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 AUTOMATIC STOPPING MECHANISM FOR RAILWAY TRAINS.
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946,415.

Patented Jan. 11, 1910.

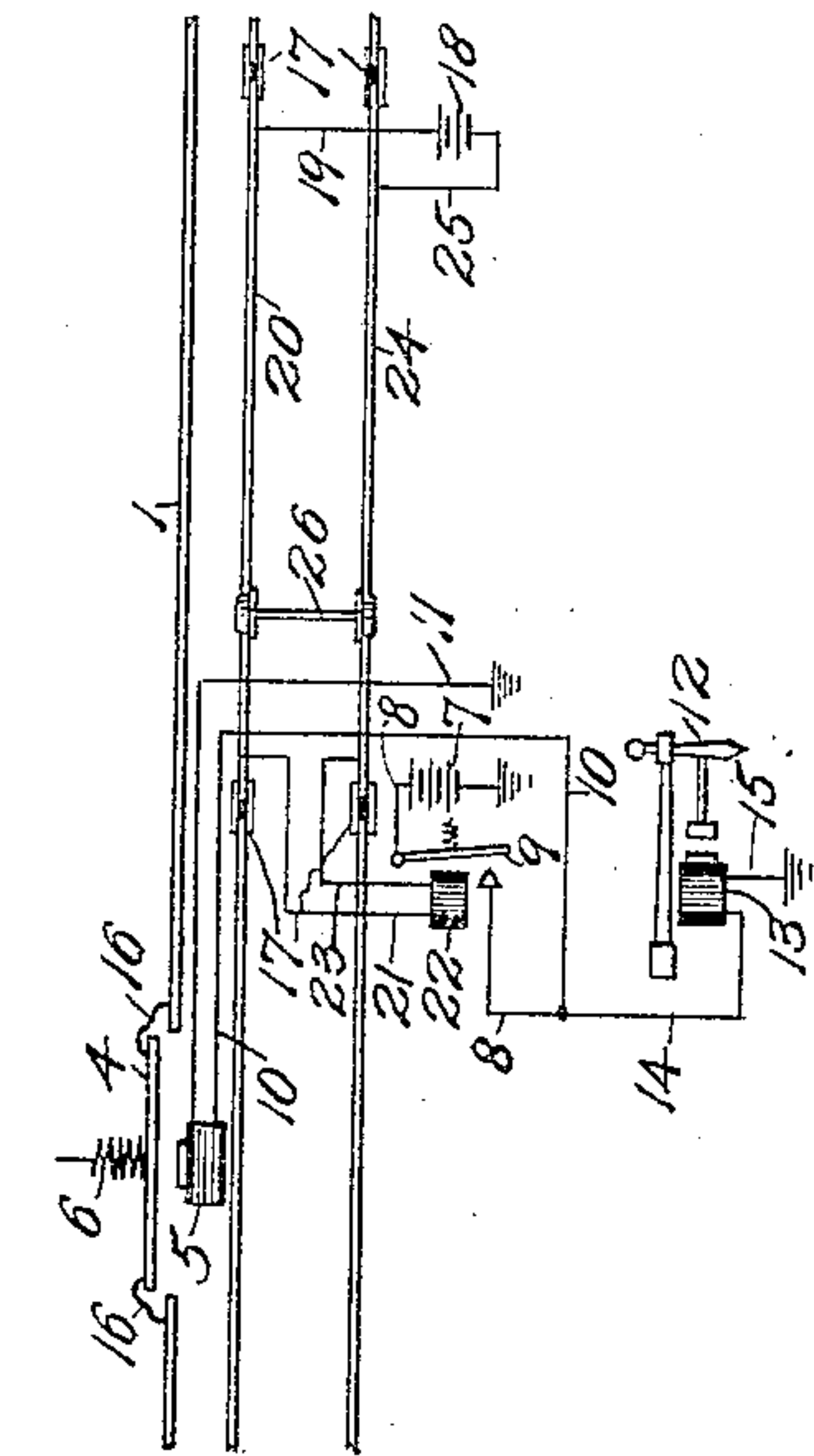


Fig. 1.

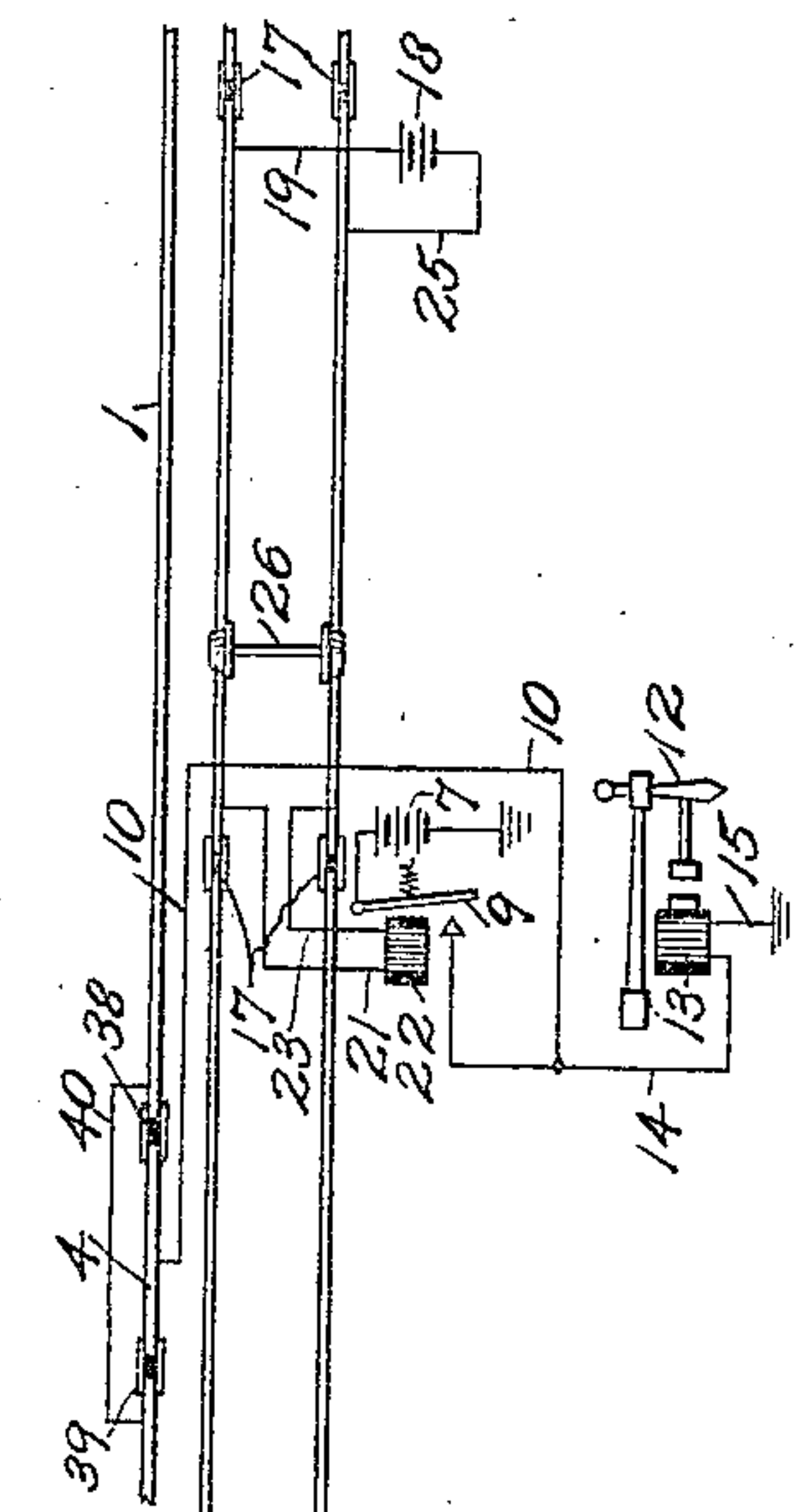


Fig. 2.

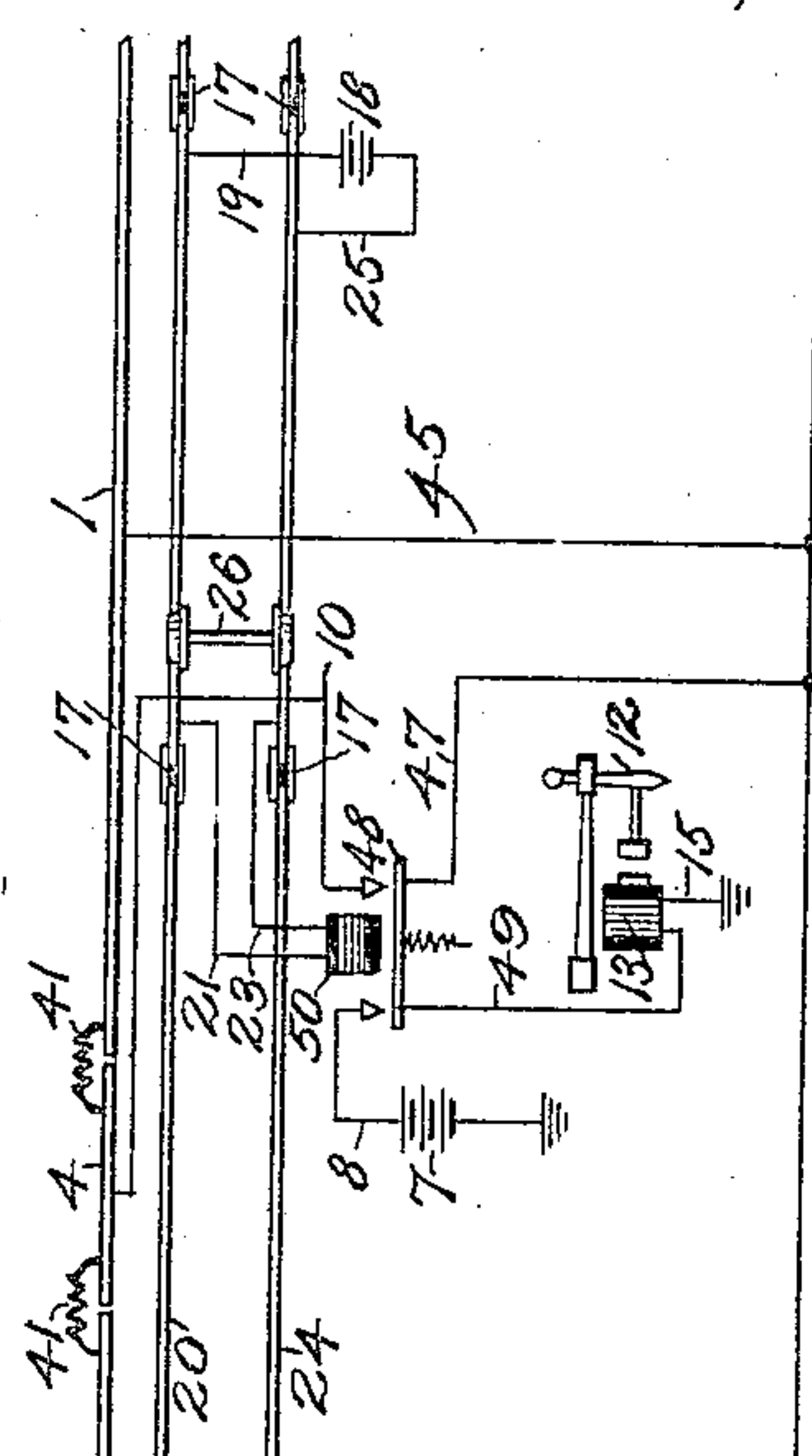


Fig. 3.

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WILLIAM J. WILGUS, OF NEW YORK, N. Y.

AUTOMATIC STOPPING MECHANISM FOR RAILWAY-TRAINS.

946,415.

Specification of Letters Patent.

Patented Jan. 11, 1910.

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To all whom it may concern:

Be it known that I, WILLIAM J. WILGUS, a citizen of the United States, residing at New York city, county of New York, and State of New York, have invented certain new and useful Improvements in Automatic Stopping Mechanism for Railway-Trains, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to certain improvements in automatic stopping mechanisms for railway trains.

In the operation of railways, and particularly in the operation of electrically operated railways on which high speed and frequent service is maintained, it is desirable that the trains be provided with stopping devices which shall operate to prevent a train from moving under certain conditions, as, for instance, to prevent a train from passing a signal which is in stop position. It is also desirable that, under some circumstances, it shall be possible for a driver to enter a block where the signal is set against him and proceed with caution through this block.

It is one of the objects of this invention to provide a stopping mechanism which depends for its action on the change of condition, whether physical or electrical, of a short controlling section, the change in condition of said section being controlled by a block circuit depending for its operation on the presence in said circuit or the absence from it of a car or train.

A further object of the invention is to provide an improved stopping mechanism which shall be of such a character that the driver of the train will be prevented from moving the train when it should be brought to a stop without his being apprised of the fact, the construction being such, however, that the driver may, after he has been apprised that the train should be brought to a stop, cause it to move under certain conditions.

The invention further extends to certain other improvements and also to certain details of construction by which the objects referred to are carried into effect.

With these and other objects in view, the invention consists in certain constructions, and in certain parts, improvements and com-

binations as will be hereinafter fully described and then specifically pointed out.

Referring to the drawings:—Figure 1 is a diagrammatic plan view of a section of a railroad equipped with one form of automatic stopping mechanism embodying the invention. Fig. 2 is a diagrammatic plan view of a railroad equipped with another form of automatic stopping mechanism embodying the invention. Fig. 3 is a diagrammatic plan view of a section of railroad equipped with still a third form of stopping mechanism embodying the invention.

The invention is more particularly intended for use in connection with railways the motive power of which is electricity, though it may be embodied in constructions which are useful in connection with railways operated by motive power other than electricity. When the invention is embodied in constructions intended to be used in connection with electrically operated railways the usual working conductor will be employed, which in the construction illustrated in Fig. 1 is marked 1. This conductor may be of any usual description, such, for instance, as a third rail or an over-head conductor, the third rail type, however, being shown. It is, of course, to be understood that the primary function of this conductor is to supply the current which furnishes the motive power for the motors of the trains, where the invention is employed in connection with electrically operated trains. An electric locomotive or car is indicated at 2, said locomotive or car being represented as attached to other cars, as indicated at 3.

Constructions embodying the invention will include a plurality of short controlling sections which will be located alongside the track and near the working conductor when the invention is employed in connection with electrically operated railways. In the best constructions embodying the invention these controlling sections will be in line with the working conductor. In the particular constructions shown the controlling sections are marked 4. The purpose of these short controlling sections is to control through proper agencies the stopping devices on a car, locomotive or train so as to bring the car or train to a stop under the proper conditions, as, for instance, when a signal is set against the driver of the car or train. While the length

of these controlling sections may be varied they should not be longer than the length of the train, and in the best constructions embodying the invention these controlling sections will be less in length than the ordinary car, it being understood that the term "car" as used in the specification is meant to include any form of car or locomotive. In constructions embodying the invention these controlling sections co-act with stopping devices on the car and the sections will be so arranged that their condition may be varied or changed so as to permit the passage of or effect the stopping of a car or train. This change of condition may be either a physical change, as, for instance, a change in location of the controlling section, or it may be a change in electrical condition, according to the characteristics of the constructions in which the invention is embodied.

While the means employed for producing the change in condition referred to may be varied, in the best constructions they will include block circuits which govern the operation of the condition changing means, the action of these block circuits being determined by the presence therein or the absence thereof of a car or train.

Referring more particularly to the construction illustrated in Fig. 1, the controlling sections 4 are arranged so that they are readily movable into and out of line with the working conductor, the movements being produced by suitable motor mechanism indicated in this figure by an electromagnet 5, the movement of the section in opposition to that of the magnet being effected by a spring indicated at 6.

It will be understood, of course, that the motor mechanism may be widely varied in its construction, the magnet illustrated being merely a diagrammatic showing of means to be employed, and the means operating in opposition thereto, herein illustrated as a spring, may be also of any suitable construction. In the best constructions the condition changing means for the controlling section will be electrically operated, the construction being such that the controlling section while normally in condition to permit the car or train to pass, will, upon any disarrangement of the controlling section, be changed so as to effect the stopping of the car or train.

In the particular construction illustrated in Fig. 1 the motor indicated at 5 operates on a closed circuit, the power for the motor being derived from a suitable source of electrical energy, such as a battery 7. From this battery a current is led through a conductor 8, which, as illustrated, contains a circuit breaker 9, and another conductor 10, to the motor mechanism, the ground for the motor being indicated at 11. As a signal will almost invariably be used in connection with each controlling section, such a signal is in-

dicated at 12, this signal being also, as shown, electrically operated by a motor mechanism indicated at 13, the power for which may be derived from a suitable source of electrical energy, such as a battery 7, by means of a branch wire 14, the ground for this motor mechanism being indicated at 15. In the particular construction illustrated in Fig. 1 the controlling sections 4 are in circuit with the working conductor, being connected thereto by flexible bonds indicated at 16.

It has heretofore been indicated that the condition of the controlling section will be normally such as to permit the passage of the car or train and, in the construction shown in Fig. 1, the motor mechanism operating, as has been stated, operates on a closed circuit, which holds the controlling section in this position. In the constructions illustrated the operation of this closed circuit is determined by block circuits extending for a considerable distance from the controlling section and its condition changing mechanism. These block circuits, as shown, are of such character that the operations effected by them are due to the presence of a car in or the absence of a car from a particular circuit or circuits. While these circuits may be variously arranged, in the constructions shown these circuits are formed in part by rails which may be divided into suitable sections by insulated supports 17. In the construction illustrated in Fig. 1 these governing circuits include a source of electrical energy, as, for instance, a battery 18, from which a conductor 19 is led, this conductor joining a rail section 20. From this rail section a conductor 21 leads to a magnet 22 and from this magnet a conductor 23 is led, this conductor joining a rail section 24. From this rail section 24 a conductor 25 leads back to the battery. The circuit breaker 9 heretofore referred to forms or carries the armature of the magnet 22, so that when the magnet is energized the armature completes the circuit, as illustrated in Fig. 1. Should, however, a car or train be present in the block circuit, as is indicated by the axle and wheels marked 26 at the right hand end of Fig. 1, the magnet 22 will be short circuited. This will permit the armature 9 to move, breaking the circuit through the motor mechanism 5, thus rendering the mechanism inoperative to hold the movable section 4 in its normal position. This section will therefore be moved out of line with the working conductor by the spring 6, as indicated at the right hand end of Fig. 1. At the same time the magnet 13 which controls the position of the signal is deenergized and the semaphore arm will be thrown up into stop position by suitable means, such as a spring, not shown.

In constructions embodying the invention the change in condition of a controlling sec-

tion varies its relation with respect to stopping mechanism which will be carried on a car or train and which may embody collector shoes 27 suitably mounted on the car. These shoes, through suitable connections to be hereinafter referred to, control the action of the stopping devices, which may be made effective through the braking mechanism of the car.

While the particular construction of stopping devices illustrated may be varied, in the best constructions they will include an actuator which will be electrically operated. As shown, this actuator includes a sliding rod 28 which is suitably connected with the armature 29 of an electromagnet 30, the pull of the magnet being resisted by a suitable spring 31. This actuator may control a valve in the main train pipe 32, the casing for this valve being indicated at 33. When the magnet is energized and its armature is held over, the actuator rod is inoperative. When, however, the circuit is broken the actuator is free to move and thus to open the train pipe valve and vent the pipe. The construction by which this valve is operated being well known, it is not illustrated.

If it be desired to effect the stopping of the train not only by applying the brakes but also by cutting off the power, the actuator rod may carry a suitable circuit breaker, not shown, which will bridge a pair of terminals in the wiring of the motor.

The actuator may operate on a closed circuit so that any defect or disarrangement of the apparatus may be immediately noticed. As shown, the main line wire of the actuator circuit is indicated at 34, this wire having branches leading to the collectors 27, of which four are shown, as four would usually be employed. The branches leading to one set of collectors are marked 35 and those leading to the other set of collectors are marked 36. The main line wire 34 leads to the magnet 30, before described, and the ground of this magnet is marked 37. It will be readily understood that any interruption in this circuit will at once deenergize the magnet 30 and cause the actuator to vent the train pipe in the manner described.

Referring to the construction shown in Fig. 1 and already described, it will be understood that if the motor mechanism indicated at 5 is operating to hold the controlling section in line with the working conductor, the shoes 27, as they pass from the working conductor onto the movable controlling section, continue to supply current to the magnet 30 and there will be no operation of the braking mechanism. Should, however, the governing circuit be open, as will be the case when a car is in the block circuit governing this motor mechanism circuit, then the controlling section will be shifted in position so that as the car

passes the shoes will not contact with the controlling section. This will immediately cause the magnet 30 to be deenergized and the brakes set.

As has been indicated, instead of producing a physical change in the controlling section, as by shifting its position in the manner already described and illustrated in Fig. 1, the condition of this controlling section may be changed by varying its electrical condition. One means of effecting this is illustrated in Fig. 2. In the construction shown in this figure the controlling section 4 is fixed in line with the working conductor but is insulated therefrom by insulating connections illustrated at 38, 39, the working conductor current being carried around the controlling sections 4 by conductors 40. In this construction the controlling sections will be supplied with current from a suitable source of electrical energy, as, for instance, the battery indicated at 7, and before referred to as operating the motor mechanism 5, the circuits being the same as those before described except that the conductor 10 instead of leading to the motor mechanism leads to the controlling section 4. With this construction when a car reaches the controlling section if the closed circuit is in condition to supply current to the controlling section there will be no operation of the braking mechanism. If, however, the circuit leading from the source of electrical energy 7 to the controlling section is open, as will be the case when a car is in the block governing circuit, no current will be supplied to the section 4 and the brakes will be operated in the manner hereinbefore referred to.

The construction illustrated in Fig. 3 illustrates another means for changing the electrical condition of the short controlling sections so as to vary the relation between it and the electrical stopping mechanism of the car. In this construction the controlling sections 4 are located in the working conductor and are connected with it by means of re-actance bonds 41. A generator is located at 42 which supplies a current to the main line conductor which is different in its characteristics from those of the propulsion current, which also passes through the conductor, the re-actance bonds before referred to preventing the passage of the current from the generator 42 but permitting the passage of the propulsion current. The current from the generator 42 is carried to the working conductor through branches 43, 44 and 45 and to the short controlling sections by means of branches 46 and 47. These branches 46 and 47 may be opened by circuit breakers 48, which circuit breakers may also control a local circuit 49 leading from a suitable source of electrical energy, as battery 7, for operating the magnet 13 of the

signal. These circuit breakers 48 may be operated by magnets 50, which are in turn controlled by block circuits, which may be as before described. It will be understood that in this construction the magnets and wiring on the cars or trains will be immune to the propulsion current. The operation of this construction is the same as that which has heretofore been described. If a magnet 50 be short circuited by a car in its governing block circuit the braking mechanism on the car will be operated in the manner heretofore described.

In practical railroading it is frequently desirable and sometimes necessary for the driver of a train to pass a signal set against him and proceed at caution to the next signal. While with the short controlling sections it might be possible to cause the train to coast the gap by getting up sufficient speed, even though the brakes were set and the power cut off, yet this would produce an undesirable strain on the equipment and cause annoyance to passengers.

In the best constructions embodying the invention, therefore, means will be provided whereby the driver may prevent the action of the stopping devices which would otherwise be produced by the change in condition of the short controlling sections. This means may include a suitable detent or locking mechanism for the actuator which may be electrically operated. In the particular construction shown the actuator rod is notched as is illustrated at 51, the notch being arranged to be engaged by a locking bolt which is carried on the armature 52 of an electromagnet 53. This magnet may be energized from a source of electrical energy, as, for instance, a battery 54, from which is led a conductor 55, this conductor terminating at a switch 56. From this switch a conductor 57 leads to the magnet 53. From this magnet another conductor 58 leads back to the battery. It is obvious that the driver by closing the switch 56 can lock the actuator mechanism so that it will not be operated even though the magnet 30 should be deenergized in the manner hereinbefore described.

Changes and variations may be made in the constructions by which the invention is carried into effect. The invention is not, therefore, to be limited to the particular constructions heretofore described and illustrated in the accompanying drawings.

Certain novel features shown but not claimed herein are claimed in a companion application No. 422,430, filed March 21, 1908.

What I claim is:—

1. In an automatic stopping mechanism for railways, the combination with a working conductor, of a plurality of single short controlling sections arranged in line with the conductor, means for changing the con-

dition of each of said sections, so as to render it operative or inoperative with respect to stopping devices mounted on a car, and block circuits for governing the operation of said condition changing means, the action of said circuits being determined by the presence of a car therein or the absence of a car therefrom.

2. In an automatic stopping mechanism for railways, the combination with a working conductor, of a plurality of single short controlling sections arranged in line with the conductor, means for changing the condition of each of said sections, so as to render it operative or inoperative with respect to stopping devices mounted on the car, block circuits for governing the operation of said condition changing means, the action of each of said circuits being determined by the presence of a car therein or the absence of a car therefrom, and signals, the indications of which are changed to correspond with the change in condition of a controlling section.

3. In an automatic stopping mechanism for railways, the combination with a working conductor, of a plurality of single short controlling sections arranged in line with the conductor, electrically operated devices for changing the condition of said controlling sections, each of said devices including a normally closed circuit, and block circuits for controlling each normally closed circuit, said block circuits being rendered inoperative to hold the controlling circuits closed by the presence of a car in a block.

4. In an automatic stopping mechanism for railways, the combination with a working conductor, of a plurality of single short controlling sections arranged in line with the conductor, electrically operated devices for changing the condition of said controlling sections, each of said devices including a normally closed circuit, block circuits for controlling each normally closed circuit, said block circuits being rendered inoperative to hold the controlling circuits closed by the presence of a car in the block, and signals, the indications of which are changed to correspond with the condition of the corresponding controlling sections.

5. In an automatic stopping mechanism for railways, the combination with a working conductor, of a plurality of short movable controlling sections each of said sections being in circuit with a source of electrical energy and in line with the working conductor, a car having stopping devices, and means for producing movement of said sections whereby a section may be rendered operative or inoperative with respect to stopping devices mounted on the car.

6. In an automatic stopping mechanism for railways, the combination with a working-conductor, of a plurality of controlling-

sections arranged in line with the conductor each of said controlling-sections being in circuit with a source of electrical energy, and means for shifting the position of the controlling-sections.

7. In an automatic stopping mechanism for railways, the combination with a working-conductor, of a plurality of short movable controlling-sections each section being in circuit with a source of electrical energy and in line with the working conductor, a positioning mechanism for each of said sections, and means for effecting the operation of the positioning mechanism.

8. In an automatic stopping mechanism for railways, the combination with a working-conductor, of a plurality of short movable controlling-sections each section being in circuit with a source of electrical energy and in line with the working conductor, a positioning mechanism for each of said sections, signals, and means for effecting the operation of the positioning mechanism and signals.

9. In an automatic stopping-mechanism for railways, the combination with a working-conductor, of a plurality of short movable controlling-sections each section being in circuit with a source of electrical energy and in line with the working conductor, a positioning mechanism for each of said sections, and means including block circuits for controlling the operation of the positioning mechanism.

10. In an automatic stopping mechanism for railways, the combination with a working-conductor, of a plurality of short movable controlling-sections each section being in circuit with a source of electrical energy and in line with the working conductor, a positioning mechanism for each of said sections, signals, and means including block circuits for controlling the operation of the positioning mechanism and the signals.

11. In an automatic stopping-mechanism for railways, the combination with a working conductor, of a plurality of short movable controlling-sections said sections being in circuit with a source of electrical energy and in line with the working conductor, a motor for determining the position of each section, and connections for automatically controlling the operation of the motors.

12. In an automatic stopping-mechanism for railways, the combination with a working conductor, of a plurality of short movable controlling-sections said sections being in circuit with a source of electrical energy and in line with the working conductor, a motor for determining the position of each section, and means including block circuits for automatically controlling the operation of the motors.

13. In an automatic stopping-mechanism for railways, the combination with a work-

ing conductor, of a plurality of short movable controlling-sections in line with the working conductor, a motor for determining the position of each section, a plurality of signals, and means including block circuits for effecting the operation of the motors and signals.

14. In an automatic stopping-mechanism for railways, the combination with a working-conductor, of a plurality of short movable controlling sections in line with the working conductor, motors operating in normally closed circuits, connections whereby the motors determine the positions of the controlling-sections, a circuit breaker in each motor-circuit, and means including block circuits for controlling the operation of the circuit breakers.

15. In an automatic stopping-mechanism for railways, the combination with a working-conductor, of a plurality of short controlling sections in circuit with a source of electrical energy and in line with the working conductor, motors operating in normally closed circuits, connections whereby the motors determine the positions of the controlling-sections, a circuit breaker in each motor-circuit, and means for controlling the operation of the circuit breakers.

16. In an automatic stopping-mechanism for railways, the combination with a working-conductor, of a plurality of short controlling-sections in circuit with a source of electrical energy and in line with the working conductor, motors operating in normally closed circuits, connections whereby the motors determine the positions of the controlling sections, a circuit breaker in each motor circuit, and means including block circuits for controlling the operation of the circuit breakers.

17. In an automatic stopping mechanism for railways, the combination with a plurality of short movable controlling sections in circuit with a source of electrical energy, of electrical devices for producing a movement of said sections whereby a section may be rendered operative or inoperative with respect to stopping devices mounted on a car, block circuits for governing the operation of said electrical devices, the action of each of said circuits being determined by the presence of a car in a circuit or absence of a car therefrom, and means controlled by the driver for rendering the movement of a controlling section ineffective.

18. In an automatic stopping mechanism for railways, the combination with a working conductor, of a plurality of short movable controlling sections arranged along the conductor and in circuit with a source of electrical energy, a car having stopping devices, electrical devices for moving the sections to render them operative or inoperative with respect to the stopping devices,

block circuits for governing the operation of said electrical devices, and means under the control of the driver for preventing the operation of the stopping devices notwithstanding the movement of a controlling section.

19. In an automatic stopping mechanism for railways, the combination with a car having a current collector and stopping devices, of a working conductor with which the collector coöperates, a plurality of short controlling sections each of said sections being in circuit with a source of electrical energy, means including block circuits for changing the condition of the controlling sections, an electrically operated actuator for the stopping devices, and a normally closed circuit including the collector and the actuator.

20. In an automatic stopping mechanism for railways, the combination with a car having a current collector and stopping devices, of a working conductor with which the collector coöperates, a plurality of short controlling sections each of said sections being in circuit with a source of electrical energy, means including block circuits for changing the condition of the controlling sections, an electrically operated actuator for the stopping devices, a normally closed circuit including the collector and the actuator, and signals the indications of which are changed in accordance with the change in condition of the controlling sections.

21. In an automatic stopping mechanism

for railways, the combination with a car having a current collector and stopping devices, of a working conductor, a plurality of short movable controlling sections each of said sections being in circuit with a source of electrical energy, motors for determining the positions of the sections, means including block circuits for controlling the operation of the motors, an electrically operated actuator for the stopping mechanism, and a normally closed circuit including the collector and the actuator.

22. In an automatic stopping mechanism for railways, the combination with a car having a current collector and stopping devices, of a working-conductor, a plurality of short movable controlling sections each of said sections being in circuit with a source of electrical energy, motors for determining the positions of the sections, means including block circuits for controlling the operation of the motors, an electrically operated actuator for the stopping mechanism, a normally closed circuit including the collector and the actuator, and signals the indications of which are changed as the sections are moved.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

WILLIAM J. WILGUS.

Witnesses:

TH. SELIERI,
VIDA SUTTON.