

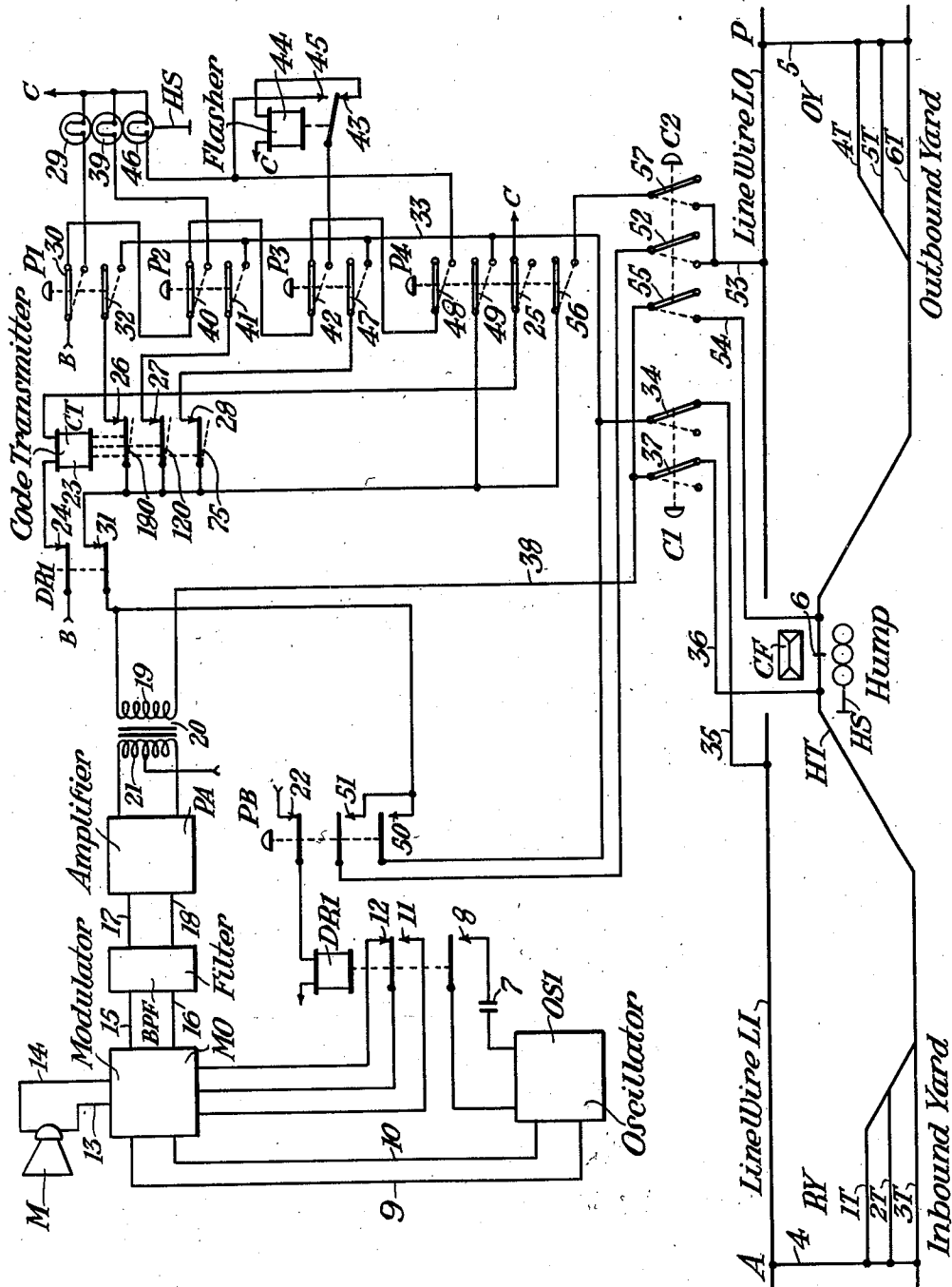
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P. P. ASH

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TRANSMITTING APPARATUS FOR TRAIN COMMUNICATION SYSTEMS

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INVENTOR
Philip P. Ash
BY *[Signature]*
HIS ATTORNEY

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TRANSMITTING APPARATUS FOR TRAIN
COMMUNICATION SYSTEMS

Philip P. Ash, Louisville, Ky., assignor to The
Union Switch and Signal Company, Swissvale,
Pa., a corporation of Pennsylvania

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My invention relates to transmitting apparatus for train communication systems, and more particularly to transmitting apparatus for communication systems for classification yards.

Railway train communication systems ordinarily use a carrier current. For telephone communication a carrier of a preselected frequency is modulated by the voice frequencies and a selected side band is transmitted, the carrier and the other side band being, ordinarily at least, suppressed. In such a system a calling or signaling current equivalent to the carrier modulated by a preselected frequency within the voice frequency range is employed. In railway classification yards such communication systems are used for directing the movements of shifting locomotives from a central yard office, and it has been proposed that the calling or signaling current be transmitted at all times except when telephone communication is desired to provide a cab signal indication that checks the operative condition of the apparatus. In classification yards where a hump is used, a fixed wayside signal of the semaphore or color light type is located in the vicinity of the hump and is controlled by the yard conductor to signal to the shifting locomotive the speed and movements desired for the cars that are being classified by being pushed over the hump. Such a fixed signal may not always be effective because of the limited visibility under bad weather conditions.

Accordingly, a feature of my invention is the provision of novel and improved transmitting apparatus for train communication systems.

Another feature of my invention is the provision of novel and improved transmitting apparatus for train communication systems for classification yards.

Again, a feature of my invention is the provision of apparatus for train communication systems incorporating novel transmitting means for supplying a carrier signaling current which is coded at different code rates whereby such coded signaling current may be used to govern different cab signal indications.

Another feature of my invention is the provision of transmitting apparatus for train communication systems for classification yards wherewith a carrier signaling current is coded at different codes to provide different cab signals for the different speeds and movements required for classifying cars, and which codes of the signaling current are made to correspond to the different indications of a fixed signal. Furthermore, telephone communication is effected be-

tween the operator at a central office station and the crew of a locomotive operating in either the inbound or in the outbound yard of a classification yard or between the operator at the central office and the crews of all the locomotives within the classification yard.

The above features of my invention, as well as other advantages which will become apparent as the specification progresses, are attained according to my invention by providing transmitting apparatus having a first manually operable switching means at one position of which the transmitting apparatus is conditioned to produce a carrier signaling current and at another position of which the apparatus is conditioned to produce a carrier telephone current, and each of which currents is supplied by the transmitting apparatus to an output circuit. Such output circuit is connected to a transmitting circuit extending along a stretch of the railway and when the apparatus is used for communication in a classification yard two or more transmitting circuits may be desired. One such transmitting circuit may be, for example, associated with one stretch of track such as the tracks of the inbound yard and a second transmitting circuit may be associated with a second stretch of track such as the tracks of the outbound yard. When two transmitting circuits are provided, the output circuit is selectively connected to such transmitting circuits by a manually operable switching means having different positions so that the output circuit may be connected to any one or to all of the transmitting circuits.

A code transmitter is governed by said one position of the first switching means to code at times the carrier signaling current. Such code transmitter is provided with different contact members which are operated at different rates and each such code contact member is included in a particular circuit path of the output circuit. A second manually operable switching means having several different positions is provided and by its position determines which circuit path of the output circuit is closed and hence determines by its position which one of the code contact members is effective to code the signaling current. This second switching means includes an additional position at which the output circuit is by-passed around the contact members of the code transmitter for supplying at times a non-coded signaling current.

When the apparatus is used for communication system of a classification yard, the second switching means would also preferably govern

the fixed signal usually provided for displaying a different signal indication for each of the different speeds and movements used to classify cars. Under such circumstances the second switching means by its position provides a specific code for the carrier signaling current for each indication of the fixed signal, and hence there is a code for each of the different speeds and switching movements to be used in classifying cars.

A second position contact of the first switching means, which position conditions the transmitting apparatus for supplying telephone current, completes a circuit path of the output circuit which by-passes the contact members of a code transmitter and the second switching means and hence for telephone communication the telephone current is delivered directly from the transmitting apparatus to the transmitting circuits according to the position of the previously mentioned other or third switching means.

I shall describe one form of apparatus embodying my invention and shall then point out the novel features thereof in claims.

The accompanying drawing is a diagrammatic view showing one form of apparatus embodying my invention when used with a train communication system for a classification yard.

Referring to the drawing, the reference character RY designates the inbound or receiving yard of a classification yard, and which inbound yard is shown as comprising three tracks 1T, 2T and 3T. The reference character OY designates the outbound yard of the classification yard, and this outbound yard is shown as also comprising three tracks 4T, 5T and 6T. Traffic normally enters the inbound yard RY from a main track (not shown) to the left as viewed in the drawing. Traffic leaves the yard RY over a hump track HT and from this hump track cars move into the outbound yard OY. In accordance with the usual practice, cars are collected on the several tracks of the inbound yard and are then pushed over the hump by a shifting locomotive. The movements of the cars from the hump to the several tracks of the outbound yard may be governed by car retarders or car riders as desired, the cars being classified in the several tracks of the yard OY according to the destination of their lading. Shifting locomotives operating in the yard RY or in the yard OY and locomotives pushing cars over the hump are under the direction of a yard master or operator located at a central office station shown at CF in the drawing.

Although only three tracks are shown for each of the yards RY and OY, it will be understood that each yard may be provided with additional tracks, each of which additional tracks would be connected to the hump track by the customary ladder track. It will also be understood that my invention is not limited to a classification yard or to a classification yard using a hump for the classification of cars, and this one embodiment of the invention will serve to illustrate the many places where apparatus embodying my invention is useful.

In order that the operator located at the central office CF may communicate both by cab signaling and by telephone communication with the crews of the locomotives operating on any track of the yard and thereby direct the movements of such locomotives quickly and efficiently, apparatus embodying my invention is provided and which apparatus includes transmitting apparatus located preferably at the central office CF and

transmitting circuits extending throughout the yard.

The transmitting circuits may take different forms and would preferably be of the type covered by the Letters Patent of the United States No. 2,112,364, granted March 29, 1938, to L. O. Grondahl, for Electric train signaling systems and wherewith the track rails are included in the transmitting circuit. In the specific embodiment of my invention two transmitting circuits are provided, one being associated with the yard RY and the other being associated with the yard OY. The first transmitting circuit includes a line wire L1 extending from a point near the central office station to a point A at the extreme left-hand end of the yard RY. At point A, the line wire L1 is connected by a wire 4 to at least one track rail of each of the tracks of the inbound yard RY. From the point A, the circuit extends through the rails of the several tracks of yard RY in multiple to the hump track HT and thence to a point adjacent the central office CF. The track rails may be bonded by the usual rail bonds to improve their electrical conductivity, but such bonds may not be required since the rails are electrically continuous due to the splice bars and bolts of the rail joints.

The second transmitting circuit includes a line wire LO extending from a point adjacent the central office CF to a point D at the extreme right-hand end of the outbound yard OY. At point D, line wire LO is connected by a wire 5 to at least one rail of each of the tracks of the outbound yard OY. From point D, the second circuit extends through the rails of the several tracks of the outbound yard in multiple to the hump track HT and thence back to office station CF.

Each of these transmitting circuits is intended to cooperate with locomotive carried receiving apparatus responsive to communication current of the character here contemplated when such communication current flows in the rails, energy being preferably transferred from the track rails to the locomotive carried apparatus inductively through the medium of an inductor mounted on the locomotive in inductive relation to the track rails. It will be observed that each transmitting circuit is not shunted by the wheels and axles of a car or locomotive, and the rails of each track form a branch path in the transmitting circuit so that energy will be transferred to the receiving apparatus irrespective of the track occupied by the locomotive, whether the locomotive is facing in one direction or the other, whether the locomotive is preceded or followed by cars on the same track, and whether the other tracks are occupied by other cars. The structure of such receiving apparatus may be any one of several forms well known to the art and may be of the type disclosed in Letters Patent of the United States No. 2,102,435, granted December 14, 1937, to W. P. Place for Receiving apparatus for communication systems. Such receiving apparatus forms no part of my invention, but it may be helpful in the understanding of apparatus embodying my invention to explain that such receiving apparatus is normally conditioned for reception and is responsive to a carrier signaling current equivalent to a preselected carrier modulated by a preselected voice frequency for governing a cab indicator and is automatically conditioned for reception of a carrier telephone current when the signaling current is discontinued, the voice frequencies of such telephone

current being reproduced at a loud speaker or telephone receiver. The cab indicator when displayed indicates that the transmitting circuit is energized with signaling current and that the system is in a working condition. The cab indicator when extinguished indicates that the signaling current is discontinued due either to a failure of the system or that the operator at the remote office station is about to initiate telephone communication. It is clear that such cab indicator may be controlled through decoding apparatus of the well-known form and made to display a distinctive signal for each of several different codes of the signaling current, and such cab signal when controlled by coded signaling current may be used to govern the speed and movement of the locomotive on which the apparatus is mounted. It is to be seen therefore that communication may be effected between the operator at the central office CF and the crew of a locomotive operating on any track of either yard RY or OY when communication current is supplied to either one or both of the two transmitting circuits, it being understood, of course, that receiving apparatus of the form described above is mounted on each such locomotive.

In order to better separate the two transmitting circuits electrically, insulated rail joints 6 may be helpful when placed in the hump track in the vicinity of the office station CF, but such insulated rail joints may not be required.

The transmitting apparatus is shown at the upper portion of the drawing and this transmitting apparatus would preferably be located at the central office CF and comprises as essential elements, an oscillator OS1, a microphone M, a modulator MO, a band pass filter BPF, a power amplifier PA, and a code transmitter CT together with an output circuit and three different manual operable switching means to be later described.

The oscillator OS1, modulator MO, filter BPF and power amplifier PA are shown conventionally in order to simplify the drawing since the specific structure of each of these devices forms no part of my present invention and such devices may be any one of several well-known types. Furthermore these devices will be explained only as required for a full understanding of my invention.

The oscillator OS1 is preferably of electron tube type and generates a carrier current of a preselected frequency, the frequency of the carrier current being determined in part by a condenser 7. The arrangement is such that when a relay DR1, to be referred to later, is released to close back contact 8 and condenser 7 is connected to the oscillator, a carrier current of a frequency of, say, for example, 6000 cycles per second is generated, and when relay DR1 is picked up and condenser 7 disconnected from the oscillator, the carrier frequency is shifted by an amount equal to a preselected frequency of say 1000 cycles so that the carrier current then generated is of the frequency of 7000 cycles. The carrier current generated by oscillator OS1 is delivered to the modulator MO over wires 9 and 10. The modulator MO is preferably of the balanced electron tube type, the connections of which are governed by relay DR1. When relay DR1 is released, closing its back contact 11, a connection is completed by which a balanced push-pull arrangement is effected for the modulator and when relay DR1 is picked up to close front contact 12, the connec-

tions of the modulator are shifted so that a parallel arrangement is effected.

The microphone M is connected to the modulator MO over wires 13 and 14 to effect modulation of the carrier supplied from the oscillator OS1 by the voice frequency produced by speaking into the microphone. When the modulator is set for its balanced condition, the side bands resulting from modulation of the carrier by voice frequency, are supplied to the input side of filter BPF over wires 15 and 16, the carrier being suppressed by the balanced arrangement of the modulator. The filter BPF is proportioned and adjusted to suppress one side band and pass the other. To further assist in understanding the invention, I shall assume that the lower side band is suppressed and the upper side band is passed. The output side of filter BPF is connected over wires 17 and 18 to the input terminals of the power amplifier PA. When the carrier current of 6000 cycles per second is used as assumed hereinbefore, and a voice frequency range of 500 to 2500 cycles is considered, the upper side band of the telephone current passed by filter BPF to the amplifier is of the range of 6500 to 8500 cycles. When relay DR1 is picked up and condenser 7 is disconnected from the oscillator so that the carrier current is of 7000 cycles and the modulator MO is shifted to a parallel arrangement, then this carrier current of 7000 cycles is passed by the filter BPF since the carrier current of 7000 cycles is the equivalent to the upper side band of the 6000 cycle carrier current modulated by the voice frequency of 1000 cycles. This carrier current of 7000 cycles is used as a signaling current.

The amplifier PA is preferably of the electron tube type and when either the telephone current of the range of 6500 to 8500 cycles or the signaling current of 7000 cycles is applied to its input terminals, such current is amplified to a relatively high energy level and supplied to an output circuit. The output circuit includes a secondary winding 19 of an output transformer 20 whose primary winding 21 is connected to the output terminals of the amplifier PA.

Relay DR1 is controlled over an obvious circuit including a normally closed contact 22 of a biased type push button PB and the relay DR1 together with push button PB form a first manually operable switching means for conditioning the transmitting apparatus to supply either the carrier signaling current or the carrier telephone current. It follows that the normal or first position of the first switching means conditions the transmitting apparatus to supply the carrier signaling current to the secondary winding 19 of the output circuit and the reverse or second position of this first switching means conditions the apparatus to supply the carrier telephone current to the secondary winding 19 of the output circuit. Additional functions for this first switching means will appear hereinafter.

The output circuit connected to secondary winding 19 of transformer 20 is provided with several different circuit paths five of which paths are governed by a second manually operable switching means, here shown as consisting of four separate circuit controllers P1, P2, P3 and P4. Each circuit controller of the second switching means is manually operable to either a normal or first position indicated in the drawing by solid lines or to a second or reverse position illustrated by dotted lines in the drawing.

A code transmitter or coder CT is provided

and as here shown it is of the relay type having three contact members 180, 120 and 75 which are operated as long as an operating winding 23 of the coder is supplied with energizing current. Winding 23 is provided with a circuit which can be traced from terminal B of a convenient source of current, such as a battery, not shown, front contact 24 of relay DR1, winding 23, a normal closed contact 25 of circuit controller P4 and to terminal C of the same source of current. Hence when the first switching means is set at its first position with relay DR1 picked up and controller P4 of the second switching means is set at its normal position, coder CT is active to operate its contact members, the arrangement being such that contact member 180 is operated to engage a contact 26 at the code rate of 180 times per minute, contact 120 is operated to engage a contact 27 at the code rate of 120 times per minute and contact member 75 is operated to engage a contact 28 at the code rate of 75 times per minute. Each of the contact members 180, 120 and 75 is interposed in one of three paths of the output circuit and which three paths are also controlled by controllers P1, P2 and P3 of the second switching means.

The circuit controllers of the second switching means are also used to govern a fixed signal HS located along the hump track HT for indicating to a locomotive pushing cars over the hump the speed and movement desired. This signal HS may be of any standard type of fixed signal and as here shown is a color light signal capable of displaying any one of four different indications; namely, a green light to indicate "proceed at normal hump speed," a yellow light to indicate "proceed at slow hump speed," a steady red light to indicate "stop" and a flashing red light to indicate "back up." The control effected by the second switching means over the three circuit paths of the output circuit which includes contact members of code transmitter CT and over the indication of the fixed signal HS is such that a distinctive code for the carrier signaling current is effected for each signal indication with the result that a cab indicator of receiving apparatus mounted on the locomotive would be made to provide a distinctive cab signal for each indication of the fixed wayside signal, and as here contemplated the 180 code for the carrier signaling current controls a cab signal which corresponds to the green light of the fixed signal to indicate "proceed at normal hump speed," the 120 code for the carrier signaling current controls a cab signal which corresponds to the yellow light of the fixed signal to indicate "proceed at slow hump speed," the 75 code controls a cab signal which corresponds to the flashing red light of the fixed signal to indicate "back up" and non-coded signaling current controls a cab signal which corresponds to the steady red light of the fixed signal to indicate "stop."

The output circuit is provided with additional circuit paths which by-pass the output circuit around the code transmitter and the second switching means and each of these additional circuit paths includes a second position contact of the first switching means, so that when the transmitting apparatus is conditioned for supplying telephone current the output circuit is completed for by-passing the telephone current around the code transmitter and the second switching means. Such additional circuit paths will be described when the operation of the apparatus is described.

The connections of the output circuit to the transmitting circuits are further governed by a third manually operable switching means comprising two circuit controllers C1 and C2.

It is believed that the manner whereby the three different switching means govern the transmitting apparatus and the connections of the output circuit to the transmitting circuits can best be understood by a description of the apparatus. In describing the operation of the apparatus, I shall first assume that a locomotive provided with proper receiving apparatus is pushing cars over the hump and hence occupies the hump track HT to the left of the central office station CF. Since the push button PB is biased to its released position, the first switching means occupies its normal position so that relay DR1 is picked up to condition the transmitting apparatus to deliver carrier signaling current. The circuit controller P4 of the second switching means is placed by the operator at its normal position and the coder CT is active. In the event the operator desires the locomotive to proceed at normal hump speed, circuit controllers P2 and P3 of the second switching means are set at their normal positions and circuit controller P1 is set at its reverse position. The operator would also set each circuit controller C1 and C2 of the third switching means at its right-hand position as illustrated by the solid lines in the drawing.

With circuit controller P1 reversed, a simple circuit easily traced is completed for a lamp 29 of signal HS and that lamp is illuminated to display a green light. A first circuit path of the output circuit is also completed at the reverse position of contact 32 of circuit controller P1 so that carrier signaling current coded at the 180 code rate flows from the top terminal of secondary winding 19 over front contact 31 of relay DR1, contact 180—26 of coder CT, reverse position of contact 32 of controller P1, wire 33, contact 34 of controller C1, wire 35, line wire L1 of the first transmitting circuit to point A, back the track rails of the tracks of the inbound yard and the track rails of the hump track HT, wire 36, contact 37, of controller C1 and wire 38 to the lower terminal of secondary winding 19. Since this signaling current is coded at the 180 code rate, the cab indicator of the locomotive occupying the hump track HT or any of the yard tracks leading to the hump track will be conditioned to display a corresponding indication which indication conveys the information to the locomotive crew to proceed at normal hump speed. This cab signal indication is continuously displayed and would also serve to indicate to the locomotive crew an operative condition of the communication system.

In the event the operator at the central office desires the locomotive to proceed at slow hump speed, the first and third switching means are left as above described but controllers P1, P3 and P4 of the second switching means are set at their respective normal positions and controller P2 is reversed. A yellow lamp 39 of fixed signal HS is now provided with a circuit including the normal position of contact 30 of controller P1 and reverse position of contact 40 of controller P2, and lamp 39 is illuminated to cause the signal HS to display a yellow light. With the controller P2 reversed a second circuit path of the output circuit, and which circuit path includes contact member 120 of the coder, is closed and made effective so that carrier signaling current flows from the top terminal of secondary winding 19,

over front contact 31, contact 120—27 of coder CT, reverse position of contact 41 of controller P2, and thence over the first transmitting circuit as previously traced and back to the lower terminal of secondary winding 19. The signaling current is now coded at the 120 code rate with the result that the cab signal indicator of the locomotive is controlled to display a corresponding signal and which cab signal corresponds to the yellow light of the fixed wayside signal and the locomotive crew is informed to proceed at slow hump speed.

In the event the operator at the central office desires the locomotive to back up, the first and third switching means are left as before and the second switching means is conditioned so that controllers P1, P2 and P4 are normal and controller P3 is reversed. Current now flows from terminal B over normal position of contacts 30 and 40 of controllers P1 and P2, respectively, reverse position of contact 42 of controller P3, back contact 43 of a flasher relay 44, winding of relay 44 and to terminal C, and relay 44 is made to alternately pick up and release. Each time relay 44 is picked up to close its front contact 45, a circuit is completed for a lamp 46 of signal HS with the result that signal HS displays a flashing red light. The third circuit path of the output circuit, and which includes contact member 75 of coder CT, is now closed and carrier signaling current flows from the top terminal of secondary winding 19 over front contact 31, contact 75—28 of coder CT, reverse position of contact 47 of controller P3, and thence over the previously traced transmitting circuit to the lower terminal of secondary winding 19. The signaling current is now of the 75 code rate and the cab indicator of the locomotive is controlled to display a "back up" indication.

Again, if the operator at the central office desires the locomotive to stop, the second and third switching means are left as before and the second switching means is conditioned so that controllers P1, P2 and P3 are normal and controller P4 is reversed. A circuit is now formed from terminal B over the normal position of contacts 30, 40 and 42 of controllers P1, P2 and P3, respectively, reverse position of contact 48 of controller P4 and lamp 46 to terminal C, and lamp 46 is illuminated to cause signal HS to display a steady red light for a stop signal indication. When controller P4 is reversed, contact 25 interposed in the operating circuit of coder CT is opened and the coder is deenergized and becomes inactive. A fourth circuit path for the output circuit, and which circuit path by-passes the contact members of the coder, is now closed so that carrier signaling current flows from the top terminal of secondary winding 19, over front contact 31, reverse position of contact 49 of controller P4, and thence over the previously traced first transmitting circuit back to the lower terminal of secondary winding 19, and the cab signal indicator of the locomotive is controlled by non-coded signaling current and is caused to indicate a stop signal indication. It is to be observed that such non-coded signaling current as well as each of the coded signaling currents cause a continuous display of the cab indicator and hence continuously checks the operative condition of the communication system.

In the event the office operator desires to convey a telephone message to the crew of the locomotive, the operator depresses push button PB to cause relay DRI to be released so that the transmitting apparatus is conditioned for

transmitting telephone current, the signaling current being discontinued. When relay DRI is released, coder CT is rendered inactive due to its operating circuit being opened at front contact 24 of relay DRI. The operator next would speak his message into the microphone M and the carrier telephone current would flow from the top terminal of secondary winding 19 over a circuit path of the output circuit including back contact 50 of push button PB, and thence over contact 34 of controller C1, wire 35, line wire L1, track rails, wire 36, contact 37 of controller C1 and wire 38 to the lower terminal of secondary winding 19. As explained hereinbefore, the loud speaker of the train carried receiving apparatus is conditioned for reproducing the telephone message when the signaling current is discontinued, and hence the telephone message of the operator at the office station CF is reproduced at the loud speaker on the locomotive. It is to be noted that the second switching means remains effective for governing the fixed signal HS during telephone communication.

In the case the office operator desired to convey the telephone message to a crew of a locomotive operating in the outbound yard OY, as well as to the crew of a locomotive on the hump track and tracks of the inbound yard RY, the controller C2 of the third switching means is set at the left-hand position and the controller C1 at its right-hand position and hence telephone current would flow not only over the first transmitting circuit as traced above, but would also flow from the top terminal of secondary winding 19 over another circuit path of the output circuit including back contact 51 of push button PB and thence over contact 52 of controller C2, line wire LO, track rails of the outbound yard OY, wire 54, contact 55 of controller C2, and wire 38 to the lower terminal of secondary winding 19. Hence the telephone message would be reproduced by the loud speaker of each locomotive.

If it is desired to telephone to a crew of a locomotive in the outbound yard only, then controller C1 is placed at its left-hand position to disconnect the first transmitting circuit from the output circuit and the controller C2 is placed at its right-hand position to connect the second transmitting circuit to the output circuit. If non-coded carrier signaling current is to be supplied to both transmitting circuits, then the first switching means is set at its first position, the second switching means is conditioned with the controller P4 reversed, and the controllers C1 and C2 of the third switching means are each set at the position to connect the respective transmitting circuit to the output circuit. Under these circumstances, carrier signaling current would flow from the top terminal of secondary winding 19 over front contact 31 and thence over two parallel paths of the output circuit, one of which includes the reverse position of contact 49 of controller P4 and contact 34 of controller C1 to the first transmitting circuit, and the second path would include the reverse position of contact 56 of controller P4, and the left-hand position of contact 57 of controller C2 to the second transmitting circuit.

It is to be understood that while two transmitting circuits are shown, a single transmitting circuit extending over any selected part of the yard may be used. Also, it is to be understood that my invention is not limited to the carrier frequencies here specified and other carrier frequencies may be used if desired.

It is to be seen, therefore, that I have provided simple and inexpensive transmitting apparatus for train communication systems incorporating novel means for supplying carrier signaling current coded at different code rates or non-coded and for supplying carrier telephone current and which currents can be supplied to one or all of a plurality of different transmitting circuits associated with different stretches of railway track.

Although I have herein shown and described only one form of transmitting apparatus for train communication systems embodying my invention, it is understood that various changes and modifications may be made therein within the scope of the appended claims without departing from the spirit and scope of my invention.

Having thus described my invention, what I claim is:

1. In apparatus for a train communication system, the combination comprising, transmitting apparatus capable of producing a carrier telephone current or a signaling current equivalent to said carrier modulated by a given voice frequency, a first manually operable switching means having a first position to condition the transmitting apparatus to produce said carrier signaling current and a second position to condition the transmitting apparatus to produce said telephone current, an output circuit coupled to the transmitting apparatus to receive such currents and provided with three different circuit paths, a code transmitter having a contact member included in a first one of said circuit paths, a second manually operable switching means having a first position for closing said first one of said circuit paths and a second position for closing a second one of said circuit paths, a second position contact of said first switching means for closing the third one of said circuit paths, and a transmitting circuit extending along a stretch of track and connected to said output circuit.

2. In combination with transmitting apparatus capable of supplying a carrier telephone current or a signaling current equivalent to said carrier modulated by a preselected voice frequency, an output circuit to receive such currents from the transmitting apparatus and provided with a plurality of different circuit paths, a code transmitter having a contact member operated at a predetermined code rate and interposed in a selected first one of said circuit paths, a first manually operable switching means having a first position to condition the transmitting apparatus to supply said signaling current and a second position to condition the transmitting apparatus to supply said telephone current and to close a second selected one of said circuit paths, a second manually operable switching means having a first position to close said first one of the circuit paths and a second position to close a selected third one of the circuit paths, two transmitting circuits one extending along a first stretch of track and the other extending along a second stretch of track, and a third manually operable switching means having different positions for connecting said output circuit to either one or both of the transmitting circuits.

3. In apparatus for a train communication system, the combination comprising, transmitting apparatus capable of producing a carrier telephone current or a signaling current equivalent to said carrier modulated by a given voice fre-

quency, a first manually operable switching means having a first position to condition the transmitting apparatus to produce said carrier signaling current and a second position to condition the transmitting apparatus to produce said telephone current, an output circuit coupled to the transmitting apparatus to receive such currents and provided with three different circuit paths, a code transmitter effective when energized to operate a contact member at a preselected code rate and which contact member is included in a first one of the circuit paths of the output circuit, a second manually operable switching means having a first and a second position for closing said first path and a second path of the output circuit respectively, a second position contact of said first switching means for closing the third path of the output circuit, means including a first position contact of the first switching means and a contact of the second switching means to energize said code transmitter, a transmitting circuit extending along a stretch of track, and other switching means to connect at times the output circuit to said transmitting circuit.

4. In apparatus for a train communication system the combination comprising, transmitting apparatus capable of producing a carrier telephone current or a signaling current equivalent to said carrier modulated by a given voice frequency, a first manually operable switching means having a first position to condition the transmitting apparatus to produce said carrier signaling current and a second position to condition the transmitting apparatus to produce said telephone current, an output circuit coupled to the transmitting apparatus to receive such currents, a code transmitter having a first and a second contact member and which members are operated at different code rates; a second manually operable switching means having a first position to close said output circuit through said first contact member, a second position to close the output circuit through said second contact member and a third position to by-pass the output circuit around said contact members; means including a second position contact of said first switching means to by-pass the output circuit around said second switching means, and a transmitting circuit effective to transmit such currents and extending along a stretch of track and connected to said output circuit.

5. In apparatus for a train communication system, the combination comprising, transmitting apparatus capable of producing a carrier telephone current or a signaling current equivalent to said carrier modulated by a given voice frequency, a first manually operable switching means having a first position to condition the transmitting apparatus to produce said carrier signaling current and a second position to condition the transmitting apparatus to produce said telephone current, a code transmitter having three different contact members which are operated at different code rates, a transmitting circuit effective to transmit such currents and extending along a stretch of track, an output circuit to connect said transmitting apparatus to said transmitting circuit, a fixed signal to govern traffic moving over said stretch of track and capable of displaying four different indications; a second manually operable switching means having four different positions and provided with contacts closed at a first position to interpose a first one of said code contact members in the

output circuit and to close a first position circuit of said fixed signal, other contacts closed at a second position to interpose a second one of said code contact members in the output circuit and to close a second position circuit of the fixed signal, other contacts closed at a third position to interpose a third one of said code contact members in the output circuit and to close a third position circuit of the fixed signal, and other contacts closed at a fourth position to by-pass the output circuit around said code contact members and to close a fourth position circuit of the fixed signal; and means including a second position contact of said first switching means to by-pass the output circuit around said second switching means.

6. In apparatus for a train communication system, the combination comprising, transmitting apparatus capable of producing a carrier telephone current or a signaling current equivalent to said carrier modulated by a given voice frequency, a first manually operable switching means having a first position to condition the transmitting apparatus to produce said carrier signaling current and a second position to condition the transmitting apparatus to produce said telephone current, a code transmitter having at least two different contact members each of which is operated at a code rate distinctive for that contact member, a transmitting circuit effective to transmit said telephone and signaling current and extending along a stretch of track, a fixed signal to govern traffic along said stretch of track and capable of displaying at least two different indications, an output circuit to connect said transmitting apparatus to said transmitting circuit and provided with at least three different paths a first and a second of which paths each includes a distinctive one of said contact members; a second switching means operable to three different positions and provided with contacts closed at a first position to close the first path of the output circuit and to close a first operating circuit for said fixed signal, other contacts closed at a second position to close the second path of the output circuit and a second operating circuit for said fixed signal and other contacts closed at a third position to close the third path of said output circuit; and means including a second position contact of the first switching means to by-pass the output circuit around said second switching means.

7. In apparatus for a railway train communication system the combination comprising, transmitting apparatus capable of producing a carrier telephone current or a carrier signaling current, a first switching means having a first position to condition the transmitting apparatus to produce said signaling current and a second position to condition the transmitting apparatus to produce said telephone current, a first and a second transmitting circuit extending along two different stretches of track and each effective to transmit said signaling and telephone currents, a code transmitter having a contact member operated at a preselected code rate, an output circuit for connecting the transmitting apparatus to said transmitting circuits, a second switching means having different positions effective at one position to interpose said contact member in the output circuit and at another position to by-pass said output circuit around said contact member, means effective at said first position of said first switching means to by-pass the output circuit

around the said second switching means, and still another switching means having different positions for selectively controlling the connections of the output circuit to said transmitting circuits.

8. In apparatus for a train communication system for a classification yard the combination comprising, transmitting apparatus located at a central office and capable of producing a carrier telephone current or a carrier signaling current, a first switching means at said central office and having a first position to condition the transmitting apparatus to produce said signaling current and a second position to produce said telephone current, an output circuit coupled to the transmitting apparatus to receive such currents, a code transmitter having a plurality of different contact members operated at different code rates, a fixed signal located along a track of the yard to govern the classification of cars and capable of displaying a plurality of distinctive signal indications, a plurality of operating circuits for said signal to effect said signal indications, a second switching means located at said office and having a plurality of different positions each of which positions is effective to interpose a selected one of said contact members in said output circuit and to close a selected one of said operating circuits for said fixed signal, means including a second position contact of said first switching means to by-pass the output circuit around said second switching means, a transmitting circuit effective to transmit said signaling and telephone currents and extending at least along the track associated with said fixed signal, and another switching means at said office and effective at times to connect said output circuit to said transmitting circuit.

9. In apparatus for a train communication system for a classification yard the combination comprising, transmitting apparatus located at a central office and capable of producing a carrier telephone current or a carrier signaling current, a first switching means at said central office and having a first position to condition the transmitting apparatus to produce said signaling current and a second position to produce said telephone current, an output circuit coupled to the transmitting apparatus to receive such currents, a code transmitter having a plurality of different contact members operated at different code rates, a fixed signal located along a track of the yard to govern the classification of cars and capable of displaying a plurality of distinctive signal indications, a plurality of operating circuits for said signal to effect said signal indications, a second switching means located at said office and having a plurality of different positions each of which positions is effective to interpose a selected one of said contact members in said output circuit and to close a selected one of said operating circuits for said fixed signal, means including a second position contact of said first switching means to by-pass the output circuit around said second switching means, a first transmitting circuit extending along the track associated with said fixed signal and a first selected portion of said yard, a second transmitting circuit extending along a second selected portion of said yard, each of said transmitting circuits effective to transmit said signaling and telephone currents, and a third switching means at said office and having different positions to connect said output circuit to either one or both of said transmitting circuits.

PHILIP P. ASH.