Nov. 28, 1933. J. CARTELLI 1,936,618

COLLISION PREVENTING SYSTEM

Original Filed July 25, 1930 3 Sheets-Sheet 1

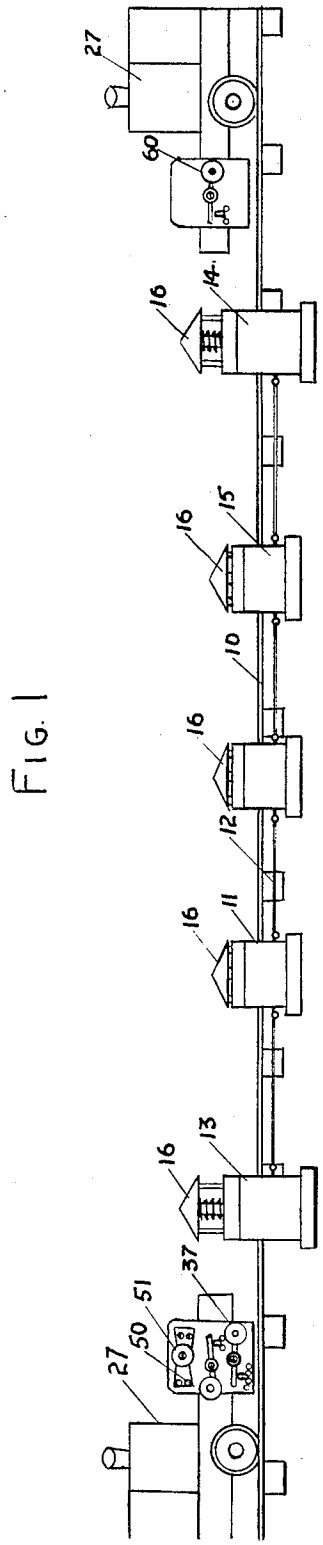


FIG. 1

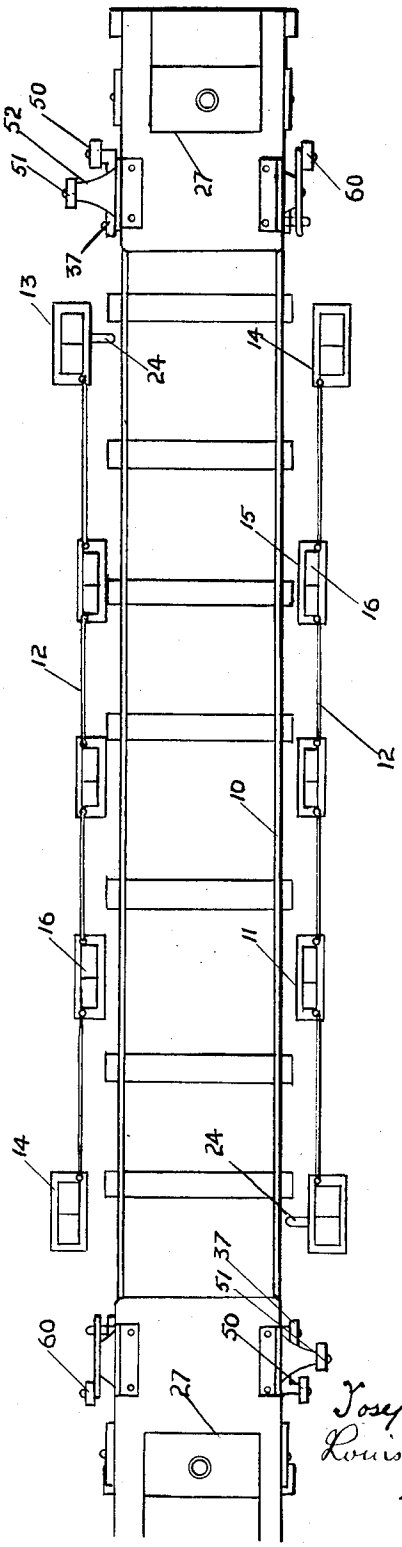


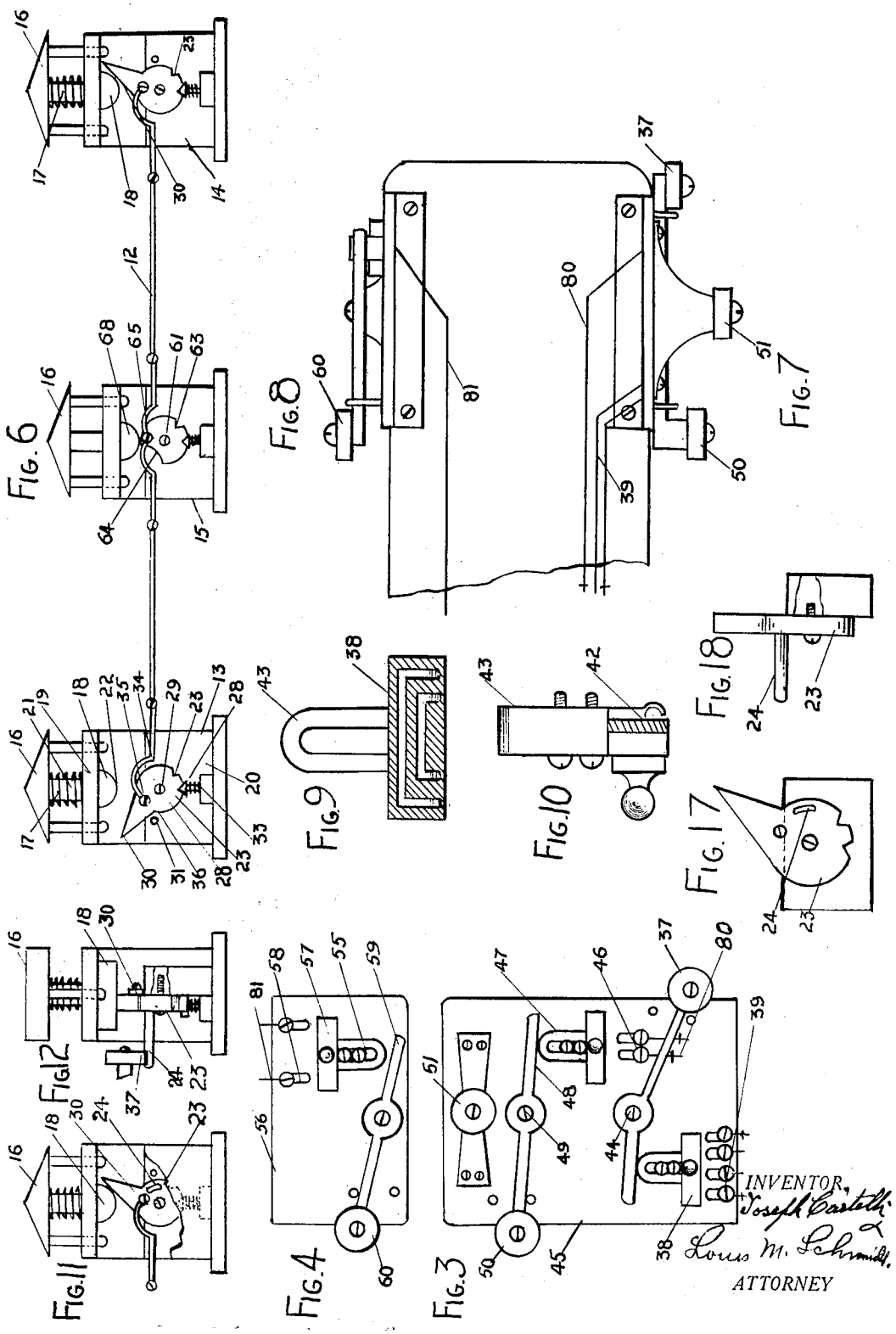
FIG. 2

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FIG. 5

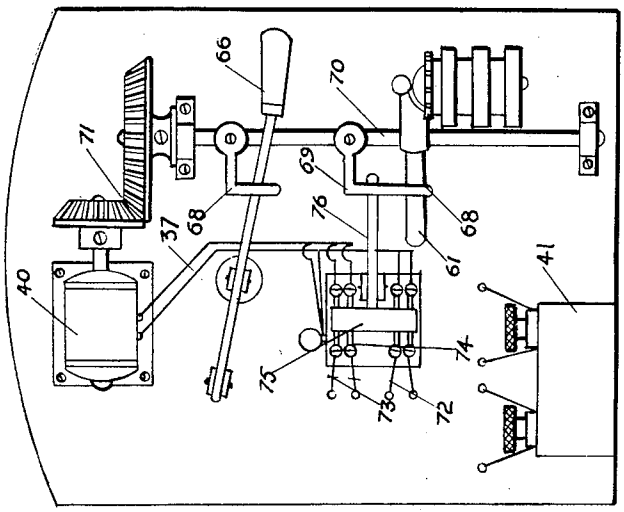


FIG. 14

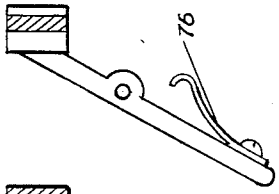


FIG. 15

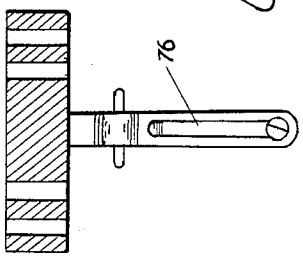


FIG. 16

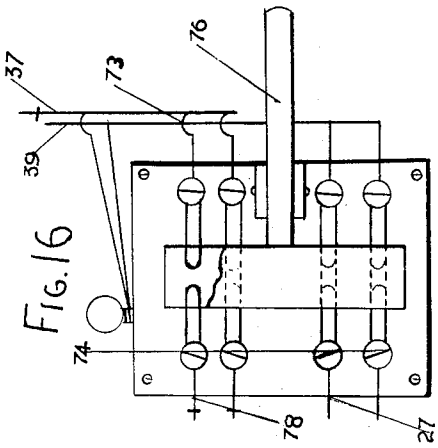
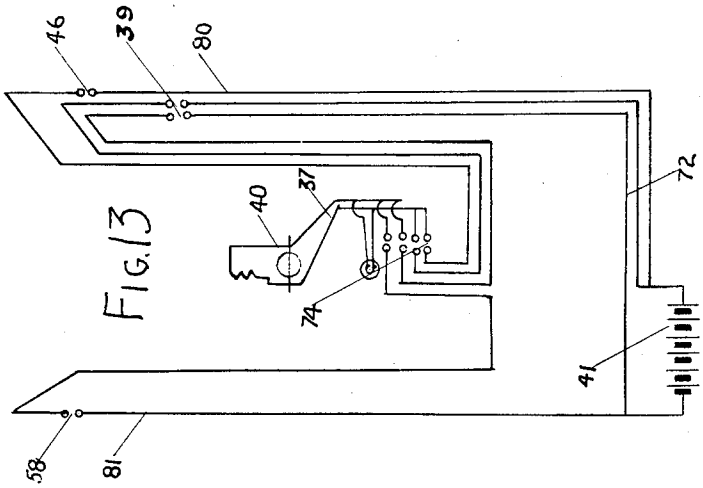


FIG. 13



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COLLISION PREVENTING SYSTEM

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3 Claims. (Cl. 246—103)

My invention relates to improvements in collision preventing systems, of the form that operates to prevent collision between locomotives operating upon a section of track, and the object of my improvement is to produce a collision preventing system that is composed of cooperating devices on the locomotives that move over the track section and located alongside the track that will serve to effect by motor driven means installed on the locomotives the stopping of a particular locomotive that makes unauthorized entry upon the track section by following one that has made proper entry thereon and that will serve to stop both after a second one has intruded upon another after such proper entry, the result attained depending upon the conditions existent.

In the accompanying drawings:—

Figure 1 is a side elevation showing diagrammatically my improved collision preventing system applied to a track section and locomotives approaching from opposite ends of the section and exposing respectively devices pertaining to the invention that are mounted on the right side and on the left side of the different locomotives, and also showing the devices that are installed along one side of the track, devices on the opposite side of the track being covered by those shown.

Fig. 2 is a plan view of the same.

Fig. 3 is an enlarged side elevation showing the devices that are installed on the right side of the locomotives.

Fig. 4 is a similar view of the devices that are installed on the left side of the locomotives.

Fig. 5 is an elevation showing diagrammatically the devices that are installed in the cabs of the locomotives.

Fig. 6 is a side elevation showing the three forms of track devices with the casing walls broken away so as to show the interior details.

Fig. 7 is a plan view showing the trip rolls on the right side that are shown in Fig. 3.

Fig. 8 is a similar view of the trip rolls of the left side devices shown in Fig. 4.

Fig. 9 is a sectional view of the double-pole cross-connecting switch member shown in Fig. 3.

Fig. 10 is an edge view of the same.

Fig. 11 is an elevation of the first track trip device as viewed from the side of the track, opposite to the view of the same device in Fig. 6.

Fig. 12 is an edge view of the same.

Fig. 13 shows a diagram of the electrical connections.

Fig. 14 is a fragmentary edge view showing the moving member of the four-pole switch that is located in the cabs of the locomotives.

Fig. 15 is a face view of the same, as seen from the back.

Fig. 16 is an enlarged face view of the entire switch and with the moving member shown in Figs. 14 and 15 in the circuit closing position.

Fig. 17 is a side elevation of the swinging member as viewed from the inner or track side, the over-hanging arm being shown in end elevation as protruding from the side face, the view being slightly enlarged relatively to the views of the same part in Figs. 6 and 11.

Fig. 18 is an edge view of the same.

My improved collision preventing system involves the cooperation of devices installed on the different locomotives or the like that are intended to be operated over a track section with devices that are installed alongside the rails of the track section so that the first and authorized locomotive can enter upon the section and depart therefrom freely under conditions that are strictly normal and correct, these movements involving the tripping and setting of certain devices upon entry and restoration of the same upon departure.

In case, however, before such departure from the track section an unauthorized locomotive enters upon the track section the result is a stoppage of movement such as to prevent a collision. Such unauthorized entry may be from the same end of the track section as the initial entry or may be from the opposite end. In the former case the intruding locomotive only is stopped. In the second case, both are stopped.

The track section 10 is provided with two similar sets 11 of devices that are installed alongside the track at the opposite sides comprising a series of connected trip devices that are connected by a cable 12 for each set. The members of the set 11 include the setting member 13 that is the first of the series at the right side as determined by the direction of approach to the track section 10 or at the entry end. The last of the series or set 11, at the departure or leaving end, is the restoring member 14. Between the ends thereof are installed a plurality of intermediate members 15, the number of which is determined by the particular conditions existent, such as the length of the track section 10 and other conditions that may be local and individual. The cable 12 is made up of cable sections extending between adjacent members and operatively connecting swinging elements thereof.

Each member comprises a suitable casing that

is surmounted by a house-topped contacting block 16 that is in the path of a cooperating roll structure that is supported on the locomotive for making tripping or setting contact, as the case may be, the block 16 being supported and guided for limited upward and downward movement for changing from one position or setting to the other. The end members 13 and 14 have each a spring 17 that tends to hold their respective blocks 16 in the elevated position and the limit for such elevated position is determined by means of a head 18 that makes contact with the under side of a top-plate 19 that surmounts the box-like base 20. The head 18 constitutes the bottom end of a stem 21 that depends from the block 16, said stem 21 being projected through the coils of the spring 17 and through a suitable opening in the top-plate 19.

In the case of the spring positioned blocks 16 the operation thereof is momentary only, involving depressing responsive to contact with the locomotive-supported roll and in opposition to the spring 17.

The head 18 cooperates with the swinging member housed within the base 20 by means of a rounded bottom contacting face 22.

The swinging members 23 of the two end members 13 and 14 are generally similar, except that the member 23 of the setting member 13 carries an auxiliary tripping arm 24 that is extended transversely from the base 20 towards the rails 25 of the track 10 for cooperation with a roll 37 that is carried at the right side of the locomotive 27 in each case for use when the said locomotive or locomotives enter upon the track section as an intruder. The swinging member 23 has a disc-like body 28 by which it is mounted on a suitable shaft 29.

The driving element is in the form of a V-shaped arm 30 that projects radially from the central body 28; a fixed stop 31 limits the swinging movement in one direction by cooperating with the arm 30, the range of movement involving contact of the tip end portion of the arm 30 with the convex contacting face 22 of the head 18, depression of the head 18 and block 16 operating to swing the swinging member 23 from the approximately vertical position to the lower deflected position that involves contact with the fixed stop 31.

Corresponding to the two positions to which the swinging member 23 may be set are notches 32 in the periphery of the swinging member supporting body or disc 28 that cooperate with a spring plunger 33 that serves to check against accidental displacement of the swinging member 23.

The normal position for the swinging member 23 of the setting trip member 13 is with the arm 30 upright and in contact with the head 18 and it is swung from this position by depressing said head 18. The swinging movement mentioned is transmitted to the devices in the series by means of the cable section 12 and the restoration of the swinging member 23 to the normal position is effected also by said cable section. The connection for the cable section 12 with the swinging member 23 is effected through the medium of a bar-like terminal member 34 that is provided with an arcuate shaped portion 35 adjacent the shaft 29 for providing clearance relatively to said shaft during the to and fro movement. The terminal 34 makes connection with a crank-pin 36 on one of the side faces of the disc-body 28.

The auxiliary arm 24 also projects from one of the side faces of the disc-like body 28 and in such a position that in the normal position the said arm 24 is set low and inoperative or inactive.

Depressing the arm 30 serves to elevate the auxiliary arm 24 so that it is in the path of the roll 37 on the right side of each of the locomotives and which roll 37 may be designated as the stop roll in that it serves to effect the stopping of the particular locomotive that is involved in such contact. Such a locomotive would be one that intruded on the protected track section after a legitimate locomotive had entered thereon.

The means and devices for effecting such stopping comprise:—a two-pole switch 38 on the locomotive 27 that is closed by lifting the stop roll 37; motor leads 39, motor 40, and a battery 41 or other source of electric current that are brought into operative connection by the closing of said switch 38, the moving member of the switch 38 being in the form of a double-pole or four-point bridging member 42 that is operatively supported by a slidably supported stem 43, said stem 43 being depressed to close the switch by the short arm of a swinging lever 44, the roll 37 being at the free end of the long arm of said lever 44.

The swinging lever 44 and switch 38 are mounted generally at the lower portion of a switch-board 45 or the like that is provided at the right side of the locomotive 27, and the said lever 44 by its long arm that carries the stop roll 37 projects forwardly so that the roll mentioned is forward of the board 45 and other devices mounted thereon.

Such devices comprise two other rolls and a second switch that is operated by one of said rolls.

Said second switch 46 is just above the lever 44 and comprises a moving member 47 that is depressed to close the switch, said moving member 47 being in the path of the short arm of a swinging lever 48 that is like the lever 44 except that it is directed the opposite way.

The long arm of said swinging lever 48 trails the pivotal support 49 thereof and supports on its free end the contact roll 50. Said roll 50 travels over the contact blocks 16 of the intermediate members 15 and makes operative contact therewith for closing any switch 46 in case the block 16 is in the elevated position at the moment of passing thereover.

At the upper middle portion of the board 45 a contact roll 51 is operatively supported so as to be in the path of the contact blocks 16 of the setting member 13 and the restoring member 14. The spacing of the roll 51 outward from the locomotive by means of its supporting bracket 52 is greater than that for the rolls 37 and 50 because the end members 13 and 14 are located farther outward than the intermediate members 15.

The switch 46 is a single pole switch that controls one line only of a circuit for the locomotive control motor 40 in the cab 53 of the locomotive, the moving member 47 operating to bridge two contacts 54 in said line.

The other line for the motor mentioned is closed by means of a switch 55 that is mounted on a supporting board 56 on the left side of the locomotive, the actuating member of which is the bridge 57 for the contacts 58. The bridge 57 is depressed for closing the switch 55 by the swinging lever 59 that carries at its trailing end the contact roll 60.

The roll 60 travels over the intermediate members 15 that are installed at the left side of the track and will make operative contact so as to close the switch 55 in case the contact block 16 of any one of these members 15 with which it

comes into registration happens to be in the elevated or active position.

The restoring member 14 differs from the setting member 13 only in the omission of the auxiliary arm 24 and the modes of operation of the two are similar. Cooperation is effected by having the connections such that one or the other has its actuating arm 30 in contact with the head 18 that is opposed thereto and by having the contacting tip end of each opposed to the outer side of the center of the head. That is to say, the head 18 moves vertically in a line that is at right angles to the axis or shaft 29. The arm 30 is located generally at the outer side of the vertical line mentioned. Thus depression of the arm 30 effects a pull on the cable sections 12 of the series so that such a pull on one arm 30 operates to elevate the mating arm 30 at the end of the series to a position ready to be acted upon by depression of its head 18.

The moving block 16 of an intermediate member 15 in each case is actuated by a pull on the cable section 12 by the setting member 13 to be raised to its high active position and is permitted to drop by gravity to the low inactive position by a pull by the restoring member 14. The interior actuating means therefor comprises the disc 61 and the head 62 dependent from the block 16 that rides on the periphery 63 thereof. An indentation 64 in the periphery 63 provides for housing the head 62 in the low position. A crank-pin 65 on one side face of the disc 61 serves to provide two-way connection for the cable sections 12 for effecting operation by pulling from either one or the other of respectively opposite directions.

The control devices in the cab 53 that are operated by the motor 40 comprise a steam control lever 66 and a brake lever 67. Each of these is in the path of the vertical branch 68 of a radial arm 69 projecting from a vertical shaft 70 that is driven by the motor 40 through bevel gearing 71.

Initially the blocks 16 of the setting members 13, one on each side of the track, are in the elevated position and the others are down and all switches are open. Assuming that the first locomotive enters the track section from the left in the views of Figs. 1 and 2, the roll 51 depresses the first block 16 at the right of the track, raises the auxiliary arm 24 at the setting station; and raises all of the other blocks 16 in the series. Next, the single-pole switch operating roll 50 makes tripping contact with the first block 16 of the intermediate member series so that one line of the motor circuit is closed.

During travel of the first locomotive on the track section the contingencies that may arise comprise the following: This locomotive may complete the run correctly and properly, making contact with the restoring block 16 of the restoring member 14 as it leaves, or unauthorized locomotives may enter the section from either of the two ends of the track section.

Entry of No. 2 locomotive from the opposite end of the section operates the track devices at its right hand side of the track precisely as described for No. 1, and with similar settings and the like. What is additional is the use of the roll 60 and switch 55 of both locomotives for closing the second connecting line of the circuit for each of the respective motors 40 and thus completing the motor circuit of each and both. The motor 40 for each locomotive of the two, locomotives Nos. 1 and 2 being considered, will thus be permitted to start and to function to shut off the steam and apply the brakes.

In the case of No. 3 that enters the track section in the rear of No. 1 the two-pole motor switch 38 and actuating roll 37 therefor come into play for making full closure of the motor circuit for the motor 40 of the intruding locomotive.

As described there are two electric circuits, involving a total of four wires 72, that lead to the two motor leads 73 for the motor 40 and in the cab 53 is installed a switch 74 of four-pole form that controls the connections for said four wires 72. One of the locomotive control levers can be utilized to operate the moving member 75 of said switch 74 so as to open the two circuits after the completion of the movement needed to stop the locomotive.

As shown, the switch moving member 75 is provided with an arm 76 that is in the path of the vertical branch 68 of the lower arm 69 that operates the brake lever.

The switch 74 in the locomotive cab is merely a control switch for closing circuits leading to the motor 40 and has no function pertaining to the essentially automatic operation of the collision preventing devices.

Locomotive No. 1 is the first to enter the protected section, whether from the left or right as shown in Figs. 1 and 2, or from west or east. It may be convenient to regard the one at the left as No. 1.

Locomotive No. 2 is arbitrarily designated as the one to make unauthorized entry from the opposite end of the section, as the one at the right in Figs. 1 and 2.

Locomotive No. 3 is not shown and is the designation applied to the one that follows No. 1 along the section.

No. 1 only is regarded as authorized. Entry thereof on the section or block serves to depress the first block 16 momentarily and by the cable connections to elevate all of the succeeding blocks 16, comprising one or more intermediate blocks, and the end block at the restoring station, the parts thus assuming the position that is shown in Fig. 6. As shown, the arm 30 is in contact with the outside of the head 18 at the restoring station 14, the head 18 being thus adapted when depressed by contact roll 51 operating on the block 16 to push the arm 30 to the initial position in contact with the stop 31.

Considering Fig. 6 further, the block 16 at the intermediate station 15 is held in elevated position mechanically by the head 62 riding on the periphery of the disc 63 and is thus in the tripping position for the roll 50 on one side of the locomotive and the roll 60 on the other side thereof. Each of these rolls operates a single-pole switch, respectively 46 and 58. The line wires respectively are designated as 80 for switch 46 and 81 for 58.

At the setting station 13 the V-shaped arm 30 is depressed against stop 31, ready to be elevated by a pull on the cable 12. At this station 13 the transversely projecting arm 24, not visible in Fig. 6, is shown in Figs. 11 and 12 and in different positions, being in the elevated tripping position in Fig. 12 with the V-shaped arm 30 down, as in Fig. 6.

In Fig. 11 the V-shaped arm 30 of the swinging member 23 is shown in the upper position in contact with the head 18 and the over-hanging arm 24 is shown in end view, projecting from the side face of said swinging member 23, said arm 24 being in the down inactive position.

Said arm 24 serves virtually as the stop arm for the intruding locomotive No. 3 by cooperating

with its roll 37 so as to effect the closing of the two-pole switch 38, said switch 38 serving to connect the source of current supply 41 with motor connecting wires 39 that lead through cab-switch 74 to the motor leads 73. Thus the motor 40 is connected for operation and for operating the steam-control valve and the brakes.

I claim as my invention:—

1. In a collision preventing system, a track section and mechanically-operated control devices installed alongside the same, a set of locomotives for operating over said section, provided individually with electric motor-driven means for interrupting the steam-supply and applying the brakes, switches for the motor circuits having moving parts, and rollers on said parts for cooperating with some of such devices, and a mechanical roller for changing the position of said control devices.

2. In a collision preventing system as described in claim 1, said control devices comprising two sets of members located on opposite sides of the track, and said switches comprising individual switches on both sides of the locomotives for cooperation with both of said sets.

3. In a collision preventing system, a track section, a set of control devices alongside said section comprising in series moving elements consisting in order of a setting member at the approach end, a plurality of intermediate members, and a restoring member at the departure end, all cable-connected, contact blocks cooperating with the respective members, a similar set of control devices on the opposite side of said track arranged in the reverse order, a group of locomotives for operating over said track that are equipped individually with an electric motor for shutting-off the steam and operating the brakes, a plurality of switches for closing the motor circuit, means for closing said switches cooperating with different parts of said sets of control devices, and mechanically-operating means on the locomotives for effecting a shifting of said moving elements, the parts being constructed and arranged so that a first and authorized locomotive can enter the section, set the control devices, restore the same and leave freely when there is no intruding locomotive, and such that when there is such an intruding locomotive from the opposite end of the section the motor circuits of both will be closed, and when an intruding locomotive trails the first the motor circuit of the trailing locomotive only will be closed.

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