

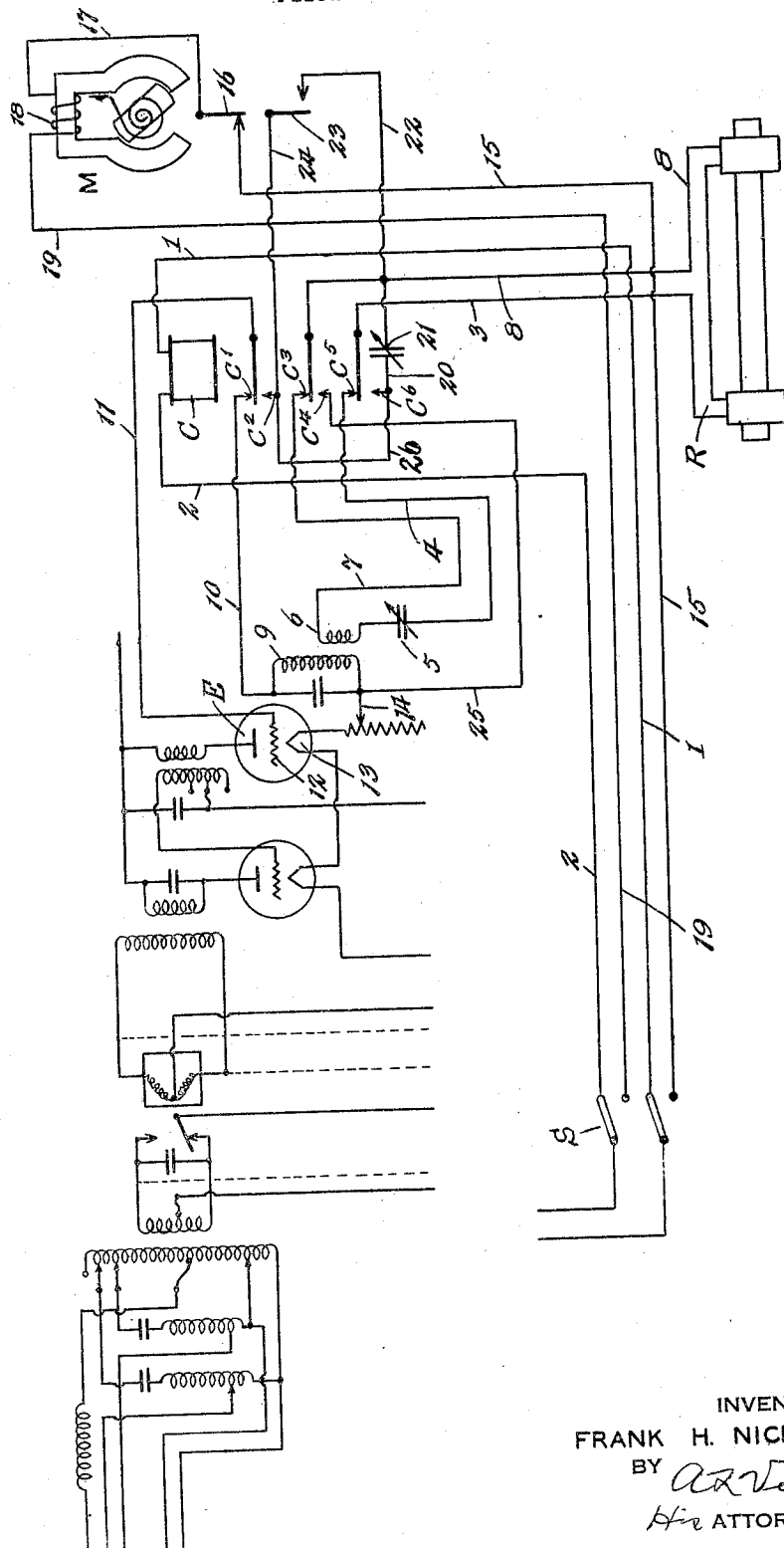
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TRAIN CONTROL SYSTEM

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TRAIN CONTROL SYSTEM

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The present invention relates to train control systems, and has for its main object and feature means whereby a train equipped to be controlled by coded current may also be controlled by non-coded current.

In the accompanying drawing the invention is disclosed in a concrete and preferred, though somewhat diagrammatic, form, the invention being shown applied by way of example to a system of the character disclosed in an application of L. V. Lewis, Ser. No. 210,165, filed August 2, 1927.

By way of a concrete instance, let us assume that the train is equipped with a four-indication code system, one of the indications being a clear or proceed code, intended to cooperate with trackway equipment of a character to supply coded current to properly control the train by means of cab signals or a brake-setting device or by both. When a train so equipped enters a territory in which the trackway equipment is non-coded, say a two-indication non-coded territory, the train control system obviously will not function. An additional complication is introduced if the coded current has a frequency different from that of the uncoded current. In the present instance it will be assumed that the coded current has a frequency of 100 cycles per second, and that the uncoded current has a frequency of 60 cycles per second, and that the traffic rails are supplied with current of one character or the other depending upon the territory in which the train is moving.

Carried on the train is an inductive receiver R to pick up the current from the rails, a traffic controlling device here represented by electron tube E, a modulator or coder M, a change-over relay C and a switch S. When in coded territory, switch S is in the position shown in the drawing and current from a suitable source therefore passes over wire 1 to coil of relay C and over wire 2 back to switch S. Relay C is thereby ener-

gized and closes front contacts C1, C3 and C5. Coded current induced in receiver R therefore flows over a circuit that can be traced as follows: wire 3, front contact C5, wire 4, tuning condenser 5, primary 6 of a transformer, wire 7, front contact C3 and wire 8, back to receiver. This induces current in secondary 9 of the transformer and such current controls the grid-filament circuit of E by current flow as follows: secondary 9, wire 10, front contact C1, wire 11, grid 12, filament 13, wire 14 back to secondary 9. Condenser 5 tunes the receiving circuit to resonance at the frequency of the coded current, which in this instance is assumed to be 100 cycles per second. It will therefore be seen that the influence of coded current in the trackway can be used to control the train by means of different codes, here three in number, one of which codes is a proceed or clear code.

When a train is in non-coded territory, switch S is reversed, thereby rupturing the circuit to relay C and deenergizing the latter so that its front contacts are open and its back contacts C2, C4 and C6 are closed. In addition, switch S when reversed closes a circuit to coder or modulator M, current flowing from a suitable source over wire 15, vibrating contact 16, wire 17, coil 18 of the coder and wire 19 back to the switch. The coder is of known construction, such as is disclosed in the application of P. N. Bossart, Ser. No. 398,342, filed October 9, 1929, and operates upon the principle that coil 18 when energized moves its armature in one direction thereby breaking its circuit at 16 and a spring moves said armature in the other direction thereby closing its circuit at 16. This modulator or coder is adapted to modulate, at the desired frequency, the uncoded current induced in the receiver so that such current will become coded to influence the train control device to its clear or proceed position. When switch S was

reversed, and relay C dropped its armatures, the circuit from the receiver to primary 6 was ruptured at C5 and C3, and the circuit through secondary 9 and the grid filament was ruptured at C1. By the closing of back contacts C2, C4 and C6 the following circuit was, however, established: from receiver R, wire 3, back contact C6, wire 26, back contact C2, wire 11, grid 12, filament 13, wire 14, wire 25, back contact C4, wire 8, back to receiver. Condenser 21 is bridged across this circuit from back contact C6 to wire 8, and thereby tunes the receiver circuit to resonance at the frequency of the uncoded track current. Coding armature contact 23 is also bridged across this circuit by wires 22, 24 and 26. When the coder is operating, the output of the tuned receiver is short circuited each time the contact 23 is closed, thereby giving the same effect as would be given by a proceed code picked up by the receiver.

It will thus be seen that the circuit means afford two alternative paths from the receiver to the traffic controlling means, one of said paths being tuned to resonance at one frequency and the other to resonance at another frequency of trackway current, and that one of said paths controls the grid-filament circuit of E through primary 6 and secondary 9 of a transformer, while the other path controls said grid-filament circuit directly and independently of said transformer.

I claim:

1. A train control system including: an inductive receiver on the train to be energized by coded or uncoded current flowing in the trackway, a train-carried traffic-control device responsive to the influence of coded current induced in the receiver, a coder on the train to so modify uncoded current induced in the receiver as to render the traffic control device responsive to the influence thereof, and selective circuit means on the train to control said device by the influence either of induced coded current or induced uncoded current modified by the coder on the train.

2. A train control system including: a train-carried traffic control device responsive to the influence of coded current, a receiver on the train to be energized by coded or uncoded current flowing in the trackway, a coder on the train to so modify uncoded current as to render the traffic control device responsive to the influence thereof, circuits to include the receiver, coder and traffic controlling device, and circuit-changing means which in one position renders the coder inoperative and causes current to be supplied from the receiver to said device independently of the coder and which in another position renders the coder operative and causes

current to be supplied from the receiver to said device by way of the coder.

3. A train control system including: a train-carried traffic control device responsive to the influence of coded current, a receiver on the train to be energized by coded or uncoded current flowing in the trackway, a coder on the train to so modify uncoded current as to render the traffic control device responsive to the influence thereof, circuits to include the receiver, coder and traffic-controlling device, a circuit-controlling relay, and a switch to control the coder and relay such that when in one position the coder is rendered inoperative and current is supplied from the receiver to said device independently of the coder and when in another position renders the coder operative and causes current to be supplied from the receiver to said device by way of the coder.

4. A train control system including: an inductive receiver on the train to be energized by coded trackway current of one frequency or uncoded trackway current of a different frequency, a train-carried traffic control device responsive to the influence of coded current induced in the receiver, a coder on the train to so modify uncoded current induced in the receiver as to render the traffic control device responsive to the influence thereof, and selective circuit means on the train affording two alternative paths, one path being tuned to resonance at the frequency of one and the other path being tuned to resonance at the frequency of the other current, to thereby control said device by the influence either of induced coded current of one frequency or induced uncoded current of another frequency but modified by the coder on the train.

5. A train control system including: an inductive receiver on the train to be energized by coded trackway current of one frequency or uncoded trackway current of a different frequency, a train-carried traffic control device responsive to the influence of coded current induced in the receiver, a coder on the train to so modify uncoded current induced in the receiver as to render the traffic control device responsive to the influence thereof, circuits, to include the receiver, coder and traffic controlling device, capable of affording two alternative paths, one path being tuned to resonance at the frequency of one and the other path being tuned to resonance at the frequency of the other current, and circuit-changing means which in one position renders the coder inoperative and supplies current from the receiver over one of said paths to said device independently of the coder and in another position renders the coder operative and supplies current from the receiver to said device by way of the coder.

6. A train control system including: a re-

ceiver on the train to be energized by modified or unmodified current flowing in track-way means, a train-carried traffic control device responsive to the influence of modified
5 current, a modulator on the train to so modify unmodified current from the receiver as to render the traffic control device responsive to the influence thereof, and selective circuit means on the train to control said device
10 either by the influence of modified current from the modulator or by modified current supplied by the receiver independently of the modulator.

Signed at Swissvale, in the county of Allegheny, and Commonwealth of Pennsylvania,
15 this 9th day of Februray, 1932.

FRANK H. NICHOLSON.

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