

W. GRUNOW, JR.
CIRCUIT CLOSING DEVICE OR SWITCH FOR USE IN CONNECTION WITH ELECTRIC OR OTHER
RAILWAYS.

1,040,941.

APPLICATION FILED MAY 10, 1911.

Patented Oct. 8, 1912.

4 SHEETS—SHEET 1.

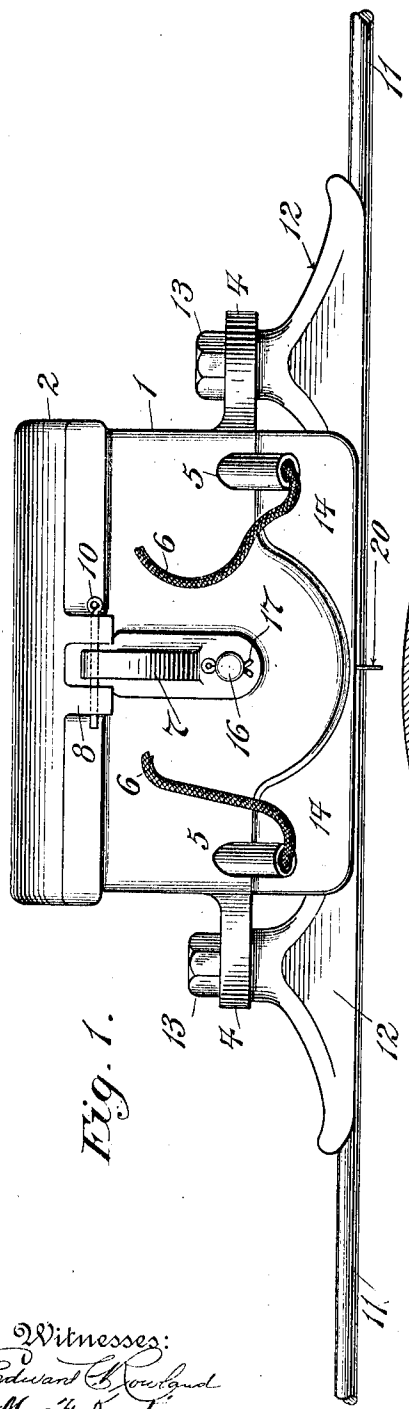


Fig. 1.

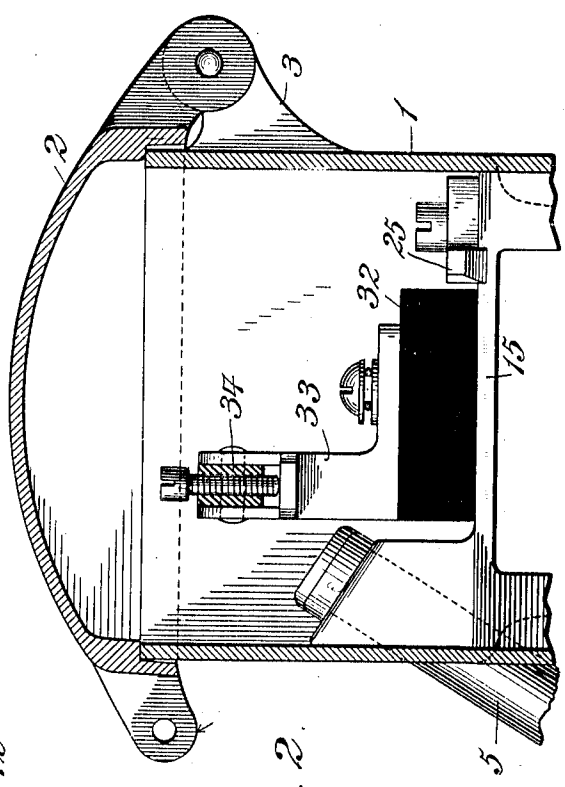


Fig. 2.

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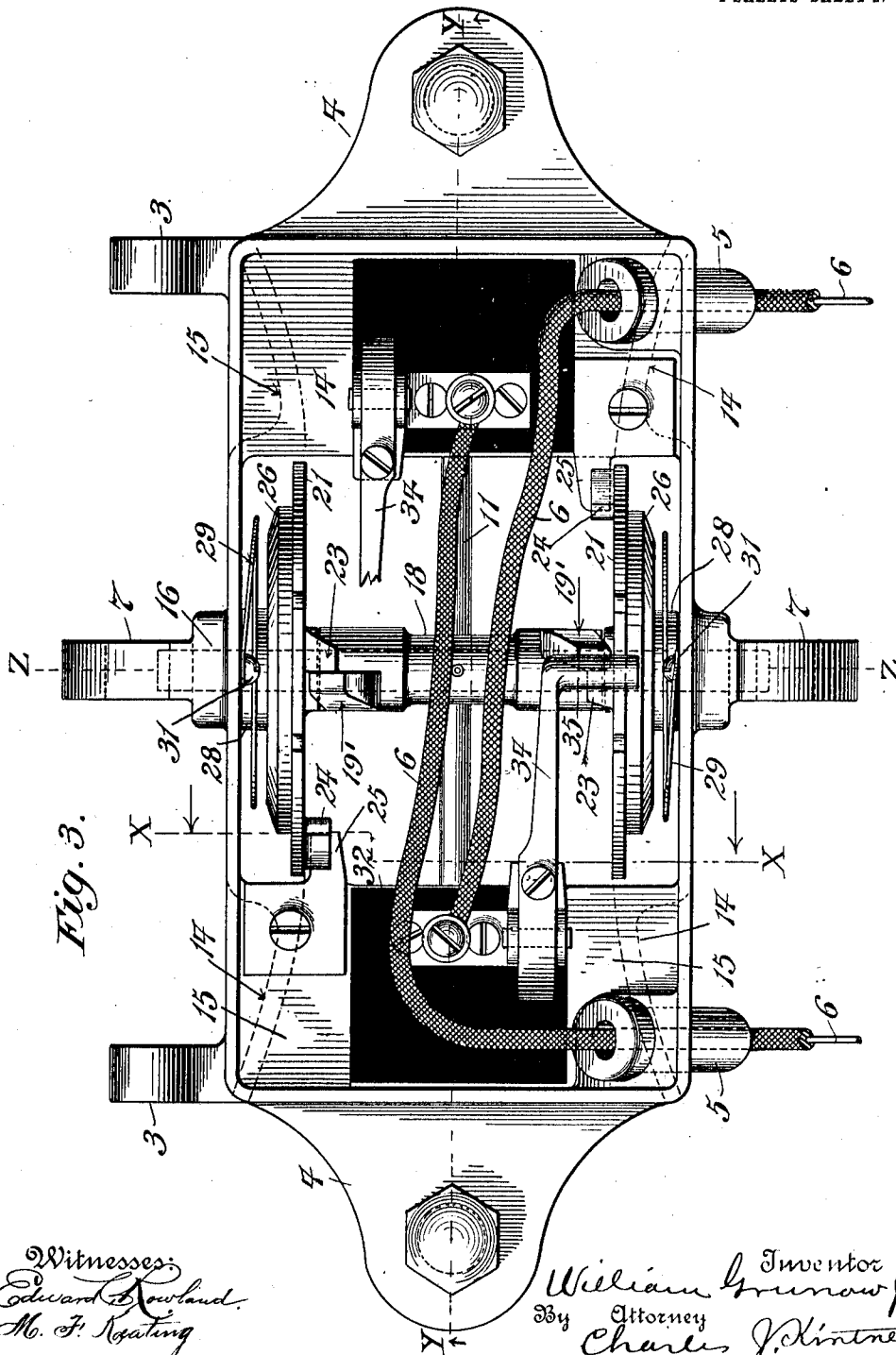
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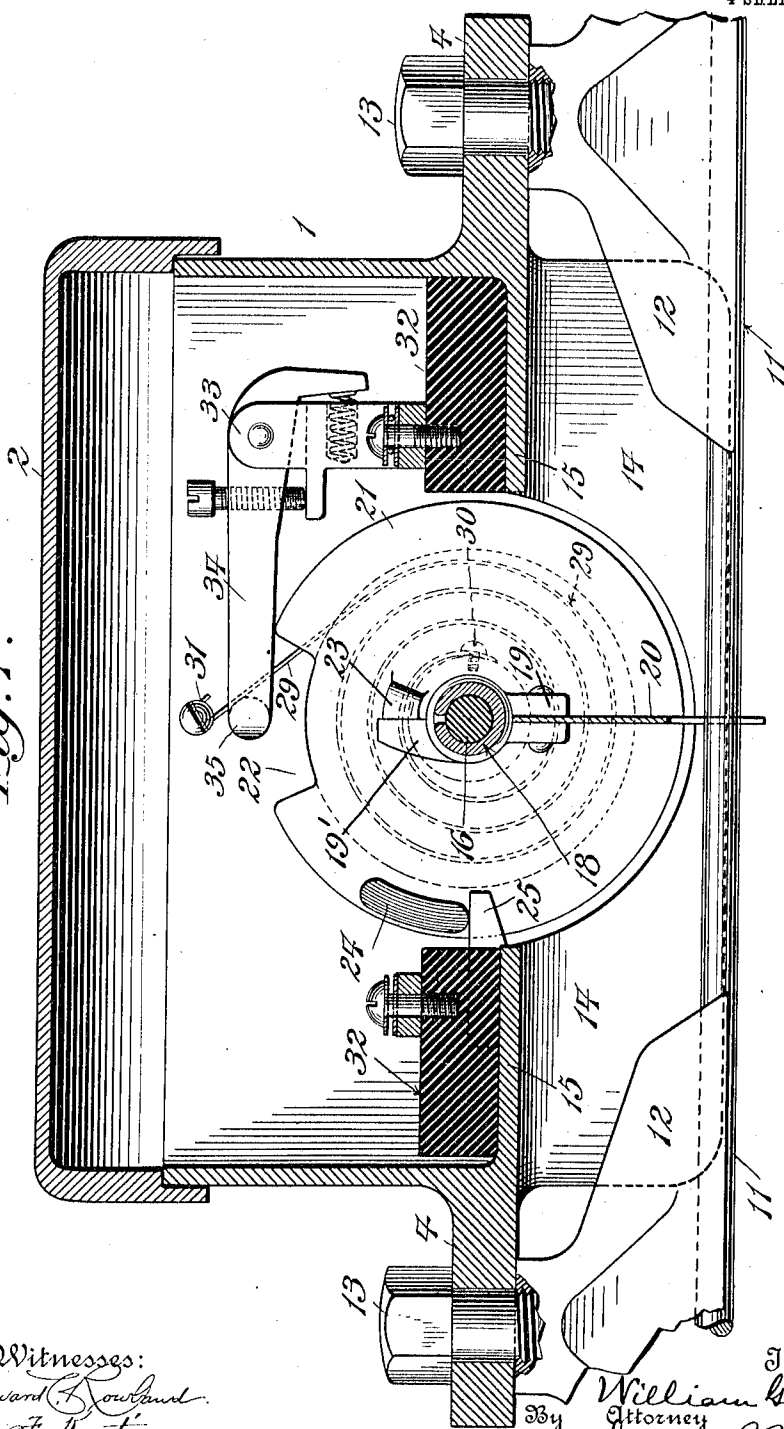
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4 SHEETS-SHEET 3.

Fig. 4.



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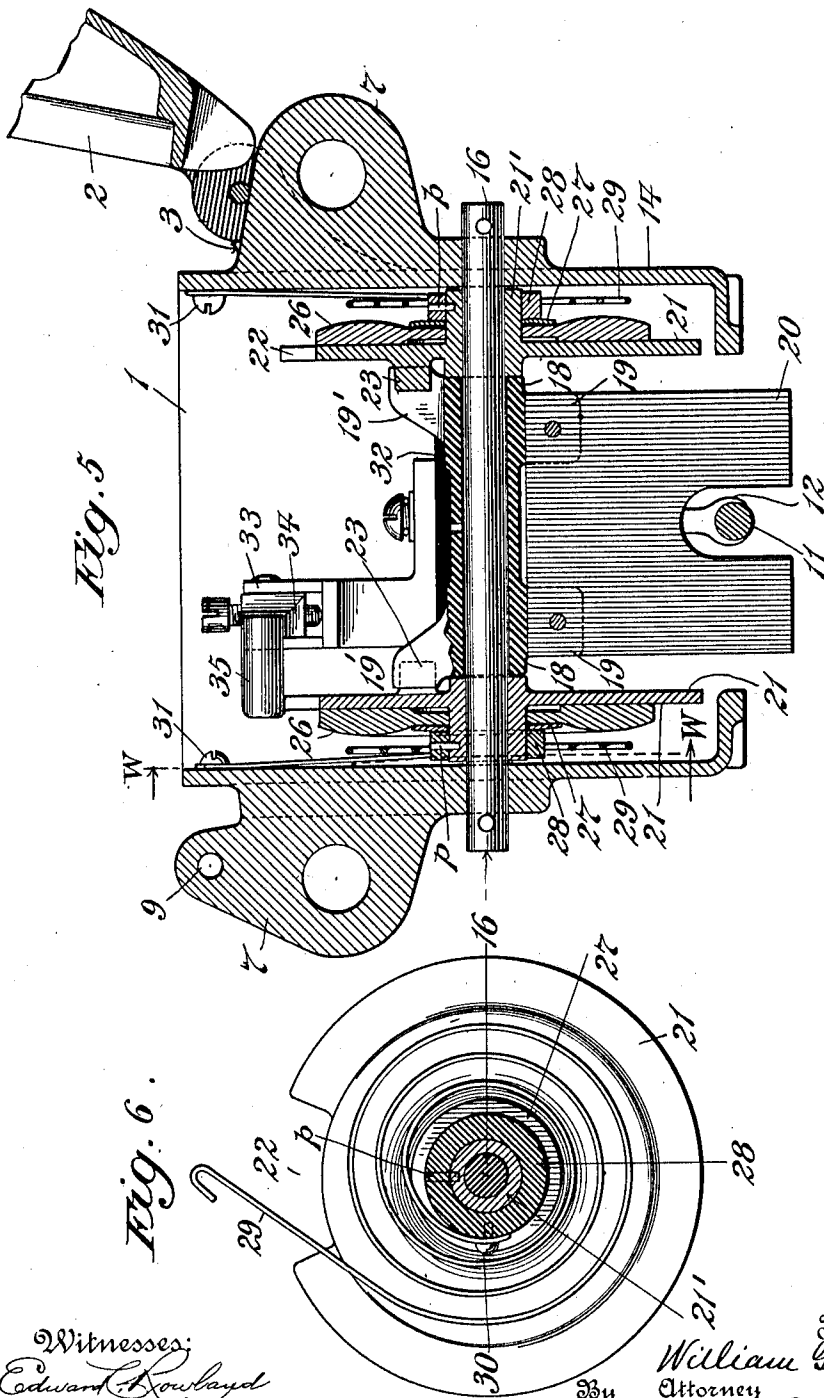
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UNITED STATES PATENT OFFICE.

WILLIAM GRUNOW, JR., OF WATERBURY, CONNECTICUT, ASSIGNOR TO AMERICAN RAILWAY SIGNAL COMPANY, A CORPORATION OF CONNECTICUT.

CIRCUIT-CLOSING DEVICE OR SWITCH FOR USE IN CONNECTION WITH ELECTRIC OR OTHER RAILWAYS.

1,040,941.

Specification of Letters Patent.

Patented Oct. 8, 1912.

Application filed May 10, 1911. Serial No. 626,312.

To all whom it may concern:

Be it known that I, WILLIAM GRUNOW, Jr., a citizen of the United States, and resident of Waterbury, county of New Haven, and State of Connecticut, have made a new and useful Invention in Circuit-Closing Devices or Switches for Use in Connection with Electric or other Railways, of which the following is a specification.

10 My invention is directed to automatic circuit closing devices or switches adapted to be used in connection with signal systems for electric and other railways, and in which it is desired to automatically close a
15 circuit either to a signal, an indicator, or any other electric translating device when a car passes a given point and in such manner as to be operative, no matter in which direction nor at what speed the car may be
20 moving. To this end it is particularly directed to improvements upon an invention disclosed in a prior patent granted to Roy C. Cram, Charles L. Graves and myself on the 16th day of July, 1907, and numbered
25 860,532, and it has for its objects: First, to provide a switch of the type indicated which shall be simpler in its construction, more practical in its operation and more durable under all conditions of usage than was the
30 device disclosed in the before-mentioned patent. Second, to provide a switch of the type indicated in which the feature of maintaining the circuit closed for a predetermined time, when a car is passing in either
35 direction, shall be more assuredly effected and by purely mechanical devices, in that the use of a liquid is absolutely avoided in the present instance, a feature which constitutes one of the essential elements of the
40 before-mentioned invention. Third, to effectually locate and arrange all of the operative parts in a water-tight switch box so that such parts are concentrated in a most compact form within the box, and also that
45 said box may be carried directly by the trolley wire and sustained thereby with the least possible danger of being seriously damaged, either by the rapid movement of a car or by extraneous effects, such as wind,
50 rain, and sleet storms. Fourth, to provide a switch of this nature in which access to all of the parts may be quickly and easily had, for inspection or for repairs in the event of possible damage thereto. Fifth, to

provide a switch of the type referred to 55 having all of the essential characteristics which necessarily flow from the compact, rigid and mechanically good arrangement of all or the parts as disclosed in the drawings and as hereinafter pointed out in the 60 specification.

For a full and clear understanding of the invention, such as will enable others skilled in the art to construct and use the same, reference is had to the accompanying draw- 65 ings, in which—

Figure 1 is a side elevational view illustrating the exterior portion of the switch box and attachments which inclose my novel switch and also its attachment to a trolley 70 wire, the two conductors to which the terminals are adapted to be connected by the switching parts of the apparatus being illustrated as entering the box and as broken off at their outgoing ends. Fig. 2 is a trans- 75 verse sectional view taken through the box and the apparatus on the broken line X—X, Fig. 3 and as seen looking thereat from left to right in the direction of the arrows and upon the supposition that the 80 lid is in position upon said box, the conductors which enter the box being detached. Fig. 3 is a plan view of the interior of the box illustrating the entire operative apparatus of the switch. Fig. 4 is a longitudinal 85 sectional view taken through the box and the apparatus on the line Y—Y Fig. 3, and upon the supposition that the lid is in place, the trolley wire and part of the apparatus being shown in side elevational view. Fig. 90 5 is a sectional view taken through Fig. 3 on the line Z—Z and upon the supposition that the lid or cover is open, the switch arm or lever and other features of the device being shown in elevational view. Fig. 6 95 is an enlarged detail view of one of the rotatable circuit controlling disks illustrating also its yielding or spring attachments, the supporting means of the disk being shown in section. 100

Referring now to the drawings in detail in all of which like letters and numerals of reference represent like parts wherever used, all of the operative parts of the apparatus being shown in full working size, 1 represents the box made preferably of cast metal 105 and 2 the lid or cover therefor pivotally secured to the box by two hinges 3, 3.

4, 4, represent two end lugs cast integral with the box, their function being to secure the latter and its operative parts to the trolley wire by bolts, as will be described later on.

5, 5, represent insulating sleeves preferably of hard rubber having enlarged heads at their inner ends and secured in openings through one side of the box, said sleeves being designed to secure the two insulating conductors 6, 6, at their points of entrance into the box wherein they are connected to the switching terminals, as will be described later on.

7, 7, represent side lugs cast integral with the box for attaching guy-wires thereto running to stationary points of support, as poles or trees, whereby the box and the trolley wire will be protected, as far as possible, from violent vibrations and the box held vertically above the wire, as shown.

8, 8, represent extensions or lugs provided with holes extending through both for securing the lid when it is closed to one of the lugs 7 through the agency of a locking pin 10 extending also through a hole 9 in the lug 7, such an arrangement making it possible, by virtue of the over-hanging nature of the lid or cover, to effectually protect the entire apparatus from the evil effects of inclement weather.

11 represents the trolley wire and 12, 12 are two metallic trolley wire ears of well known form which are grooved in their lower edges and secured to the trolley wire in the well known manner by swaging them therearound; or by soldering or brazing them thereto; or both, as clearly illustrated at the lower part of Fig. 5. These trolley ears are, as is well understood, practically angular in cross section and in their upper ends are screw-threaded bolt holes for receiving the bolts 13, 13 so as to thereby secure the entire box and its inclosed apparatus directly to and above the trolley wire, as is clearly illustrated in Figs. 1 and 4.

14, 14 represent dependent walls which are cast integral with the box and taken together are of angular entering conformation as the trolley wheel approaches in either direction when it passes under the box. These dependent walls also have inward extensions at their lower edges as clearly illustrated in Fig. 5 so as to protect the lower part of the apparatus from the evil effects of inclement weather, the entire structural arrangement being such as to offer the least possible opposition to the free movement of the trolley-wheel between the dependent walls.

15, 15 are inward extensions at the bottom of the box proper, constituting the means of support for such of the operative parts as are practically stationary and also for the insulation of such parts.

16 represents a shaft which constitutes the entire support for the rotary or movable parts of the device, said shaft being adapted to be inserted through journal bearings in the walls of the box and provided with openings for securing locking pins 17, 17 (see Fig. 1) after all of the parts are assembled.

18 represents a metallic sleeve which is rotatably journaled upon the shaft 16 and is provided on its lower and upper sides with integral lugs or ears 19, 19 and 19', 19' respectively, the lower set of lugs or ears being slotted in the direction of the axis of the shaft 16, as clearly shown in Fig. 4, for the purpose of supporting the operating arm or lever 20 which is grooved at its lower end as shown for permitting it to extend a definite distance below the trolley wire 11 and on opposite sides thereof. An oiling hole is provided at the center and upper side of the sleeve 18 for the purpose of affording lubrication between the sleeve and the shaft.

21, 21 are rotatable metallic disks constituting electrical terminals, the hubs 21¹, 21¹ of which are journaled upon the shaft 16 and on opposite sides of the arm or lever 20 and its supporting sleeve 18, the hubs abutting against the ends of said sleeve.

22, 22 represent circuit breaking notches or air spaces in the periphery of the two conducting disks 21, 21 and located, when the disks are in position in direct alinement with each other, their function being to leave the circuit of the terminals normally broken, as will be described in connection with the description of the mode of operation.

23, 23 are lugs located on the inner faces of the disks 21, 21, and on opposite sides respectively of the lugs 19¹ 19¹, as is clearly indicated in Fig. 5, by virtue of the sectional and dotted lines respectively.

24, 24 are stops cast integral with the inner faces of the metallic disks 21, 21 and near the outer surface thereof, their function being to stop the disks from rotating when they come into mechanical contact with stationary stops 25, 25 located respectively at the opposite ends of the box and secured directly to the inward bottom extensions 15, 15.

26, 26 are braking disks having plane faces on one side adapted to bear frictionally against the outer faces of the rotatable metallic terminal disks 21, 21 and journaled upon the hubs 21¹, 21¹ of said disks.

27, 27 are spring washers adapted to yieldingly hold the friction disks 26, 26 with their friction faces against the outer faces of the disks 21, 21.

28, 28 are nuts secured upon the outer ends of the hubs 21¹, 21¹ with their inner faces so adjusted in engagement with the spring washers 27 as to give the proper

frictional relation between the braking disks, or inertia devices 26, 26 and the rotatable disks 21, 21, said nuts being locked respectively by pins *p, p*, when properly adjusted.

5 29, 29 are spiral springs having their inner ends secured directly to the nuts 28, 28 by set-screws 30, 30 and their outer ends, after having been placed under proper tension, secured to the inner walls or casing
10 of the box by screw-clamps 31, 31 the turned over ends of the wires being of sufficient length, as shown in Fig. 6, to give proper tensile strength, it being understood that these springs, when under stress, tend to
15 rotate the terminal disks with their friction disks in reverse direction.

32, 32 are blocks of insulating material, preferably of hard rubber, secured to the upper surface of the inward extensions 15,
20 15 of the box by screws and constituting means of support for the fixed terminals 33, 33 located at opposite ends of the box. These fixed terminals 33, 33 are connected respectively, as will be apparent on inspection
25 of Fig. 3 of the drawings, to the outgoing conductors, 6, 6, the one running to a signal located say at a distance in the rear and adapted to be released by a current passing therethrough, and the other running say
30 a definite distance in front and adapted to set a signal.

34, 34 represent yielding conducting terminals pivotally supported at the tops of the fixed terminals and provided with adjusting screws for adjusting their free rectangular ends 35 with relation to the conducting surfaces of the disks 21, it being apparent that both of these rectangular ends
35 are located, when the switch is normal, exactly in the middle of the air spaced insulating notches 22, 22 above the disks so that the circuit is broken in all directions.

It will be apparent, particularly on inspection of Fig. 4 of the drawings, that
45 when the switch is in normal position the arm or lever 20 hangs vertically with its lower end in the path of a trolley wheel as it is moved in either direction under the trolley wire 11, and also, as before stated,
50 that the circuit is broken between the trolley wire and the yielding terminals 34, 34, because of the fact that their rectangular ends are out of contact with the disks 21, 21. It will also be understood that the entire box
55 1, its lid or cover 2, its dependent walls 14, and the ears 12, 12 are normally charged directly by the current in the trolley wire. Upon the supposition, therefore, that proper adjustment has been effected with relation
60 to the frictional bearing between the faces of the disks 21, 21 and 26 26 and the proper stress effect placed upon the springs 29, 29, so that they tend to rotate the disks 26, 26 in opposite directions, I have provided a
65 means for effecting a definite time element;

that is to say, a definite time for which the circuit must be closed through either of the yielding terminals 34, 34, no matter in which direction the car may be traveling, or what the speed thereof. In the operation of my
70 invention, a slowly traveling car will impart a relatively slow rotation to the disk 21, thereby permitting the latter to overcome the inertia of its frictionally-engaged disk 26 and carry the latter around with
75 it; the relatively small kinetic energy of such slowly moving disks being quickly absorbed by the spring 29 upon disengagement of the arm 20 from the moving car. On the other hand, a rapidly moving car will rotate
80 the disk 21 at such high speed that it will be unable to overcome the inertia of the disk 26 by its frictional engagement with the latter, and the disk 21 will, therefore, rotate more or less independently of said disk 26.
85 During such forward rotations at speeds sufficiently low to permit rotation of the combined disks 21 and 26 as a single mass, the disk 21 will be shifted at low velocity through a relatively small angle, while
90 higher velocities of the disk 21 will cause independent rotation of the latter at higher speeds and through larger angles; the period, or length of time, of all such forward rotations of the combined disk 21 and 26
95 as a single mass being practically constant, and the similar periods of all independent rotations of the disk 21 at higher speeds being constant and slightly less than the relative period of the combined disks. The relatively small angular swing of the combined
100 disks 21 and 26 as a single mass places the spring 29 under a relatively low tension, which causes said spring to return said disk to normal position in definite constant periods of time; the independent swing of the
105 disk 21 through larger angles placing the spring 29 under greater tension and causing said spring to return the disks to normal position in definite constant periods of time
110 slightly larger than the return period of said disks when forwardly rotated as a single mass through lesser angles. My invention, therefore, provides a compact and simple construction adapted to act with certainty
115 to maintain the circuit closed through a definite constant period of time under all practical conditions.

I do not limit my invention to the especial details of construction disclosed in the accompanying drawings, as obviously a number of the details thereof might be departed from and still come within the scope of my claims hereinafter made, the
120 essence of my invention lying in the perfection of a circuit controlling device of the type indicated in which a constant time interval is effected solely through the agency of mechanically impelled devices, such as
125 are disclosed in the before-mentioned patent, 130

and my claims are generic as to this feature; also as to the features of general utility pointed out in the statements of the objects of invention.

5 I believe it is broadly new with me to provide means in the nature of frictional brake surfaces so interrelated and so operatively connected to the switch box or base that the evil effects of undue momentum are
10 overcome and a relatively constant time element obtained.

Having thus described my invention what I claim and desire to secure by Letters Patent of the United States is—

15 1. A normally open circuit provided with a movable terminal, in combination with resilient means tending to maintain said movable terminal in normal, open position, means for shifting said terminal to closed
20 position against the tension of said resilient means, and a freely-supported inertia device frictionally engaging said movable terminal, whereby said circuit will be closed for definite, constant periods of time under
25 all practical conditions.

2. A normally open circuit provided with a movable terminal, in combination with means for shifting said movable terminal to close the circuit, and a freely-supported
30 inertia device frictionally engaging said movable terminal.

3. A normally open circuit provided with a movable terminal, in combination with means for shifting said movable terminal to close the circuit, a freely-supported inertia device frictionally engaging said movable terminal, and resilient means engaging

said movable terminal for yieldingly maintaining the latter in open position.

4. A normally open circuit provided with a movable terminal, in combination with means for shifting said movable terminal to close the circuit, a freely supported inertia device, yielding means for maintaining said device in frictional engagement
45 with said movable terminal, and means for adjusting said yielding means.

5. In a circuit-closing switch, the combination of stationary and movable terminals, resilient means tending to normally
50 maintain said movable terminals in open position, means for shifting said movable terminals against the tension of said resilient means to close the circuit, and an inertia device mounted for free movement
55 in frictional engagement with said movable terminal, whereby said circuit will be closed for definite, constant periods of time under all practical conditions.

6. In a circuit-closing switch, the combination of stationary and movable terminals, means for shifting said movable terminal to close the circuit, and an inertia device mounted for free movement in frictional engagement with said movable terminal.
60 65

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

WILLIAM GRUNOW, JR.

Witnesses:

C. J. KINTNER,
M. F. KEATING.