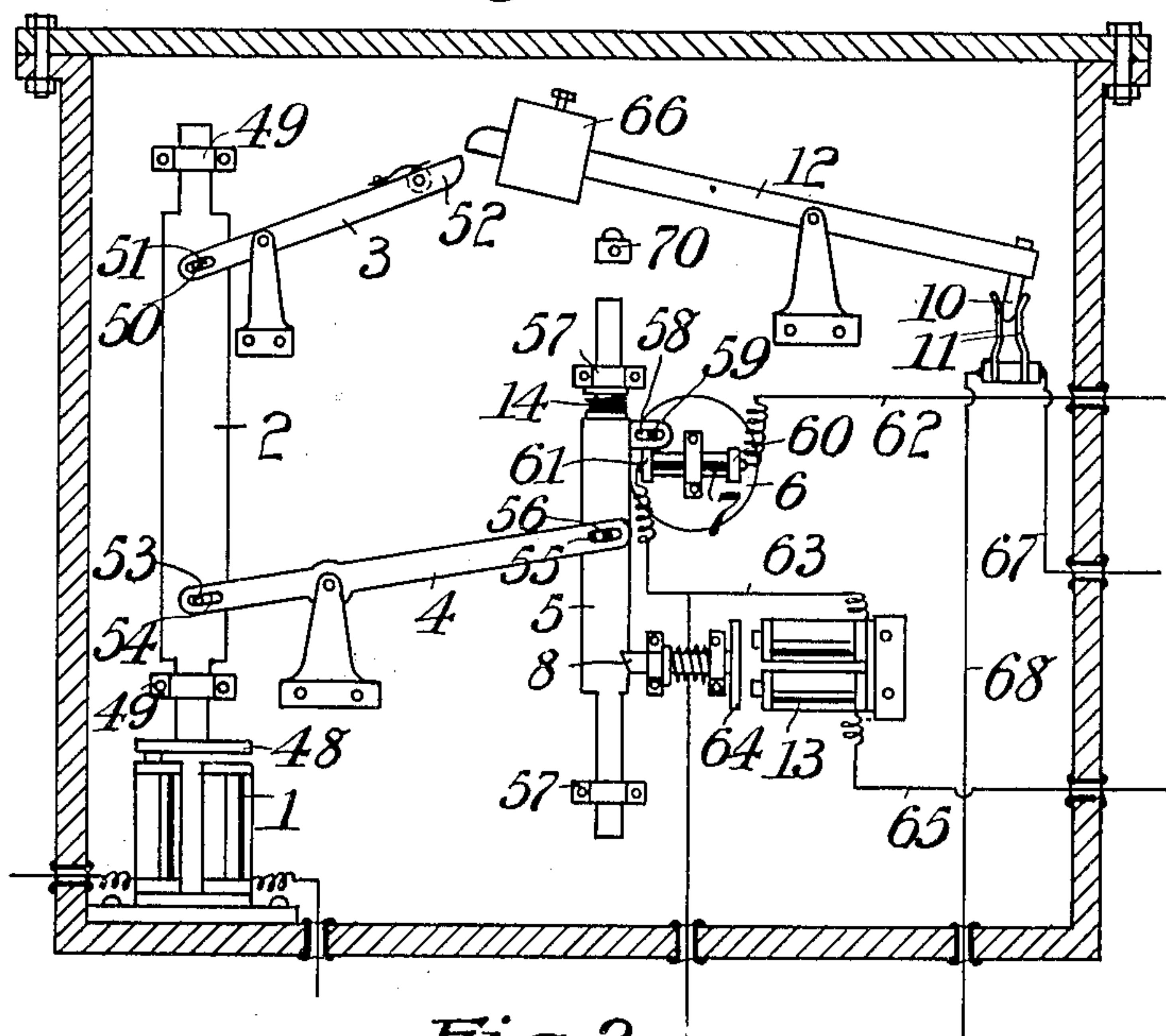
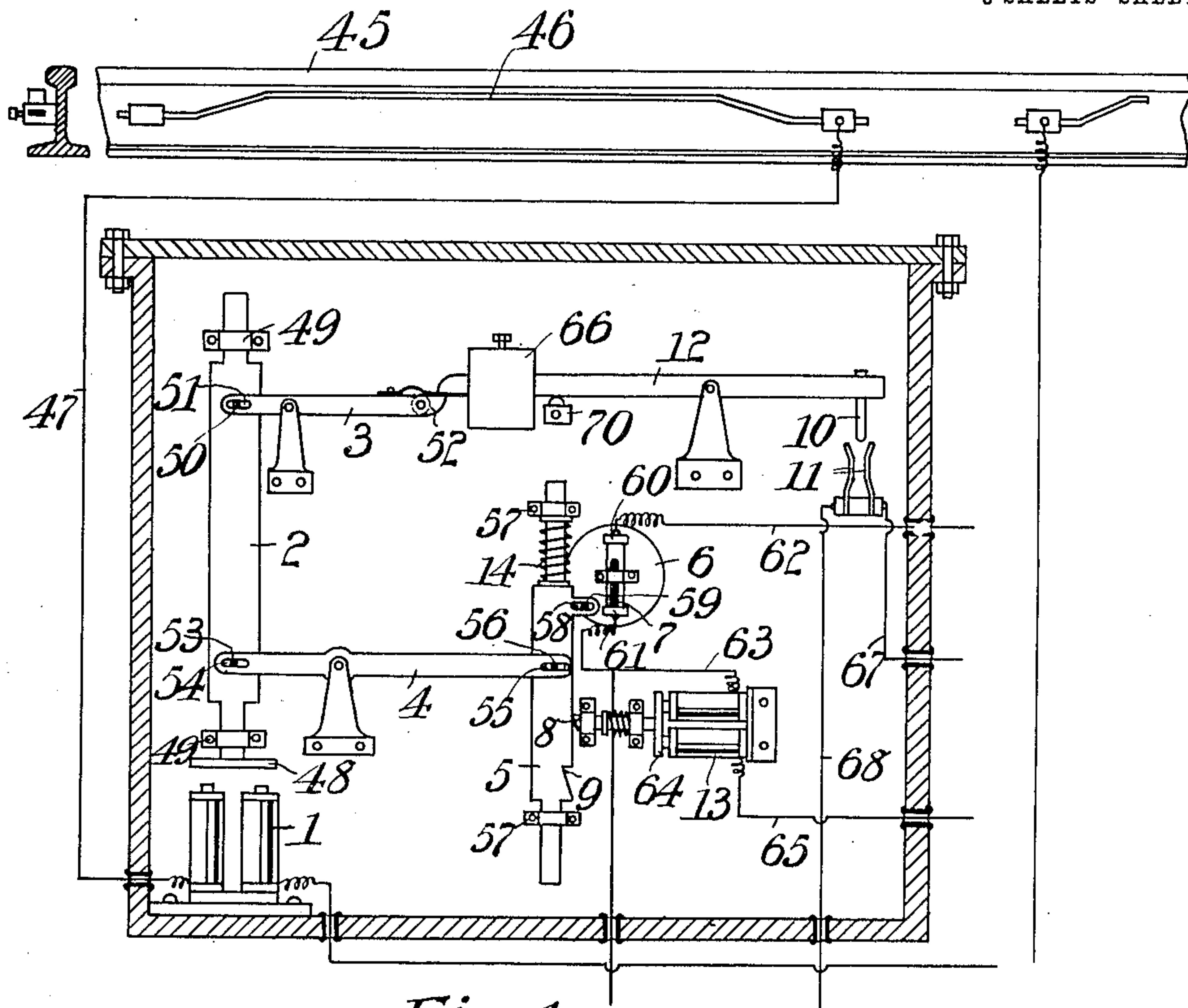


E. UNVERRICHT.

AUTOMATIC DEVICE FOR PROTECTING TRAINS.

APPLICATION FILED JAN. 8, 1906.

3 SHEETS—SHEET 1.



Witnesses.

Carl Book

Friedrich Lurrow

Inventor

Eduard Uverricht

No. 869,398.

PATENTED OCT. 29, 1907.

E. UNVERRICHT.
AUTOMATIC DEVICE FOR PROTECTING TRAINS.

APPLICATION FILED JAN. 8, 1906.

3 SHEETS—SHEET 2.

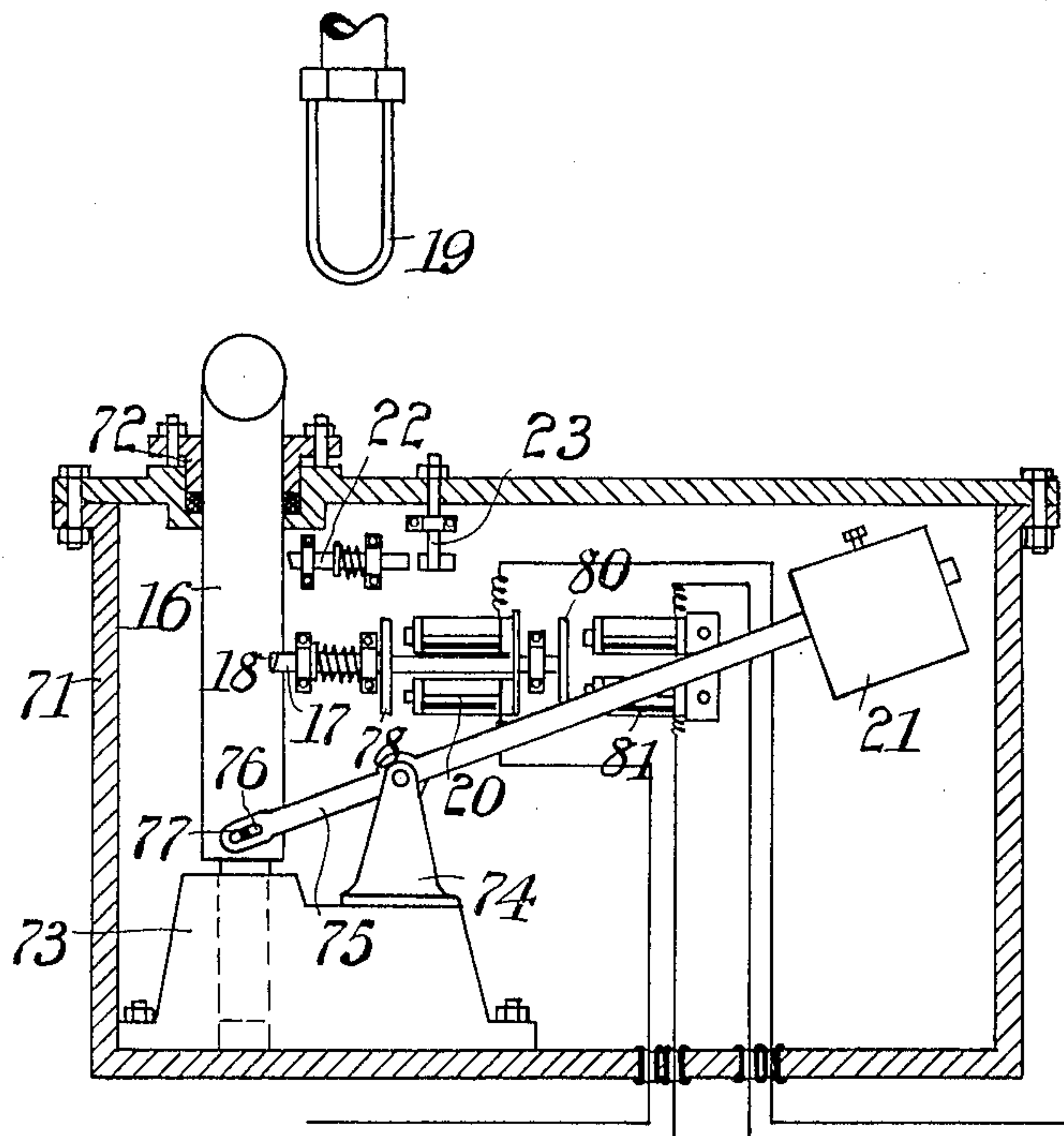


Fig. 3.

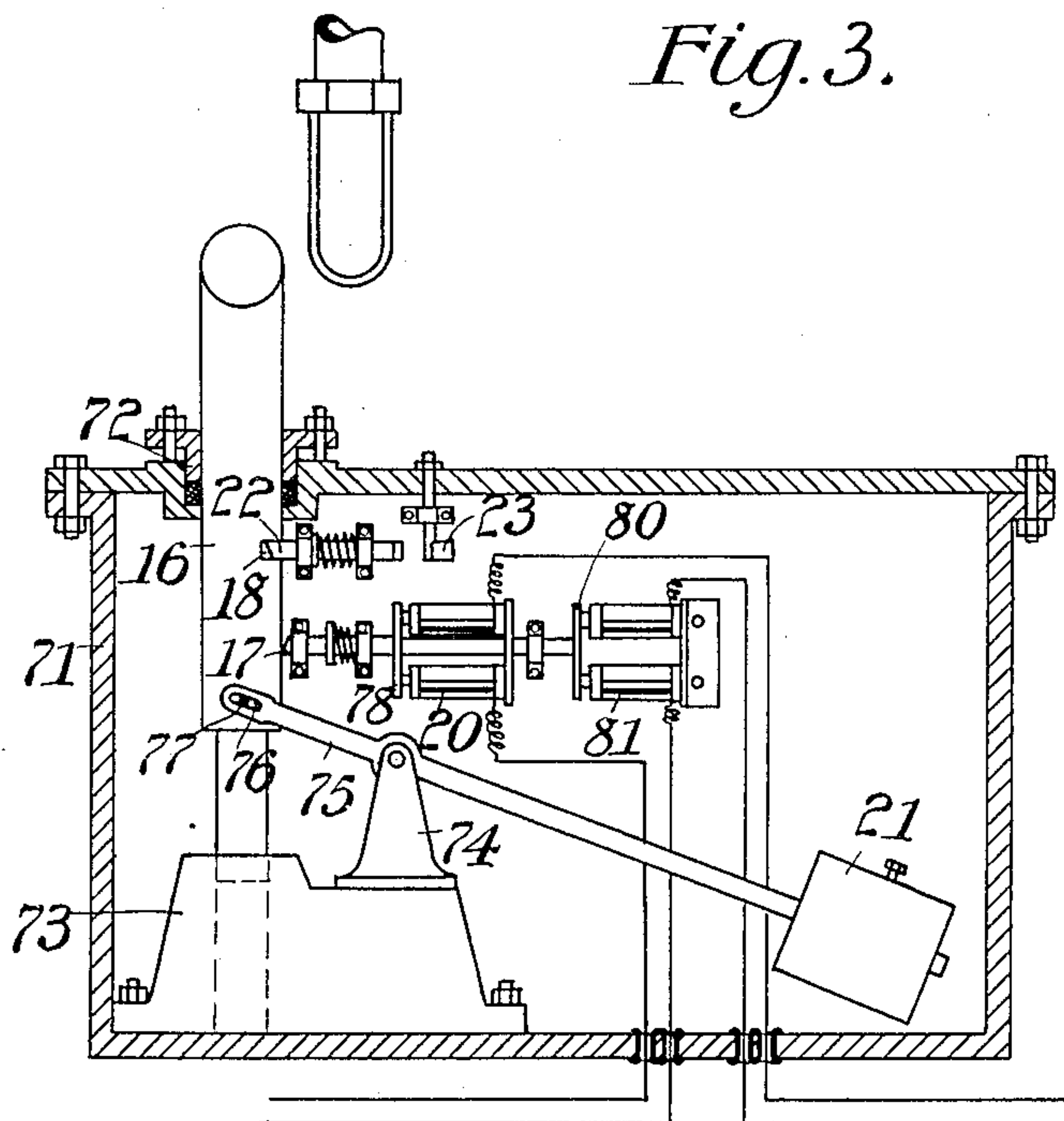


Fig. 4.

Witnesses

Carl Bock

Friedrich Linnow

Inventor

Eduard Unverricht

No. 869,398.

PATENTED OCT. 29, 1907.

E. UNVERRICHT.
AUTOMATIC DEVICE FOR PROTECTING TRAINS.

APPLICATION FILED JAN. 8, 1906.

3 SHEETS—SHEET 3.

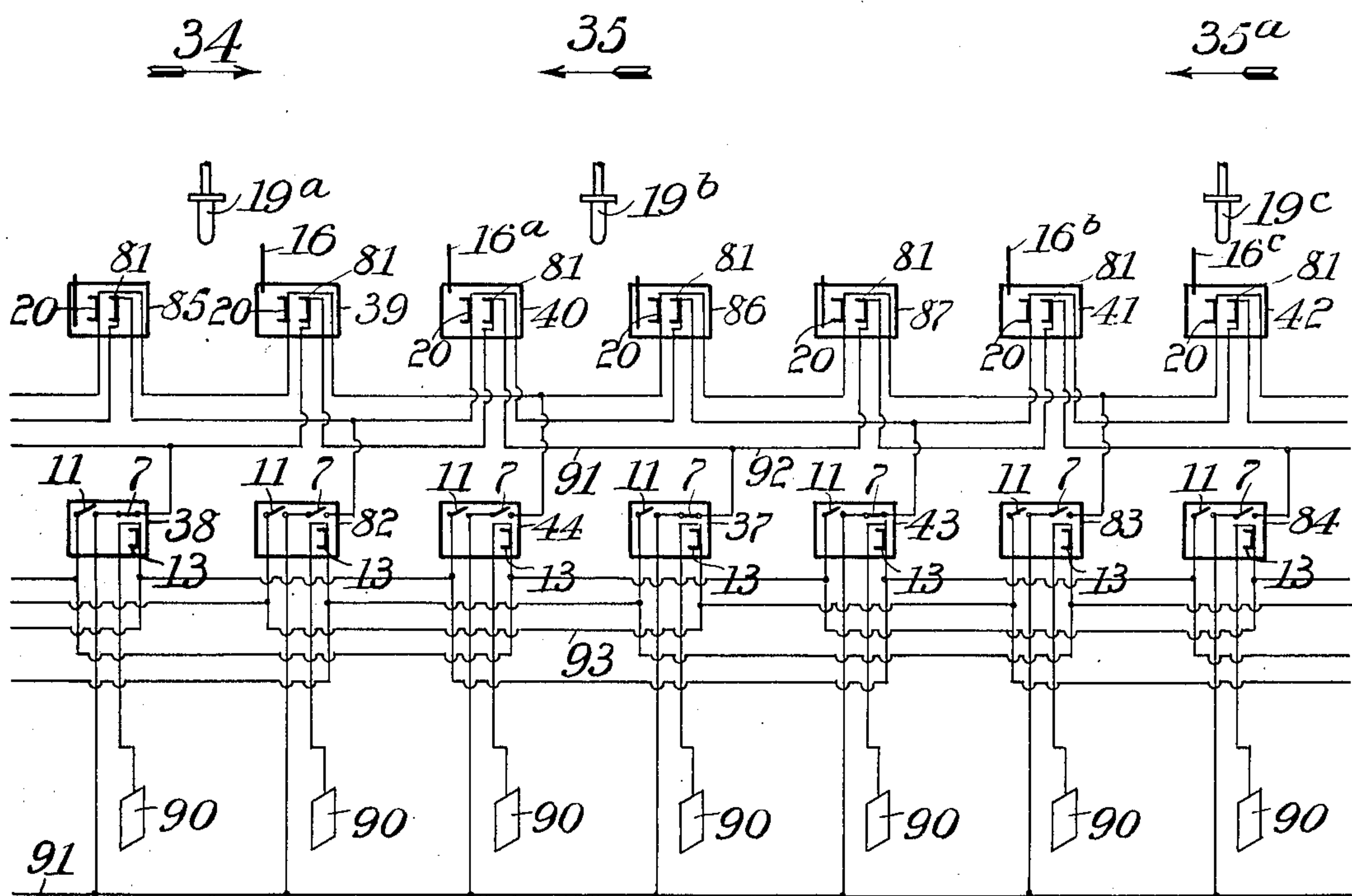


Fig. 5.

Witnesses
Karl Book
Friedrich Lunow

Inventor
Eduard Unverricht

UNITED STATES PATENT OFFICE.

EDUARD UNVERRICHT, OF ALTONA, GERMANY.

AUTOMATIC DEVICE FOR PROTECTING TRAINS.

No. 869,398.

Specification of Letters Patent.

Patented Oct. 29, 1907.

Application filed January 8, 1906. Serial No. 295,103.

To all whom it may concern:

Be it known that I, EDUARD UNVERRICHT, a subject of the King of Prussia, and resident of No. 218 Allée, Altona, in the Empire of Germany, have invented a new and useful Automatic Device for Protecting Trains, of which the following is a specification.

My invention relates to improvements in automatic means for protecting railway trains, which means are controlled by electric circuits, and the objects of my improvements are:—First to prevent the collision of trains running in opposite directions along the same line. Secondly to prevent one train from running into the end of another train running in the same direction along the same line. And, thirdly to prevent a train from passing over switches or points which are incorrectly set.

The invention consists in the combination of a plurality of electric circuits each of which contains two open portions at a distance from one another along the line, means adapted to be actuated by a passing train for closing one of said open portions, means adapted to be actuated by an object endangering said passing train for closing the other of said open portions, a plurality of section-stops arranged in conjunction with each circuit, and means adapted to be actuated by the current in each circuit when closed for setting said section-stops whereby when the current flows said section-stops are so set as to apply the brakes on the train.

The invention also consists in a special arrangement of said plurality of electric circuits as hereinafter described.

The invention also consists in the arrangement of mercury contact-tubes for the electric circuits and means for operating said tubes to close the circuits as hereinafter described.

The invention also relates to means for locking the mercury contact-tubes in the position which they occupy when completing the electric circuit in combination with means adapted to be actuated by a passing train for subsequently releasing said locking devices.

The invention also consists in means for operating section-stops placed along the line, and means for locking the same when set and means for subsequently releasing the same by hand.

One embodiment of the present invention is illustrated in the accompanying drawings, in which:—

Figure 1 illustrates in part sectional elevation the means for operating one of the mercury contact-tubes, the latter being shown in its vertical position. Fig. 2 illustrates in part sectional elevation the means for operating one of the mercury tubes, all the parts being shown in the position which they occupy immediately after the tube has been turned into its horizontal position.

Fig. 3 is a part sectional elevation of a section-stop and means for operating the same, the relative position of a compressed-air brake-pipe cap on a passing train being indicated. Fig. 4 is a sectional elevation similar to Fig. 3 the parts being shown in the position which they occupy when the section-stop is set for stopping a passing train. Fig. 5 is a diagram showing a portion of a system of connections and a suitable arrangement of the device shown in Figs. 1—4 along the line.

Referring to Fig. 1, 45 is one of the rails, 46 a contact mounted on the same in such a way that on the passing of a train a current flows through the wire 47 and energizes the electromagnet 1. The armature 48 of said electromagnet is attached to the slide 2 guided by the guides 49. Said slide is provided with a pin 50 engaging in the slot 51 of a pivoted lever 3 having a spring-pressed pivoted toe 52. The slide 2 is also provided with a pin 53 engaging in the slot 54 of the pivoted lever 4, which lever has a slot 55 engaging with the pin 56 of the slide 5 guided in the guides 57. Said slide is spring-pressed by the spring 14 and has a slot 58 in which the pin 59 on a revoluble disk 6 engages. Said disk carries a tube 7 of insulating material preferably glass partially filled with mercury. Said tube is provided with terminal caps 60, 61 connected with the wires 62 and 63. The slide 5 has a notch 9 in which the spring-pressed locking bolt 8 engages when the parts occupy the position shown in Fig. 2. Said bolt 8 is attached to the armature 64 of the electromagnet 13, which electromagnet is adapted to be energized by current flowing through the wire 65. 12 is a pivoted lever provided with a counterweight 66 and with a contact 10 adapted to co-act with the contact springs 11 connected respectively with the wires 67, 68. 69 is the casing.

The mechanism illustrated in Figs. 1 & 2 is adapted to operate as follows:—On the passage of a train the electromagnet 1 is energized, the armature 48 is pulled downwards, the slide 5 is driven upwards by the lever 4, and the disk 6 is rotated through approximately 90° so that the tube 7 becomes horizontal. In this position of the tube the connection between the wire 62 and the wire 63 is complete. On the slide 5 being pushed upwards the bolt 8 engages the notch 9 and is not released therefrom until the electromagnet 13 is subsequently energized by the train passing on to a further section of the line. Simultaneously with the raising of the slide 5 the lever 12 is tipped up and the wire 67 is connected with the wire 68 through the contact 10, the current then flowing through the said contact being employed to release the bolt 8 on the last but one device similar to that shown in Fig. 1 operated by the train.

The contact 10, 11 is completed only momentarily as the lever returns into its position of rest, determined by the stop 70, after the toe 52 has escaped from the end of the lever 12.

5 Referring to the section-stop and its actuating mechanism shown in different positions in Figs. 3 & 4, 16 is the section-stop proper or bolt which is provided with a wide engaging surface for engagement with the compressed-air brake-pipe cap of a passing train when
10 in danger. Said stop 16 passes through the casing 71 by means of a gland 72 and is guided below in a casting 73 on which a standard 74 of a pivoted lever 75 is mounted. Said lever is provided at one end with a counterweight 21 and at its other end has a slot 76 in
15 which the pin 77 engages, said pin being fixed to the stop 16. The stop 16 is provided with a notch 18 which in the position of the mechanism shown in Fig. 3 is in engagement with the spring-pressed bolt 17 fastened to the armature 78 of the electromagnet 20. Said ar-
20 mature is also connected with the armature 80 of the electromagnet 81, said electromagnets being in different circuits and being adapted to be actuated as hereinafter described. 22 is a spring-pressed bolt adapted to engage the notch 18 when the mechanism occupies
25 the position indicated in Fig. 4, 23 being a key extending through the casing and adapted to be operated by hand when it is desired to release the bolt 22.

The method in which the mechanism operates is as follows:—The normal position of the mechanism is
30 that shown in Fig. 3. In case of danger one or other of the electromagnets 20, 81 is energized and the bolt 17 is withdrawn whereupon the counterweight 21 raises the stop 16 into such a position that on the passage of the train in danger its compressed-air
35 brake-pipe cap 19 is broken, said cap being made of brittle material. The stop 16 is locked in its raised position by the automatic engagement of the bolt 22 in the notch 18. Said bolt can be released by turning the key 23 by hand and said stop can be pushed
40 downward by hand until the bolt 17 engages the notch 18.

Referring to Fig. 5, 38, 82, 44, 37, 43, 83, 84 is a series of devices each similar to that shown in Fig. 1 arranged at the ends of sections of equal lengths.
45 85, 39, 40, 86, 87, 41, 42 is a series of devices each similar to that shown in Fig. 3, one of which is arranged at the end of each section. 19^a, 19^b, 19^c are three compressed-air brake caps supposed to be carried by the trains indicated in position and direction of travel
50 by the arrows 34, 35 and 35^a. The section-stops of the section-stop mechanism 39, 40, 41, 42 are indicated respectively by the reference characters 16, 16^a, 16^b, 16^c. The lines 7 indicate by their open or closed positions the vertical or horizontal positions of the
55 mercury contact-tube 7 (Figs. 1 & 2). 20, 81, Fig. 5 indicate electromagnets corresponding to the electromagnets 20, 81 Figs. 3 & 4. The lines 11 by their open or closed positions indicate the contact 10, 11, Figs. 1 & 2, in its open or closed condition. 13 in
60 each case in Fig. 5 indicates an electromagnet similar to the electromagnet 13, Figs. 1 & 2. In each case said electromagnet is earthed at 90. 91 is the current

supply conductor. The mercury contact-tubes 7 are so interconnected with themselves and with the elec-
tromagnets 20, 81 that each contact-tube 7 is in the
65 same circuit as the contact-tube which is next but two to it in both directions. Each circuit interconnecting two mercury tubes contains one of the elec-
tromagnets 20, 81 of each of the two intermediate sec-
tion stop mechanisms. Thus, the mercury tube 7 of
70 37 is connected through the wire 91 with the mercury tube 7 of 38 and said wire forms the coils of the elec-
tromagnets of the electromagnet 81 of 40 and 81 of 39. On the other side of 37 the tube 7 of 37 is connected
75 through the wire 92 and through the electromagnet 81 of 87 and 81 of 41 with 7 of 84. Each releasing magnet
13 is connected through the next but one contact 89 to earth and the supply conductor 91. Thus 13 of 37
is connected through the wire 93 with the contact 11
80 of 82.

The manner in which the system of connection illus-
trated in Fig. 5 operates is as follows:—The train 34
has closed contact 7 of 38 and the contact 7 of the
mechanism next in the rear is still closed while the
contact 7 of the mechanism next but one in the rear
85 is open on account of contact 11 of 38 having been temporarily closed on the passage of the train 34 over
38. The contact 7 of 38 being closed it follows that if the contact 7 of 37 were closed the electromagnets 81
of 40 and 39 would be energized and the stops 16^a, 16
90 raised. In the diagram this is the case because the train 35 has passed over 37 and has consequently
closed 7. Consequently the trains 34, 35 will be
stopped by the stops 16, 16^a respectively and a colli-
sion avoided. Further, the contact 7 of 43 is still
95 closed, while 7 of 83 is open on account of 11 of 37 having been temporarily closed. It consequently
follows that if the contact 7 of the device (not shown) preceding the device 84 be closed the electromagnets
81 of 41 and 42 will be energized and the stops 16^b, 100
16^c raised. In Fig. 7 this is actually the case because a train 35^a following too closely upon 35 has already
closed 7 of the device (not shown) preceding the de-
vice 84.

What I claim as my invention and desire to secure
105 by Letters Patent is:—

1. Means for automatically protecting railway trains, consisting of the combination of a plurality of electric circuits, each of which contains two open portions at a
distance from one another along the line, means adapted
110 to be actuated by a passing train for closing one of said open portions, means adapted to be actuated by an object endangering said passing train for closing the other of
said open portions, a plurality of section-stops arranged
in conjunction with each circuit, and means adapted to be
115 actuated by the current in each circuit when closed for setting said section-stops whereby when the current flows
said section-stops are so set as to apply the brakes on the train.

2. Means for automatically protecting railway trains, consisting of a plurality of electric circuits, each of which
contains two open portions at a distance from one another
120 of three sections, said plurality of circuits being so arranged that each of a plurality of them overlaps the next
for two-thirds of its length, means in conjunction with
125 each circuit adapted to be actuated by a passing train for closing one of the open portions of said circuit, means adapted to be actuated by a train endangering said pass-

ing train for closing the other of said open portions, two section-stops arranged in conjunction with each circuit, one stop being at a distance of one section from the one open portion of the circuit, and the other stop being one section from the other open portion of the circuit, and means adapted to be actuated by the current in each circuit when closed for setting said section-stops, whereby when the current flows said section-stops are so set as to apply the brakes on the trains.

10 3. Means for automatically protecting railway trains, consisting of the combination of a plurality of electric circuits, each of which contains at a distance from one another along the line two tubes of insulating material partially filled with mercury, each of said tubes being normally in a vertical position, whereby the circuit has normally an open portion between the top of the mercury and the top end of each tube, means adapted to be actuated by a passing train for turning one of said tubes into a substantially horizontal position, and thereby closing the circuit in said tube, means adapted to be actuated by an object endangering said passing train for turning the other tube into a substantially horizontal position and thereby completely closing the circuit, a plurality of section-stops arranged in conjunction with each circuit, and means adapted to be actuated by the current in each circuit when closed for setting said section-stops whereby when the current flows said section-stops are so set as to apply the brakes on the train.

30 4. Means for automatically protecting railway trains, consisting of a plurality of electric circuits, each of which contains at a distance from one another along the line of three sections two tubes of insulating material partially filled with mercury, each of said tubes being normally in a vertical position, whereby the circuit has normally an open portion between the top of the mercury and the top end of each tube, said plurality of circuits being so arranged that each of a plurality of them overlaps the next for two-thirds of its length, means in conjunction with each circuit adapted to be actuated by a passing train for turning one of the mercury tubes into a substantially horizontal position and thereby closing the circuit in said tube, means adapted to be actuated by a train endangering said passing train for turning the other tube into a substantially horizontal position and thereby completely closing the circuit, two section-stops arranged in conjunction with each circuit, one stop being at a distance of one section from the one mercury tube, and the other stop being one section from the other mercury tube, and means adapted to be actuated by the current in each circuit when closed for setting said section-stops, whereby when the current flows said section-stops are so set as to apply the brakes on the trains.

55 5. Means for automatically protecting railway trains, having underneath breakable compressed air brake-pipe caps, consisting of a plurality of electric circuits, each of which contains at a distance from one another along the line of three sections two tubes of insulating material partially filled with mercury, each of said tubes being normally in a vertical position, whereby the circuit has normally an open portion between the top of the mercury and the top end of each tube, said plurality of circuits being so arranged that each of a plurality of them overlaps the next for two-thirds of its length, means in conjunction with each circuit adapted to be actuated by a passing train for turning one of the mercury tubes into a substantially horizontal position and thereby closing the circuit in said tube, means adapted to be actuated by a train endangering said passing train for turning the other tube into a substantially horizontal position and thereby completely closing the circuit, two section-stops arranged in conjunction with each circuit, one stop being at a distance of one section from the one mercury tube, and the other stop being one section from the other mercury tube, and means adapted to be actuated by the current in each circuit when closed for setting said section-stops, whereby when the current flows said section-stops

are so set as to engage and break the compressed air brake-pipe caps when the train passes over said stops.

6. Means for automatically protecting railway trains, having underneath breakable compressed air brake-pipe caps, consisting of the combination of a plurality of electric circuits, each of which contains two open portions at a distance from one another along the line, means adapted to be actuated by a passing train for closing one of said open portions, means adapted to be actuated by an object endangering said passing train for closing the other of said open portions, a plurality of section-stops 16, having notches 18, arranged in conjunction with each circuit, pivoted levers engaging the stops, counterweights 21 on the levers, spring-pressed bolts 17 normally engaging in the notches 18, electro-magnets 20, 81 adapted to be actuated by the currents in the circuits when closed for disengaging the bolts 17, spring-pressed bolts 22 for engaging in the notches 18 after the counterweights have raised the stops into the position in which they engage and break the compressed air brake-pipe caps, and keys 23 for disengaging said bolts 22.

7. Means for automatically protecting railway trains, having underneath breakable compressed air brake-pipe caps, consisting of the combination of a plurality of electric circuits, each of which contains two open portions at a distance from one another along the line, means adapted to be actuated by a passing train for closing one of said open portions, means adapted to be actuated by an object endangering said passing train for closing the other of said open portions, a plurality of section-stops 16, having notches 18, arranged in conjunction with each circuit, pivoted levers engaging the stops, counterweights 21 on the levers, spring-pressed bolts 17 normally engaging in the notches 18, and electro-magnets 20, 81 adapted to be actuated by the currents in the circuits when closed for disengaging the bolts 17, to permit the counterweights to raise the stops into the position in which they engage and break the compressed air brake-pipe caps.

8. Means for automatically protecting railway trains consisting of a plurality of electric circuits, each of which contains two open portions at a distance from one another of three sections, said plurality of circuits being so arranged that each of a plurality of them overlaps the next for two-thirds of its length, means in conjunction with each circuit adapted to be actuated by a passing train for closing one of the open portions of said circuit, means adapted to be actuated by a train endangering said passing train for closing the other of said open portions, two section-stops 16 arranged in conjunction with each circuit, one stop being at a distance of one section from the one open portion of the circuit and the other stop being one section from the other open portion of the circuit, said stops 16 having notches 18, pivoted levers engaging the stops, counterweights 21 on the levers, spring-pressed bolts 17 normally engaging in the notches 18, electro-magnets 20, 81, two for each stop 16, one electro-magnet being in one circuit and the other in one of the other overlapping circuits, said electro-magnets being adapted when energized to disengage the bolts 17, to permit the counterweights to raise the stops into the position in which they engage and break the compressed air brake-pipe caps.

9. Means for automatically protecting railway trains, consisting of the combination of a plurality of electric circuits, each of which contains at a distance from one another along the line two tubes of insulating material partially filled with mercury, each of said tubes being normally in a vertical position, whereby the circuit has normally an open portion between the top of the mercury and the top end of each tube, means adapted to be actuated by a passing train for turning one of said tubes into a substantially horizontal position, and thereby closing the circuit in said tube, means locking said tube in said horizontal position, an electro-magnet adapted when energized to unlock said locking means, a normally open circuit containing said electro-magnet, means at a distance from the above-mentioned means for turning said tube into a hori-

zontal position adapted to be subsequently actuated by the passing train to close the latter circuit to release said tube, means adapted to be actuated by an object endangering said passing train for turning the other tube into a substantially horizontal position and thereby completely closing the circuit, means locking said tube in said horizontal position, an electro-magnet adapted when energized to unlock said locking means, a normally open circuit containing said electro-magnet, means at a distance from the above-mentioned means for turning said tube into a horizontal position adapted to be subsequently actuated by the object endangering the passing train to close the latter circuit to release said tube, a plurality of section-stops ar-

ranged in conjunction with each circuit, and means adapted to be actuated by the current in each circuit when closed for setting said section-stops whereby when the current flows said section-stops are so set as to apply the brakes on the train. 15

In witness whereof I have hereunto signed my name this 23rd day of December 1905, in the presence of two subscribing witnesses. 20

EDUARD UNVERRICHT.

Witnesses:

LOUIS VANDORY,
BESSIE F. DUNLAP.