J. G. SCHREUDER & V. K. SPICER.

COMBINED SIGNAL AND SPEED CONTROLLING MECHANISM FOR RAILWAY TRAINS.

APPLICATION FILED AUG. 3, 1907.

903,414.

Patented Nov. 10, 1908.

2 SHEETS—SHEET 1.

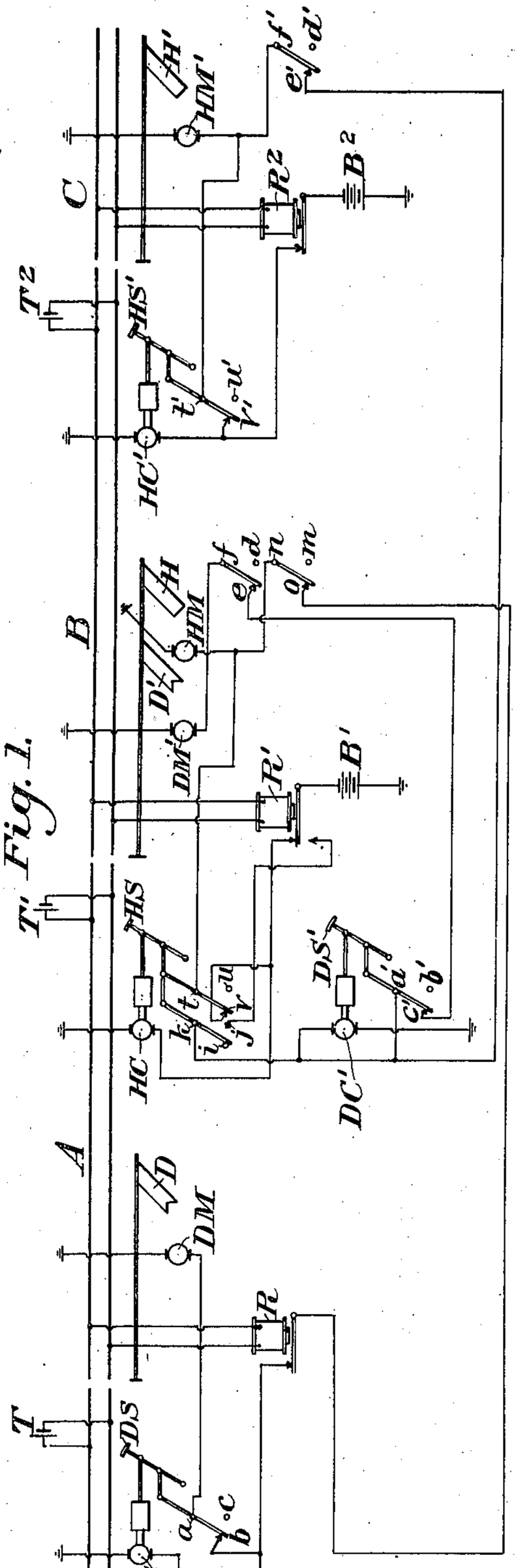


Fig. 1.

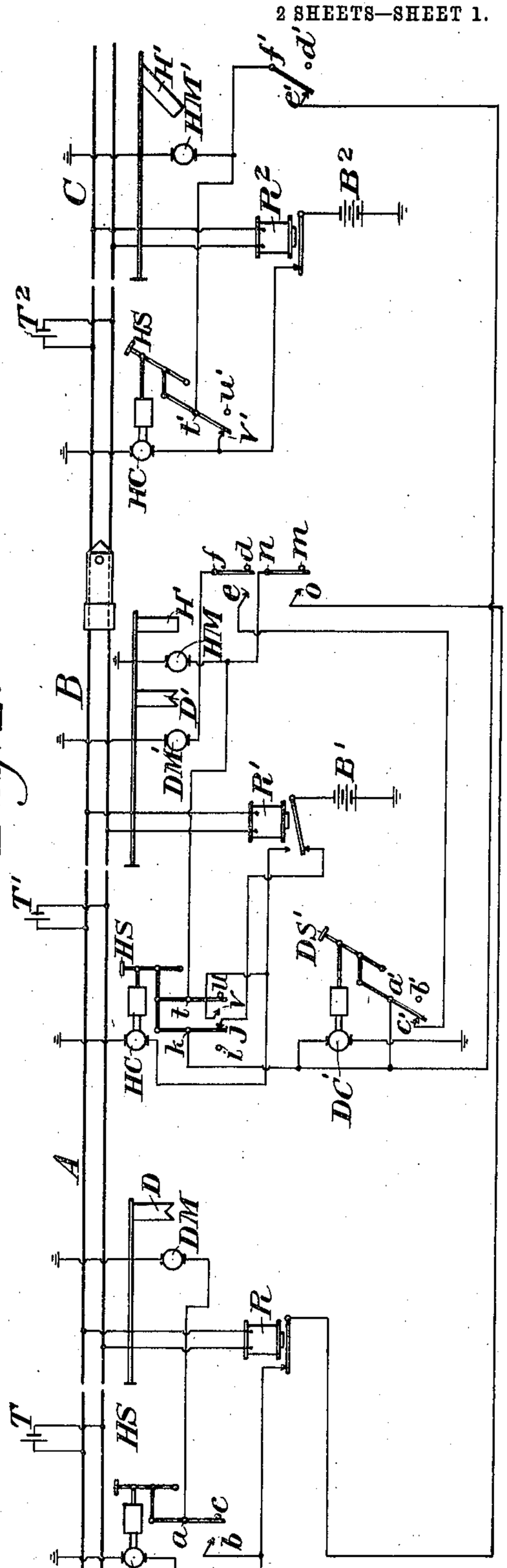


Fig. 2.

WITNESSES

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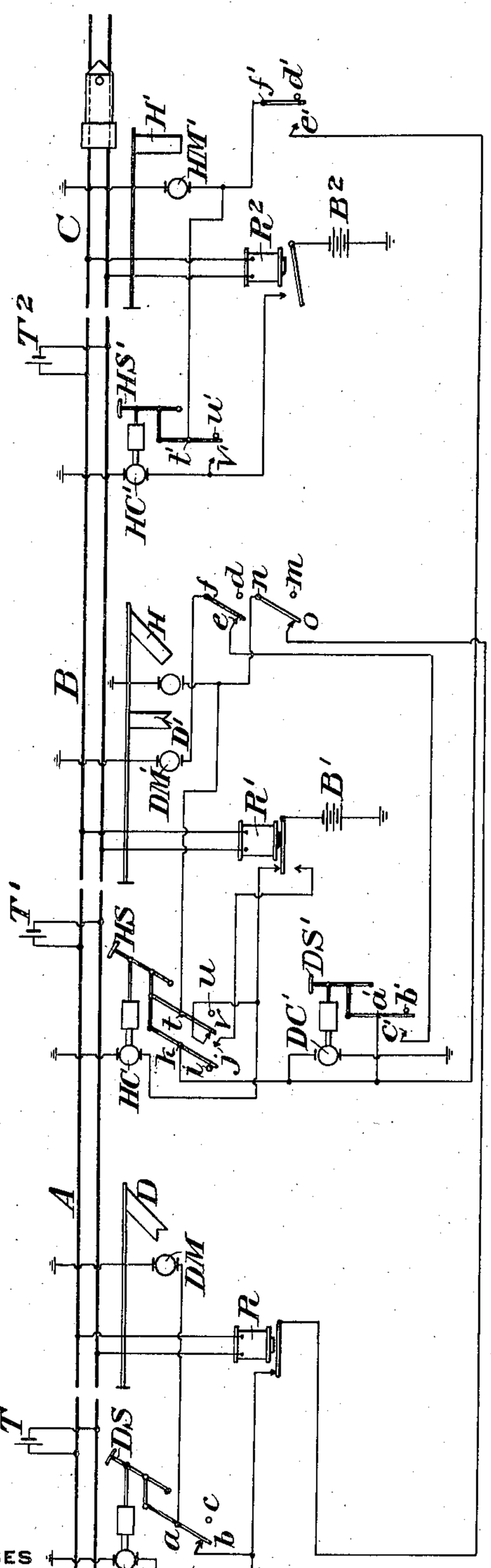


Fig. 3.

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# UNITED STATES PATENT OFFICE.

JENS G. SCHREUDER, OF EDGEWOOD PARK, PENNSYLVANIA, AND VIBE K. SPICER, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE UNION SWITCH & SIGNAL COMPANY, OF SWISSVALE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## COMBINED SIGNAL AND SPEED-CONTROLLING MECHANISM FOR RAILWAY-TRAINS.

No. 903,414. Specification of Letters Patent. Patented Nov. 10, 1908.

Application filed August 3, 1907. Serial No. 386,937.

*To all whom it may concern:*

Be it known that we, JENS G. SCHREUDER, of Edgewood Park, Allegheny county, Pennsylvania, and VIBE K. SPICER, of Chicago, Cook county, Illinois, have invented a new and useful Combined Signal and Speed-Controlling Mechanism for Railway-Trains, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figures 1, 2 and 3 are diagrams illustrating our invention, Fig. 1 showing the condition of the apparatus when the parts are all at safety or clear position; and Figs. 2 and 3 showing the condition of the apparatus with a train in different blocks.

In our application Serial No. 386,932, filed of even date herewith, we have described and claimed trip-actuated mechanisms for the purpose of automatically bringing a train to a stop, or of reducing its speed to a predetermined limit, under certain conditions. In such mechanisms, the engine or train is provided with two different trip arms or devices, one of which is arranged to engage a track trip or stop to be thereby actuated to cause an emergency application of the brakes, while the other arm or device is arranged to engage a track trip or stop to cause the service, or partial, application of the brakes.

Our present invention is designed to provide means for automatically controlling the positions of the track trips or stops, and also signal mechanism actuated in connection with the track trips or stops.

In accordance with our invention, we provide home and distant signals, together with track trips or stops for each signal, and preferably so arranged that their automatic operation shall effect the movement of the signal arms to corresponding positions.

The object of the invention is to provide means for use in connection with suitable trip-operated mechanism on the engine or train, such as described and claimed in our said applications, whereby it will be impossible for an engineer to run by a home signal set at danger, and whereby the speed of the train will be automatically reduced, in case it is above a certain speed, in passing a distant signal set at caution.

Our invention will be best understood by reference to the accompanying drawings, in which it is diagrammatically illustrated, and which will now be described, premising however, that various changes may be made by those skilled in the art without departing from the spirit and scope of our invention.

In these drawings, the letters A, B and C designate three adjacent insulated blocks or sections of a railway track. D is a distant signal at the entrance to the block A; D′ a similar signal at the entrance to the block B; H a home signal at the entrance to the block B, and H′ a home signal at the entrance to the block C. DM indicates the magnet of a controller for actuating the distant signal D, DM′ a similar controller for actuating the distant signal D′, HM the magnet of a controller for actuating the home signal H, and HM′ the magnet of a controller for actuating the home signal H′. DS indicates a track trip or stop placed in advance of the distant signal D, and arranged to be moved into and out of operative position by a controller DC, which may be of any suitable character such as ordinary electropneumatic cylinder. DC′ is a similar controller for actuating the track trip or stop DS′, which is placed in advance of the distant signal D′. HC is a controller for actuating a track trip or stop HS, placed in advance of the home signal H, and HC′ is a controller for operating a track trip or stop HS′ placed in advance of the home signal H′. T, T′, $T^2$ designate the track batteries for the respective blocks, and B′, $B^2$ are the signal and train stop batteries for the respective blocks B and C. R, R′, $R^2$ are relays which are connected across the rails of the respective blocks or track sections. *a*, *b*, *c* is a switch which controls in part the circuit of the magnet DM, and which is actuated by the movement of the track stop DS. *a′*, *b′*, *c′* is a similar switch which controls in part the circuit of the magnet DM′, and which is actuated by the distant signal track stop DS′. *d*, *e*, *f* is a switch actuated by the movement of the home signal arm H, and in series with the

switch $a'$, $b'$, $c'$ for controlling the magnet DM'. $m$, $n$, $o$ is a switch also actuated by the home signal arm H controlling in part the circuit of the magnet DM, said circuit being also controlled by the switch $a$, $b$, $c$ before referred to. $j$, $i$, $k$ is a switch actuated by the track trip or stop HS controlling in part the circuit of the magnet DC'. $t$, $u$, $v$ is a switch also actuated by the track stop HS, and controlling the connection of the battery B' to the magnet HM. $t'$, $u'$, $v'$ is a switch actuated by the track stop HS' and controlling the connection of the battery $B^2$ to the magnet HM'. $d'$, $e'$, $f'$ is a switch actuated by a suitable connection with the home signal arm H' and controlling in part the circuit of the magnet HM'.

The system as shown is designed for the normal "clear" position, all stop arms and signals being arranged to take the safety or proceed position as soon as a train has cleared the controlling track section, provided the apparatus is in good working order. Any derangement of the apparatus will result in the stops or signals, or both assuming danger positions. To this end, the controllers for the stop and signal blades are in clear positions, on closed circuits, and are arranged to operate to move the corresponding stops and signal blades to danger position by the breaking of their circuits. The condition shown by Fig. 1 is that wherein the blocks are all unoccupied and the stops and signals are clear. When a train enters the block A at the left hand end, the relay R is at once short-circuited, causing its armature to drop, and thereby opening the circuit of the magnet DC. This moves the track stop DS into engaging position, and also actuates the switch $a$, $b$, $c$ to open the circuit of the magnet DM at $b$. The distant signal blade D therefore moves to caution position.

Fig. 2 shows the condition of the apparatus with a train in the block B. As soon as a train enters this block, the track relay R' is short-circuited, its coils being thereby deenergized sufficiently to permit its armature to fall away from its pole piece, and thereby break the circuit of the controller magnet HC. This moves the track stop HS to engaging position, and its movement shifts the switches $j$, $i$, $k$ and $t$, $u$, $v$ from the position shown in Fig. 1 to the position shown in Fig. 2. A current now flows from the battery B' through the back contact of the relay R' and through the switch arm $j$, $k$ to and through the controller magnet DC' of the track stop DS'. This holds the track stop DS' in clear position.

Another circuit flows from the battery $B^2$ through the front contact of the relay $R^2$ to the switch $t'$, $u'$, $v'$, and thence through switch $d'$, $e'$, $f'$ back to the controller DC', also holding the distant stop arm DS' clear.

The falling of the armature of the relay R' also breaks the circuit of the home signal magnet HM and the switches $d$, $e$, $f$ and $m$, $n$, $o$ go to the position shown in Fig. 2. This opens the circuit of the distant signal blade D at the point $o$, the switch $m$, $n$, $o$ being closed only when the home signal blade H is at clear. As the train proceeds, clearing the block B and entering the block C, the apparatus will assume the condition shown in Fig. 3. As soon as the train passes completely out of the block B, the relay R' again picks up, while the relay $R^2$ is short-circuited, and its armature drops. The dropping of this armature opens the circuit of the controller HC', and the track stop HS' goes to operative position. This actuates the switch $t'$, $u'$, $v'$ to open the circuit of the magnet HM', and the home signal H' goes to stop position. At the signal station of the block B the condition is that the home blade is clear and the distant blade at caution. The home blade clears up due to the fact that the block B is unoccupied, and the relay R' has again picked up to complete the circuit of the controller HC, thereby clearing the stop arm HS and actuating the switch $t$, $u$, $v$ to close the circuit of the magnet HM. When the stop arm HS clears, the stop arm DS' shifts to the engaging position ready to apply the service stop to any train attempting to pass at a greater speed than that prescribed by the system. This is due to the fact that the magnet DS' is deenergized when the circuit in the battery $B^2$ is broken at the point $e'$, as the arm H' goes to stop, and also when the battery B' is cut off at the time the relay R' picks up and the controller $j$, $i$, $k$ shifts from the contact $j$.

As the train passes out of the limits of the block C the apparatus will assume the position of all clear, as shown in Fig. 1. It will also be understood that the present invention may be used in connection with any suitable controlling apparatus on the trains, as well as with the apparatus described in our said application.

It will be noted from the foregoing, and from an examination of the diagram, that the distant signal blade D must remain at its danger position until the home signal blade H has moved to clear. Also that the distant signal blade D' must remain at danger position until both home blades HH' have cleared. Also that by reason of the fact that the circuits of the controllers for the blades DHH' are controlled by switches actuated by the track stops DS, HS and HS', that the signals cannot go to their clear positions except when the corresponding track stops are in clear position.

While we have shown our invention as applied for a normal clear position, in which all stop arms and signals will take the proceed position when the track is clear and the parts

are all in working order, it will be obvious that the invention is equally applicable to a system in which the parts are normally at stop position and are cleared by the train movements.

The advantages of our invention will be understood by those skilled in the art.

We provide simple means of automatic character whereby the speed of the train may be automatically reduced in passing a distant signal set at caution, and whereby a train may be automatically stopped by a home signal at stop. This is so connected with the signal mechanism that the home and distant blades are controlled by the track stops in a simple and efficient manner, the signals being held in their respective positions until the respective track stops have been moved.

Any suitable or usual controlling mechanism may be employed for actuating the track stops, and also the signal blades, such devices being well known in the art.

What we claim is:—

1. In apparatus for train control, a stop signal, a caution signal, a separate track stop for each signal, actuators for shifting said stops into and out of operative positions, track circuits for controlling said actuators, actuators for moving the signals, and circuits controlled by the movement of the track stops for controlling the last named actuators; substantially as described.

2. In train controlling apparatus, home and distant signals, a movable track trip in connection with each signal, controllers for said track trips for moving them from operative to inoperative positions, circuits for said controllers, and switch devices operated by the movements of the home signals, by the movement of the controllers, and by passing trains, to control the positions of the track trips and of the signals; substantially as described.

3. In train controlling apparatus, home and distant signals, movable track trips, actuating devices for the signals and trips, said trips each having an operative and an inoperative position, switches controlled by the movement of the trips, other switches controlled by the movement of the signals, track controlled relays, and electrical circuits controlled by the switches and relays and controlling the operation of the signals and trips, whereby the signals go to danger when the corresponding trips are moved to operative position, and will remain at danger until the corresponding trips have moved to inoperative positions; substantially as described.

4. In train controlling apparatus, track trips, home and distant signals, the trips having different positions corresponding to different positions of the signals, actuating devices for the trips and signals, and inter-related electric circuits for said actuating devices controlled by the passage of trains and causing correlated operations of the signals and trips, substantially as described.

5. In train controlling apparatus, home and distant signals, track trips movable to different positions corresponding respectively to different positions of the signals, actuating devices for the signals and for the trips, and interrelated electrical circuits controlling the operation of said actuating devices and controlled by the passage of trains, substantially as described.

6. In train controlling apparatus, home and distant signals, track trips movable to different positions corresponding respectively to different positions of the signals, actuating devices for the signals and for the trips, and interrelated electrical circuits controlling the operation of said actuating devices and controlled by the passage of trains, whereby shifting of the trips effects a correlated effect on the signals, substantially as described.

In testimony whereof, we have hereunto set our hands.

JENS G. SCHREUDER.
VIBE K. SPICER.

Witnesses as to Jens G. Schreuder:
JAS. JOHNSON,
C. C. WHITE.

Witnesses as to Vibe K. Spicer:
E. T. BARNES,
W. M. VANDERSLUIS.