No. 656,473. Patented Aug. 21, 1900.

C. J. REED.

ELECTRIC CONTROLLER.

(Application filed Jan. 13, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

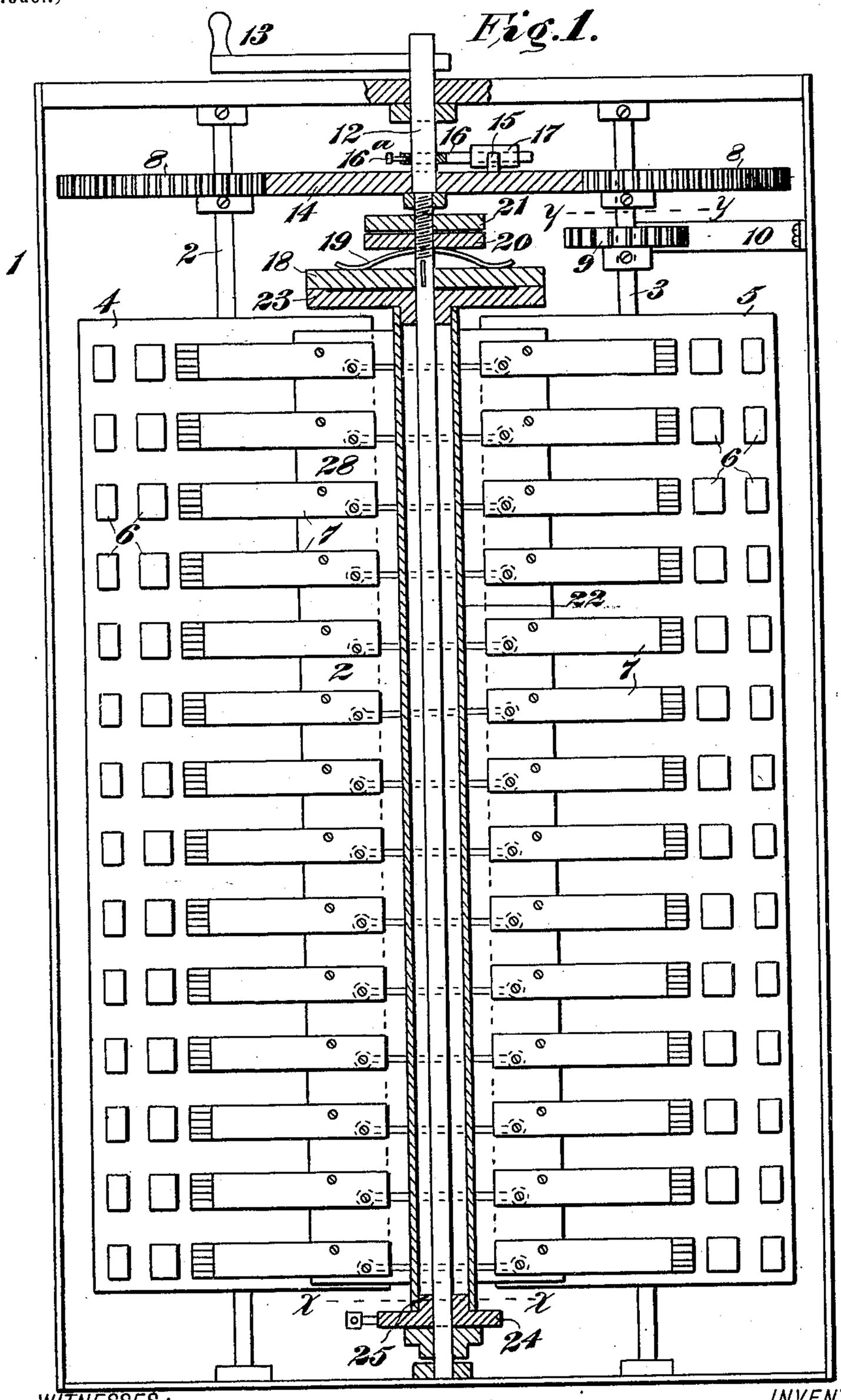

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Fig. 2.

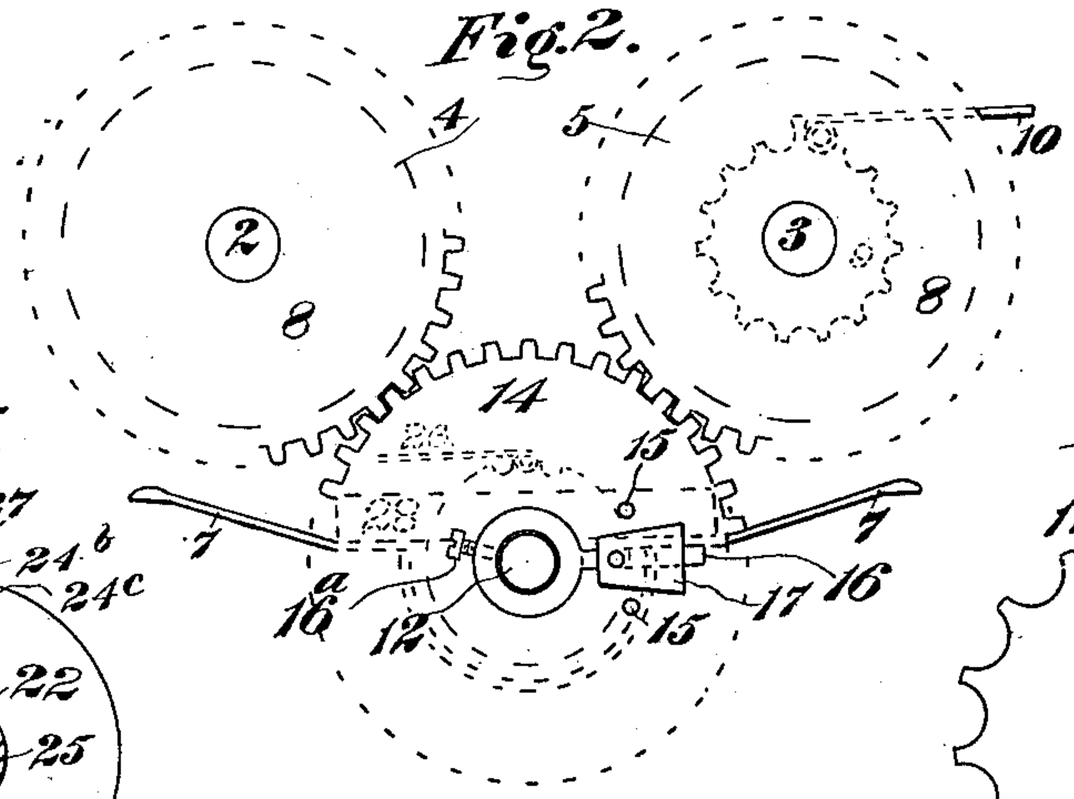

Fig. 5.

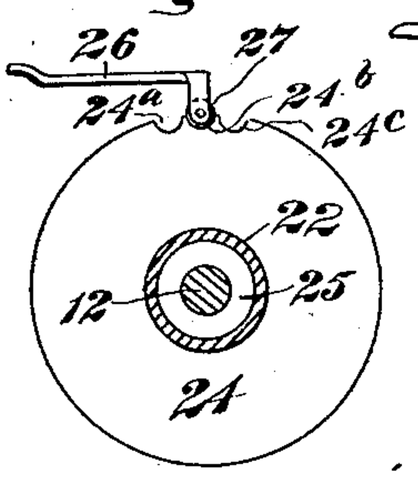

Fig. 6.

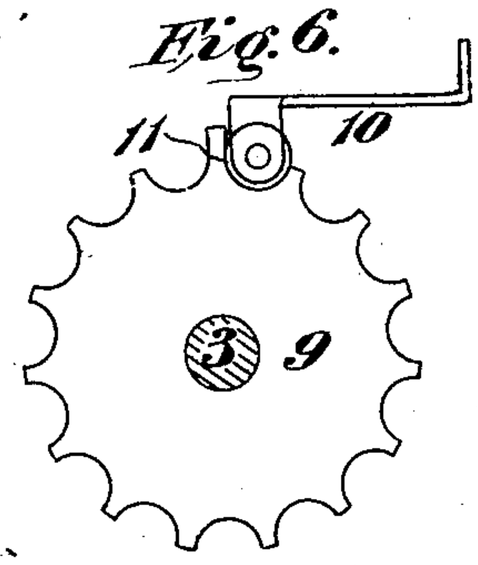

Fig. 3.

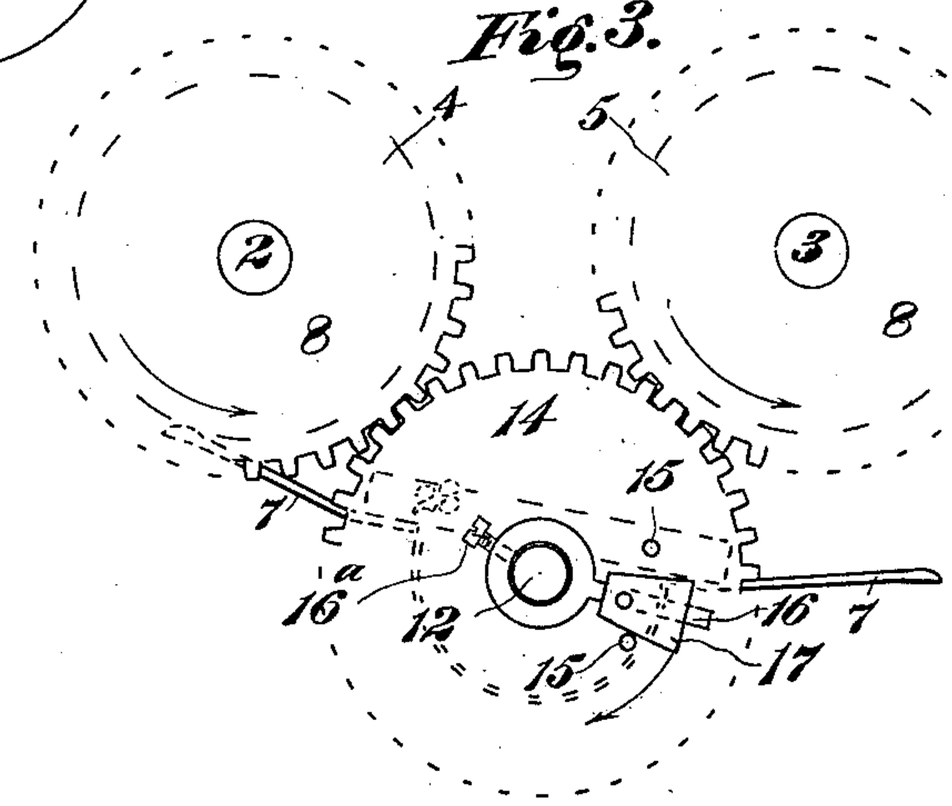

Fig. 4.

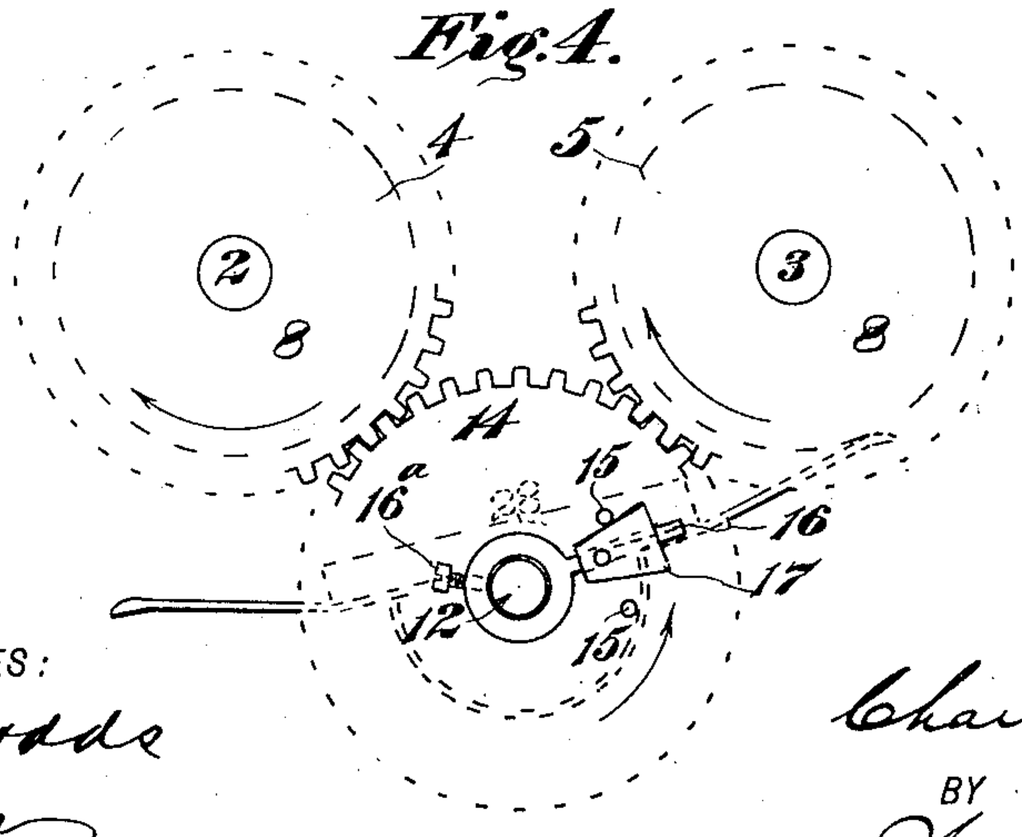

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Fig. 7.

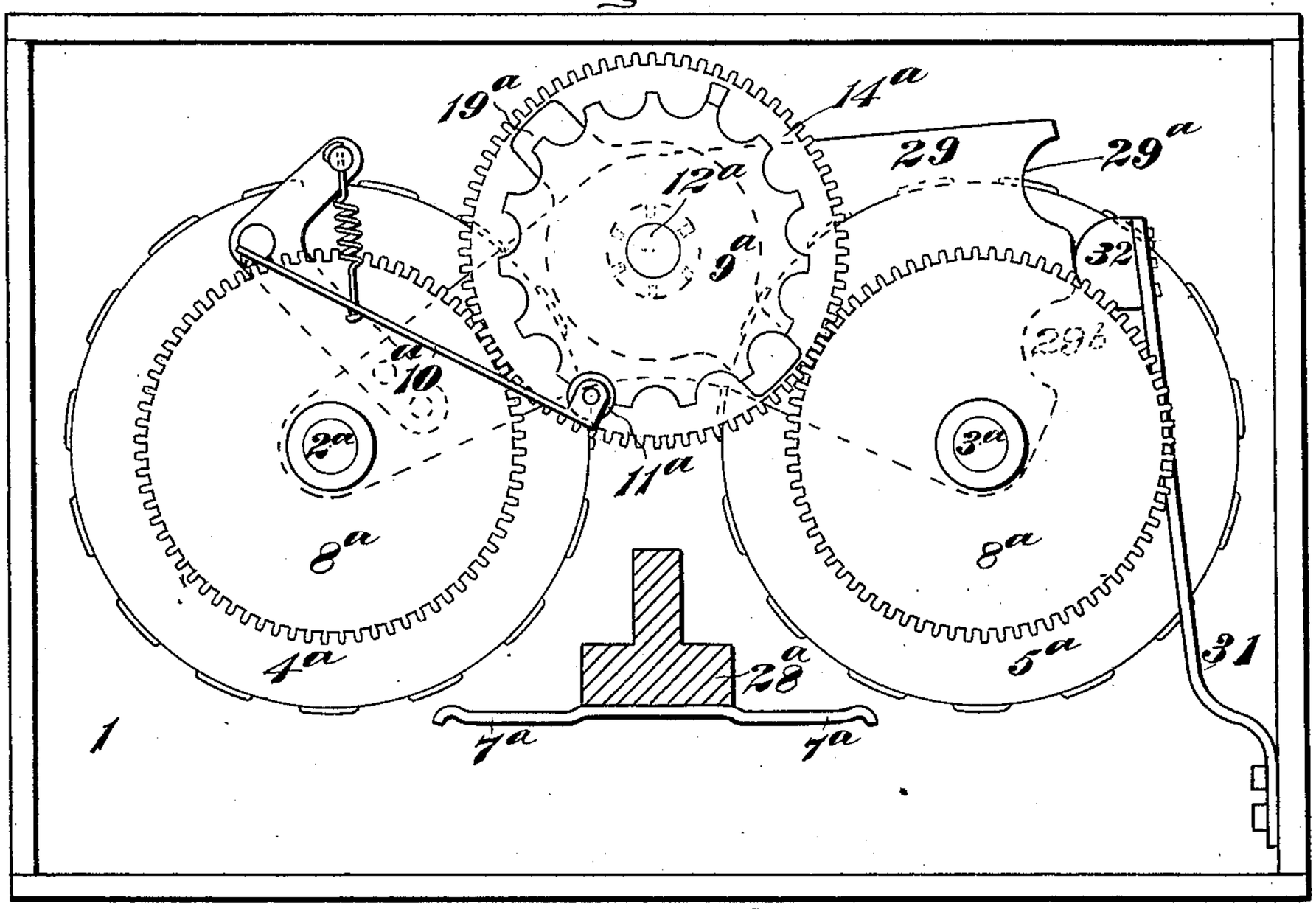
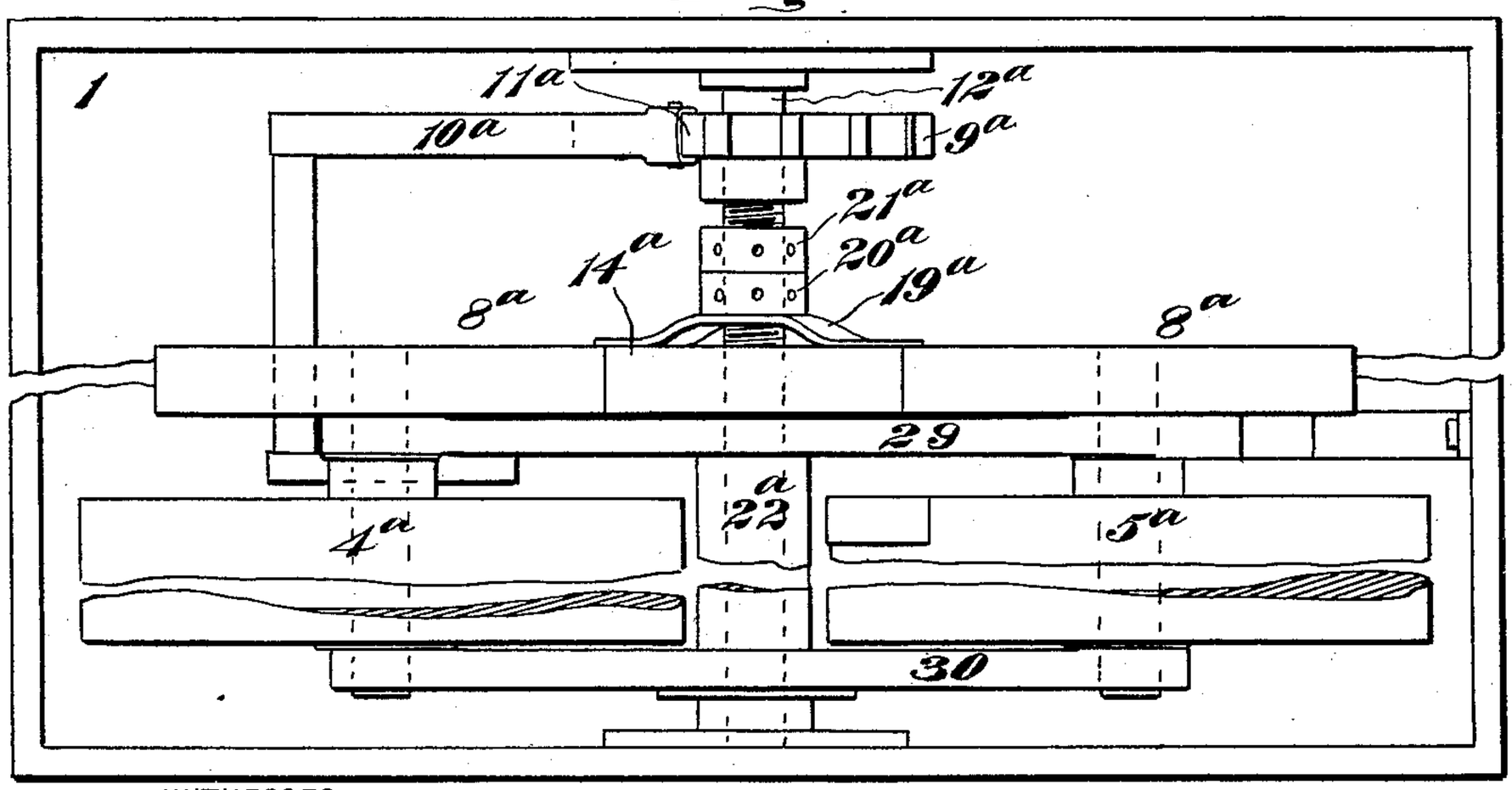


Fig. 8.



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UNITED STATES PATENT OFFICE.

CHARLES J. REED, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 656,473, dated August 21, 1900.

Application filed January 13, 1899. Serial No. 702,040. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. REED, a citizen of the United States, residing in Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Electric Controllers, (Case No. 800,) of which the following is a specification.

My invention relates to electric controllers or switching devices; and it has for its object to produce a two-part controller for regulating or controlling two separate circuits or sets of circuits at different times, the part of the controller corresponding to one circuit or set of circuits being thrown into operative position and that corresponding to the other circuit or set of circuits being thrown out of operative position, and vice versa, according to the direction of rotation of the operating-handle.

In the operation of electric translating devices, such as motors, at different speeds it is necessary to frequently change the relation of the components of one or several electric circuits. This is generally accomplished by means of a controller, which consists ordinarily of a drum rotated by a handle and having on its convex surface a number of longitudinal sets of metallic contact-pieces suitably arranged and interconnected and a plurality of stationary contact brushes or fingers forming terminals of the various components of the electric circuit or circuits and arranged to engage with the contact-pieces on the drums as the latter are rotated from one position to another. In all such controlling devices heretofore in use, so far as I am aware, the stationary and drum contacts make engagement and the circuits are correspondingly changed in a certain fixed order when the operating-handle is turned in one direction, and the same coöperation of contacts and changes in circuits is made in the reverse order when the operating-handle is turned in the opposite direction. In certain methods of operating electric translating devices—such, for example, as those described by me in my applications filed November 14, 1898, Serial No. 696,385, and November 25, 1898, Serial No. 697,358—it is sometimes found desirable to operate the translating devices through one set or system of contacts in a fixed order and to subsequently operate the same devices through a different set or system of contacts in a fixed order and to always operate in the same order each of the two systems as well as to be able to change from one system of contacts to the other without at any time reversing the order of the contacts in either system. It is further desirable in certain applications of the method above referred to to operate the two systems of contacts alternately by moving or rotating the same operating-handle alternately in opposite directions. I accomplish all of these objects in a simple and efficient manner by means of the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of one form of controller; and Figs. 2, 3, and 4, views, partially in plan and partially in section, of certain of the controller-operating mechanism, these views showing the contact brushes or fingers in three different positions. Figs. 5 and 6 are horizontal sectional views taken, respectively, on lines x x and y y of Fig. 1. Fig. 7 is a view, partially in plan and partially in section, of a modified form of controller embodying my invention; and Fig. 8 is a front elevation of such modified controller, only the upper and lower ends of the frame and the drums being shown.

Referring particularly to Figs. 1 to 6, inclusive, 1 is a supporting base or frame, which may be of any known or suitable form, material, and dimensions. Mounted in suitable bearings in this frame are two shafts 2 and 3, on which are respectively mounted drums 4 and 5, provided with surface contact pieces or plates 6, suitably arranged in sets and interconnected in a manner well known in the art in order that they may coöperate with the contact brushes or fingers 7 as the drums are rotated to suitably vary the circuit connections of the controlled apparatus or machines. Each shaft has keyed or otherwise rigidly fastened to it, above the drum, a gear-wheel 8, and the shaft 3 is provided with a notched disk 9, the notches in which correspond to the several running positions which it is necessary or desirable to indicate to the motorman as the drums are rotated. A spring-actuated arm or pawl 10 is provided with a roller 11, which coöperates with the

notches in the disk, as is usual in devices of this character. Journaled in suitable bearings in the frame, midway between the two drums 4 and 5, but laterally displaced with reference thereto, is a shaft 12, the upper end of which projects through the frame and is provided with a suitable operating-handle 13. This shaft 12 is also provided with a gear-wheel 14, of such size as to mesh with the gear-wheels 8 on the shafts 2 and 3. This gear-wheel 14 is provided with two pins or lugs 15, and located between these is a horizontally-projecting arm 16, the inner end of which surrounds the shaft in the form of a ring and is fastened thereto by means of a set-screw 16^a or otherwise. This arm 16 is, as shown, provided with a longitudinally-movable block 17, fastened to the arm by means of a set-screw or otherwise. This block 17 is wedge-shaped in order that it may be moved longitudinally upon the arm, so as to secure just the amount of play between the two pins or stops 15 that is desired. Below the gear-wheel 14 the shaft 12 is provided with a friction-disk 18, upon the upper side of which bears a suitable spring 19, an adjusting-nut 20 and a lock-nut 21 being screw-threaded upon the shaft, so as to adjust the pressure exerted by the spring 19 upon the friction-disk 18. This disk 18 is fastened to the shaft 12 by means of a key or spline, so that it has no movement circumferentially with reference thereto, but is movable longitudinally. Surrounding the shaft 12 is a hollow shaft or tube 22, to the upper end of which is rigidly fastened a friction-disk 23, corresponding to the disk 18 on the shaft 12. The lower end of this hollow shaft or tube 22 is also provided with a disk 24, having a hub 25, over which the tube fits, the disk being provided with three notches 24^a, 24^b, and 24^c, corresponding to the three working positions into which it is desired to move the hollow shaft. A suitable pawl 26 is provided with a roller or other projection 27, so located as to engage the notches in the disk. Two sets of brushes 7 are mounted upon a suitable support 28, so as to project in opposite directions, this support 28 being rigidly fastened to the hollow shaft 22. It will be readily seen that when the operating-handle 13 is turned in one direction the friction-clutch 18 23 will act to rock the hollow shaft 22, the brush-support 28, and the brushes 7 in the same direction that the operating-handle is moved, so as to bring the brushes on one side into engagement with the corresponding drum. The disk 24 and pawl 26 27 will obviously tend to hold the parts in this position, and as the shaft 12 is rotated farther in the same direction the friction-plate 18 on the shaft 12 will slide over the friction-plate 23 on the hollow shaft 22, thus permitting the brushes to remain in contact with the drum 4 or the drum 5, as the case may be, during the rotation of the same to make the desired circuit changes. If the operating-handle be moved in the opposite direction, the friction-plates will again cohere with sufficient force to rock the hollow shaft, the brush-support, and the brushes in the opposite direction, so as to bring the latter into engagement with the corresponding drum, the disk 24 being moved to bring the pawl-roller 27 into the corresponding notch, so as to retain the brushes in contact with the drum while the handle is being moved in that direction. It will also be seen that by reason of the lost motion between the block 17 on the arm 16 and the pins or stops 15 on the gear-wheel 14 the brushes will be rocked into engagement with the corresponding drum before any rotation of the drums takes place.

Referring now particularly to Figs. 7 and 8, the supporting frame or casing 1 is or may be substantially the same as the corresponding part already described, as are also the drums 4^a and 5^a and the gear-wheels 8^a and 14^a. In this modification, however, the two drum-shafts 2^a and 3^a are journaled at their respective ends in two plates 29 and 30, these plates being rigidly mounted upon a hollow shaft 22^a, surrounding but not attached to the main shaft 12^a. In this case the notched disk 9^a for indicating the several running positions of the controller is mounted on the central or main shaft 12^a, and a pawl 10^a and roller 11^a are suitably mounted in such position as to coöperate therewith. The brushes 7^a are stationary, they being mounted upon a suitable supporting-bar 28^a, and the drums 4^a and 5^a are rocked to bring them into contact with the brushes, the means for this purpose being similar to the means heretofore described—that is, a spring 19^a is located on the shaft 12^a above the gear-wheel 14^a and is pressed against the latter by means of an adjusting-nut 20^a and a locking-nut 21^a, thus pressing the wheel to a greater or less degree against the upper supporting-plate 29. This plate 29 is provided at one end with two notches 29^a and 29^b, corresponding to the two positions of the drums. A pawl 31 is fastened to the frame, and its free end is provided with a projection 32 to engage with the notches 29^a and 29^b. It will be apparent from the foregoing description that when the main shaft is rotated in one direction by means of an operating-handle like or similar to that shown in Fig. 1 the supporting-plates 30 and 29 will be moved until the pawl projection 32 drops into one of the notches therein and the corresponding drum is brought into engagement with the brushes or fingers 7^a at that side, a further rotation permitting the gear-wheel 14^a to move without further movement of the supporting-plates. In the same manner, if the operating-handle is moved in the opposite direction the supporting-plates will be moved to such position that the projection 32 on the pawl 31 will drop into the corresponding notch and the corresponding drum will be brought into engagement with the brushes on that side of the support, this position being maintained so long as the same

direction of movement of the operating-handle is continued in order to rotate the drum for the purpose of making circuit changes.

The apparatus shown and described, while adapted to the purpose for which it is intended, may obviously be modified in many respects, both as regards the structure and the arrangement of the parts and as regards the number and dimensions of such parts, without departing from the spirit and scope of my invention.

I claim as my invention—

1. An electric controller or switching device, comprising a plurality of brushes constituting the terminals of translating devices, sources of energy or component parts of operative electric circuits, in combination with two separate systems of contact-plates arranged in sets or groups and means for causing said brushes to engage successively several sets of contact-plates of one system in a fixed order and subsequently to engage successively several sets of contact-plates of the other system in a fixed order, and for causing each system of contact-plates to return to its initial or out-of-circuit position during the engagement of the other system with the brushes.

2. An electric controller or switching device, comprising a plurality of brushes, constituting the terminals of translating devices, sources of energy or component parts of operative electric circuits, in combination with two separate systems of contact-plates arranged in sets or groups and means for causing said brushes to engage successively several sets of contact-plates of one system in a fixed order and subsequently to engage successively several sets of contact-plates of the other system in a fixed order and for causing the initial relative position of the brushes and one system of contact-plates to be restored during the engagement of the brushes with the other system.

3. In an electric controller, the combination with a plurality of contact fingers or brushes, of two drums provided with suitable interconnected and arranged contact pieces or plates, an operating shaft and handle, gearing between said shaft and said drums and means operated by the rotation of said shaft to produce a relative movement of the brush and drum supports, whereby an engagement between the brushes and one drum and disengagement of the brushes and the other drum are effected prior to any movement of rotation of the drums upon their axes.

4. In an electric controller, the combination with a plurality of double contact brushes or fingers, of a pair of drums provided with sets of contact-pieces suitably arranged and connected, an operating shaft and handle, gearing between said shaft and said drums and a means actuated by the rotation of said shaft to produce an initial relative movement of the brush and drum supports for effecting an engagement between the brushes and one drum and a disengagement of the brushes and the other drum, the drum which is brought into engagement with the brushes being determined by the direction of rotation of the shaft.

5. In an electric controller, the combination with a plurality of brushes mounted upon a support adapted to have a limited rotary movement, of a pair of drums provided with contact-pieces suitably arranged and interconnected, an operating shaft and handle, gearing between said shaft and said drums, and a friction-clutch mechanism between said shaft and said brush-support, whereby the brushes are moved into engagement with one drum when the shaft is rotated in one direction and into engagement with the other drum, when the shaft is oppositely rotated.

6. In a controller for electric motors, the combination with a plurality of terminal brushes or fingers and a movable support therefor, of a pair of drums provided with interconnected contact-pieces, an operating shaft and handle geared to said drums and a yielding friction-clutch connection between the shaft and the brush-support, whereby the brushes are initially moved into engagement with the one or the other drum according to the direction of rotation of the operating-shaft.

In testimony whereof I have hereunto subscribed my name this 6th day of January, 1899.

CHARLES J. REED.

Witnesses:
JAMES W. LAWS,
ROBT. B. FLETCHER.