FIG. 2. CONTROL OFFICE TRANSMITTER

ANTENNA

INVENTOR.

J. G. KARLET

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5 SHEETS-SHEET 2
FIG. 3. LOCOMOTIVE RECEIVER

[Diagram of locomotive receiver system with labeled components: antenna, rectifiers, locomotive motor control, batteries, demodulator, carrier receiver and amplifier, battery charger, etc.]

INVENTOR.
J.G. KARLET

BY
Forest M. Hutchinson
HIS ATTORNEY
REMOTE CONTROL SYSTEM FOR A TRIMMING LOCOMOTIVE

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REMOTE CONTROL SYSTEM FOR A TRIMMING LOCOMOTIVE

Joseph G. Karet, Roanoke, Va., assignor to General Rail-
way Signal Company, Rochester, N.Y.

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This invention relates to a control system for a re-
motely controlled locomotive and more particularly con-
cerns a control system for a remotely controlled trimming
 locomotive in a railroad car classification yard.

In railroad classification yards, freight cars received
from incoming trains are disconnected from the trains and
reclassified as to further destinations. The yard includes
a large number of classification tracks connected by
switches to a main track. A control tower is centrally
provided, wherein an operator controls the operation of the
switches to route the incoming cars to designated clas-
sification tracks. The imparting of movement to the cars
on the main track to carry them to their respective clas-
sification tracks is normally effected by providing a "hump"
on which the cars are pushed, and then disconnected,
permitting them to run free down the inclined portion
of the "hump" to the speed necessary to carry them to their respective classification tracks. However,
because of certain factors which affect the free move-
ment of the cars, such as weight, frictional characteristics
of the individual cars, weather, wind, and the condition
of the tracks, cars will occasionally stop short of their in-
tended destinations, thereby preventing the dispatching of
subsequent cars over the "hump" or onto a respective classification track. When a car is prematurely stopped
between the "hump" and its respective classification track,
a trimming locomotive, under the control of an engineer,
is employed to push the car to its intended destination.

An object of this invention is to provide a control sys-
tem for a remotely controlled trimming locomotive in a
railway car classification yard.

Another object of this invention is to provide a trimming
 locomotive in a railroad car classification yard controlled
by carrier waves transmitted from the control tower.

Another object of this invention is to provide a spur
 track storage location for the trimming locomotive pro-
vided with means for automatically charging the batteries
of the trimming locomotive when it is at rest.

A further object of this invention is the provision of
means for preventing the control tower operator from
operating the trimming locomotive when there is an un-
safe traffic condition existing in the classification yard.

A still further object of this invention is the provision of
means in the trimming locomotive for stopping the
trimming locomotive when it occupies a predetermined
position on a spur track storage location.

A still further object of this invention is to provide a
remotely controlled trimming locomotive for a railroad
classification yard which locomotive automatically brakes
its forward and reverse movement upon the deenergization
of the driving motor.

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 progresses.

In describing the invention in detail, reference is made
to the accompanying drawings in which similar letter
reference characters are used to designate similar parts
of the organization, and in which:

Fig. 1 illustrates the general layout of a railroad car
classification yard provided with the present invention;
Fig. 2 illustrates the organization of apparatus at the
control office for the remote control of the trimming
 locomotive;
Fig. 3 illustrates the organization of the apparatus
located on the trimming engine, and also shows the organiza-
tion of the apparatus located adjacent the spur track which
cooperates with the trimming locomotive; and
Figs. 4A and 4B illustrates the motor control circuits
which control the operation of the trimming locomotive.

For the purpose of facilitating the disclosure of the
present invention as to its mode of operation, schematic
wiring diagrams have been used to illustrate the circuit
organization rather than attempting to show the specific
structure and arrangement of parts that will be employed
in practice. Rather than to show wiring connections
to all sources of energy, the symbols (+) and (−) have
been used to indicate connections to the respective posi-
tive and negative terminals of suitable batteries, or other
sources of direct current.

With reference to Fig. 1, the track layout for a railroad
classification yard is illustrated wherein the cars to be
classified travel in the direction of the arrow D on the
main track MT. The cars are pushed to the crest of the
hump and are then free rolling down the inclined main
track MT and selectively routed to a respective classification
track CLT. The control tower CTO contains
control equipment which actuates certain switches W in
accordance with the intended destination of a respective
freight car to a classification track CLT.

A trimming locomotive is normally located on a spur
track SPT adjacent to the track MT. Although in the
present application, the spur track is shown below the
crest of the hump, it is understood that it can be located
at any convergent point in the classification yard accord-
ing to the individual needs of practice. Spur switch SW,
capable of being operated to a normal or reverse position,
is provided, to connect the spur track SPT to the main
track MT. With the switch SW in a reverse position, a
route is provided for the ingress or egress of the locomo-
tive from the track SPT. When the switch SW is in a
normal position, a route is provided for the cars to be
classified.

A hump signal HSG capable of displaying stop and pro-
ceed aspects is controlled by an operator in the control
tower CTO and is provided to control the approach of cars
onto the hump crest. When the signal HSG displays a
stop aspect, cars to be classified are not allowed to ap-
proach the hump crest.

Transmitting apparatus as shown in Fig. 2 is located
in the tower CTO for transmitting a distinctive carrier
frequency modulated by tones which are transmitted by
the antenna A and are selectively received by a receiver
located on the locomotive T. The locomotive T moves
in either a forward direction from the track SPT toward
the classification tracks CLT, or in a reverse direction
toward the main track MT, and eventually the track
SPT, at either a fast or a slow rate of speed, in accord-
ance with the distinctive frequency of the tones trans-
mitted.

In operation, when a freight car to be classified has in-
advertently come to a stop between the hump HU and a
classification track CLT, or on a designated classification
track CLT, the operator in the control tower puts the
signal HSG to stop, operates the switch SW to a reverse
position, and operates the transmitter to transmit a distinc-
tive tone which causes the locomotive to move in a for-
ward direction from the track SPT, thereby eventually
causing the locomotive to push the stopped car to its intended destination. The control operator then causes the transmitter to transmit another distinctive tone which results in the reverse movement of the locomotive T to a predetermined position on the spur track SPT. As will be described in detail, the locomotive automatically stops at a predetermined location on the track SPT when it reaches the area occupied by the ramp RA by the operation of a reverse cut off apparatus. The batteries BT shown in Fig. 3 which provide the energy for the locomotive driving motors M1 and M2 are charged to their full potential by suitable charging apparatus C, which apparatus is so disposed as to be self-operated while the locomotive T is at rest on the track SPT.

With reference to Fig. 2, the control office apparatus for the transmission of locomotive controls is illustrated in block form, and a track layout is shown including the spur track SPT connected to the main track MT by a switch SW and includes the hump signal HSG.

A locomotive control lever LC capable of being normally operated to a forward, reverse or stop position, is provided on a suitable control panel in the control tower CT. When the lever LC is moved to a designated position, it remains in that position until normally operated to a different position. However, any suitable control lever may be employed. A self-restoring push button FBP is provided to control the speed of the locomotive T. The momentary actuation of button FBP results in the increased speed of the locomotive T.

When the lever LC is in an extreme right-hand position, the locomotive T is operated in a reverse direction, and when it is in a normal position the locomotive T is operated in a forward direction. With the lever LC intermediate between the left and right-hand positions, the locomotive T is deenergized, and at rest. When the push button FBP is depressed the locomotive T is operated at a fast rate of speed, as for example, 5 miles per hour and when it is in a normal position the locomotive T is operated at a lower rate of speed, as for example, 3.5 miles per hour.

The system herein proposed for the purpose of effecting the remote control of the locomotive T consists of transmitting a continuous carrier wave which is modulated by two distinct audio frequencies either individually or simultaneously by the lever LC.

In accordance with the transmission of controls for the locomotive T by the operation of the control lever LC, a field office control relay FOC or ROC is picked up, which renders the output of a respective tone generator GF or GR effective to apply its output to a suitable voltage amplifier, which amplified output is applied to the modulator, and the output of the modulator is applied to the carrier wave oscillator; then the modulated carrier wave is further amplified and the output of the power amplifier is supplied to the antenna A1 for radiation to an appropriate receiver on the locomotive T. As the control lever LC has been actuated to either a forward or reverse position the depression of the push button FBP causes the inactive tone generator to apply its amplified output to the modulator which serves to operate the locomotive T at a higher speed in the designated direction in accordance with the position of the lever LC as will hereafter be described in detail.

A relay RGP is energized in response to a stop or red aspect of the signal HSG and it is deenergized in response to a proceed or green aspect of the signal HSG. A switch repeater relay RWP is energized when the switch SW is in a reverse position and deenergized when the switch SW is in a normal position. A signal switch control relay GWC is provided to control the output of the modulator in accordance with the pick-up condition of the relay RWP and the relay RGP.

When the relays RGP and RWP are energized, a circuit is completed extending from (+) and including the front contact 21 of relay RGP, the front contact 22 of relay RWP, and the winding of the signal control relay GWC, to (−). When the relay GWC is energized the front contact 23 of relay GWC is closed which completes a circuit allowing the plate voltage supply 24 of the modulator to become effective. Therefore, it is apparent that the tone generators GF and GR are ineffective in transmitting a tone when the signal HSG displays a proceed aspect, or the switch SW is in a normal position.

The forward office control relay FOC is provided for causing the tones generated by the tone generator GF to be applied to the carrier wave transmitting apparatus. A reverse office control relay ROC is provided for causing the tone generated by the tone generator GR to be applied to the carrier wave transmitting apparatus.

In response to the operation of the lever LC to its left-hand or forward position, the forward office control relay FOC is energized by a circuit which extends from (−) and includes contact 26 of lever LC in its forward position and the winding of relay FOC, to (−). The relay FOC picks up and renders the output of the tone generator GF effective to modulate the transmitted carrier wave by closing a circuit which extends from terminal 44 of the tone generator GF; the front contact 27 or relay FOC, terminal 45 of the relay FOC; the front contact 32 of relay ROC; and the winding of the voltage amplifier, to (-).

When the control lever LC is operated to its right-hand or reverse position, a reverse relay ROC is energized by a circuit which extends from (+) and includes contact 26 of the lever LC in the reverse position and the winding of relay ROC, to (−). When the relay ROC is energized the tone generator GR is effective to modulate the carrier wave by closing a circuit which extends from terminal 39 of the tone generator GR, the front contact 31 of relay ROC, the back contact 32 of relay FOC, terminal 33 of the voltage amplifier, terminal 34 of the voltage amplifier, front contact 35 of relay ROC to terminal 36 of the tone generator GR.

After a control has been transmitted to cause the locomotive to move forward in accordance with the particular audio frequency generated by the tone generator GF, the operator can depress the button FBP which picks up the relay ROC by a circuit which extends from (−) and includes contact 36 of lever LC in the reverse position, the back contact 43 of the button FBP, terminal 34 of the relay ROC, the winding of the relay ROC, to (−), to modulate the carrier wave with the frequency of the tone generator GR.

With the button FUB depressed, the tone generator GR and the tone generator GF are feeding their respective tones simultaneously and serially into the voltage amplifier by a circuit which extends from terminal 44 of the tone generator GF; the front contact 27 of relay FOC, terminal 33 of the voltage amplifier, terminal 34 of the voltage amplifier, front contact 35 of relay ROC, terminal 36 of tone generator GR, terminal 30 of tone generator GR, front contact 31 of relay ROC, front contact 32 of relay FOC, front contact 45 of relay ROC, and front contact 28 of relay ROC to the terminal 46 of the tone generator GF. It is thus provided that in response to the picking up of the relays FOC and/or ROC by the positioning of the lever LC and/or the actuation of the button FBP, one or both of the tone generators are rendered effective to apply their output individually or simultaneously to a modulator for distinctively modulating the carrier wave. The duration of the modulation is governed by the length of time that the control lever is in either a right-hand or a left-hand position. The output of the power amplifying portion of the carrier wave transmitter is supplied to the antenna A1 for radiation to the receiver of the trimming locomotive T as is illustrated in Fig. 5.

In the event that the remotely controlled locomotive is to be installed in a large classification yard, or where the needs of practice may require the operation of a trim-
ming locomotive to a distant location, suitable transmitting antennas may be installed in appropriate places throughout the yard and connecting committer by various means which are well known in the art.

The portion of apparatus located on the trimming locomotive to be controlled as shown in Fig. 3.

With reference to Fig. 3 a receiving antenna A2 which receives the output of the antenna A1 is connected to a suitable receiver the output of which is applied to the transmitter T, and the output of the transmitter is connected to the receiver control relay F; and the amplifier AR is distinctively tuned to receive and amplify the demodulated audio frequency currents generated by the tone generator GF of the transmitter to effect the energization of the forward receiver control relay F; and the amplifier AR is distinctively tuned to receive and amplify the demodulated audio frequency currents generated by the tone generator GR to effect the energization of the reverse relay R.

As herein shown the modulated carrier wave is received through the antenna A2, amplified by the carrier amplifier, demodulated by a conventional demodulator, amplified by a tuned audio amplifier AF is distinctively tuned to receive and amplify the demodulated audio frequency currents generated by the tone generator GF and GR, both the relays R and F are energized.

Relay F in the motor control circuit as shown in Figs. 4A and 4B governs the operation of the trimming locomotive in a forward direction, and the relay R controls the locomotive in a reverse direction.

There is provided a home stop switch HSB for removing circuit energy from the locomotive motor control circuit when the relay R is energized and the locomotive is traveling in a reverse direction. The home stop switch HSB is so disposed on the trimming locomotive that when the locomotive reaches an area on the spur track which is operated by a stationary ramp RA, the switch HSB cooperates with the raised portion of the ramp RA to open the contact 48 of the switch HSB which renders the energized relay R ineffective to control the reverse movement of the locomotive, thereby causing it to stop. The front contact 47 of relay R is serially connected with the back contact 46 of the switch HSB so that the relay R in a picked up condition, is ineffective in closing a circuit in the motor control apparatus through the front contact 47 when the switch HSB is in cooperative relationship with the ramp RA.

In operation, when the locomotive is traveling in a direction towards its spur track location the home stop switch HSB will be energized by RA and bring the locomotive to a stop at the proper position on the spur track SPT without further attention on the part of the operator which operation will be described in detail. It should also be noted that the home stop mechanism affects only the reverse control of the locomotive.

Trolleys L1 and L2 are attached to the locomotive T and suitably connected to the batteries BT. Contacts C1 and C2 are located adjacent the track SPT and so disposed as to frictionally engage the trolleys L1 and L2.

When the locomotive T is in proper position the trolleys L1 and L2 engage the contact mechanism C1 and C2, respectively, and energize relay R and bring the locomotive T at rest on the spur track SPT. Conventional means are provided for cutting out the battery charger when the battery is charged to its full potential.

Figs. 4A and 4B illustrate the control circuit for the driving motors M1 and M2 which propel the trimming locomotive. The motors M1 and M2 are, for example, 50 H. S. short wound motors which are directly geared to the axles of the locomotive. The motor M1 is geared to the front axle and the motor M2 is geared to the rear axle. Although short wound motors are used to drive the locomotive because they tend to run at a constant speed, which gives the operator greater control over the trimming locomotive other types of motors may be used according to the individual needs of practice.

As illustrated in Fig. 4B, the motors M1 and M2 comprise armatures AT1 and AT2, respectively, and field windings F1 and F2, respectively.

Storage batteries BT supply the energy for the motors M1 and M2. The battery is assumed to be an 88 cell storage battery capable of providing a potential of at least 117 volts under no-load condition. In one application of this invention battery cells which are commonly known as Edison cells having positive electrodes of nickel oxide flake and negative electrodes of powdered iron, and an electrolyte consisting of a dilute solution of potassium hydroxides are utilized. This type of cell is considered advantageous for the reason that it has a high kilowatt-hour capacity and can stand indefinitely in either a charged or discharged condition without adverse effect on the batteries. However, other types of storage batteries may be used according to the needs of practice.

A local manual control lever TPL and a speed button SPB are provided on the locomotive to locally operate the motor control circuit. The lever TPL is capable of being manually operated to a reverse, automatic, or stop position, and the burn-up relay R is then dependent on the control of the motor armature to effect the desired speed.

As previously described the relay R (also shown in Fig. 3) is picked up in response to the output of the amplifier AR, which output is controlled by the manual operation of the control lever LC (see Fig. 2) to its reverse position; and the relay F is picked up in response to the output of the amplifier AF which output is controlled by the lever LC in its forward position.

A reverse relay relay RP, a reverse selection relay RC, and a reverse motor control relay RM are provided to control the motors M1 and M2 in the reverse direction of rotation. A forward relay relay FP, a forward selection relay FX, and a forward motor control relay FM are provided to control the motors M1 and M2 in their forward direction of rotation.

A field control relay FL is provided to control the energization of the fields F1 and F2 of the motors M1 and M2. A speed selection relay SP, a slow speed control relay SL and a fast speed control relay FL govern the selective speed of the motors M1 and M2.

The reverse time delay relay RTD, the forward time delay relay FTD, and the dynamic braking relay DB are provided to control the braking of the motors M1 and M2 when the relays R and F are energized. Control relay PR is provided to continuously ring while the locomotive is operated in either a forward or reverse direction.

Assuming that the operator wishes to move the locomotive in a forward direction at a slow rate of speed the relay F is energized in response to the previously mentioned operations of the transmitter and receiver in accordance with the position of the control lever LC. When the relay F is picked up it energizes the forward repeater relay relay FP by a circuit which extends from (+), and includes front contact 49 of relay F, back contact 50 of relay R, and the winding of relay FP, to (—).

When relay FP is energized relay FX is energized by a circuit which extends from (—), and includes front contact 53 of relay FX and the winding of relay FTD, to (—). When relay FTD is picked up relay FX the forward time delay relay FTD is energized by a circuit which extends from (—), and includes front contact 53 of relay FX and the winding of relay FTD, to (—). Upon the picking up of relay FX the forward time delay relay FTD is energized by a circuit which extends from (—), and includes front contact 54 of relay FTD and the winding of the field energizing relay FL to (—).

When the relay FTD is picked up relay FX is energized by a circuit which extends from (—), and includes front contact 54 of relay FTD and the winding of the field energizing relay FL to (—).
FD2 of the motors M1 and M2 by a circuit which extends from (+), and includes the field windings FD1, FD2, and front contact 57 of relay FL to a common low voltage terminal 98 of the battery BT. When relay FL is picked up the forward motor control relay is energized by a circuit which extends from (+), and includes front contact 59 of relay FX, front contact 60 of relay FL, back contact 61 of relay DB, and winding of relay FM, to (−). The picking up of relay FM energizes the armatures AT1 and AT2 of the motors M1 and M2 by a circuit which extends from common terminal 98 of the battery BT, a front contact 62 of relay FM, the armatures, and AT1, front contact 63 of relay FM, front contact 64 of relay SL, and the common terminal 66 of the battery BT.

At this point the motors M1 and M2 are driving the locomotive in a forward direction. If the operator wishes to increase the speed of the locomotive, the button FPB is depressed which results in the picking up of the normally deenergized reverse receiver control relay R as described previously. When relay R is picked up a circuit for the relay SP is energized by a circuit which extends from (+), and includes front contact 49 of relay F, front contact 86 of relay R and the winding of relay SP, to (−). The picking up of the relay SP opens its back contact 55 which deenergizes the previously picked-up relay SL and energizes the relay FT by a circuit which extends from (+), and includes front contact 87 of relay SP, back contact 88 of relay SL, and the winding of relay FT, to (−). The picking up of the relay FT and the dropping away of relay SL increases the armature voltage of the motors M1 and M2 by closing a circuit which extends from common battery terminal 98, front contact 62 of relay FM, armatures AT2 and AT1, front contact 63 of relay FM and front contact 85 of relay FT to the negative terminal 92 of the battery BT. When relay R was picked up subsequent to the picking up of the relay F a reverse control on the motor was prevented by the open condition of the back contact 67 of relay F. Also, relay FP remains in its picked up position by an alternate circuit which extends from (+), and includes front contact 57 of relay F, front contact 93 of relay FP and the winding of relay FP, to (−). Thus it can be seen that the circuit is so arranged that the picking up of one of the demodulating relays with one already in a picked-up condition energizes only the speed control relay SP and the fast relay FT. If the locomotive had been traveling in a reverse direction and the speed were to be increased the relay F would have subsequently picked up and the relay RP would have remained energized by an alternate circuit which extends from (+), and includes the back contact 48 of the switch HSIB, the front contact 47 of the relay R, the front contact 94 of the relay RP, and the winding of the relay RP to (−).

Assuming that the operator wishes to bring the locomotive to a stop, the control lever LC is moved to its intermediate position as hereinafter mentioned thereby resulting in the deenergization of both the relays F and R. The dropping away of the relays F and R results in the picking up of the dynamic braking relay DB by a circuit which extends from (+) and includes the front contact 54 of the forward time delay relay FTD, the back contact 95 of the relay FX which has become deenergized upon the dropping away of the relay FP, the back contact 96 of relay RX and the winding of relay DB, to (−). It should be noted that a slow drop-away relay and remains picked up for a length of time after the forward receiver control relay F is deenergized. In one application of this invention the FTD relay is designed to remain picked up for a period of 10 seconds after the opening of its pick-up contacts in a shorter or longer time as may be useful, the opening of the FTD relay may be used as the needs of practice may dictate. It should also be noted that the field energizing relay FL remains picked up during the time that the relay FTD is energized. The picked-up condition of the dynamic braking relay DB closes its front contact 97 which dynamically brakes the motors M1 and M2 for a period of 10 seconds. This conventional method of braking is effective in that the induced voltage of the armatures AT1 and AT2 will cause a current to flow through the dynamic braking resistance thereby producing a distinct retarding torque.

In causing the locomotive to return to its spurt track location SPT the operator actuates the lever LC in the control office to its reverse position, and the reverse control relay R is picked up as previously described.

When the relay RP is picked up the relay RP is energized by a circuit which extends from (+) and includes the back contact 48 of the home stop switch HSIB, the front contact 47 of the relay R, the back contact 67 of the relay F and the winding of relay RP to (−). The picking up of the relay RP energizes the relay RX by a circuit which extends from (+) and includes the front contact 68 of relay RP, the back contact 69 of the relay FTD, and the winding of the relay RX to (−). When the relay RX picks up the relay RTD is energized by a circuit which extends from (+) and includes front contact 70 of relay RX and the winding of relay RTD to (−). When the relay RTD is picked up it energizes the relay FL by a circuit which extends from (+) and includes front contact 71 of relay RTD and the winding of relay FL to (−). The picking up of the relay FL energizes the field windings FD1 and FD2 of the motors M1 and M2 as previously described. The picking up of relay FL completes a circuit for energizing the armatures AT1 and AT2 of the motors M1 and M2 which extends from (+) and includes the front contact 72 of the relay RX, the front contact 73 of the relay FL, the back contact 74 of the relay DB, and the winding of the relay RM to (−).

The picking up of the relay RM completes a circuit for energizing the armatures AT1 and AT2, a front contact 90 of relay RM, the front contact 64 of relay SL, and the common terminal 66 of battery BT. If the operator wishes to decrease the speed of the locomotive traveling in a reverse direction the actuation of the push button FPB (of Fig. 2) results in the picking up of the receiver control relay F which causes an increased voltage to be applied to the armatures of the motors M1 and M2 by a circuit previously described for the increase in speed of the locomotive traveling in a forward direction.

When the locomotive returns to its spurt track SPT over the switch SW in a reverse position the switch mechanism HSIB cooperates with the ramp RA as previously described, opening the back contact 48 of the switch HSIB thereby deenergizing the reverse relay RP, and removing the source of potential from the armatures AT1 and T2 of the motors M1 and M2. The reverse time delay relay RTD has operating characteristics similar to the relay FTD which dynamically brakes the motors M1 and M2 for an appropriate period of 10 seconds after the reverse control is removed. The relay RTD energizes the relay DB by a circuit which extends from (+) and includes front contact 71 of the relay RTD, back contact 95 of the relay FX, back contact 96 of the relay RX and the winding of relay DB to (−). Under proper conditions the battery charging apparatus is effective to charge the relay F and the relay FX. It should be noted at this time that the bell BL is ringing during the time the locomotive is moving in either a forward or reverse direction. The bell is energized by a circuit which extends from (+) and includes the front contact 100 or 99 of the relay FM or RM respectively and the wiper of the dynamic braking relay DB.

The test control level TPL when manually operated to its forward position energizes the relay FX by a circuit which extends from (+) and includes the contact 81 of
the lever in its forward position, back contact S of relay RTD and the winding of relay FX to (—). When the lever is operated to its reverse position, it energizes relay RX by a circuit which extends from (+) and includes contact 82 of lever TPL, back contact 69 of relay FTD, and the winding of relay RX to (—). The manual depression of the speed pushbutton SPB energizes the relay SP by a circuit which extends from (+) and includes the contact 83 of button SPB, and the winding of relay SP to (—).

Although this embodiment of the present invention employs a space ratio for communication of the respective tones between control office and the locomotive, it is to be understood that other forms of communication of these tones may be employed, such as the tones being applied directly or indirectly to the track rails. It is to be also understood that other forms of motive power may be utilized to propel the locomotive, as for example an internal combustion engine.

Having thus described a remote control system for a trimming locomotive in a classification yard, it is to be understood that various adaptations, alterations, and modifications 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 appended claims.

What I claim is:

1. In a railway car classification system including a main track connected to a plurality of classification tracks, a signal operable to display a stop and a proceed aspect, for regulating the approach of traffic from said main track to said classification tracks, a relay means operated in response to the aspect displayed by said signal, a spur track connected to said main track, a trimming locomotive normally at rest on said spur track, a prime mover located on the locomotive for moving the locomotive from the spur track to the main track when the prime mover is energized, a first circuit means for energizing the prime mover, and a second circuit means controlled by said relay means when said signal displays a stop aspect for controlling the energization of said first circuit means.

2. In a railway classification system including a main track connected to, a plurality of classification tracks, a control office, a signal operable to display a stop and a proceed aspect adjacent said main track for governing the approach of traffic on said main track, a spur track, a spur switch connecting said spur track to said main track, a trimming locomotive normally at rest on said spur track, an electric motor driveably attached to said locomotive, a detection control relay located on said locomotive, a circuit means responsive to the operation of the detection control relay for activating said electric motor, a carrier wave transmitting means located at the control office, a modulated carrier wave of a distinctive frequency, receiving apparatus on said locomotive responsive to a distinctive modulated frequency for energizing said detection control relay, and circuit means responsive to the aspect displayed by said hump signal for controlling the transmission of said modulated carrier wave.

3. In a railroad classification yard including a main track connected to a plurality of classification tracks, a signal operable to display a stop and proceed aspect for regulating traffic from said main track to said classification tracks, a relay means distinctively operated in response to the aspect displayed by said signal, a spur track connected to said main track, a trimming locomotive normally at rest on said spur track, a motor driving means located on said trimming engine for moving said trimming engine onto said main track, a pulse transmitting means located at a central point, a manually operable means located in said central point, a first circuit means responsive to said manually operable means for activating said transmitting means only when said signal relay means is operated in response to a stop aspect of said signal, a pulse receiving means on said locomotive for receiving transmitted pulses, and circuit means responsive to said transmitted pulses for activating said motor driving means.

4. In a railway car classification system including a main track connected to a plurality of classification tracks, a control office, a signal for regulating the approach of traffic from said main track to said classification tracks, signal circuit means for operating said signal to display a stop and a proceed aspect, a signal track connected to one of said tracks, a locomotive capable of being remotely operated from said control office and able to move in a forward direction from the spur track over said main track to a respective classification track and in a reverse direction from a respective classification track over said main track onto the spur track, a stationary contact means adjacent said spur track, a circuit breaking means located on said locomotive effective to deenergize the locomotive in response to the stationary contact means when the locomotive is traveling in a reverse direction on said spur track, and a circuit means responsive to the signal circuit means for permitting the locomotive to be operated in a forward direction only when the signal displays a stop aspect.

5. In a railroad classification yard system including a main track connected to a plurality of classification tracks by track switches, a control office, a spur track, a spur switch connecting the spur track to said main track, a signal capable of being operated to display a stop and proceed aspect for regulating traffic from said main track to a respective classification track, a trimming locomotive, a motor located on the trimming locomotive capable of driving the locomotive in a forward direction from the spur track onto said main track and in a reverse direction from the main track onto the spur track, a manually operable means, a carrier wave transmitting means capable of selectively transmitting carrier currents of distinctive frequency, a carrier wave receiving means located on the locomotive capable of receiving distinctive transmitted carrier waves, a first circuit means for causing the transmitter to transmit a certain frequency in accordance with the operation of the manually operable means, a second circuit means for operating the locomotive in a forward and reverse direction in response to the reception of a certain transmitted frequency, a circuit breaking means located on the locomotive for deenergizing the motor when the locomotive is moving in a reverse direction, a fixed contact element disposed adjacent the spur track to actuate the circuit breaking means when the locomotive is on the spur track, and a third circuit means for rendering the transmitting means ineffective to operate the locomotive when the traffic controlling signal displays a stop aspect.

6. In a railroad classification system including a track layout having a main track leading to a plurality of classification tracks and also having a spur track connected to said main track directly leading to said plurality of classification tracks, a trimming locomotive of the self-propelled controllability type operable over said tracks but normally located on said spur track, radio receiving means on said locomotive operable upon the reception of different distinctive signals to control the operation of said trimming locomotive in forward and reverse directions and to stop, radio transmitting means at a remote location and manually controllable to transmit any one of said different distinctive signals for reception by said radio receiving means on said locomotive, a normally closed electric switch on said locomotive opened in accordance with the occupancy by said locomotive of a particular portion of said spur track, said radio receiving means being rendered effective to operate the locomotive selectively in a forward or reverse direction when said electric switch is closed but only forward when the switch is open, and wayside means in said particular
The portion of said spur track for opening said electric switch on said locomotive.

7. In a railroad classification system including a track layout having a main track leading to a plurality of classification tracks and also having a trimmer locomotive track connected through a track switch to said main track directly leading to said plurality of classification tracks, a trimmer locomotive of the self propelled remote control type normally located on said trimmer locomotive track but operable subject to remote control over said main track and said classification tracks, radio transmitting means at a remote point selectively operable to transmit any one of a plurality of distinctive signals, and radio receiving means on said locomotive operable to receive said distinctive signals transmitted by said transmitting means and acting in response thereto for controlling the operation of said locomotive, and switch positions indicating and control means at the remote point actuated in accordance with the position of said track switch for rendering said radio transmitting means effective only when said track switch is indicated as being in a predetermined position to permit the trimming locomotive to enter the main track.

References Cited in the file of this patent

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