J. J. RUDDICK.

TROLLEY SWITCH.

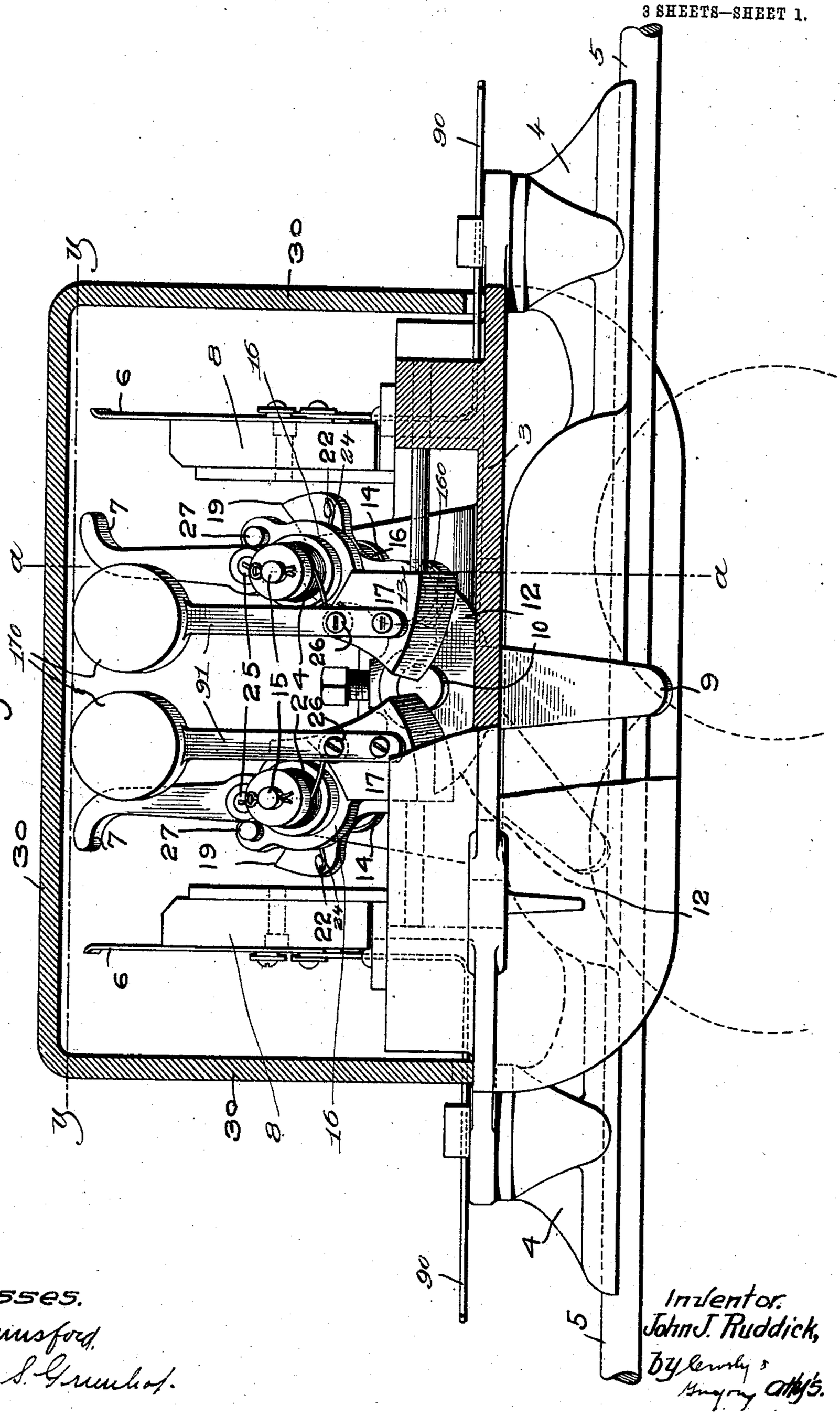
APPLICATION FILED MAY 28, 1908.

915,700.

Patented Mar. 16, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



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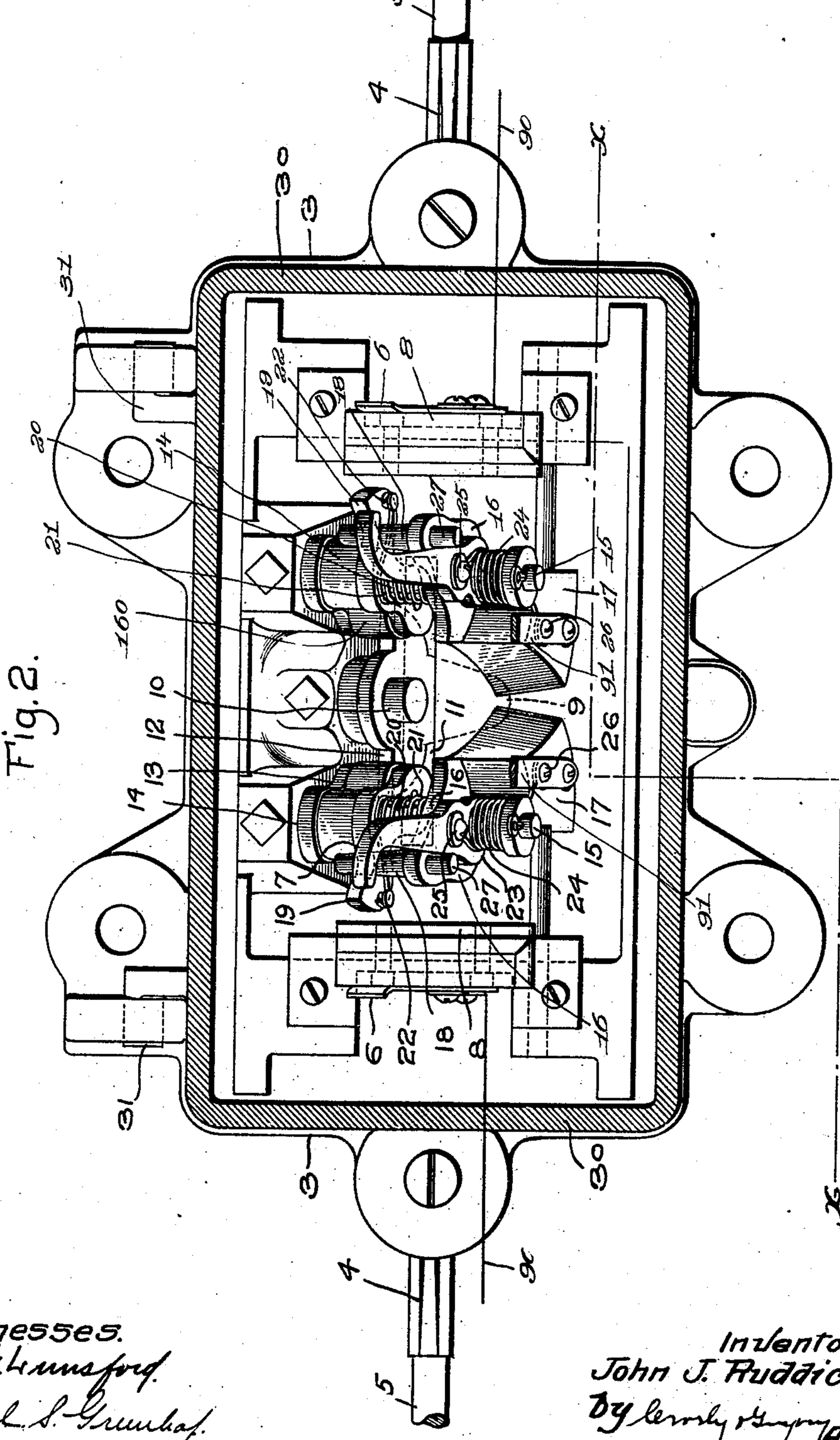
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

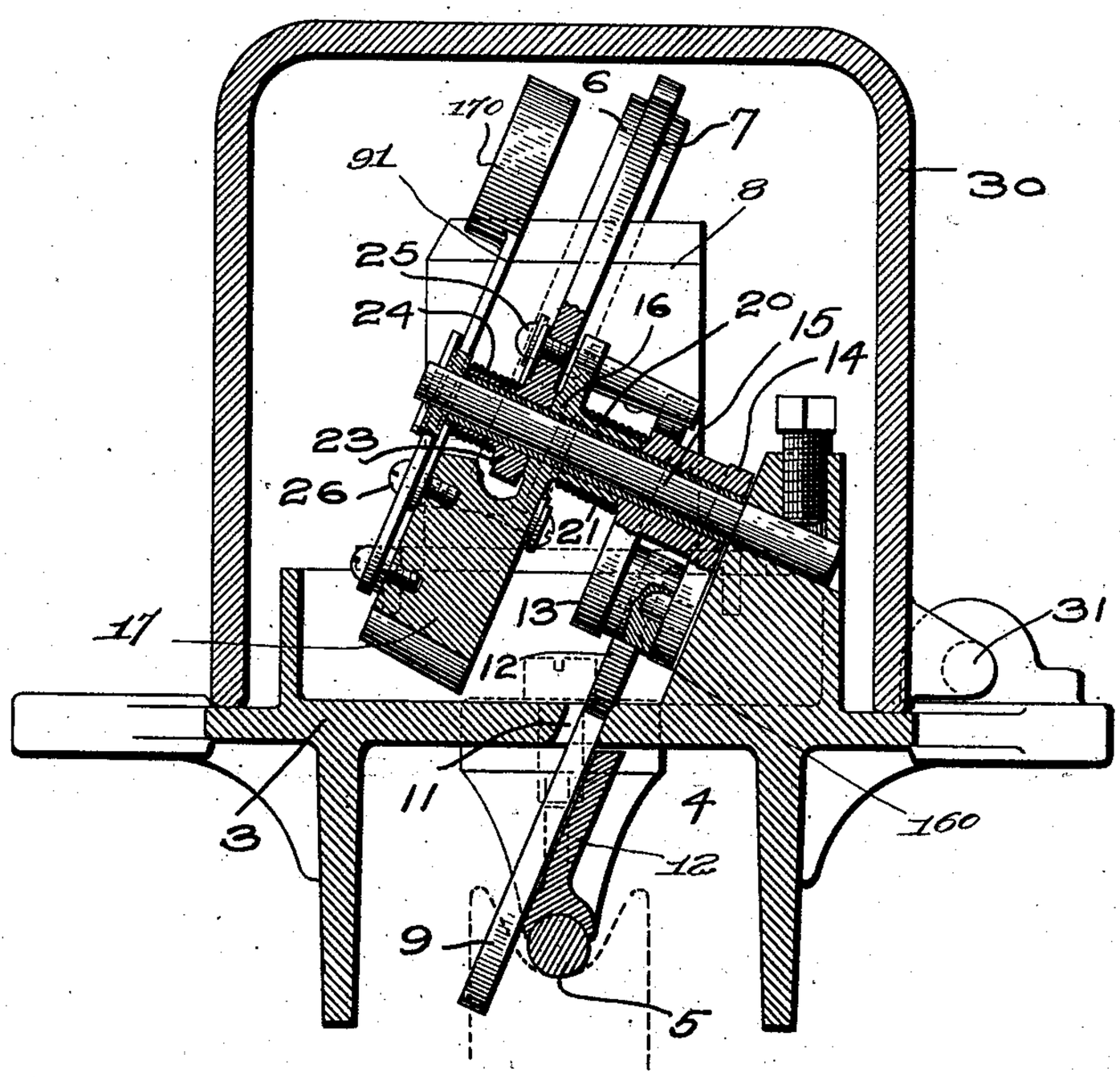
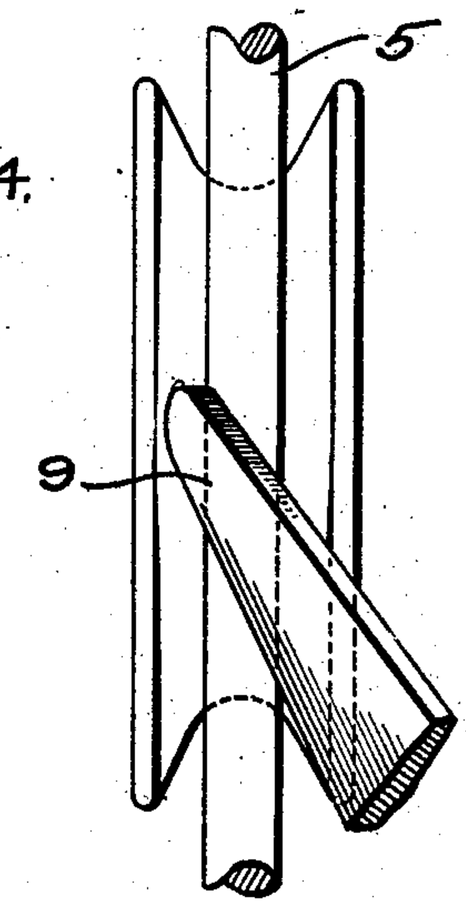


Fig. 4.



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UNITED STATES PATENT OFFICE.

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TROLLEY-SWITCH.

No. 915,700. Specification of Letters Patent. Patented March 16, 1909.

Application filed May 28, 1908. Serial No. 435,503.

To all whom it may concern:

Be it known that I, JOHN J. RUDDICK, a citizen of the United States, residing at Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Trolley-Switches, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to trolley switches such as are used in connection with electric signal systems for electric railways.

The term "trolley switch" is commonly used to designate the switch which is operated by the trolley wheel or traveling contact on an electric car for the purpose of closing or opening a circuit by means of which the signals of the signal system are operated.

The objects of my invention are to provide a novel construction of trolley switch in which the trip or other member operated by the trolley wheel may be made comparatively light so that it will have comparatively little inertia and thus be less liable to become broken if struck by a rapidly moving trolley wheel; to provide a novel construction of trolley switch which comprises an inertia device which acts to lengthen the time that the contacts are together when the trolley switch is operated by the trolley wheel, and to provide a novel construction in which the trip device may be operated equally well with a new trolley wheel or a well worn one; and to improve generally this character of trolley switch all as will be more fully hereinafter described and then pointed out in the claims.

In the drawings wherein I have shown one embodiment of my invention, Figure 1 is a part side elevation and a part section on the line *x*—*x*, Fig. 2; Fig. 2 is a section on the line *y*—*y*, Fig. 1; Fig. 3 is a section on the line *a*—*a*, Fig. 1. Fig. 4 is a detail showing the manner in which the trip is operated by the trolley-switch.

The various parts of the trolley switch are supported on a suitable frame 3 which has the wire-support 4 to which the trolley-wire 5 is secured as usual.

The switch herein shown is a double switch, that is, one adapted to be operated by a car passing in either direction although this is not essential to my invention as the latter might be embodied in a single switch. The double switch merely involves duplicating the parts of a single switch. 6 and 7 are the contacts of the switch. The contact 6 is rigidly secured to a support 8 of insulating material and is connected to the wire 90 of the signal circuit. The contact 7 is the movable contact which is closed against the contact 6 thereby to close the circuit by movement of the trip 9 when the latter is actuated by the trolley wheel. One feature of my invention is in so sustaining the trip that it will be actuated equally well by a new or a worn trolley wheel. I accomplish this end by pivotally sustaining said trip so that it will swing in an inclined plane when actuated by the trolley wheel. The trip normally stands at one side of the trolley wheel with one end thereof below the trolley wire, but when it is actuated by the trolley wheel it swings in an inclined plane so that the lower end thereof is carried up directly over the trolley wire. The trip may be sustained in such inclined position in a variety of ways without departing from the invention. I have herein shown the trip as extending through a slot 11 in the floor of the frame and as lying against the side of the inclined flange 120 which acts as a guide for the trip in its movement. The trip is also shown as pivotally sustained on the stud 10 which in the present embodiment of my invention has an inclined position, although this is not essential to the invention. As the trolley wheel passes along the wire 5, the flange of the wheel will strike the lower end of the trip, as shown in Fig. 3, wherein the wheel is shown in dotted lines. The movement of the trolley wheel will swing the trip in one direction or the other, said trip in its swinging movement following the face of the inclined flange 120 and thus swinging in a plane which is inclined transversely to the trolley wire. During this swinging movement of the trip the lower end thereof swings upwardly and because the trip is swinging in an inclined plane, said end will be carried into a position above and in substantially the vertical plane of the wire 5, as shown in dotted lines in Fig. 1.

The wear to which a trolley wheel is subjected when in use operates to deepen the groove in it without wearing away specially on the flanges and widening the groove. If the trip 9 hung vertically at the side of the trolley wire it would be operated solely by the flange of the wheel, and the amount of movement given to it would depend upon the depth of the flange, which in turn is depend-

ent on the depth of the groove or the amount which the wheel is worn; but by giving the trip the inclined position shown, the trip is released from the trolley wheel as the latter passes under it, when the portion of the trolley wheel which bears on the wire has passed the end of the trip, and said trip will, therefore, always be released at the same time regardless of the amount which the trolley wheel is worn. This is one of the important features of the invention as it insures proper operation of the contact by any and every trolley wheel.

In order to reduce the likelihood of the trip breaking by contact with the rapidly moving trolley I have made said trip as light as possible so that its inertia is reduced to a minimum. I have also interposed between the trip and the movable contact 7 yielding connections which are adapted to give when the trip is operated quickly thereby preventing the breakage of any parts, said yielding connections operating to move the contact with a slower movement than that given to the trip. I have also provided between the trip and contact an inertia device which operates to prolong somewhat the length of time that the contacts are closed together.

The trip herein shown is provided with an arm 12 which is adapted to engage an arm 13 on an actuating member 14 which is shown as pivoted to a stud 15 extending from the frame. The arm 13 preferably has an anti-friction roll 160 thereon to reduce friction between it and the arm 12 of the trip.

Interposed between the actuator 14 and the contact 7 is an inertia device, and for convenience I have mounted all three of these parts, that is, the actuator 14, the inertia device and the contact 7, on the same stud 15. The inertia device is shown at 16, and it is provided with a weight 17 which tends to restore it to its normal position and which also acts as the inertia member to prolong the time of contact between the members 6 and 7. The said inertia device has an arm 18 which is adapted to engage an arm 19 extended from the actuator; said inertia device is also provided with a hub 20 around which is wound a spring 21, one end of which is fastened to the actuator as at 22 the other end of which is fastened to the inertia device.

The inertia device is shown as having extending upwardly therefrom an arm 91 which carries at its upper end a weight 170, (said arm being broken out in Fig. 2), this weight coöperating with the weight 17 to give the device the necessary inertia or momentum to prolong the time when the contacts 6 and 7 are together.

When the parts are in the normal position both the weight 170 and the weight 17 occupy positions on the same side of the fulcrum stud 15, and, therefore, they both tend to hold the inertia device in its normal position, but when the inertia device is given its turning movement the momentum of these weights serve to lengthen the turning movement of the inertia device and thus prolong the time of contact.

The movable contact 7 is provided with a hub 23 which is loosely mounted on the stud 15 and around said hub is coiled a spring 24, one end of which is fastened to the contact, as at 25, and the other end of which is fastened to the inertia device, as at 26.

The inertia device is shown as having an arm 27 which is adapted to engage the contact 7 for restoring it to its normal position.

The parts thus far described constitute those forming one switch, and if the device is a double switch, as herein shown, then the trip will have two arms 12; and the actuator, inertia device and contact 7 may be duplicated on the other side as is shown in the drawings.

In the operation of the parts when the trip is operated by the trolley wheel the shoulder 12 by engagement with the arm 13 will turn the actuator about the stud 15 thereby putting tension on the spring 21 which transmits the turning movement of the actuator to the inertia device which also turns about the stud 15. This turning movement of the inertia device puts tension on the spring 24 which transmits the turning movement to the contact 7 and the latter is swung over into engagement with the fixed contact 6. The springs 21 and 24 are of such tension that if the trip 9 is operated slowly the actuator, inertia device and contact will move in unison as one piece, but if the trip is struck a quick blow by a rapidly-moving trolley wheel, said trip and actuator will be given a quick movement and because of the inertia in the inertia member, the spring 21 will be wound up. The tension of said spring, however, immediately starts the inertia member 16 and the latter transmits its motion to the movable contact 7, as will be obvious. The yielding connection between the actuator and inertia device permits the trip and actuator to be moved quickly by a sharp blow without danger of breaking any of the parts, as would be the case if the trip were connected positively instead of yieldingly to the contact device. When the trip is thus operated with a quick movement and the spring 21 is suddenly wound up, the recoil of the spring gives the inertia device a forward movement, and owing to the momentum of the weights 17 and 170, said inertia member is carried beyond the point necessary for closing the contact 7 against the contact 6. This extra additional movement of the inertia device is permitted by the spring 24, and during the time taken for this extra movement, the contacts are held

closed, thus prolonging the actual time which the contacts are together. With my improved switch, therefore, the time which the contacts are together is not dependent upon the speed with which the trip is actuated by the trolley wheel as the inertia device operates to prolong the contact when the trip is rapidly operated. Furthermore, the parts which are subjected to quick blows or rapid operations are made light and therefore not susceptible to breakage.

The movable parts of the switch are preferably covered by a suitable cover 30 which is shown as hinged to the frame 3, as at 31.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a trolley switch, the combination with a trip, of an inertia member connected thereto a movable contact member and a yielding connection between the inertia member and said contact member.

2. In a trolley switch, the combination with a trip, of an inertia member yieldingly connected thereto and a movable contact member connected to and operated by the inertia member.

3. In a trolley switch, the combination with a trip, of an inertia member yieldingly connected to the trip, and a movable contact member yieldingly connected to the inertia member.

4. In a trolley switch, the combination with a trip, of a contact member, and an inertia member interposed between said trip and contact member and yieldingly connected to each.

5. In a trolley switch, the combination with a trip, of a contact member, and an inertia member interposed between said trip and contact member and yieldingly connected to the trip.

6. In a trolley switch, the combination with a pivotally-mounted contact, of a pivotally-mounted inertia device yieldingly connected thereto, a trip, and means to actuate the inertia device by movement of the trip.

7. In a trolley switch, the combination with a pivotally-mounted trip, of a pivotally-mounted actuator to be operated thereby, an inertia device yieldingly connected to the actuator, and a contact member connected to the inertia device.

8. In a trolley switch, the combination with a pivotally-mounted trip, of a stud, an actuator pivoted thereon and adapted to be operated by the trip, and an inertia device also mounted thereon and yieldingly connected to the actuator, and a contact member also pivoted thereon and yieldingly connected to the inertia device.

9. In a trolley switch, the combination with a contact member, of a pivotally-mounted trip suspended above the trolley-wire and inclined transversely thereto.

10. In a trolley switch, the combination with a frame, of a trolley-wire section secured thereto, and a trip pivoted to the frame above the trolley-wire section in a position inclined transversely to said wire section.

11. In a trolley switch, the combination with a frame, of a trolley-wire section secured thereto, and a depending trip pivoted to the frame above the trolley-wire section, inclined transversely thereof, and having its lower end normally projecting below said trolley-wire section.

12. In a trolley switch, the combination with a contact member, of a trip for actuating said member and mounted to swing in a plane inclined transversely to the trolley wire.

13. In a trolley switch, the combination with a frame, of a trolley wire section secured thereto, a trip depending from the frame and mounted to swing in a plane inclined transversely to the trolley wire section, and a contact actuated by the swinging movement of the trip.

14. In a trolley switch, the combination with a frame, of a trolley wire section secured thereto, a contact, and a trip for operating said contact, said frame having an inclined guiding face over which the trip moves.

15. In a trolley switch, the combination with a movable contact member, of a trip for actuating said member, and a trolley-wire section, said trip being pivotally mounted above the trolley-wire section to swing in an inclined plane, having its lower end normally below the trolley-wire section.

16. In a trolley switch, the combination with a movable contact member of a trip for actuating said member, and a trolley-wire section, said trip being pivotally mounted above the trolley-wire section, having its end situated normally below the trolley-wire section and adapted to swing into position vertically over said trolley-wire section when actuated by the trolley.

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

JOHN J. RUDDICK.

Witnesses:
LOUIS C. SMITH,
FREDERICK S. GREENLEAF.