

No. 627,549.

Patented June 27, 1899.

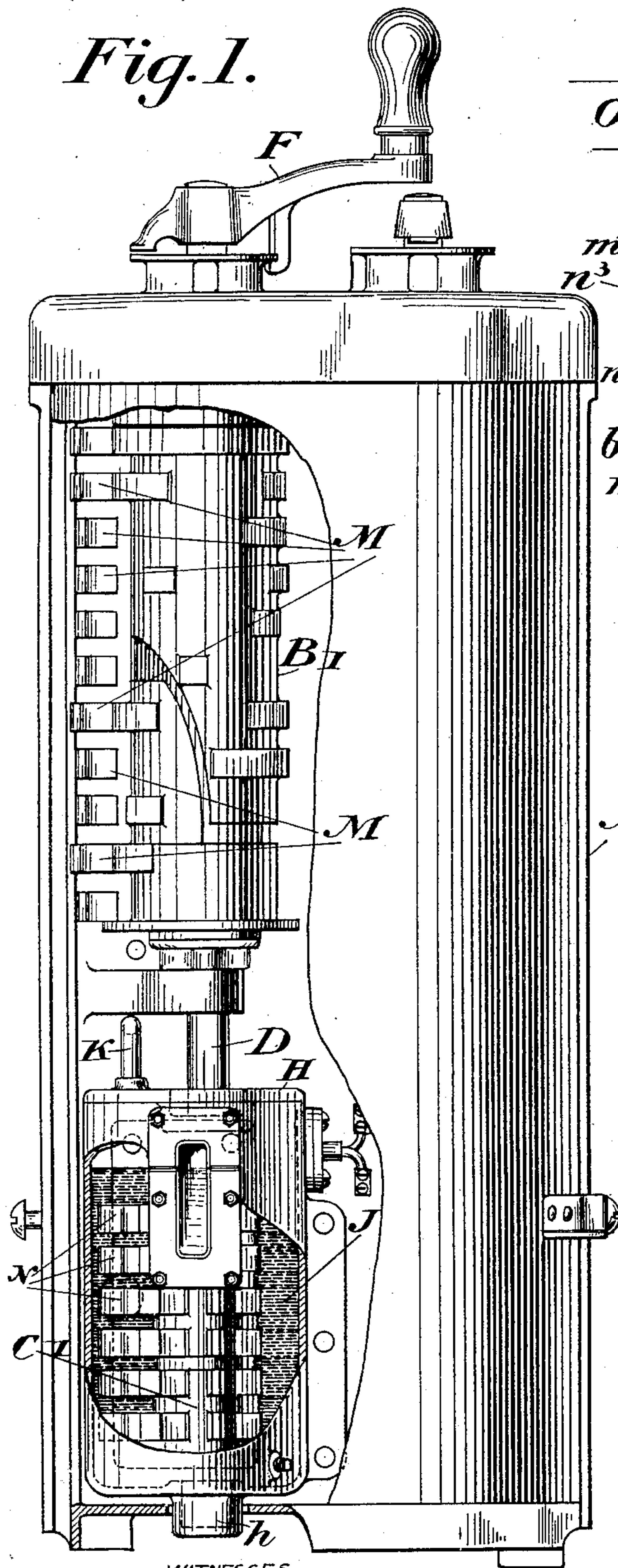
G. VALLEY.  
ELECTRIC CONTROLLER.

(Application filed Jan. 7, 1897.)

(No Model.)

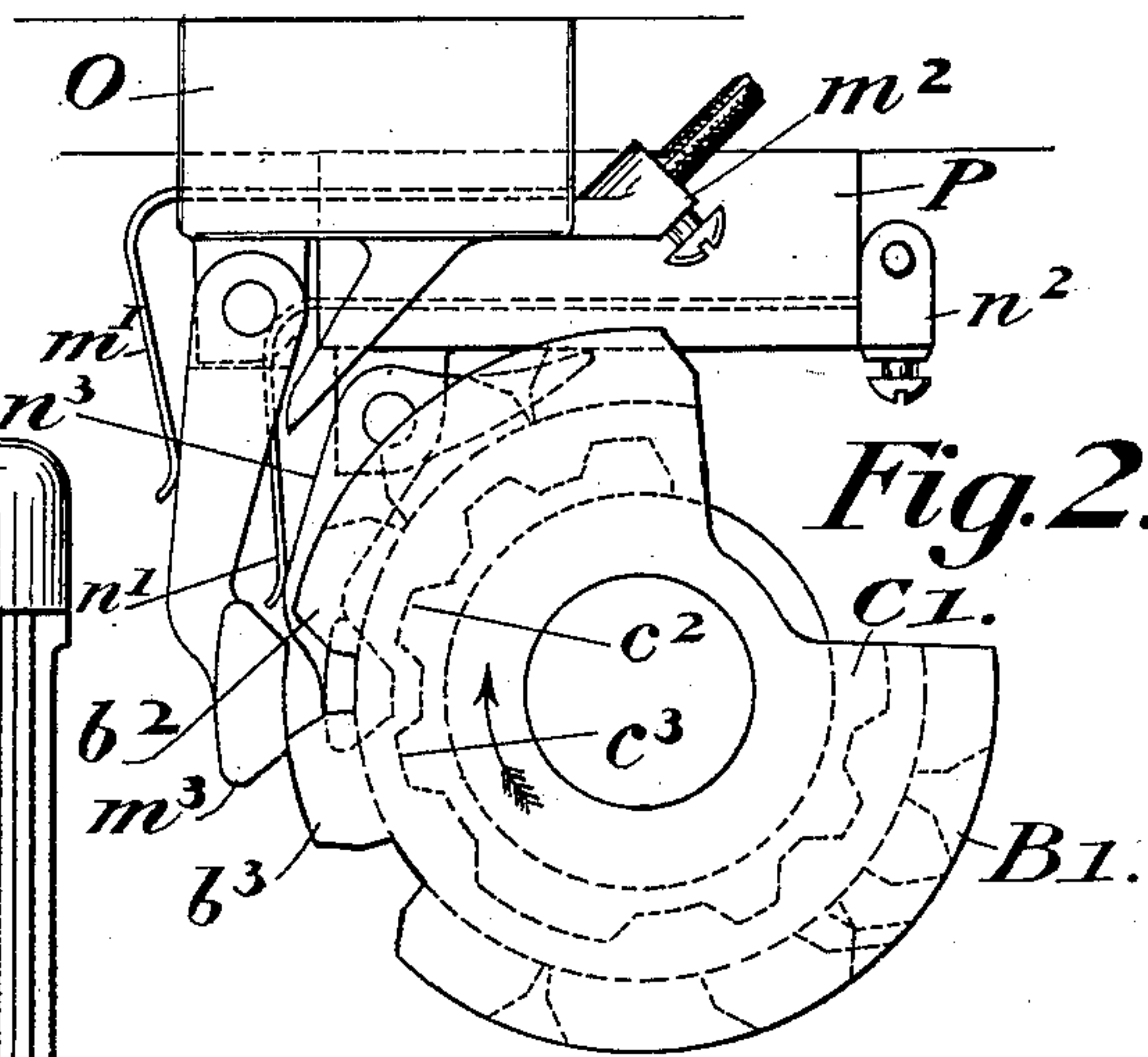
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*Fig. 1.*

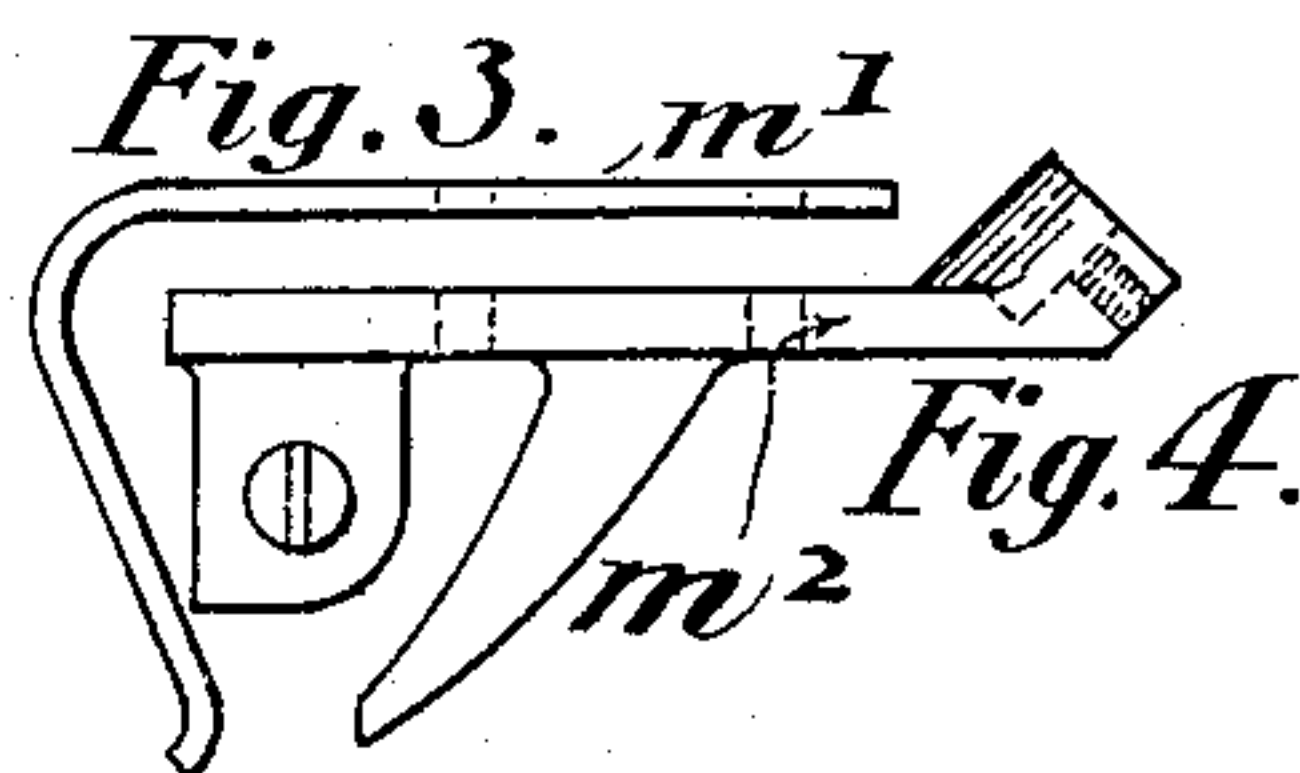


WITNESSES

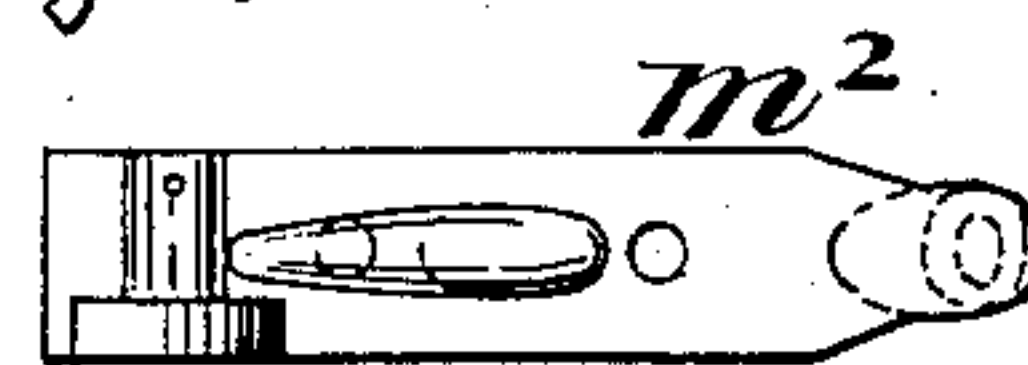
*H. C. Stiff*  
*C. J. Kuss Jr.*



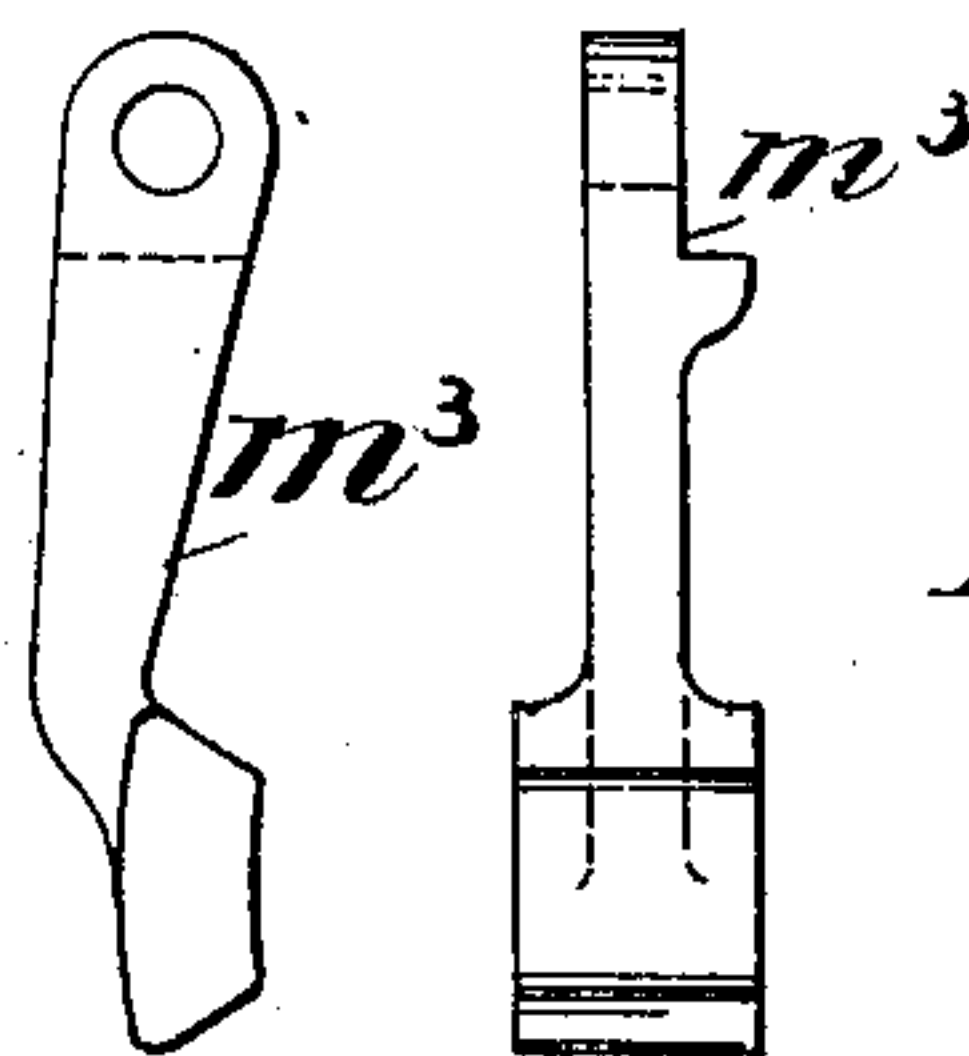
*Fig. 2.*



*Fig. 4.*



*Fig. 5.*



*Fig. 6.*

*Fig. 7.*

INVENTOR  
*Gustaf Valley*  
BY  
*Richard L. Lys*  
ATTORNEY.

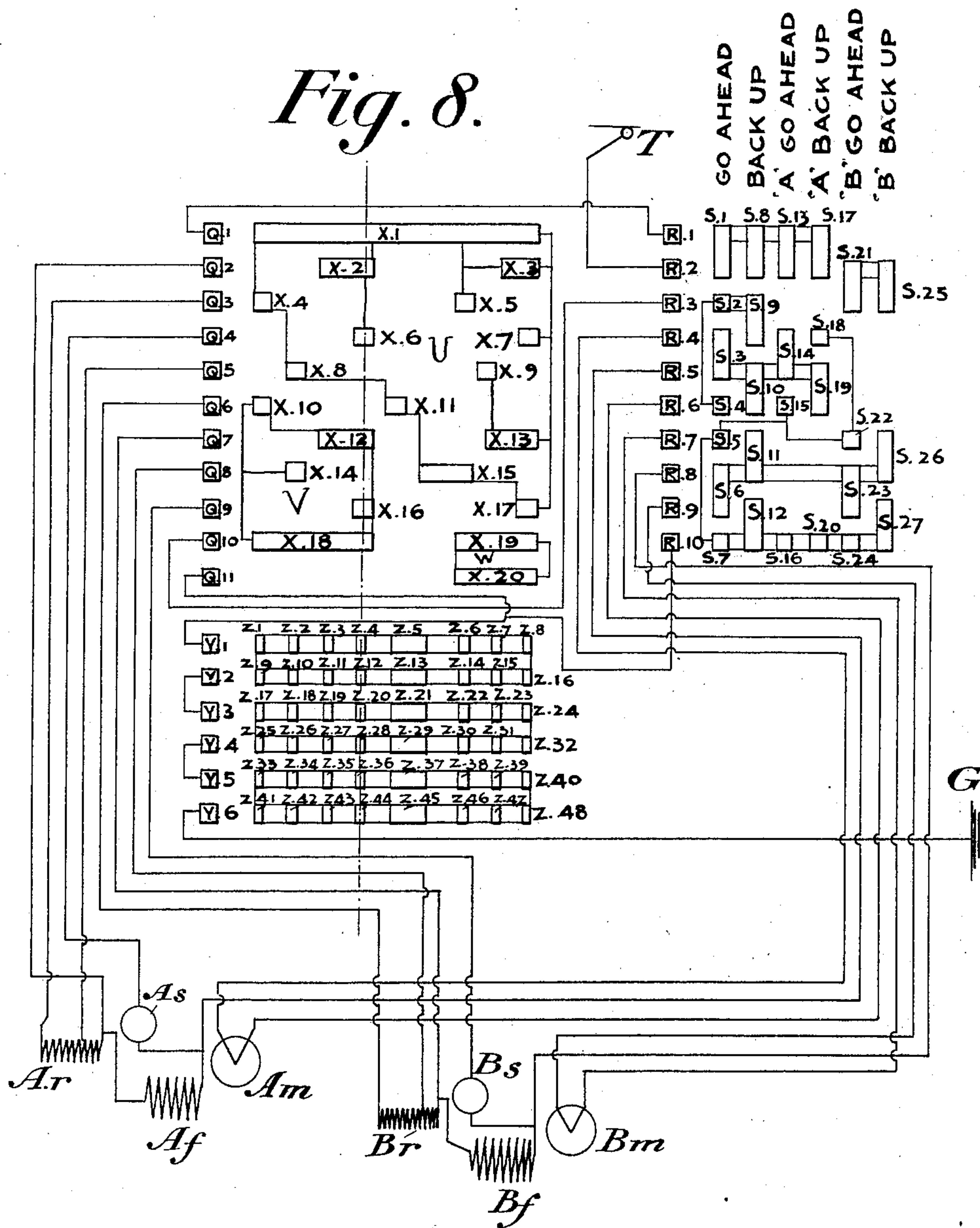
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2 Sheets—Sheet 2.

Fig. 8.



WITNESSES:

*H. C. Stiff*  
*C. F. Kress, Jr.*

INVENTOR

*Gustaf Valley*  
BY  
*Richard L. Gye*  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

GUSTAF VALLEY, OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR TO THE  
STEEL MOTOR COMPANY, OF SAME PLACE.

## ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 627,549, dated June 27, 1899.

Application filed January 7, 1897. Serial No. 618,248. (No model.)

*To all whom it may concern:*

Be it known that I, GUSTAF VALLEY, of Johnstown, Cambria county, Pennsylvania, have invented certain new and useful Improvements in Electric Controllers, of which the following is a specification.

My invention relates to electric controllers of the class used on electric-railway cars, and has for its object the provision of a controller which, while being adapted to serve the purposes required of controllers of this class, will be cheaper to construct, simpler in operation, and more durable than those now known to the art.

To these ends my invention consists, broadly, in an auxiliary switch surrounded by a suitable arc-extinguishing medium and so constructed and connected electrically that all making and breaking of the circuit is concentrated at the contacts of said switch.

My invention also comprises the novel construction, arrangement, and combination of certain other portions of the controller, as will be hereinafter pointed out.

Referring to the drawings, Figure 1 is a front view of a controller, with portions of the main casing and that of the vessel surrounding the auxiliary drum broken away, embodying the features of my invention. Fig. 2 is a plan view of the main and auxiliary drums and contiguous parts of the controller. Fig. 3 is a top view of one of the contact-finger springs. Figs. 4 and 5 are respectively top and side views of the binding-posts of the contact-fingers. Figs. 6 and 7 are respectively top and side views of the hammers of the contact-fingers. Fig. 8 is a diagram of the electric connections of the controller, omitting certain unessential connections, such as those to the connecting-board of the controller.

The controller-casing A' contains within it the drums B' and C', which are adapted to rotate together when the shaft D, upon which they are mounted, is turned by the movement of the operating-lever F.

I prefer to use a reversing and cut-out switch similar to the one shown in Letters Patent No. 561,839, issued to me June 9, 1896; but this is not here shown, except diagrammatically in Fig. 8. Neither do I show the

binding-posts, the locking devices, nor the construction of the drums B' and C', as such form no part of my present invention.

H is a vessel through the top of which the shaft D passes and extends into a bearing-pocket *h* in the lower end of the vessel.

J is a suitable arc-extinguishing medium, preferably oil, with which the vessel H is filled to a level somewhat above the top of the drum C'.

K is a vent-pipe.

M M are the contact-fingers, adapted to make contact with the contacts in drum B', each comprising a spring *m'*, a binding-post *m*<sup>2</sup>, and a hammer or contact member *m*<sup>3</sup>.

Within recesses in the finger-board O the binding-posts *m*<sup>2</sup> *m*<sup>2</sup> and the springs *m'* *m'* are secured, as shown in Fig. 2. One end of *m*<sup>2</sup> is adapted to make an electric connection with the desired part of the circuit and to a lug on the other end of *m*<sup>2</sup>. The hammer *m*<sup>3</sup> is pivoted, the curved end of the spring *m'* being adapted to press *m*<sup>3</sup> toward the drum, while the horn shown on *m*<sup>2</sup> acts as a stop to prevent too much movement in this direction.

*n'*, *n*<sup>2</sup>, and *n*<sup>3</sup> are similar parts of the N group of fingers secured to the finger-board P. They are similar in arrangement to *m'*, *m*<sup>2</sup>, and *m*<sup>3</sup>, except that the stop shown on *m*<sup>2</sup> is placed upon *n*<sup>3</sup>. The N fingers are immersed in the oil J and are adapted to make contact with the contact-points upon drum C'.

The arrangement of contacts upon the drum C' is shown in Fig. 2 and their relation with the contacts on the drum B'. Both drums are rotating in the direction shown by the arrow. The hammer *m*<sup>3</sup> has already made contact with *b*<sup>3</sup>, while the hammer *n*<sup>3</sup> has not yet reached *c*<sup>3</sup>. Conversely it is evident that *n*<sup>3</sup> had broken contact with *c*<sup>2</sup> before *m*<sup>3</sup> had broken contact with *b*<sup>2</sup>. As this relation is continued throughout the operating arc of the drums, all making and breaking of the circuit is concentrated within the oil. These relative positions between the contacts upon drum B and those upon drum C are clearly shown diagrammatically in Fig. 8.

Referring to Fig. 8, the Q group of connections represent the contacts of the M fingers, while the X group represent the contacts of



the controlling-drum B'. The Y group represent the contacts of the N group of fingers, while the Z group represent those of the auxiliary drum C'. The R group represent contacts of the fingers of the reversing and cut-out switch, and the S group represent the contacts of the reversing and cut-out drum. Ar, Af, As, and Am represent the resistance, field, shunt-coil for weakening the strength of said field, and armature, respectively, of one of the motors, while Br, Bf, Bs, and Bm represent, respectively, similar parts of the other of the motors. T is the trolley side of the circuit, and G is the ground side thereof.

Of the eleven points in the Q group of finger-contacts two (Q' and Q<sup>10</sup>) are connected to fingers of the R group, (R' and R<sup>3</sup>), so that the trolley side of the circuit which is connected to R<sup>2</sup> may be connected to either Q' or Q<sup>10</sup>, as desirable. One of the Q group is connected to one of the Y group. Of the other eight Q contacts four are connected to parts of the A motor-circuit and four to parts of the B motor-circuit. The X group of contacts, which by the rotation of the drum upon which they are mounted come in contact with the Q group, are divided into three sets, U, V, and W, the contacts of each set being electrically connected together, but each set being insulated from the other sets. The U group comprises both "series" and "multiple" points, the series points always serving to direct the current from the "trolley" side of the circuit to desired parts of the A circuit, while the multiple points serve to direct it to the desired parts of both circuits in multiple. The contacts of V group are all series points and always serve to direct the current to parts of the B circuit. The contacts of the W group are both multiple points and serve to direct the current to the ground side of the circuit. The connections of the Y fingers and Z drum-contacts are simple and clearly shown, these groups merely being interposed between the usual parts of the circuit and the ground side thereof.

As an illustration of the capabilities with a small number of contacts which my improved arrangement allows, I will suppose the reversing-switch to be at "Back up both" and the main drum, with the center of the Q and Y groups of contacts, opposite the dotted line passing through the X and Z groups. In this case the course of the current would be:

T R<sup>2</sup> S<sup>8</sup> R' Q' X', thence part through X<sup>2</sup> Q<sup>2</sup> Af and part through X<sup>6</sup> S<sup>10</sup> R<sup>6</sup> Am (backward-actuating side) R<sup>4</sup> S<sup>9</sup> R<sup>3</sup> Q<sup>10</sup> X<sup>18</sup>, thence part through X<sup>12</sup> Q<sup>7</sup> Bf and part through X<sup>16</sup> Q<sup>9</sup> Bs, here joining, thence R<sup>8</sup> S<sup>11</sup> R<sup>7</sup> Bm (backward-actuating side) R<sup>9</sup> S<sup>12</sup> R<sup>10</sup> Y' Z<sup>4</sup>, &c., Z<sup>12</sup> Y<sup>2</sup> Y<sup>3</sup> Z<sup>20</sup>, &c., Z<sup>28</sup> Y<sup>4</sup> Y<sup>5</sup> Z<sup>36</sup>, &c., Z<sup>44</sup> Y<sup>6</sup> G, in this manner backing up with both motors, the fields of each being weakened and the current passing through the auxiliary drum before reaching the ground side.

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I wish to be understood as not limiting myself to the exact details as here shown and described; as many changes in the mechanical and electrical combinations may be made without departing from the scope of my invention.

What I claim, and desire to protect by Letters Patent, is—

1. In an electric controller, in combination, a rotatable drum having a plurality of contacts, an auxiliary drum rotatable with the first-mentioned drum and in electric circuit therewith, said auxiliary drum being surrounded by an arc-extinguishing medium and having a plurality of contacts placed in such relation with the contacts of said first-mentioned drum that the circuit is always made and broken by the auxiliary drum.

2. In a system of electric control for motors, two separate circuits, each containing part of the motors and of the other apparatus used in conjunction therewith, a controlling-drum and fingers adapted to engage contacts upon said drum, a group, as U, of contacts upon said drum, adapted to direct the electric current to the desired parts of one of the said circuits, or to both of said circuits in multiple, as desired, a second group of contacts, as V, upon said drum, insulated from the first-mentioned group and adapted to direct the current to parts of the other of said circuits, and a third group of contacts, as W, upon said drum insulated from both of the aforementioned groups and adapted to direct the current to the ground side of the circuit.

3. In a system of electric control for motors, two separate circuits, as A and B, each containing part of the motors and apparatus used in conjunction therewith, a reversing and cut-out drum connected to the source of supply and to parts of each of the said circuits, a connection from said reversing and cut-out drum to a group, U, of movable contacts adapted by their movement to first connect with parts of the said A circuit and afterward with parts of both of the said circuits in multiple, another connection from said reversing and cut-out drum adapted to engage first a group V of movable contacts, adapted by their movement to connect with parts of the said B circuit, said connection afterward engaging a group W of movable contacts adapted to connect with the return side of the circuit.

In testimony whereof I have affixed my signature in presence of two witnesses.

GUSTAF VALLEY.

Witnesses:

T. H. NORMAN,  
H. W. SMITH.