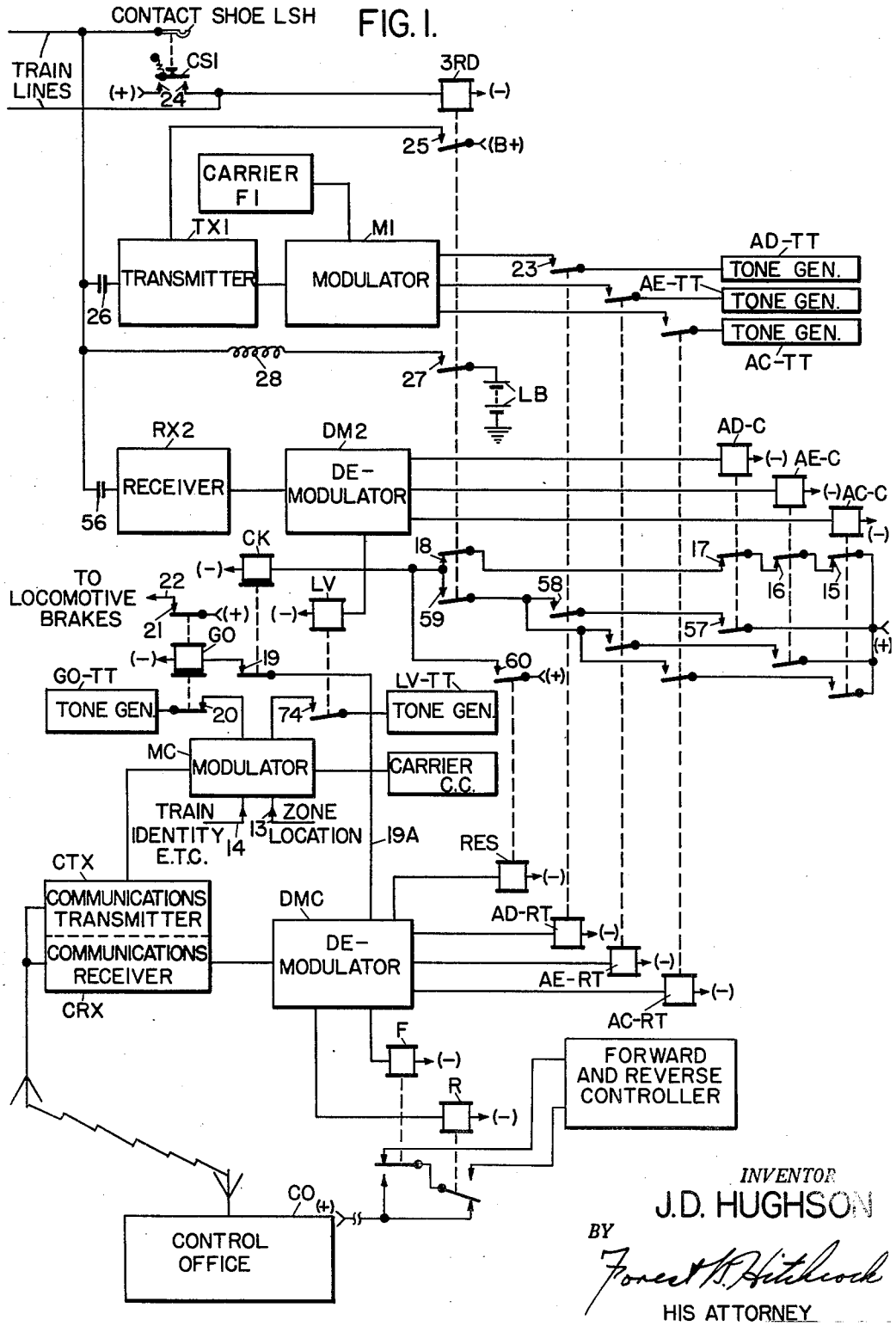
Nov. 16, 1965 J. D. HUGHSON 3,218,452

RAILWAY TRACK SWITCH CONTROL SYSTEM

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FIG. 1.



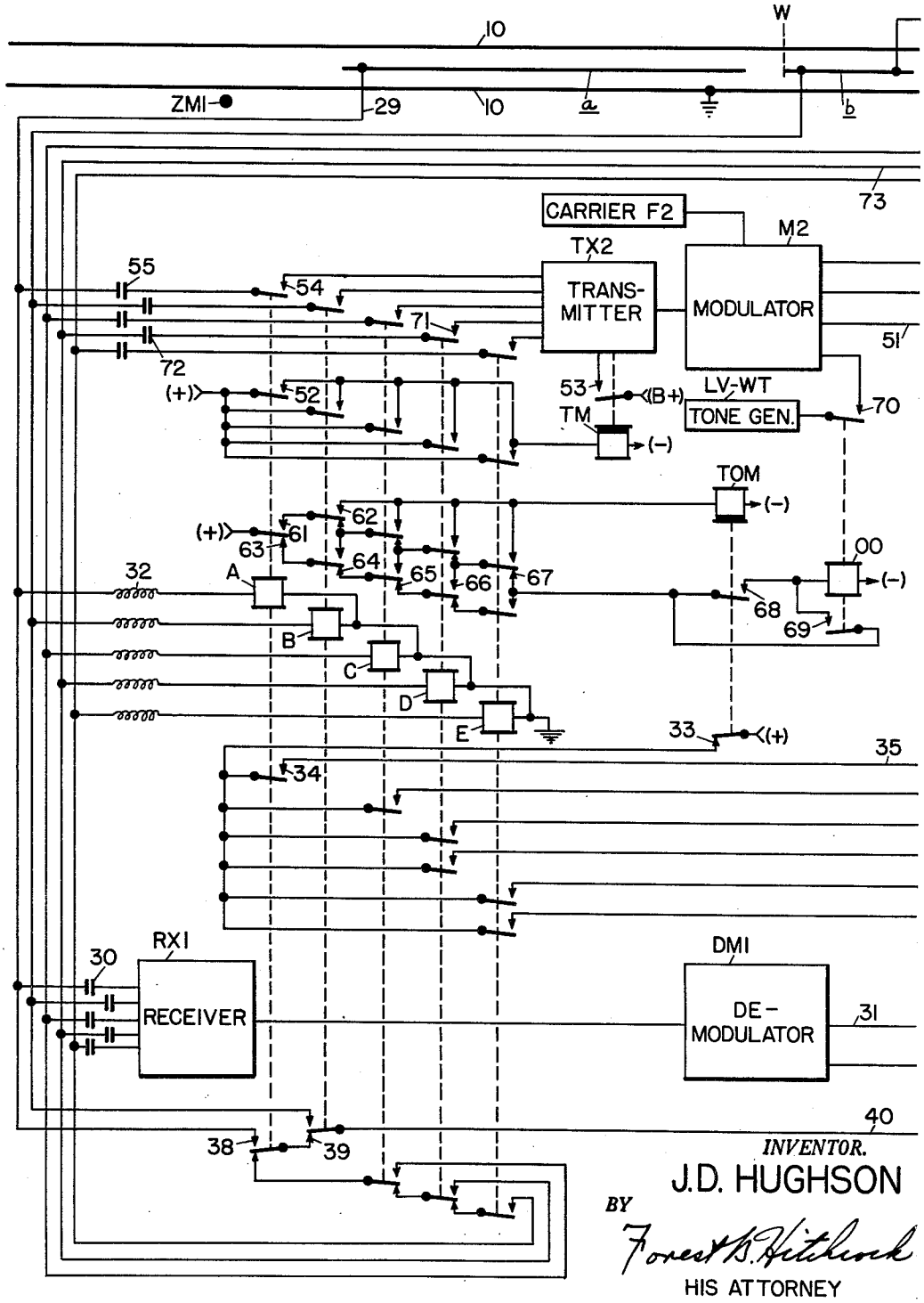
INVENTOR
J.D. HUGHSON
BY
Forrest B. Hitchcock
HIS ATTORNEY

Nov. 16, 1965 J. D. HUGHSON 3,218,452

RAILWAY TRACK SWITCH CONTROL SYSTEM

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FIG. 2A.



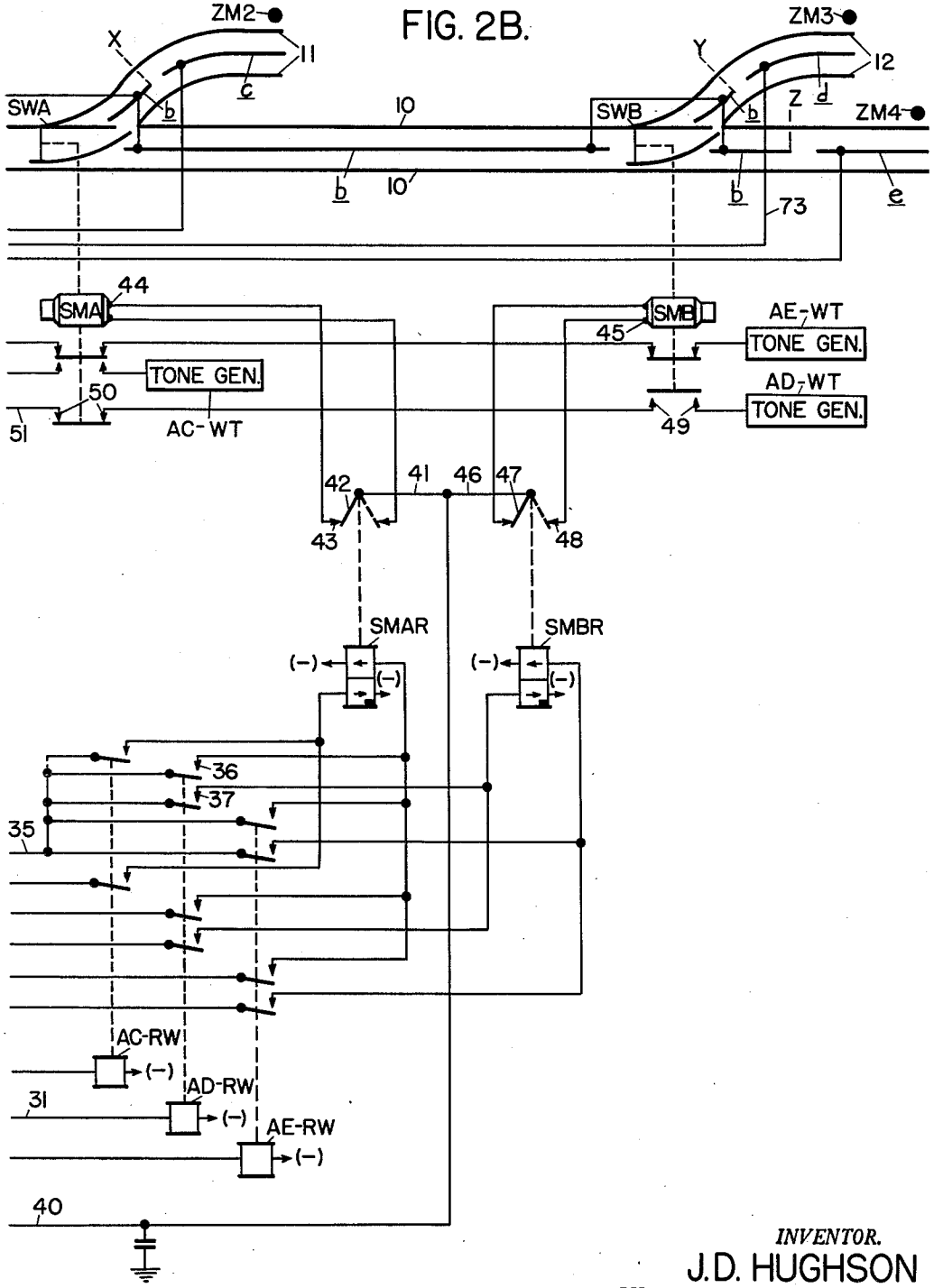
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J.D. HUGHSON
BY
Forest B. Hitchcock
HIS ATTORNEY

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RAILWAY TRACK SWITCH CONTROL SYSTEM

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FIG. 2B.



INVENTOR.

J.D. HUGHSON

BY

Forrest B. Hitchcock

HIS ATTORNEY

United States Patent Office 3,218,452
Patented Nov. 16, 1965

3,218,452

RAILWAY TRACK SWITCH CONTROL SYSTEM

J Donald Hughson, Rochester, N.Y., assignor to General Signal Corporation

Filed Nov. 3, 1960, Ser. No. 66,991
8 Claims. (Cl. 246—4)

This invention generally relates to track switch control systems for railroads and more particularly pertains to a track switch control system wherein locomotive power is utilized to control the operation of the track switches.

In many previously proposed systems, locomotive power has been applied, through contact rails and shoes, etc., to operate a wayside switch in advance of a railway locomotive. However, one limitation inherent to these previously proposed systems is that only one track switch was thrown for each application of the locomotive power. With this in mind, it is proposed in accordance with the present invention to utilize a locomotive carried power source to simultaneously control all track switches necessary for establishing a designated route for a train through a track switching area.

To accomplish the transfer of locomotive power to the wayside, and therefore to the various track switches, it is more specifically proposed to provide wayside means situated along the track, in advance of the track switching area, which extracts power from the locomotive carried power source to be selectively applied to control the track switches in accordance with the route designated for the train, thereby eliminating the need for wayside power sources.

It is furthermore proposed to provide a reporting back from the wayside to the locomotive regarding the condition of various track switches after an application of the locomotive power and to cause this reporting back to be effective to stop the locomotive if the condition of the switches does not correspond to the designated route for the train.

With the above in mind, a general object of the present invention is to utilize locomotive power for controlling the operation of track switches in accordance with the desired routing of the train through a track switching area.

A further object of the present invention is to provide that the wayside report back the condition of the track switches and to further provide that this reporting back from the wayside be effective to stop the locomotive if the desired route has not been completely set up.

Other objects, purposes and characteristic features of the present invention will be in part obvious from the accompanying drawings, and in part pointed out as the description of the invention progresses.

In describing the invention in detail, reference will be made to the accompanying drawings, in which like reference characters designate corresponding parts, and in which:

FIG. 1 illustrates certain train carried apparatus in accordance with one embodiment of the present invention; and

FIGS. 2A and 2B, when placed side-by-side, illustrate a track switching area provided with certain wayside circuiting in accordance with this same embodiment of the present invention.

In order to simplify the illustrations in the drawings and facilitate in the explanation of the fundamental characteristics of the invention, various parts and circuits have been shown diagrammatically in accordance with conventional symbols. Arrows with associated symbols (+) and (−) are employed to indicate connections of the circuits to the opposite terminals of suitable sources of current such as wire 40 in FIGS. 2A and 2B; and

the sources of current may be of any suitable characteristic for the purpose intended. The various contacts of the relays involved in the illustrations are shown conventionally as being in a lower or incline position when the coil or winding of the associated relay is deenergized, and in a raised or horizontal position when the relay is energized; the contacts belonging to any given relay are shown connected to its coil or winding by dotted lines, and these contacts may be either below or above the illustration of the relay winding. The front and back contacts between which the movable contacts are operated by the different relays are shown conventionally as arrowheads and the movable contacts are ordinarily of the type which have their contacts pulled downwardly by gravity or by spring action.

Referring now to the accompanying drawings, FIGS. 2A and 2B illustrate a switching area in which a single track **10** is connected to tracks **11** and **12** through power switches SWA and SWB respectively. Such a track layout is typical of mining operation, for example, wherein tracks **11** and **12** might extend to the working area where ore trains are loaded, and track **10** might extend to the dumping site. Strategically located within this track layout is a plurality of third rail sections (*a*, *b*, *c*, etc.), the purpose of which will be described in detail later.

Although the present invention is primarily concerned with the operation of track switches utilizing locomotive power, the selected embodiment is illustrated as being associated with a zone control system, for example, of the type disclosed in the U.S. application of W. D. Hailes Ser. No. 23,664 filed April 21, 1960, for controlling unmanned railway vehicles and which detects the approach of a train towards the illustrated switching area for initiating communication between the locomotive and the control office whereby route information is sent from the control office to the locomotive, to selectively direct the locomotive power to the various track switches. However, it should be understood at this time that various other means may be employed for designating the route of a locomotive without departing from the spirit or scope of the present invention.

Thus, certain zone markers ZM are situated in the illustrating track layout, of FIGS. 2A and 2B, so as to define the approach boundaries of the switching area and would normally be located well in advance of the third rail sections, in accordance with the requirements of practice. Each of these markers could, for example, be in the form of a tuned wayside coil being tuned to a frequency indicative of the marker location in the track layout. It is intended here that such zone markers ZM would then be included in a zone control system, for example, of the type disclosed in the above-mentioned Hailes application heretofore described. In a zone control system of this type, a locomotive carried sweep frequency oscillator scans a frequency range including those of the zone markers ZM and actuates certain other train carried apparatus for registering the zone location of the train, when it passes a particular marker. The location of the train, along with any other desirable particulars such as train identity, contents, etc. is then transmitted from the locomotive to the control office CO (see FIG. 1) via a two way communication system.

Referring now to FIG. 1, wires **13** and **14**, bearing the designations ZONE LOCATION and TRAIN IDENTITY ETC., are connected to modulator MC and such designation of wires **13** and **14** is assumed to be representative of connection between modulator MC and various tone generators (not shown). These tone generators may be energized in accordance with the zone location and train identity etc. of the approaching train, as is fully described in the above-mentioned Hailes application. The various tones applied to modulator MC

are then used to modulate the communications carrier frequency CC which is transmitted from the locomotive to the control office CO by communications transmitter CTX.

After receiving this transmission from the locomotive, the control office CO transmits route information, in the form of other tone modulations by communication carrier back to the locomotive instructing it to take a certain route through the track switching area illustrated in FIGS. 2A and 2B. The route information is received, on the locomotive by communications receiving equipment, including communications receiver CRX and demodulator DMC which demodulates the route information from the carrier frequency and selectively registers the route for the locomotive on route relays RT in FIG. 1. Included in this transmission from the control office CO is a further proceed tone modulation of communications carrier CC which permits the train to proceed in the direction selected by forward and reverse relays F and R, controlling the Forward and Reverse Controller, as is fully described in the above-mentioned Hailes application. Furthermore, the symbol *xx* represents the additional conditions, fully discussed in the Hailes application, upon which the energization of the Forward and Reverse Controller is dependent.

For reasons which will become obvious as the description progresses, it is intended, in the present embodiment, that trains approaching the illustrated switching area carry a plurality of contact shoes SH, each having an associated contact switch CS, for coacting with third rail sections *a*, *b*, etc. illustrated in FIGS. 2A and 2B. Furthermore, in the present embodiment, it is intended that each end of a train will carry a contact shoe SH, with certain other shoes SH interposed along the train, and that this plurality of contact shoes be connected in multiple by a train line so that every contact shoe SH is similarly energized, as will be described later. Similarly, the various contact switches CS are also connected in multiple by a train line (see FIG. 1). Furthermore, in the present embodiment, the spacing of this plurality of train carried contact shoes SH is such that at least two differently designated third rail sections (*a* and *b*, or *b* and *c*, for example) are simultaneously contacted by contact shoes SH, while any part of a train is occupying that switching area enclosed by points W, X, Y and Z in FIG. 2B.

When the train now advances towards the illustrated switching area, so that the leading contact shoe (for example, shoe LSH in FIG. 1) is connected to a third rail section (*a*, for example), the route information now registered on route relays RT is transmitted via the third rail section to the wayside. This third rail route transmission is provided by selectively modulating a carrier frequency F1 (see FIG. 1) with the output of one of a plurality of tone generators TT, such selecting being dependent upon the registration of route relays RT. This modulated carrier F1 is then transmitted via the third rail section, to the wayside where it is demodulated and causes energization of a wayside route relay RW (see FIG. 2B) corresponding to the designated route for the train.

While the leading contact shoe LSH is connected to the third rail section, the locomotive battery LB (see FIG. 1) is also connected to the wayside to furnish operating energy to the wayside apparatus of FIGS. 2A and 2B, and is furthermore directed by the registration of the wayside route relays RW to properly position track switches SWA and SWB in accordance with the designated routing of the train through the switching area.

After a certain time interval has elapsed, so as to permit the track switches to properly position themselves, the condition of the track switches is reported back to the train via the contacted third rail section, and if the condition of the switches is in correspondence with the route called for by the train, a relay CK on the locomotive (see FIG. 1) is energized and prevents application of the locomotive brakes. Check relay CK, when thus energized, is also effective to cause a check tone to be applied to the communications carrier frequency CC which, when transmitted back from the locomotive to the control office CO, instructs the control office that the track switches have properly positioned themselves for the designated move through the track switching area.

Referring now to FIGS. 2A and 2B of the accompanying drawings, third rail sections *a*, *c*, *d* and *e* are disposed along the various railway tracks and might for example, extend braking distance plus safety margins away from track switches SWA and SWB, depending upon the requirements of practice, while the plurality of electrically connected third rail sections, designated by the reference character *b*, are positioned around the various switch locations and, in the present embodiment, these third rail sections *a*, *b*, etc., perform the functions of the conventional switch detector track sections; i.e. prevent throwing of a switch under a train and detect when a train has properly cleared a switch.

Having thus considered the general mode of operation for the system, attention will now be given to a more detailed description of the selected embodiment of the present invention. For presenting this detailed description, it will be assumed that track switches SWA and SWB are in their normal position and that all wayside relays, of FIGS. 2A and 2B, are in their deenergized positions.

Check relay CK, in FIG. 1, is normally in its energized position, being energized by a circuit extending from (+), through back contacts **15**, **16**, **17** and **18** of relays AC–C, AE–C, AD–C and 3RD respectively, and to (−). Relay GO is therefore also normally energized by the obvious circuit including front contact **19** of relay CK and wire **19A** extending from demodulator DMC. This energization of relay GO is then effective, through its own front contact **20**, to modulate communications carrier CC with a tone from tone generator GO–TT. When this tone is transmitted back to the control office CO, it informs the control office that the train is proceeding along its designated route. In addition, relay GO is effective to prevent application of the locomotive brakes while in its energized position. Although the actual braking mechanism of the locomotive is not illustrated in the accompanying drawings, it is intended here that the dropping away of front contact **21** relay GO will deenergize wire **22**, in FIG. 1, and thus be effective to cause automatic brake application through the use of an electro-pneumatic EPV valve (not shown), or the like. It should be understood at this time that the energization of wire **19A** is assumed to be under control of the control office, so that the control office may stop the train at any time, as is fully described in the above-mentioned Hailes application.

When, however, a railway train advances so that its leading contact shoe LSH is connected to a third rail section, the normal energizing circuit for check relay CK is interrupted by the picking up of relay 3RD and, relay CK will drop away after a predetermined time interval (for example, two seconds) and thus cause brake application, unless a new energizing circuit is established for it, as will be described hereinafter.

Suppose now that a train, traveling in the forward direction, is approaching the illustrated track switching area from the left in FIG. 2A and passes zone marker ZM1, situated to the left of third rail section *a*. Zone marker ZM1 now coacts with train carried apparatus, as is fully discussed in the Hailes application Ser. No. 23,664, and causes wires **13** and **14**, in FIG. 1, to be selectively energized with various tones indicative of the zone location and train identity, etc. of the approaching train. Modulator MC now operates to modulate communications carrier CC with the tones supplied from wires **13** and **14**, and this modulated carrier frequency

CC is then transmitted, by communications transmitter CTX, from the locomotive to the control office CO.

As mentioned previously, the control office of the zone control system of the above-mentioned Hailes application then transmits route information to the locomotive in the form of further tone modulations to carrier frequency CC and, assuming that the train is to proceed, for example, from track **10** on to track **12**, route relay AD–RT will be selectively energized after the tone modulated carrier frequency CC has been demodulated by train carried demodulator DMC.

This energization of route relay AD–RT now causes tone generator AD–TT to be connected to modulator M1 through front contact **23** of relay AD–RT, so that carrier frequency F1 is modulated by the tone supplied by tone generator AD–TT. However, transmitter TX1 is ineffective, at this time, to transmit this modulated carrier frequency F1 since its high voltage (B+) has not as yet been applied.

As the locomotive progresses so that shoe LSH contacts third rail section *a*, the associated contact switch CS1 is depressed and results in an energization of relay 3RD by a circuit extending from (+), through closed contacts **24** of contact switch CS1, and to (−). The high voltage (B+) is now applied to transmitter TX1 through front contact **25** of relay 3RD so that the modulated carrier frequency F1 is now applied through capacitor **26** to shoe LSH. At the same time, the locomotive battery LB is also connected to shoe LSH through front contact **27** of relay 3RD and choke **28**. It should be pointed out at this time that capacitor **26** and choke **28** have been provided to respectively isolate transmitter TX1 from the locomotive battery LB and also the locomotive battery LB from the carrier frequency F1 transmitted from transmitter TX1.

With contact shoe LSH now in contact with third rail section *a*, of FIG. 2A, the modulated carrier F1 is applied from third rail section *a*, along wire **29** in FIG. 2A, through capacitor **30** to the input of receiver RX1, from whence this modulated carrier F1 is applied to demodulator DM1 so as to cause wayside route relay AD–RW, in FIG. 2B, to be energized, by wire **31** extending between FIGS. 2A and 2B.

Referring now to FIG. 1, the energization of relay 3RD, upon connection between contact shoe LSH and third rail section *a*, opens the normal energizing circuit for check relay CK at back contact **18** of relay 3RD. As mentioned previously, this relay CK is slow drop away in nature and will assume its deenergized position after a predetermined time lapse, unless a new energizing circuit is established.

Referring again to FIG. 2A, the energization of third rail section *a* with battery LB also causes energization of third rail relay A by a circuit extending from third rail section *a*, along wire **29**, through choke **32**, and to ground. Capacitor **30** and choke **32** perform the similar functions described for capacitor **26** and choke **28** of FIG. 1.

With relays A and AD–RW energized, relays SMAR and SMBR, of FIG. 2B, are now selectively energized so as to properly position track switches SWA and SWB respectively for the desired routing of the train. It should be pointed out at this time that relays SMAR and SMBR are of the type in which the associated armature is operated to either of its two extreme positions in accordance with the selective energization to either the upper or lower windings of the relay and that the armature remains in its last operated position when energization is removed from the relay windings. Thus, the upper "normal" winding of relay SMAR is now energized by a circuit extending from (+) in FIG. 2A, through back contact **33** of relay TOM, front contact **34** of relay A, along wire **35** between FIGS. 2A and 2B, through front contact **36** of relay AD–RW and to (−). In addition, the lower "reverse" winding of relay SMBR is energized by a circuit extending from (+) in FIG. 2A, through back contact **33** of relay TOM, front contact **34** of relay A, along wire **35** between FIGS. 2A and 2B, through front contact **37** of relay AD–RW and to (−).

With relays SMAR and SMBR now energized as just described, the locomotive battery LB is connected to the associated switch machines SMA and SMB of FIG. 2B, to selectively position track switches SWA and SWB to their desired normal and reverse positions respectively. Thus, switch machine SMA is energized, so as to position track switch SWA in its normal position, by a circuit extending from third rail section *a* (connected to locomotive battery LB), along wire **29**, through front contact **38** of relay A, back contact **39** of relay B, along wire **40** between FIGS. 2A and 2B, along wire **41** to the movable contact **42** of relay SMAR, through "normal" contact **43** of relay SMAR, and to the "normal" terminal **44** of switch machine SMA. Similarly, the "reverse" terminal **45** of switch machine SMB is energized by a circuit extending from third rail section *a*, wire **29**, front and back contacts **38** and **39** of relays A and B respectively, along wire **40** between FIGS. 2A and 2B, along wire **46** to the movable contact **47** of relay SMBR, and to "reverse" contact **48** of relay SMBR.

With the track switches SWA and SWB now in their normal and reverse positions respectively, tone generator AD–WT, of FIG. 2B, is connected to modulator M2 (FIG. 2A) by a circuit including "reverse" contacts **49** of switch machine SMB, "normal" contacts **50** of switch machine SMA, and along wire **51** between FIGS. 2A and 2B. Modulator M2 now operates to modulate carrier F2 with the tone received from tone generator AD–WT in FIG. 2B.

In order to delay the transmission of modulated carrier F2 until the track switches SWA and SWB have had sufficient time to position themselves in response to route information from the locomotive, a time relay TM (see FIG. 2A) is provided which prevents application of high voltage (B+) to transmitter TX2 for a certain time interval. Thus, when the locomotive carried contact shoe LSH is connected to third rail section *a*, and subsequently relay A is energized, an energizing circuit for timing relay TM is completed in FIG. 2A and extends from (+), through front contact **52** of relay A, and to (−). However, this energization of timing relay TM is ineffective to cause pick up of this relay until the predetermined relay pick up time has elapsed. Obviously, the selection of this pick up time for timing relay TM is dependent upon the operating speeds of the various track switches SWA and SWB.

Assuming now that the track switches have had sufficient time within which to operate, timing relay TM now becomes picked up and high voltage (B+) is applied to transmitter TX2 through front contact **53** of timing relay TM.

Modulated carrier F2 is now applied to third rail section *a* through front contact **54** of relay A, capacitor **55**, and wire **29**. This modulated carrier F2 is then picked up on the locomotive by contact shoe LSH which feeds this modulated carrier F2 through capacitor **56** (see FIG. 1) as input to receiver RX2. This modulated carrier F2 is then demodulated by demodulator DM2 and selectively energizes route correspondence relay AD–C, provided track switches SWA and SWB have been properly positioned for a move from track **10** to track **12**.

Assuming this to be the case; i.e. track switch SWA in its normal position and track switch SWB in its reversed position, check relay CK is now energized, as illustrated in FIG. 1, by a circuit extending from (+), through front contact **57** of relay AD–C, front contact **58** of relay AD–RT, front contact **59** of relay 3RD, and to (−). Thus, check relay CK has been reenergized, so as to retain relay GO in its normal energized position, and thus prevents an application of the locomotive brakes. At the same time, modulator MC is supplied with a tone from tone generator GO–TT so that the control office

may be informed that the designated route has been set up.

If track switches SWA and SWB had not been properly positioned in accordance with the designated route for the train, so that the tone from tone generator AD–WT, of FIG. 2B, had not been received by receiver RX2 in FIG. 1, during the release time of check relay CK, this check relay CK would have dropped away, thus opening the energizing circuit for relay GO, at front contact **19** of relay CK. As mentioned previously, when relay GO has assumed its released position, wire **22**, of FIG. 1, is deenergized and the locomotive brakes are then applied so as to stop the train.

It will be noted in FIG. 1 that if check relay CK remains deenergized, a manual reset is necessary from the control office to release the brakes of the locomotive; i.e. a modulated carrier CC must be received by communications receiver CRX which is effective to pick up reset relay RES, and thus cause check relay CK to be reenergized by a circuit extending from (+), through front contact **60** of relay RES, and to (−).

As mentioned before, by proper positioning of the illustrated third rail sections (*a*, *b*, etc.) at the track switching area, these third rail sections can be made to perform the functions of the conventional switch detector track circuits, without using normally energized track relay. To illustrate this, assume that switches SWA and SWB have been positioned for the move from track **10** to track **12** and that the railway train has advanced so that its leading contact shoe LSH, in FIG. 1, is now connected to third rail section *b*, while a subsequent contact shoe along the train-line is connected to third rail section *a*. Therefore, third rail relays A and B are both energized by power from the locomotive battery LB.

Relay TOM, in FIG. 2A, is thus energized by a circuit extending from (+), through front contacts **61** and **62** of relays A and B respectively, and to (−). It will be noted in FIG. 2A that relay TOM is energized as long as two differently designated third rail sections are energized with the locomotive battery LB. Such energization of relay TOM now interrupts the previously discussed energizing circuits for relays SMAR and SMBR, of FIG. 2B, by opening of its back contact **33**, so as to prevent any change in the switch positions while a train is occupying that switching area enclosed by points W, X, Y and Z in FIG. 2B.

As soon as the train advances so that its tail end has passed point Y, on track **12**, only third rail section *d* is energized with the locomotive battery LB. Since relay TOM is slow drop away in nature, relay **00**, in FIG. 2A, is now energized by a circuit extending from (+), through back contacts **63**, **64** and **65** of relays A, B and C respectively, front contact **66** of relay D, back contact **67** of relay E, front contact **68** of relay TOM, and to (−). In addition, relay **00** is provided with a stick circuit, including its own front contact **69**, which retains it in an energized position so long as a single third rail section is energized.

This energization of relay **00** is indicative that a train has left the switching area and therefore tone generator LV–WT is connected to modulator M2 through front contact **70** of relay **00** and supplies a certain "leaving" tone to modulate carrier frequency F2; i.e. such modulation indicates that a train has left, or is clear of, the illustrated switching area.

Carrier F2, modulated with the tone from tone generator LV–WT is then applied by transmitter TX2 (assuming that timing relay TM has been picked up), through front contact **71** of relay D, capacitor **72**, and along wire **73**, between FIGS. 2A and 2B, to third rail section *d* where it is picked up by the connected contact shoe SH and is fed through capacitor **56** to receiver RX2 in FIG. 1. This "leaving" tone is then effective to cause demodulator DM2 to energize relay LV, in FIG. 1, which in turn connects tone generator LV–TT to modulator MC, through front contact **74** of relay LV, and therefore modulates carrier frequency CC with a tone by which the control office CO may be advised of this leaving condition, so that a switching back of the train, for example, might be immediately initiated by the control office and thus generally permit more rapid movement of trains utilizing the illustrated switching area.

From the above, it is apparent that a track switch control system has been provided by the selected embodiment of the present invention in which all track switches necessary for establishing a designated route for a train, are simultaneously controlled by power from the locomtotive, and in which the train is stopped if the proper route is not set up in a predetermined time interval.

However, although the selected embodiment illustrates the use of contact shoes SH, cooperating with various third rail sections *a*, *b*, etc. for supplying the locomotive battery to the wayside, it should be understood that various other means may be employed in practice for accomplishing this power transfer. In addition, although a two frequency method has been utilized, in the selected embodiment, for transmission of route information from the train to the wayside and subsequently route check transmission back to the train, it should be further understood that a single frequency method, operated on a time sharing basis, could also be employed depending upon the requirements of practice.

Having described a track switch control system as one specific embodiment of the present invention, it is desired to be understood that this form is selected to facilitate in the disclosure of the invention rather than to limit the number of forms which it may assume and, it is to be further understood that various modifications, adaptations and alterations may be applied to the specific form shown to meet the requirements of practice, without in any manner departing from the spirit or scope of the present invention, except as limited by the appending claims.

What I claim is:

1. A railway track switch control system for controlling the operation of the track switches of a switching area in accordance with the desired routing of a railway vehicle through said switching area comprising, a source of power carried by said railway vehicle, route registration means for registering the desired route for said vehicle through said switching area, first transfer means in advance of said switching area for transferring power from said vehicle carried power source to the wayside, wayside means responsive to the registration of said route registration means for selectively applying the power transferred from said vehicle carried power source to operate the track switches of said switching area to their respective desired positions for establishing the desired route called for by said route registration means, second transfer means disposed within said switching area to define a detector track section at each of said track switches for transferring power from said vehicle carried power source to the wayside as long as said vehicle occupies a detector track section, and protective means effective as long as power is being transferred by said second transfer means for preventing the operation of the associated track switch.

2. A railway track switch control system for controlling the operation of the track switches of a switching area in accordance with the desired routing of a railway vehicle through said switching area comprising, a source of power carried by said railway vehicle, route registration means for registering the desired route for said vehicle through said switching area, first transfer means in advance of said switching area for transferring power from said vehicle carried power source to the wayside, wayside means responsive to the registration of said route registration means for selectively applying the power transferred from said vehicle carried power source to operate the track switches of said switching area to their respective desired positions for establishing the desired route called for by said route registration means, second transfer means disposed within said switching area to define a

detector track at each of said track switches for transferring power from said vehicle carried power source to the wayside as long as said vehicle occupies a detector track section, protective means effective as long as power is being transferred by said second transfer means for preventing operation of the associated track switch, and detector means for detecting when said vehicle is clear of a detector track section after having once occupied said detector track section.

3. A railway track switch control system for simultaneously operating a plurality of two position track switches of a switching area to either similar or dissimilar positions in accordance with the desired routing of a railway vehicle through said switching area comprising, a source of power carried by said railway vehicle, vehicle carried route registration means for registering the desired route for said vehicle through said switching area, transfer means in advance of said switching area for transferring power from said vehicle carried power source and the registration of said vehicle carried route registration means to the wayside, wayside means responsive to the transferred registration of said vehicle carried route registration means for selectively applying the power transferred from said vehicle carried power source to simultaneously operate the track switches of said switching area to their respective desired positions for establishing the desired route called for by said vehicle carried route registration means, switch position registration means for registering the positions of said track switches after said desired route has been called for, and vehicle carried route check means responsive to the registration of said vehicle carried route registration means and said switch position registration means for causing a brake application on said vehicle if the registration of said switch position registration means does not agree with the registration of said vehicle carried route registration means.

4. The combination specified in claim 3 wherein the registration of said switch position registration means is transferred to said vehicle by way of said transfer means.

5. In a railway track switch control system, the combination of, route registration means for registering the desired route of a vehicle over a track switch, switch operating means responsive to the registration of said route registration means for causing said track switch to be operated to its desired position for establishing the desired route called for by said route registration means, switch position registration means for registering the position of said track switch after said desired route has been called for, and vehicle carried route check means responsive to the registrations of said route registration means and said switch position registration means for causing a brake application on said vehicle if the registration of said switch position registration means does not agree with the registration of said route registration means.

6. The combination specified in claim 5 wherein said vehicle carried route check means include a slow drop away relay deenergized when said vehicle approaches said track switch and reenergized only if the registration of said switch position registration means comes into agreement with the registration of said route registration means, said relay causing a brake application on said vehicle if dropped away.

7. In a system for controlling a track switch in accordance with the desired routing of an approaching

vehicle over said track switch, the combination of, a source of power on said vehicle, registering means effective when said vehicle approaches said track switch to register remotely on the vehicle the desired routing of said vehicle over said switch, transfer means in advance of said track switch for transferring power from said vehicle carrier power source to the wayside, switch operating means responsive to said vehicle route registration effective to cause said transferred power to position said track switch as required to provide said desired vehicle routing, and vehicle carried route check means responsive to the position of said track switch and said vehicle route registration effective to permit said vehicle to travel over said track switch only provided that the position of said switch corresponds to said desired vehicle routing.

8. In a railway track switch control system for controlling the operation of a power track switch, a source of power carried on a vehicle utilizing said track switch, wayside transfer means disposed around said track switch to define a detector track section for said track switch for transferring power from said vehicle carried power source to the wayside as long as said vehicle occupies said detector track section, protective means effective as long as power is being transferred by said wayside transfer means for preventing operation of said track switch, detecting means for detecting when said vehicle is clear of said detector track section after having once occupied said detector track section, said detecting means comprising a plurality of spaced third rail sections disposed one after another along the route to be taken by the vehicle utilizing said track switch and including one third rail section disposed on the exit side of said track switch, each of said third rail sections being electrically connected to said vehicle carried power source and being spaced from one another so that at least two of said sections are concurrently energized during the time that said vehicle is moving over said track switch, and a normally deenergized relay energized with power from said vehicle carried power source when only said exit third rail section of said plurality is connected to said vehicle carried power source subsequent to the concurrent energization of at least two of the said third rail sections.

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ARTHUR L. LA POINT, *Primary Examiner.*

JAMES S. SHANK, LEO QUACKENBUSH, *Examiners.*