

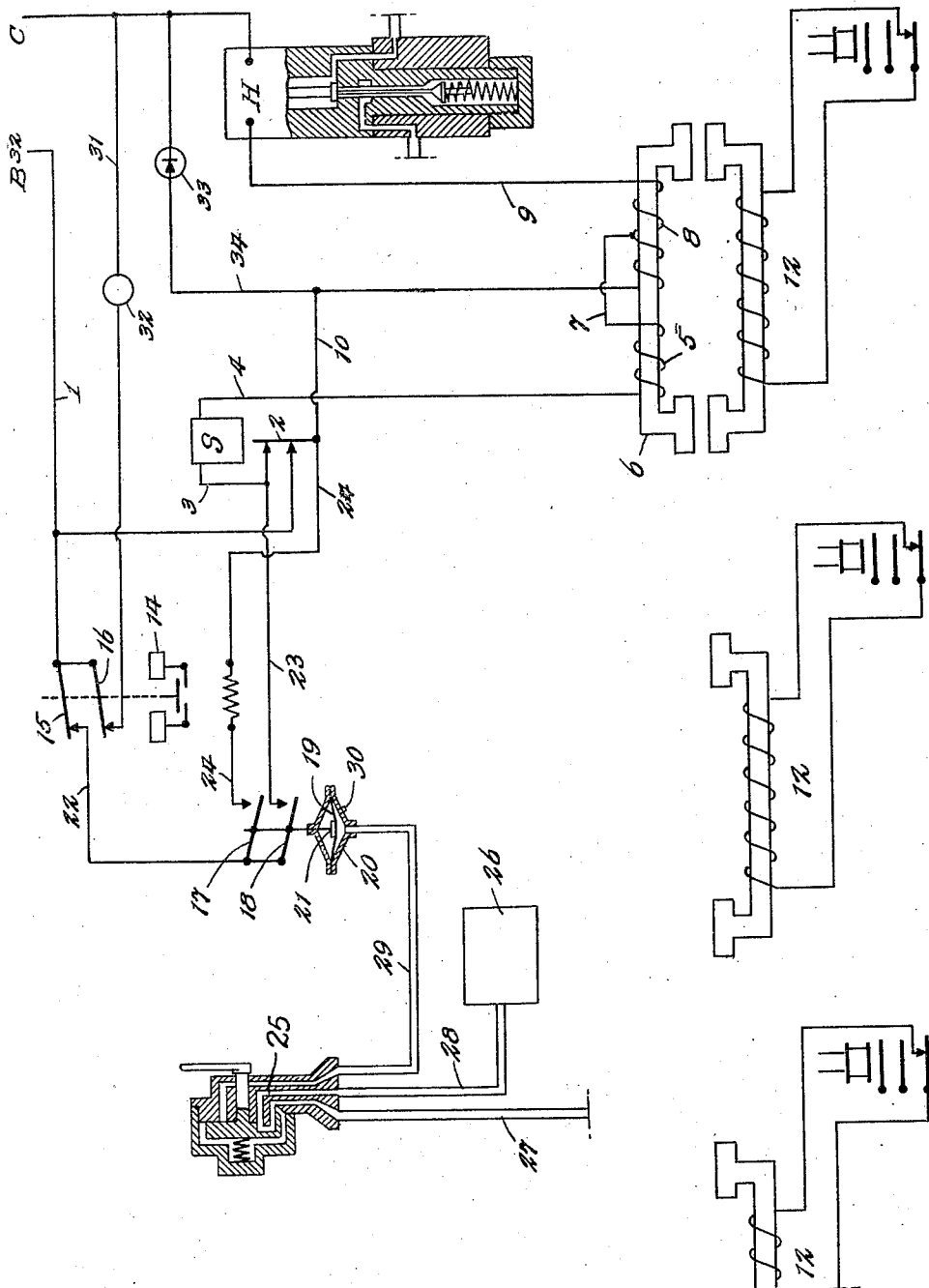
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TRAIN CONTROL SYSTEM

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TRAIN CONTROL SYSTEM

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This invention relates to train control systems, particularly of the intermittently controlled type.

In the accompanying drawing the invention is disclosed in a preferred and concrete, though somewhat diagrammatic, form.

In systems of the character here contemplated, it is customary to provide a control relay on the train which is normally held energized by current from a source of power connected to said relay through a stick contact in the form of a polarized armature. Wayside control means in the form of inductors located at different control points along the line of way are utilized, under adverse traffic conditions, to reverse the position of the polarized armature thereby rupturing the circuit through, and deenergizing the relay, and whereby also a circuit through a brake-setting device such as a magnet valve is ruptured so that the brakes are applied. Means have also heretofore been used whereby if the engineer is on the alert he may forestall the automatic brake application and retain the control relay energized by a manually operated acknowledgment device to be actuated by the engineer within a predetermined time before passing an adverse control point. In the arrangement just outlined, the engineer can run the train at an uninterrupted speed as long as he is on the alert and acknowledges the adverse traffic conditions.

The main object and feature of this invention is to compel a slowing down of the train when passing an adverse control point without, however, imposing a continuing speed limitation on the train after an adverse control point such as a caution signal is passed. Although, as stated, no continuing speed limitation is imposed, yet this arrangement renders it unlikely that the engineer will overrun a stop signal after passing a caution signal.

In the exemplification shown in the drawing, a control relay S is arranged on the train, which relay is normally held energized by a circuit leading from a suitable source of power connected to B³² and from thence over wire 1 to polarized armature 2, wire 3, coil of relay S, wire 4, secondary 5 of engine receiver

6, wire 7, part of primary 8, wire 9, magnet valve or brake-setting device H and common return C, back to source. This is a high resistance circuit so that the magnetizing effect on engine receiver 6 is negligible. Another circuit which is normally closed is from source to B³², wire 1, armature 2, wire 10, all of primary 8 of receiver 6, wire 9, coil of H and common return C back to source. This is a low resistance circuit and magnetizes the receiver. As long as magnet valve H remains energized, the brakes are held off. Arranged along the line of way at different control points are inductors 12, which under clear traffic conditions exercise no effective control on the engine receiver, but which under adverse traffic conditions act to reduce, or under certain conditions, to reverse the current through relay S and thus cause armature 2 to release thereby opening the contacts of said relay S so that it, as well as magnet valve H, becomes deenergized. In these circumstances an automatic brake application is initiated.

14 indicates a speed-governed device connected to an axle or otherwise controlled by the speed of the train, and this device controls here two contacts 15 and 16 such that when the train is running below a given speed said contacts are in their closed position, but when the train is running above a given speed they are in their open position. 17 and 18 are two other contacts connected to diaphragm 19 of what may be called an acknowledgment relay 20. Normally, contacts 17 and 18 are open because diaphragm 19 is held in its collapsed position by a spring or by a weight 21. Contacts 15, 17 and 18 control an acknowledgment circuit to retain relay S and magnet valve H energized, notwithstanding adverse traffic conditions and the adverse influence of the inductors. Thus it will be seen that, with the above-mentioned contacts closed, a circuit can be traced from B³², wire 1, contact 15, wire 22, contact 18, wire 23, wire 3, coil of S, wire 4, secondary 5, part of primary 8, wire 9, magnet valve H, and common return C; and that another circuit can be traced from B³², wire 1, contact 15, wire 22, contact 17, wire 24, wire 10, 100

primary 8, wire 9, magnet valve H and common return C. It will be noted that these circuits are not dependent for their continuity upon the position of armature 2, and that therefore both relay S and magnet valve H can be energized regardless of the position of armature 2. It is equally clear that unless the train is running below a given speed contact 15 will not be closed, and it is also clear that unless the effect of spring or weight 21 is counteracted, contacts 17 and 18 will not be closed. Manually operated means to expand the diaphragm are therefore provided which here take the form of the usual acknowledgment valve and its accessories. As here shown, 25 indicates an acknowledgment valve of known construction so arranged that when in one position connection is established between a charged reservoir (not shown) and the acknowledgment reservoir 26 by means of pipes 27 and 28, while at the same time pressure is cut off from acknowledgment relay 20 (below diaphragm 19). When, however, the acknowledgment valve is turned, communication is cut off between pipes 27 and 28, while at the same time communication is established between pipes 28 and 29 which latter leads to relay 20. It will now be seen that when the engineer receives an indication, as by means of a wayside signal, that the train is approaching an adverse control point, he may then, if he is on the alert, operate valve 25 thereby causing fluid pressure to pass beneath diaphragm 19 so as to close contacts 17 and 18. If the train is running below a given speed, a contact 15 will likewise be closed and relay S will remain energized and consequently an automatic brake application will be prevented when passing the adverse control point. After an adverse control point has been passed at reduced speed, the engineer is free to accelerate the speed of the train because no continuing speed limitation is imposed by the system under these conditions.

If, however, the train is not running at reduced speed when passing an adverse control point, the engineman must suppress the automatic brake application by making a brake pipe reduction of a predetermined amount, which prevents the automatic application by the functioning of the well-known suppression feature. The brakes must be held applied until the speed has been brought below the low speed limit, at which time governor contacts 15 and 16 will close, and an acknowledgment can be effected. As soon as the acknowledgment has been effected the brakes can be released in the usual manner, and the train speed will then be somewhat below the prescribed low speed limit.

In accordance with well-known practice in air brake equipment and forestalling devices, once an automatic brake application is in-

itiated it will continue. To release the present system after an automatic brake application has occurred, it is necessary to bring the speed of the train below the predetermined limit and also to operate the acknowledgment valve thereby energizing relay S and magnet valve H, after which a recharge of the brake pipe can be initiated as usual by first placing the brake valve handle in the lap position to restore the brake application valve to its normal position and then moving the brake valve handle to either running or release position. Also, the acknowledgment valve should be returned to the position where the acknowledgment reservoir is replenished.

It is unnecessary to describe the action of the system when passing a non-adverse control point because inductor 12 will, in these circumstances, have no controlling effect upon the system. It remains, however, to be said that contact 16 leads to a conductor 31 that extends to common return C, in which conductor 31 is a lamp 32 that is lighted when the train is running below a given speed, but which becomes extinguished when the speed of the train rises above a given point. 33 is a spark arrester located in conductor 34 that extends between wire 10, leading to armature 2, and common return C. It is unnecessary to go into the purpose of this spark arrester here.

I claim:

1. A train-carried control system including: a normally energized control relay; a normally energized brake-setting device; two circuits controlled by a front contact of the control relay, one circuit including said control relay and brake-setting device in series, and the other circuit including the brake-setting device; and manually controlled means to maintain said circuits closed independently of the front contact of the control relay provided the train is running below a given speed.

2. A train-carried control system including: a normally energized control relay; a normally energized brake-setting device; a receiver having a primary and a secondary winding; two circuits controlled by a front contact of the control relay, one circuit including in series the control relay, the secondary winding and part of the primary winding of the receiver and the brake-setting device, and the other circuit including in series all of the primary winding of the receiver and the brake-setting device; and manually controlled means to maintain said circuits closed independently of the front contact of the control relay provided the train is running below a given speed.

In testimony whereof I affix my signature.
FRANK H. NICHOLSON.