f*A to the circular series of segments 46, 48 and 50 of the distributor. At the dispatcher's board and associated with the control lever panel 18 is an indication lamp 55 one side of which is connected to the wire 34 and the other side of which is connected to the negative side of the battery or other source of current associated with the back contact of relay OS. Therefore, when relay OS is deenergized and its armature 15 drops, current will flow through wires 16 and 4 to and through the distributor arm 3, through segment 51, and over the wire 34 and lamp 55 back to the source, illuminating said lamp. The lamp 55 is associated with the control levers 19 and 20 for wayside station No. 1 and another lamp is similarly connected to and associated with the distributor and the control levers of each of the remaining wayside stations, and any one of these lamps will be illuminated upon deenergization of relay OS at the time when the distributor arm is contacting with the segment such as 51 in the outer circular path and in the distributor section group to which that lamp is connected.

Also, at the dispatcher's office, but not necessarily mounted on the same board or panel with the control levers hereinbefore mentioned, is a track diagram wherein the spots such as 56, 57 and 58 indicate insulated rail joints in the track; the heavy lines 59 and 60 indicate straight sections of track; 61 indicates the switch section of said main line; 62 indicates the portion of a

siding parallel to the main track; and 63 indicates the switch of the siding. As distinctly shown, the line 63 is made vertical instead of oblique as heretofore customary in such diagrams in order to save space on the indicating board, thereby making possible a considerable shortening of the indicating board and on which is amply shown the trackage condition of a long railway system.

In Fig. 1 is shown station No. 1 which is one end of a passing siding at which is located a switch machine SM for moving the switch, as well as an entering signal S1 and a take-siding signal S2, and in addition thereto the leaving signals S3 and S4. The rails are insulated as shown to provide a track circuit section including a battery 64 and the relay TR. While this figure shows only one wayside station it will be readily understood that this is only for the sake of brevity since the wiring diagram for this station No. 1 is practically duplicated for other wayside stations. Fig. 2 illustrates partial wiring diagrams for three wayside stations, and is presented for the purpose of showing the only changes which occur in the wiring at said stations.

Referring particularly to Fig. 1 current is taken off the main line at different frequencies for operation of the several relays located at station No. 1 and for controlling the operation of signals, switches, etc. and from Fig. 2 it will be understood that at the remaining wayside stations there will be a similar take-off of current, all of the wayside stations being connected serially in the line circuit, wherefore impulses will occur simultaneously at all of said stations when the control levers are manipulated.

In other words, the line wire 2 is broken, and the gap bridged by a circuit including wires 65 and 66 across which are parallelly connected a plurality of tuned circuits A^2, B^2, and C^2 which contain the station selecting relays A, B and C respectively. These tuned circuits are tuned to form paths of low impedance for the current having the frequencies respectively of the transformers *f*A, *f*B and *f*C and are therefore in resonance with the tuned circuits A', B' and C'. The wire 65 has an extension 67 and the wire 66 has an extension 68 across which extensions are parallelly connected tuned circuits 5^2, 6^2, 7^2 and 8^2 which contain the control relays 5', 6', 7' and 8' respectively.

Each of the relays A, B, and C has an armature with front and back contacts, the armatures 69, 70 and 71 of said respective relays being connected to a common wire 72 leading to any suitable source of current which, in the drawings, is shown as the positive side of a battery. Said front and back contacts are wired differently for the different wayside stations, it being observed that at station No. 1 the front contact of relay A and the back contacts of relays B and C are not electrically connected in circuit. On the other hand, the back contact of relay A and the front contacts of relays B and C are connected in parallel for energizing the transmitting relay T.

With particular reference to Fig. 2 the aforementioned construction and connections at station No. 1 are repeated but the connections at stations Nos. 2 and 3 are somewhat different. At all stations the station selecting relays A, B and C are connected in similar tuned circuits and are provided with similar armatures, but the difference lies in the wiring of the front and back contacts thereof. That is to say, at station No. 2 the front contacts of relays A and B and the back contact of relay C are not connected, but the back contacts of relays A and B and the front contact of relay C are connected in parallel to energize the transmitting relay T. At station No. 3 the back contacts of relays A and C as well as the front contact of relay B are unconnected, whereas the front contacts of relays A and C and the back contact of relay B are connected in parallel to energize the transmitting relay T. Where additional wayside stations are to be controlled, further combinations of armature contact wiring are employed, and in this connection it will be understood that the number of segment control sections may be increased on the distributor with attendant change in R. P. M. of the distributor arm, and the number of station selecting relays may be increased to suit the needs of the control system.

The transmitting relay T is normally energized and therefore attracts its double armature, thereby closing the tuned circuit OS^2 which is parallelly connected across wires 65 and 66. On the other hand, when relay T is deenergized its armatures will drop, the armature 73 contacting the back contact and causing current to flow from any suitable source (indicated as a battery in Fig. 1) over the wire 74 through the armature 75 of a track relay TR thence over the wire 76 to the back contact of relay T, over the armature 73, thence over the wire 77 to the front contacts of all of the control relays 5', 6', 7', and 8'. The armature 78 of the relay 5' is connected in circuit to one end of the magnet coil 79, the other end of which is connected to a source of current such as the aforementioned battery; and the armature 80 of the relay 6' is connected to one end of the magnet 81 the other end of which is connected to said battery. Between the juxtaposed magnets 79 and 81 is an armature 82 adapted to be attracted to whichever of said magnets is energized. If the armature be magnetized, then it will "stick" in the position to which it is moved even after the attracting magnet coil has become deenergized, and not be moved therefrom until energization of the other magnet coil.

In a like manner the control relays 7' and 8' have respective armatures 83 and 84 connected in circuit with juxtaposed magnet coils 85 and 86 between which is an armature 87, all having functions and operations similar to the corresponding parts last described.

The armature 82, in either of its positions, is adapted to make contacts controlling actuation of the switch machine SM, and the armature 87, in either of its positions, is adapted to make contact to control the operation of all of the signals S1, S2, S3 and S4 at station No. 1 as indicated diagrammatically by the dotted lines in Fig. 1, and as should readily be understood.

The switch machine SM is adapted to actuate a switch circuit controller or contact member indicated at 90 which completes a circuit when the switch is either in full normal, or reverse, position. This circuit, when the switch is in full normal position, is from battery (any suitable source of current) over the wire 91 through the member 90, through wire 92 to the front contact of relay TR, and when the switch is in reverse position the member 90 will be moved to bridge the ends of wires 95 and 96 which are taps off of wires 91 and 92 respectively. The circuit then continues from the front contact of relay TR through its armature 93, the wire 94, master control relay M, and thence back to battery. When a train

enters the track section containing relay TR, said relay will be deenergized whereupon its armatures will drop and break the circuit just described, thereby deenergizing master relay M. This same opening of the circuit will occur should there be a faulty actuation of the switch by which the contact member 90 does not assume its full thrown position in either direction. That is to say, said member will close said circuit when in the full limit of movement in one direction and contacting wires 91 and 92, or it will perform the same function of closing the circuit when it is in the limit of its opposite movement and contacting wires 95 and 96 which are connected in parallel with wires 91 and 92.

When relay M becomes deenergized, its double armature will drop thereby opening the tuned circuit MC^2 connected in parallel with the wires 65 and 66. The tuned circuit MC^2 is a path of low impedance for the current having the frequency of transformer fMC, and master control relay M is in series with the tuned circuit MC'. Therefore, the opening of the contacts of the master control relay M will open the tuned circuit MC^2 which in turn opens the path of low impedance for the current having the frequencies of transformer fMC, and as relay MC is serially connected in the tuned circuit including MC' and MC^2, the interruption to the flow of current having the frequency of the transformer fMC will cause the opening of relay MC.

The operation of the system is as follows. A plurality of transformers is provided each having a frequency different from the frequency of any of the others. Should the dispatcher wish to operate the switch of station No. 1 to the reverse position (opposite to that shown) he will move the switch lever 19 upward as indicated by the arrow and the letter R thereby opening contact 21 and closing contact 22. Opening of contact 21 deenergizes relay PC permitting closing of the circuits from transformers fA, fB, and fC to and through the segments 46, 48 and 50 of the distributor. When the contact 22 is thus closed, a circuit is completed for the current having the fequency of transformer f6 to flow through the wire 34 to the contact segment 51 of station group 1 on the distributor.

In this group there only occur the segment 51 of station No. 1 and the segment 50 controlling the circuit of relay A at all of the wayside stations, thereby attracting the armatures of said relays A against their front contacts and away from their back contacts. This attraction only accomplishes results, however, at station No. 1 by virtue of the breaking of the battery circuit through transmitting relay T thereby deenergizing the latter. The corresponding relays T at the remaining stations will not be deenergized because the battery circuit of sad relay is still maintained at stations Nos. 2 and 3 by the back contacts of relays B. The deenergization of relay T at station No. 1 therefore completes the battery circuit through its armature 73 to the front contacts of the control relays 5', 6', 7' and 8'.

Simultaneously with the operation of relays A and T, current having the frequency of transformer f6 will flow from the contact segment 51 to and through the distributor arm 3, wire 4, the tuned circuit 6, wire 9, the line wire 2 through wires 66 and 68 to and through the tuned circuit 6^2 to energize the control relay 6' thereby attracting its armature 80 and closing a circuit which energizes magnet coil 81 and attracts the armature 82 to the left as seen in Fig. 1. This closes the circuit through the switch machine SM causing it to operate and move the switch to the reverse position. When the switch machine is thus operated its contact member 90 moves from the position shown in Fig. 1 downwardly to ultimately come in contact with the wires 95 and 96, and in this movement the circuit controlled by the member 90 is momentarily interrupted causing the deenergization of relay M, in turn breaking the tuned circuit MC^2. This causes relay MC to become deenergized and to cause the breaking of the circuit including relay PC which is thereby de-energized.

When the arm 3 of the distributor again moves around to contact the segments 50 and 51 of station No. 1, current having the frequency of transformer fA will flow through said arm, wires 4, etc. to energize relay A, thereby attracting its armature 69 and deenergizing relay T at station No. 1, the opening of the front contact of said last mentioned relay breaking the tuned circuit OS^2 thereby interrupting the path of low impedance of current having the frequency of transformer fOS causing deenergization of relay OS and the dropping of its armature 15 to close a battery circuit over wire 17, armature 15, wire 16, wire 4, distributor arm 3, segment 51, wire 34, through lamp 55, and thence back to battery. This will cause a momentary illumination of the lamp 55 indicating to the dispatcher that the switch is moving to the reverse position.

Should the switch for any reason fail to complete its reverse movement then the switch contact member 90 will never complete its movement from the wire 91 to the wire 95, thereby causing the lamp 55 to be continuously periodically illuminated whereas, in the proper movement of the switch the movement of the member 90 is relatively fast and thus only a momentary lighting of the lamp will result. After the proper momentary illumination of the lamp has occurred, the dispatcher will then be free to return the switch lever 19 to the central position shown in Fig. 1 thereby completing the circuit and energizing relay PC, which then picks up its armatures and opens the circuits of the transformers fA, fB, and fC to the distributor, thereby cutting off from the line circuit the current frequencies of the transformers fA, fB and fC, and allowing the wayside station relays A, B and C to come to rest. Should the periodically continuous illumination of the lamp 55 occur, indicating an incomplete switch movement, the dispatcher is free to move the switch lever 19 downward as indicated by the arrow and letter N, thereby causing the switch machine SM to operate the switch and switch contact member 90 to the normal position, as hereinafter explained, so that the switch may be used in this position until the trouble is rectified.

On the contrary, if it is desired to move the switch back to its normal position, then the dispatcher will throw the switch lever 19 downwardly in the direction indicated by the arrow and the letter N. This causes an opening of contacts 24 and a closing of contacts 23. The opening of contacts 24 will break the circuit through the relay PC thereby deenergizing the same to complete the circuits containing the frequencies of fA, fB, and fC to the respective distributor segments 50, 48 and 46. The closing of contacts 23 completes a current circuit having the frequency of and including transformer f5, wire 34, segment 51 and the arm 3 of the distributor,

wire 4, tuned circuit 5, wire 9, wire 2, wires 66 and 68, tuned circuit 5^2 energizing control relay 5' to attract its armature 78 and causing a closing of the circuit including the magnet coil 79 which attracts its armature 82 in the reverse manner against a contact in a circuit to and through the switch machine SM to operate the switch in the opposite direction. The remaining operations and actuations of relays are the same as just previously described and therefore need not be repeated, the lamp 55 again being momentarily lighted when the switch contact member 90 moves properly and synchronously with the switch. Thus, when the dispatcher gets his "OS indication" through the light 55 he is then free to move his switch lever back to the central position shown in Fig. 1. In this operation as well as the operation in the preceding paragraph, it will, of course, be understood that the dispatcher is manually throwing the switch lever on the panel board 18 associated with station No. 1.

Should similar switch operations be desired, for example at station No. 2, the operations would be substantially the same except the dispatcher would manipulate his switch lever on the panel board and associated with station No. 2 wherefore the operations hereinbefore described would not take place until the rotating arm 3 had come into registry with the combination of distributor segments in the section group controlling station No. 2. At this time said arm will be in contact with a segment 50 as will as a segment 48, the segment 50 controlling the current having the frequency of transformer *f*A and the segment 48 controlling the current having the frequency of transformer *f*B, thereby causing the currents of these frequencies to flow in the line circuit to and through the tuned circuits of relays A and B at all the stations. This attracts the armatures of both relays but at station No. 1 such attraction will still cause its relay T to remain energized. At station No. 2 the movement of said armatures positively opens its relay T wherefore the hereinbefore described operations of switch changes will take place at station No. 2. There will be no switch operation at station No. 3 because the movement of the armatures of its relays A and B will retain its relay T energized.

In a similar manner should the dispatcher desire to throw the switch at station No. 3, he operates the switch lever associated with station No. 3 which causes the foregoing circuit manipulations to be effective only when the distributor arm comes into registry with the segments of station group 3, and when this occurs only the segments 48 and 51 will be contacted. The contacting of segment 48 controls the current having the frequency of transformer *f*B and thus energizes the relays B at all of the stations. When this occurs, only relay T at station No. 3 will be deenergized because at stations Nos. 1 and 2 attraction of the armature of their relays B will not cause deenergization of their relays T.

The operation of the trackside signals is carried out in a manner similar to the description given immediately hereinbefore with respect to the operation of the switch, except that the dispatcher will manipulate the signal lever 20 for the particular wayside station desired instead of the switch lever. This will bring about the functioning of control relays 7' and 8' at the selected wayside station in accordance with the desired signal control, and the energization of these relays will throw the armature 87 to close a battery circuit including the signals S1, S2, S3 or S4. Like the armature 82, armature 87 may be permanently connected to a battery current to close the circuits of the switch machine and signals, respectively; or it may be merely a mechanical means to close spaced terminals of such circuits, and therefore be supplied with double pole contacting members, all as will be readily understood.

With switches and signals properly set the passage of a train over the track circuit including the battery 64 and relay TR causes the deenergization of said relay and the opening of circuits including its armatures. That is to say, the opening of the circuit including armature 93 causes the deenergization of master relay M which in turn opens the tuned circuit MC^2 and deenergizes MC and in turn relay PC, when the contact arm 3 engages the distributor segments 50 and 51 of station group 1, whereby the current having the frequency of transformer *f*A energizes relays A at all the stations. At station No. 1 the attraction of the armature 69 causes deenergization of relay T at said station thereby opening the tuned circuit OS^2 and causing a deenergization of OS with consequent completion of battery circuit to and through the lamp 55, thus telling the dispatcher that the train is passing the control station No. 1. When the train has passed out of said control section of the track then the relay TR is again energized by its battery 64, attracting its armatures and closing the circuit through master relay M which in turn attracts its armatures and completes the tuned circuit MC^2 causing relay MC in turn to be energized and pick up its armature 35 and complete a battery circuit including the relay PC which latter attracts its armatures and reestablishes the normal condition of the system for further control actuation.

It is obvious that those skilled in the art may vary the details of construction as well as arrangements of parts without departing from the spirit of the invention, and therefore it is not desired to be limited to the foregoing except as may be required by the claims.

What is claimed is:—

1. In a train traffic control system the combination of a trackside signal and switch actuating mechanism; a main line circuit including relays for controlling said signal and said mechanism, said relays being tuned for different current frequencies; a source of pulsating current of similarly different current frequencies for said circuit; and manually and automatically operated means for selecting a current of a particular frequency for operating the desired relay; and station selecting current frequencies impressed upon said line circuit in different prearranged combinations simultaneously with control current frequencies common to all stations.

2. In a train traffic control system the combination of a trackside signal and switch actuating mechanism; a main line circuit including selectively operated relays for controlling said signal and said mechanism; a source of pulsating current of different current frequencies for said circuit; and manually and automatically operated means including a rotating distributor for selecting a current of a particular frequency for operating the desired relay; and station selecting current frequencies impressed upon said line circuit in different prearranged combinations simultaneously with control current frequencies common to all stations.

3. In a train traffic control system the combi-

nation of a trackside signal and switch actuating mechanism; a main line circuit including selectively operated relays for controlling said signal and said mechanism; a source of pulsating current of different current frequencies for said circuit; and manually and automatically operated means for selecting a current of a particular frequency for operating the desired relay; and station selecting current frequencies impressed upon said line circuit in different prearranged combinations simultaneously with control current frequencies common to all stations.

4. In a train traffic control system the combination of a trackside signal and switch actuating mechanism; a main line circuit including selectively operated relays for controlling said signal and said mechanism; a source of pulsating current of different current frequencies for said circuit; and means including a manually operable switch as well as an automatically rotating distributor for selecting a current of a particular frequency for operating the desired relay; and station selecting current frequencies impressed upon said line circuit in different prearranged combinations simultaneously with control current frequencies common to all stations.

5. In a train traffic control system the combination of a trackside signal and switch actuating mechanism; a main line circuit including selectively operated relays for controlling said signal and said mechanism; a source of alternating current of different current frequencies for said circuit; and manually and automatically operated means for selecting a current of a particular frequency for operating the desired relay; and station selecting current frequencies impressed upon said line circuit in different prearranged combinations simultaneously with control current frequencies common to all stations.

6. In a train traffic control for a railway having a plurality of trackside signals the combination of a source of current of different current frequencies; a main line circuit including relays responsive to said current frequencies for controlling said signals; and manually and automatically operated means for selecting a current frequency making responsive the relay for controlling the desired signal; and station selecting current frequencies impressed upon said line circuit in different prearranged combinations simultaneously with control current frequencies common to all stations.

7. In a train traffic control for a railway system having a plurality of wayside stations and including trackside signals the combination of a source of pulsating current having different frequencies; a distributor provided with a constantly rotating arm connected to said source, and a plurality of segments adapted to be contacted by said arm in its rotation, said segments arranged in concentric paths as well as in wayside station control groups, the segments of certain paths serially connected and each series adapted to be energized with current from said source at one of said different frequencies; manually controlled means for selectively energizing the distributor segments not serially connected with current from said source having a frequency different from that of any of the other frequencies; a line circuit passing through all of the wayside stations and adapted to convey the pulsating current at frequencies selected and controlled by said distributor and said manual means, said current for operating the signals at said stations; and a plurality of relays at each station connected in said line circuit for controlling signal actuating circuits, each relay tuned for resonance with one of said different current frequencies whereby the signals will be operated in accordance with the frequencies of the current flowing in the line circuit.

8. In a traffic control system, a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; station selecting frequencies impressed in different prearranged combinations simultaneously with control frequencies common to all stations; a plurality of current paths arranged in parallel with respect to each other and each being in series with said transmission circuit, each path selective to a different one of said current frequencies; and a traffic controlling device responsive to the flow of current in said paths.

9. In a traffic control system, a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; a central office and a wayside station the latter including a plurality of current paths arranged in parallel to each other and each being in series with respect to said transmission circuit, each path selective to a different one of said current frequencies; and a traffic device controlling means actuated by relays included in said selective paths; said traffic device actuated when its particular control frequency is impressed upon said transmission circuit simultaneously with a prearranged station selecting frequency combination.

10. In a traffic control system, a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; a central office and a wayside station, said central office including a plurality of current paths arranged in parallel to each other and each being in series with respect to said transmission circuit, each path selective to a different one of said current frequencies; and a normally energized traffic control indication means included in said selective paths.

11. In a traffic control system, a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; station selecting relays included in said circuit; a normally energized control circuit adapted to maintain the station selecting relays in a state of rest; and means for deenergizing said control circuit to cause actuation of one or more station selecting relays.

12. In a traffic control system, a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; station selecting relays included in said circuit; a normally energized control circuit adapted to maintain the station selecting relays in a state of rest; and means for deenergizing said control circuit to cause actuation of one or more station selecting relays in accordance with one or more of said frequencies.

13. In a traffic control system, a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; station selecting relays in tune with said frequencies; a normally energized control circuit adapted to maintain the station selecting relays in a state of rest; and means for de-energizing said control circuit to cause actuation of said station selecting relays in accordance with a predetermined current frequency combination.

14. In a traffic control system, in combination a transmission circuit; means for impressing a plurality of current frequencies upon said circuit; a central office; a wayside station; and a detector track circuit associated with said wayside station

and including a relay adapted to be de-energized upon the passing of a train, said central office including a normally energized traffic indication device connected in circuit with contacts controlled by said relay at said wayside station and adapted to be de-energized by the operation of said relay at any wayside station.

15. In a traffic control system, the combination of a trackside signal device and switch actuating mechanism; a main line circuit, relays for controlling said signal device and said mechanism, said relays being responsive to current in circuits tuned for different current frequencies; a source of pulsating current of similarly different current frequencies for said circuits; manually and automatically operated means for selecting current of a particular frequency for operating the desired relay; and station selecting current frequencies impressed upon said line circuit simultaneously with a control current frequency common to all stations.

16. In a traffic control system, a main line circuit, a source of pulsating current of different current frequencies for said circuit; relays controlled from said line circuit and responsive to current in circuits tuned for similarly different current frequencies; manually and automatically operated means for selecting current of a particular frequency for operating the desired relay; and station designating current frequencies impressed upon said line circuit simultaneously with a control current frequency common to all stations.

17. In a traffic control system, a main line circuit, a source of pulsating current of different current frequencies for said circuit; relays controlled from said line circuit and responsive to current in circuits tuned for similarly different current frequencies; and station designating current frequencies impressed upon said line circuit simultaneously with a control current frequency common to all stations.

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