

No. 685,781.

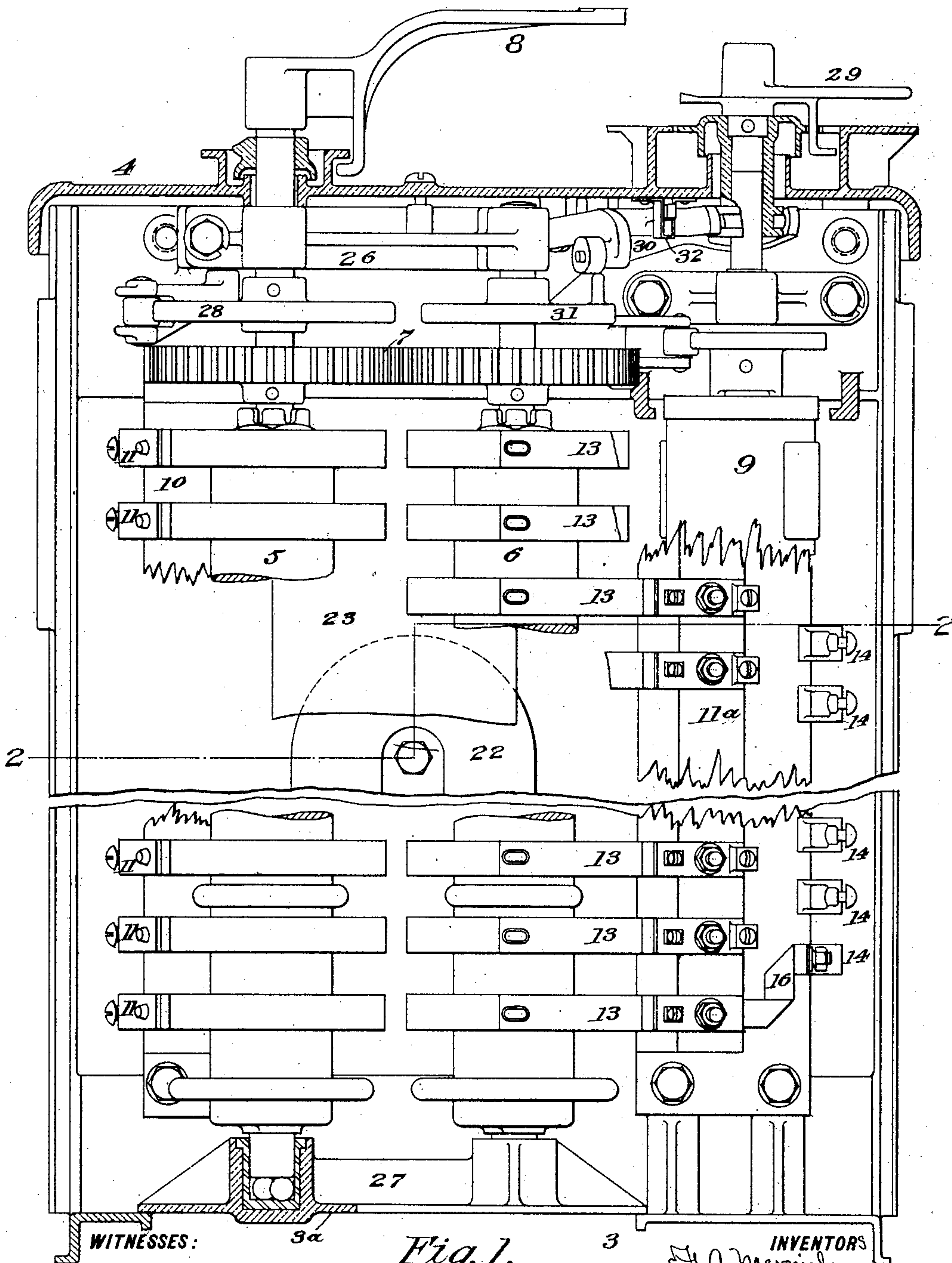
Patented Nov. 5, 1901.

F. A. MERRICK & E. W. STULL.  
ELECTRIC RAILWAY MOTOR CONTROLLER.

(Application filed Mar. 13, 1901.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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Fig. 1.

3

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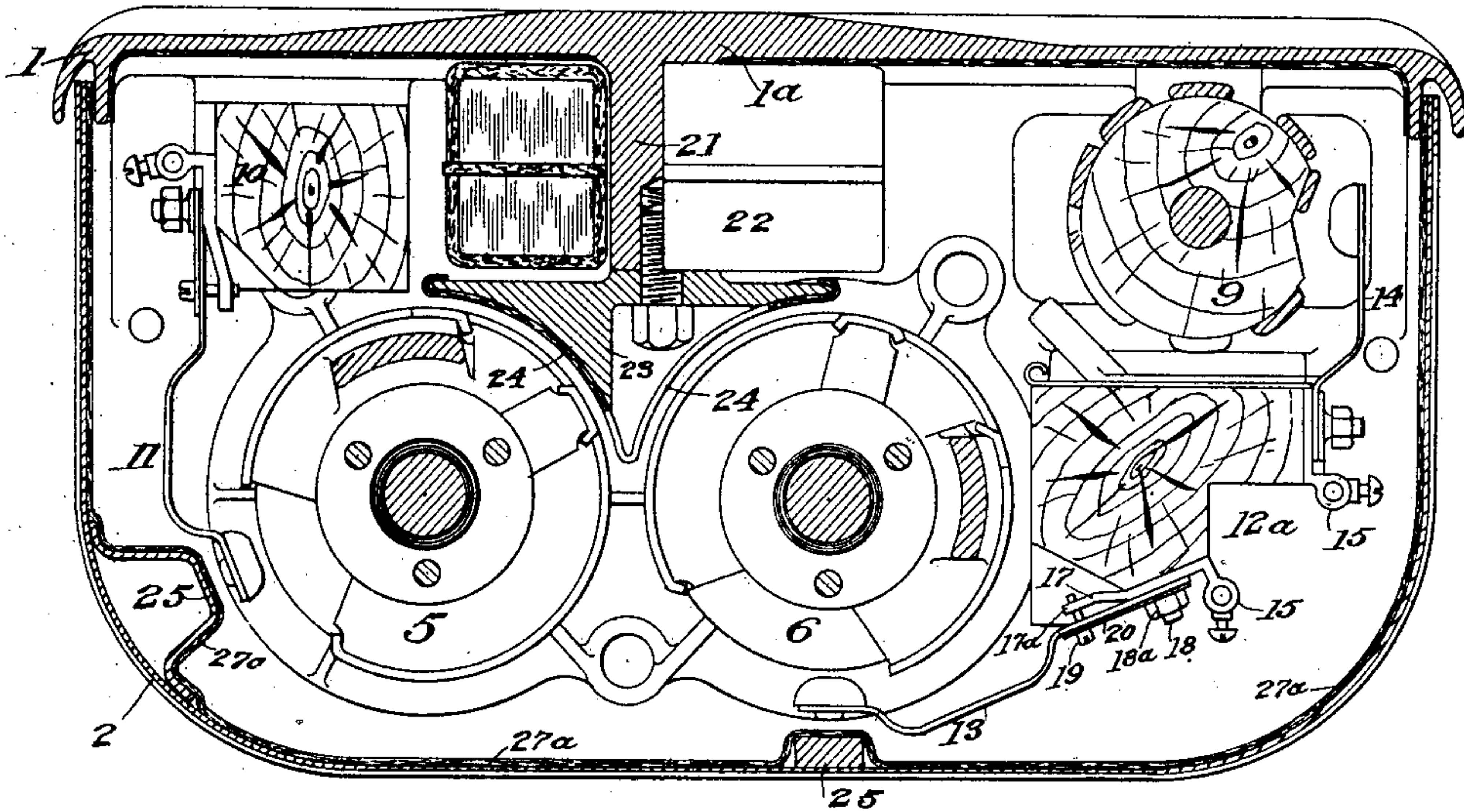


Fig. 2.

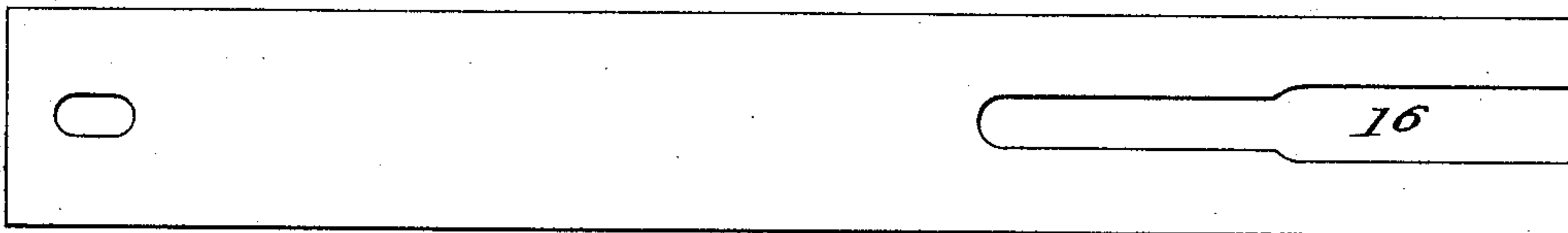


Fig. 3.

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# UNITED STATES PATENT OFFICE.

FRANK A. MERRICK AND EMMETT W. STULL, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNORS TO THE LORAIN STEEL COMPANY, A CORPORATION OF PENNSYLVANIA.

## ELECTRIC-RAILWAY-MOTOR CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 685,781, dated November 5, 1901.

Application filed March 13, 1901. Serial No. 50,982. (No model.)

*To all whom it may concern:*

Be it known that we, FRANK A. MERRICK and EMMETT W. STULL, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented a new and useful Improvement in Electric-Railway-Motor Controllers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention has relation to electric-railway-motor controllers of the general type shown in the patent to Valley, No. 576,333, of February 2, 1897, which have two contact-carrying regulating-drums operated by a single handle or lever and in addition thereto a third drum forming the movable member of a motor-reversing and cut-out switch.

The objects of our invention are, first, to so construct, combine, and arrange the various parts of a controller of this type as to permit of convenient access to such parts for adjustment, renewal, and repairs, and at the same time to make the structure as compact as possible; second, to provide novel and efficient means for extinguishing arcs formed at the contacts of the two regulating-drums, and, third, to provide an improved adjustable contact-finger for use in connection with both the regulating and the reverse-switch drums. We attain these objects by the novel construction, arrangement, and combination of parts, all as hereinafter described, and pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation, partly broken away, of a controller embodying our invention, the front portion of the casing being removed. Fig. 2 is a transverse section on the line 2 2 of Fig. 1, and Fig. 3 is a detail view of one of the contact-fingers.

The casing of the controller is formed in four separable parts—viz., the back portion 1, the front and side portion 2, the bottom portion 3, and the top portion 4.

5 and 6 designate the two contact-carrying regulating-drums, which are arranged side by side on parallel vertical shafts journaled in suitable bearings at the top and bottom portions of the casing. These two drums are

placed as close as possible to the front portion of the casing, considerably nearer to one end thereof than the other, and are inter-gearred at 7 to be simultaneously operated by the movement of a handle 8.

9 is the reverse-switch and cut-out drum, which is journaled in the extreme rear corner portion of the casing, diagonally opposite the drum 5.

10 is a finger-board to which are secured a series of fingers 11, which engage the contacts of the drum 5. This finger-board is placed in the other extreme rear corner portion of the casing and the fingers are secured to its outer lateral face.

11<sup>a</sup> is a second finger-board which is placed immediately in front of the drum 9 and laterally of the drum 6. To the beveled front side of this board 11<sup>a</sup> are secured a series of contact-fingers 13, which engage the contacts of the drum 6, and to the outer lateral face of the same board are secured the fingers 14, which engage the contacts of the drum 9. Between the fixed ends of the two sets of fingers 13 and 14 the board 12 is cut away or recessed to form a space 12<sup>a</sup> for the various conductors which are connected to the terminal lugs 15 of the said fingers and also to receive bent copper strips 16, which form permanent electrical connections between some of the fingers 13 and 14.

It will be readily seen from Fig. 2 that when the front portion 2 of the casing is removed all three sets of contact-fingers will be fully exposed and accessible for adjustment, renewal, &c., and that the three drums will also be exposed and in position to permit inspection and repairs to their respective contacts. From the practical standpoint this is a very important feature of the controller, since it enables adjustments and repairs to be readily and easily made with the controllers in place on the car-platforms and without dismantling them. The adjustments are further facilitated by the novel construction of the contact-fingers themselves, which will now be described.

Each finger consists of a thin strip of copper or other material of high conductivity and inherent elasticity bent to the proper shape



to bring the contact-button secured to its free end into proper relation to the contacts of the drum and having extending into its opposite end an elongated longitudinal slot 16.

5 17 is a rigid finger-base which carries the terminal lug 15 and to which the finger is secured by a bolt 18 and nut 18<sup>a</sup>, which also secures said base to the finger-board. The end portion 17<sup>a</sup> of the finger-base is offset  
10 backwardly away from the finger and is formed with a seat for an adjusting-screw 19, which passes through the inner end of the finger-slot 16.

20 is a thin spring follower-plate which  
15 seats against the outer face of the slotted portion of the finger and forms the bearing for the nut 18<sup>a</sup> and for the end of the screw 19.

The manner in which the adjustment of the finger is effected by turning the screw 19  
20 is readily apparent from Fig. 2. It will also be noted that by slacking the nut 18<sup>a</sup> the finger can be bodily removed whenever desired and that when replaced its adjustment will be the same as before its removal. The  
25 tension of the finger and of the follower 20 against the head of the screw 19 is sufficient to prevent said screw from turning and obviates the use of special means for securing the adjustment.

30 The back portion 1 of the casing is thickened at 1<sup>a</sup> from top to bottom and is formed with an inward projection 21, around which is placed a closed blow-out coil 22. Secured to the inner edge of the projection 21 is a  
35 triangular pole-piece 23, which extends both above and below the coil to substantially the full height of the drums 5 and 6, between the rear portions of which it extends, with its curved lateral faces 24 adjacent to their  
40 peripheries and separated therefrom by only a comparatively short air space or gap. The front portion 2 of the casing, directly opposite the contact-point of both drums 5 and 6, is provided with reinforcements 25 of mag-  
45 netic material, which also act as pole-pieces. When the coil 22 is excited, magnetic circuits are established from the pole-pieces 23 through both the drums 5 and 6, which are composed largely of magnetic material, to  
50 the pole-pieces 25, the circuits being thence completed through the metal of the casing. In this manner both sets of contact-fingers are located in a magnetic field of considerable density, whose lines of force are ap-  
55 proximately perpendicular to the direction of arcs formed between said fingers and the movable contacts of the drum, and thus exert a very efficient extinguishing action thereupon.

60 In order to prevent magnetic leakage, we preferably make both the upper bearings 26 and the lower bearings 27 of the drum-shafts of brass or other non-magnetic material. We also preferably make the part 3<sup>a</sup> of the casing  
65 portion 3 between the reinforcements 25 of non-magnetic material for a similar purpose.

27<sup>a</sup> designates a lining of asbestos or other suitable insulating material for the inner wall of the casing.

28, Fig. 1, designates the usual index-plate 70 and pawl.

29 designates the reverse-switch handle, and 30 a lever device actuated by a cam-plate 31 on the shaft of drum 6 and controlling the movement of said handle, which is shown as  
75 being of the type described and claimed in the patent to F. W. Garrett, No. 665,087, of January 1, 1901. The lever 30 is fulcrumed to a lug depending from the top portion 4 of the casing and is further supported therefrom  
80 by a strap or stirrup 32. When the top 4 is removed, said lever will be removed therewith out of the way.

It will be noted that by the construction, arrangement, and combination of parts above  
85 described not only do we obtain the advantages hereinbefore mentioned, but we provide a very compact form of controller in which the available space within the casing is utilized to the best advantage. We do not, how-  
90 ever, wish to limit ourselves to the precise construction, arrangement, and combination of parts which we have herein shown and described, since variations may be made therein without departing from the spirit and scope  
95 of our invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a controller of the class described, the  
100 combination of an inclosing casing, having a removable front and side portion, of the two regulating-drums journaled side by side at the front portion of said casing and nearer one end thereof than the other, the reverse-  
105 switch drum located in the opposite rear portion of the casing, the finger-board located in front of the reverse-switch drum and carrying one set of fingers, which engage the contacts of the said drum at the outer side there-  
110 of, and another set of fingers which engage the contacts of one of the regulating-drums at its front portion, and a second finger-board in the diagonally opposite portion of the casing, carrying a set of fingers which engage  
115 the other regulating-drum at its outer side, all three of said sets of fingers being secured to outer faces of the said boards and fully exposed by the removal of said front and side portion.  
120

2. In a controller of the class described, the combination of the inclosing casing, and the three contact-carrying drums journaled therein, of two finger-boards located at diagonally opposite corner portions of the casing, one of  
125 said boards having secured thereto two sets of fingers, one for each of two of said drums, and the other board carrying a single set of fingers for the third drum, all of the said fingers being secured to outer faces of the said  
130 boards and contacting with outer sides of the drums.



3. In a motor-controller, the combination with a regulating-drum and a reverse-switch drum, of a finger-board between the peripheries of said drums and having secured to one side thereof a set of fingers having engagement with the contacts of the regulating-drum, and to another side thereof another set of fingers having engagement with the contacts of the reverse-switch drum, and between the said fingers, having a cut-away or recessed portion to receive the electrical connections leading to the said fingers.

4. In a motor-controller, the combination with an inclosing separable casing, of two regulating-drums journaled side by side at the front portion of said casing, a blow-out coil behind the said drums, a pole-piece extending between the peripheries of the drums, and opposing pole-pieces on the said casing at the opposite side of said drums.

5. In a controller for electric motors, the combination with an inclosing casing and two parallel contact-carrying drums journaled side by side at the front portion thereof, of said casing and drums being composed largely of magnetic material, and the casing having reinforced portions both in front and rear of said drums, and a projection extending inwardly toward the drums from its rear portion, of a blow-out coil surrounding the said projection, and a vertical pole-piece secured to said projection and having faces contiguous to the peripheries of both drums.

6. In a controller for electric motors, the combination with a controller-casing formed

largely of magnetic material, and a pair of contact-carrying drums journaled therein, of a blow-out coil common to both drums, a pole-piece extending between the two drums and having surfaces adjacent to each, and contact-fingers located at the opposite sides of each of said drums and between the same and polar reinforcements of the said casing.

7. An adjustable contact device for electric controllers, comprising a rigid base-piece rearwardly offset at one end portion, an elastic contact-carrying strip or finger having a contact-button at one end, and an open longitudinal slot at its opposite end portion, a bolt and nut securing the slotted end portion of said strip to the non-offset portion of said base, and an adjusting-screw seated in the offset portion of the base and engaging the said strip.

8. The herein-described adjustable contact device for electric controllers, consisting of the flexible slotted strip or finger, the rigid finger-base having an offset portion, the spring follower-plate, the bolt and its nut, and an adjusting-screw, arranged substantially as and for the purpose described.

In testimony whereof we have affixed our signatures in presence of two witnesses.

FRANK A. MERRICK.  
EMMETT W. STULL.

Witnesses:

CORA G. COX,  
H. W. SMITH.