No. 876,804 PATENTED JAN. 14, 1908.

H. A. HILL.

ELECTRIC SAFETY SYSTEM.

APPLICATION FILED FEB. 18, 1907.

3 SHEETS—SHEET 1.

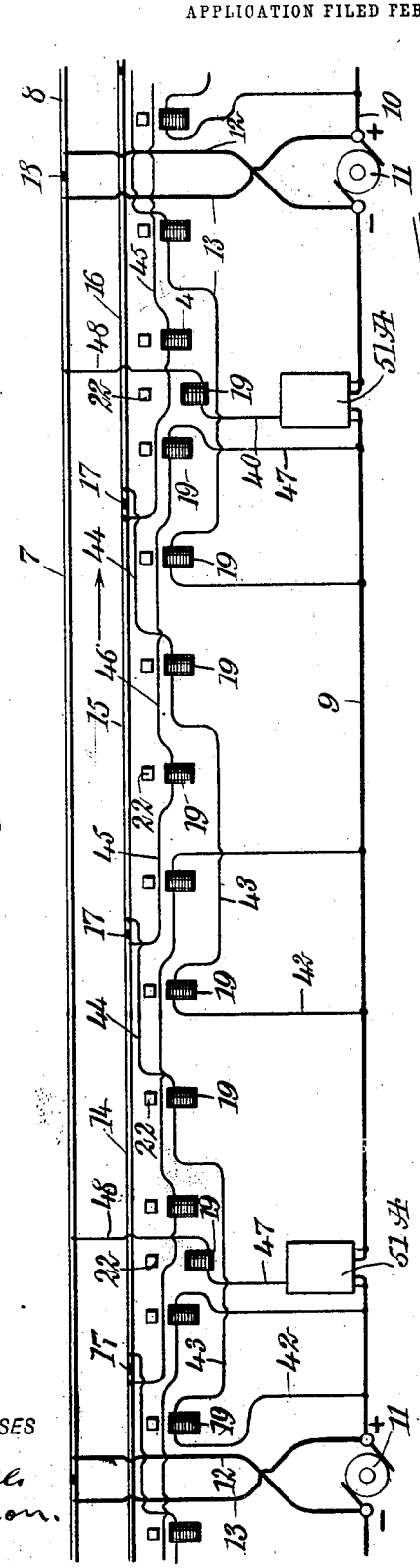

Fig. 1.

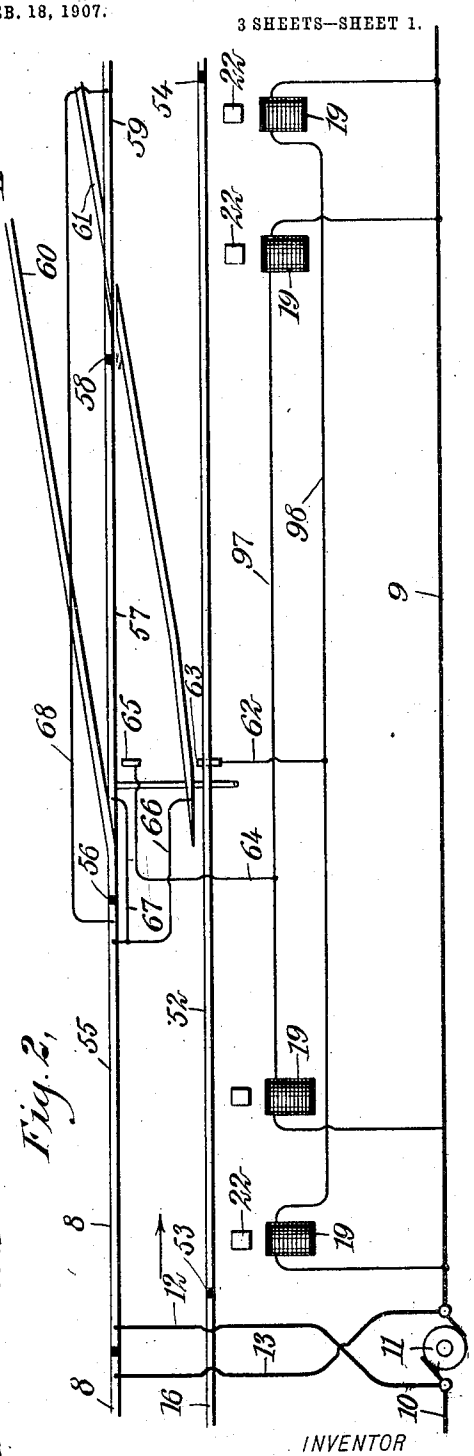

Fig. 2.

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Fig. 3.

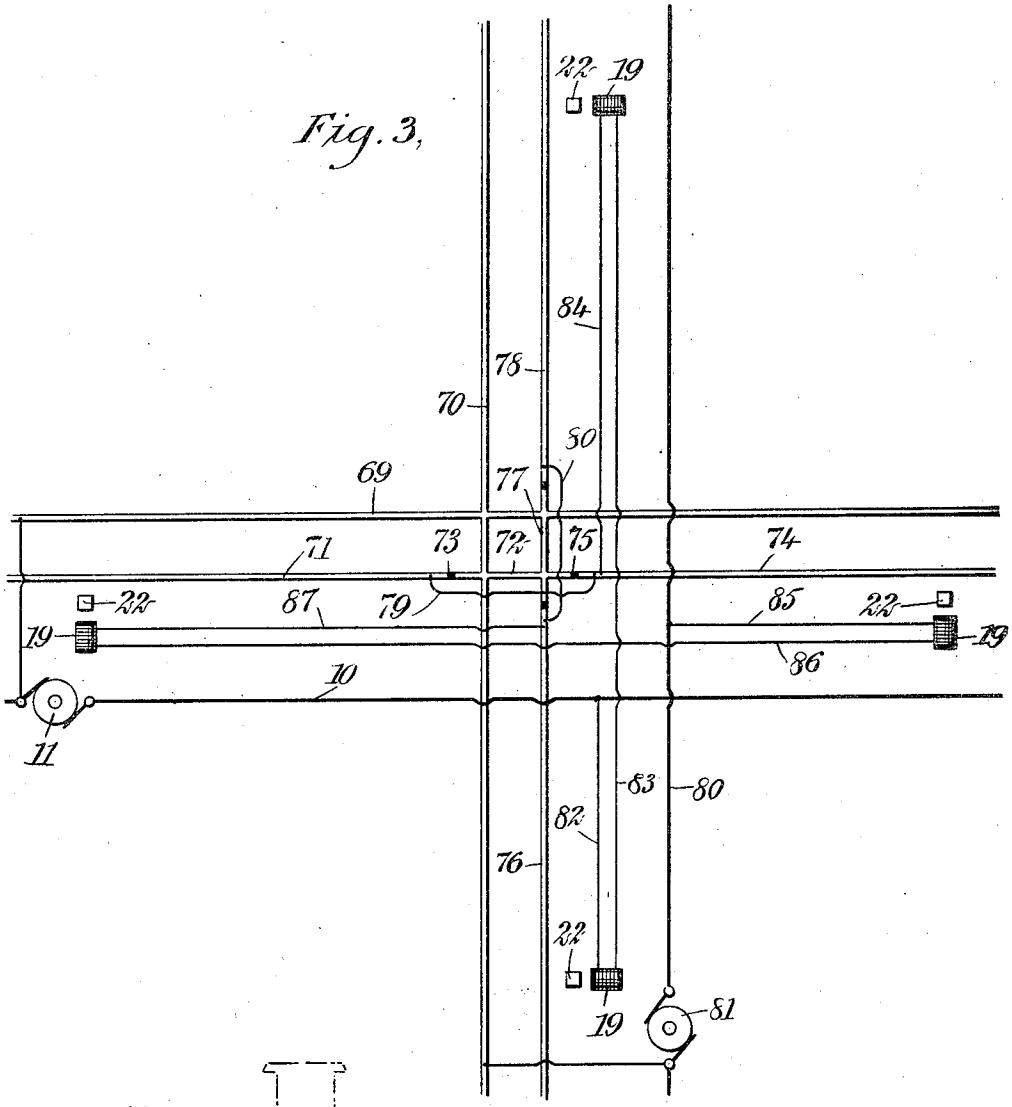
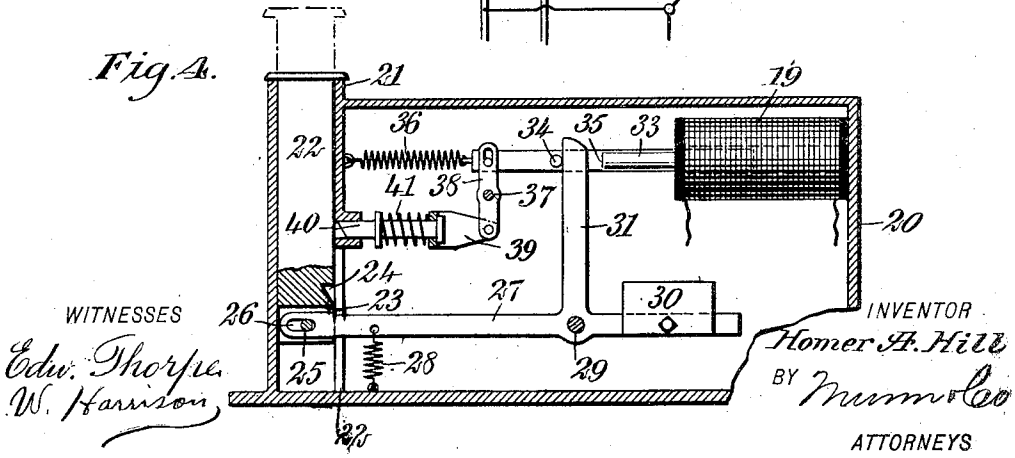


Fig. 4.



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3 SHEETS—SHEET 3.

Fig. 5,

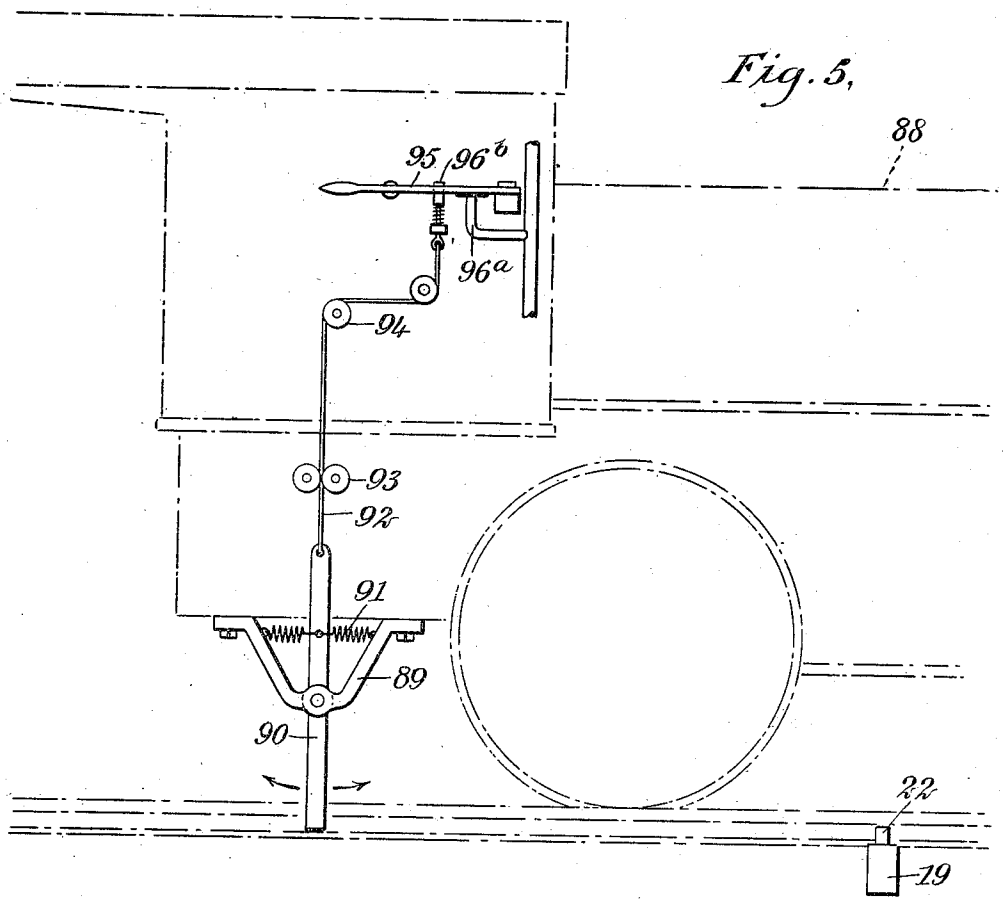
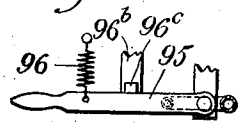


Fig. 5a.



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UNITED STATES PATENT OFFICE.

HOMER ALLIN HILL, OF DELAFIELD, WISCONSIN.

ELECTRIC SAFETY SYSTEM.

No. 876,804. Specification of Letters Patent. Patented Jan. 14, 1908.

Application filed February 18, 1907. Serial No. 357,894.

To all whom it may concern:

Be it known that I, HOMER A. HILL, a citizen of the United States, and a resident of Delafield, in the county of Waukesha and State of Wisconsin, have invented a new and Improved Electric Safety System, of which the following is a full, clear, and exact description.

My invention relates to railways, my more particular object being to produce certain improvements in the interest of safety.

My invention comprises more particularly, electrically operated mechanism employed for the purpose of stopping trains when the same arrive in the proximity of other trains, or upon some part of the road upon which travel is rendered dangerous because of the condition thereof.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a diagram showing a part of a railroad track equipped with my system, the latter being so arranged as to enable trains to mutually warn each other and also to stop each other when they arrive within certain predetermined limits. This figure further shows means whereby a wash-out or the like, damaging the track to any great extent, or an open drawbridge, may not only give warning to an approaching train but may cause the automatic stoppage of the latter; Fig. 2 is a diagram showing my system as applied to a track switch in such manner that when the switch is open or displaced beyond certain limits, a train approaching the switch is warned and also automatically stopped; Fig. 3 shows my system as applied to a railway crossing, the parts being so arranged as to give to a train a warning somewhat similar to those above mentioned; Fig. 4 is a detail view showing in section one of the electrically operated trips, sustained along the track for the purpose of automatically bringing to a standstill, a locomotive or similar member of rolling stock, the trip having first been automatically placed in proper condition to perform this office; Fig. 5 is a side elevation of a lever carried by a locomotive and actuated by some one of the automatic trips, for the purpose of applying the air-brake and stopping the train.

Rail sections 7, 8 are disposed in alinement with each other. Feed wires 9, 10, are connected with dynamos 11 or with batteries or other equivalent source of electricity, successive feed wires 9, 10, being connected by wires 12, 13, with the rail sections 7, 8 in the manner indicated in Fig. 1. Rail sections 14, 15, 16, are placed in alinement with each other and together make up a rail which is disposed parallel to the rail made up of sections 7, 8. Insulating sections 17, 18, are employed for separating the various rail sections. By this arrangement the road is divided up into blocks represented by rail sections 14, 15, 16, several of these blocks constituting a section represented by the length of one of the rail sections, 7, 8. Disposed at intervals along the track are solenoids 19, each mounted within a casing 20 as indicated in Fig. 4. Each casing 20 is provided with a tubular portion 21 in which works a plunger 22, the upper end of the same being of mushroom shape so as to prevent the entrance of ice and snow into the tubular portion 21. The plunger 22 is provided at its bottom with a slot 23 and also with a notch 24. A pin 25 is mounted within the slot 23 and passes through a slot 26 in the end of a lever 27. Connected with this lever is a spring 28 which maintains it normally in the position indicated in Fig. 4. The lever is journaled upon a pin 29 and carries an adjustable slide 30, the position of which is so arranged that the plunger 22 assumes its normal position when the mechanism is inactive. The lever 27 extends through a slot 32 in the tubular portion 21 of the casing 20. This lever is provided with an upwardly projecting arm 31.

The solenoid 19 has a movable core 33 of magnetic material, preferably soft iron and this core is provided with a pin 34, and a shoulder 35 mounted upon opposite sides of the upwardly projecting arm. A spring 36 retracts the core 33 or armature, whenever the latter is released by the solenoid 19.

Mounted upon a pin 37 is a lever 38, the latter being pivotally connected to the core 33 and also to a yoke 39. Loosely mounted within this yoke is a latch 40 beveled at its outer end as shown in Fig. 4 and adapted to enter the notch 24 when the plunger 22 is raised. A spiral spring 41 encircles the latch 40 and gives it a proper degree of tension to enable it to snap into the notch 24.

Whenever the solenoid 19 is energized the

lever 27 is actuated by the core 33 and raises the plunger 22; each time this occurs the lever 38 is turned angularly upon the pivot 27 and compresses the spring 41. By the time the plunger 22 reaches its uppermost position (indicated by dotted lines in Fig. 4), the tension of the spring 41 becomes great enough to enable the latch 40 to perform the office above indicated, so that the plunger 22 is supported in the position indicated by dotted lines in Fig. 4. When however, the solenoid 19 is deënergized, the return of the core 33 and lever 38 to their respective normal positions causes the withdrawal of the latch 40 and allows the plunger 22 to return to its normal position. The space intermediate of the shoulder 35 and the pin 34 should be so proportioned as to allow a relaxation of tension upon the spring 41 sufficient to disengage the latch 40 from the notch 24 before the lever 27 begins to move downward.

In the form shown in Fig. 1, the wires 42 are each connected with solenoids 19, and by the aid of a wire 43 and a wire 44, connection is established through the solenoids just memtioned, from one of the rail sections 14, 15, 16 to the feed wire 9. Similarly, others of the solenoids 19 are connected by wires 45, 46, 47, so as to establish communication between each of the sections mentioned and the feed wire 9. It will be noted however, that wires 44, 43, 42 extend in an opposite direction to the wires 45, 46, 47. For instance, if a train is traveling toward the right (as indicated in Fig. 1, by the arrow), upon reaching any given rail section there will be, both ahead of and behind the train, at least two solenoids 19, in communication with the rail section upon which the train rests. Suppose now, that a train is within the block represented by the rail section 15; in other words, occupies the position indicated by the arrow. The following circuit is now completed: source of electricity at the left of Fig. 1, wire 12, rail section 7, axles of train to rail section 15; the current here divides, a part going through wire 44, solenoid 19, wire 43, solenoid 19, wire 42, back to source of electricity; the other part of the current going through wires 45, 46, 47 (and the solenoids 19 connected therewith) back to source of supply. Four solenoids 19 are thus energized, two of them being in front of the train and two others behind it. This is true whether the train be stationary or in motion. The energizing of each solenoid 19 causes the elevation of a plunger 22 as above described. It follows therefore, that no matter what may be the length of a train and whether it be stationary or in motion, there are two elevated plungers 22 ahead of the train and two others behind it. These plungers 22 when thus elevated serve to guard the train as hereinafter described. At intervals along the track, a pair of wires 48, 49 are connected with the solenoids 19 and mechanism accompanying the same, arranged as above described.

In the form shown in Fig. 2 the rail section 52 is an alinement with the rail section 16 and provided at its ends with insulating sections 53, 54. Similarly, the rail section 8 is in alinement with rail sections 55, 57, 59, the latter being insulated by sections 56, 58, of insulating material. Rails 60, 61 constitute a side track. A wire 62 is connected with a contact 63 normally open but which is closed whenever the track switch indicated here in Fig. 2 is open. Similarly, a wire 64 is connected with a contact 65, the latter being also closed when the switch is open. A wire 66 connects together rail sections 55 and 61 and a wire 67 extends from the wire 66 to the rail section 57. A wire 68 connects together rail sections 55 and 59. When, therefore, the track switch shown in Fig. 2 is open, or in other words, when the rails 60, 61 are in condition to receive a train from the rails 52, 55, a circuit is closed through the solenoids 19 as follows: source of electricity 11, wire 12, rail section 55, wires 67, 66, rail sections 57, 61, contacts 65, 63, wires 64, 62, wires 97, 98, solenoids 19, to wire 9, then to source of electricity. Such being the case and the solenoids 19 being energized as above described, the plungers 22, controlled by these solenoids, are moved upwardly into position indicated by dotted lines in Fig. 4 as above described, and guard trains approaching the switch, as hereinafter described.

In the form shown in Fig. 3 the rails 69, 70, cross each other. Parallel with the rail 69, are rail sections 71, 72, 74, separated by short sections 73, 75, of insulating material, and parallel with the rail 70 are rail sections 76, 77, 78, similarly insulated. A wire 79 connects rail sections 71, 74 together, and similarly a wire 80 connects together rail sections 76, 78. A dynamo is shown at 81 and is connected with the wire 80, in the same manner that dynamo 11 is connected with the wire 10. A wire 82 connects the feed wire 10 with a solenoid 19 of the kind above described, and from this solenoid a wire 83 leads to a similar solenoid 19; from the latter a wire 84 leads to the rail section 74. From the feed wire 80, lead wires 85, 86, 87 and solenoids 19 establish communication from the feed wire 80 to the rail section 76.

From the above description of the mechanism shown in Figs. 1 and 2, it will be understood very readily, how a train approaching the crossing shown in Fig. 3 will energize two of the solenoids 19 upon the intersecting track and how the plungers 22 are raised into position for guarding other trains approaching this crossing.

The manner in which the trains are guarded by the action of the plungers 22, as

described above, is by enabling these plungers to operate mechanism carried by a locomotive and shown in Fig. 5. Mounted upon the locomotive body 88 is a bracket 89 carrying a lever 90, the latter being connected by springs 91 with this bracket so as to normally maintain the lever 90 in the position indicated. A flexible connection 92 such as a cord or a chain, passes over pulleys 93, 94 and is connected with a lever 95. A tensile spring 96 is connected with the lever 95 which normally closes the end of a pipe 96^a communicating with the train pipe. A spring latch 96^b is provided with a lug 96^c and against this lug the lever 95 is pressed so as to normally maintain the train pipe closed. Whenever the lever 90 is tripped to the right or to the left, the train pipe is vented and the brakes are applied. Of course, a bell, or any other alarm device, may be located in the cab and actuated at the same time by a movement of either lever 90, 95. The lower end of the lever 90 is in alinement with the plungers 22, and consequently when a plunger is raised into the position indicated by dotted lines in Fig. 4, the train can not pass this plunger without the lever 90 being tripped, and the train is thus brought to a standstill. Consequently, in using the apparatus shown in Figs. 1, 2, and 3, it is clear that the raising of the plunger 22 and maintenance of the same in its uppermost position, are sufficient to stop any train passing the plunger in question.

Having thus described my invention I claim as new and desire to secure by Letters Patent:

1. A trip comprising a casing provided with a tubular portion, a plunger mounted within said tubular portion, a lever loosely pivoted to said plunger for the purpose of raising the same, said lever being provided with a projecting arm, a solenoid provided with a movable core having a pin disposed upon one side of said projecting arm, and a shoulder upon the opposite side thereof, a spring for retracting said core, and a pawl for supporting said plunger when the same is raised by said lever.

2. A trip comprising a casing provided with a tubular portion, a plunger mounted within said tubular portion, a lever loosely pivoted to said plunger for the purpose of raising the same, said lever being provided with a projecting arm, a solenoid provided with a movable core having a pin disposed upon one side of said projecting arm, and a shoulder upon the opposite side thereof, a spring for retracting said core, a pawl, and connections from said pawl to said core for the purpose of retracting said pawl when said spring draws said core back to its normal position.

3. A trip comprising a casing, a plunger movable in relation to said casing, a lever mounted within said casing and provided with a portion for raising said plunger, a solenoid provided with a movable core, said core being connected with said lever for the purpose of raising said plunger, a spring for retracting said core, a pawl for supporting said plunger when raised, a lever pivotally connected with said core, a yoke pivoted to said lever and connected with said pawl, and a spring connected with said pawl and with said yoke for the purpose of normally maintaining the latter in a predetermined relative position.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOMER ALLIN HILL.

Witnesses:
G. E. KING,
E. C. THEOBALD.