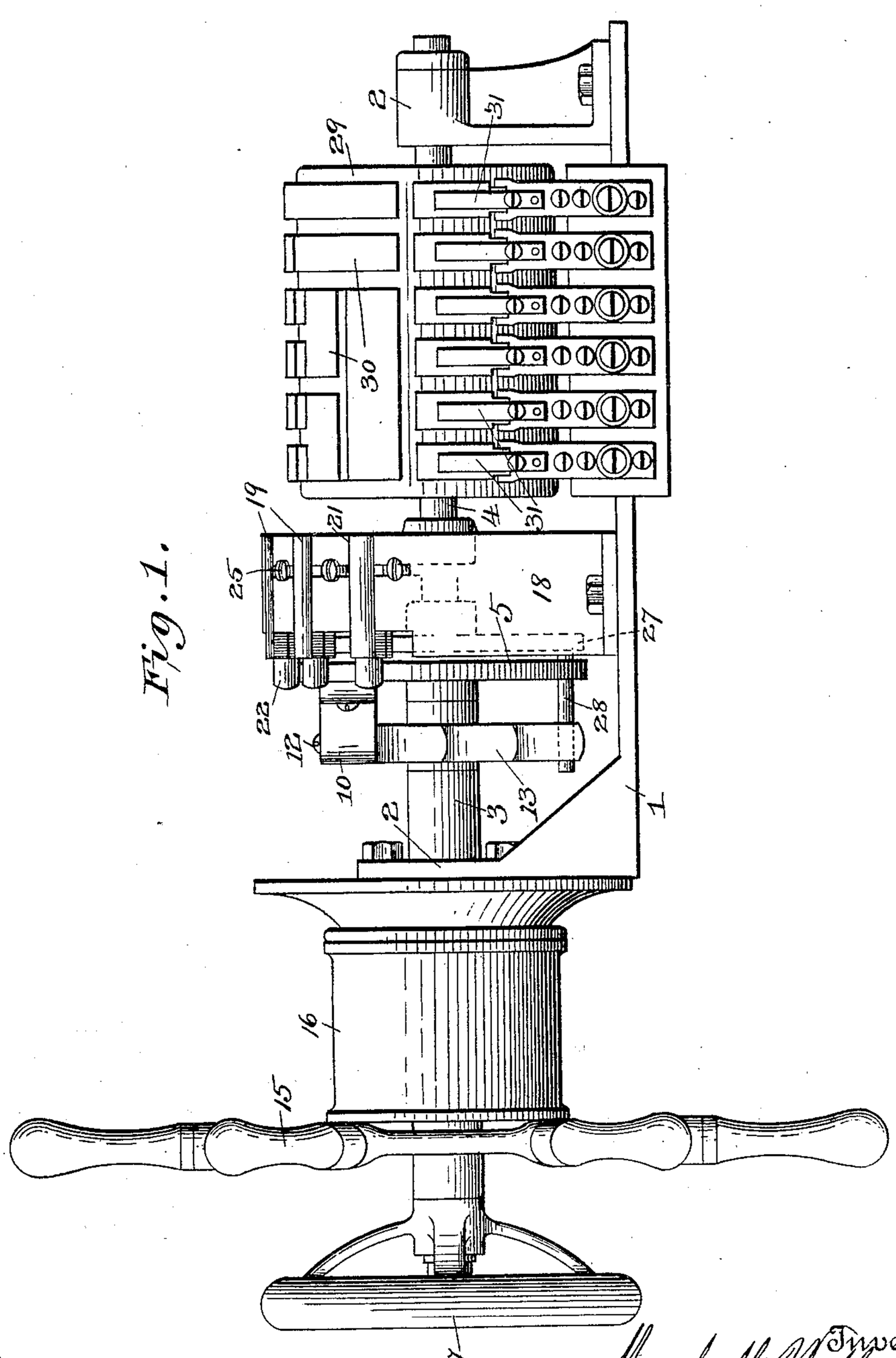
(No Model.) 3 Sheets—Sheet 1.

M. W. HANKS.

ELECTRIC CONTROLLER.

No. 606,009. Patented June 21, 1898.

Fig. 1.



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ELECTRIC CONTROLLER.

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Fig. 2.

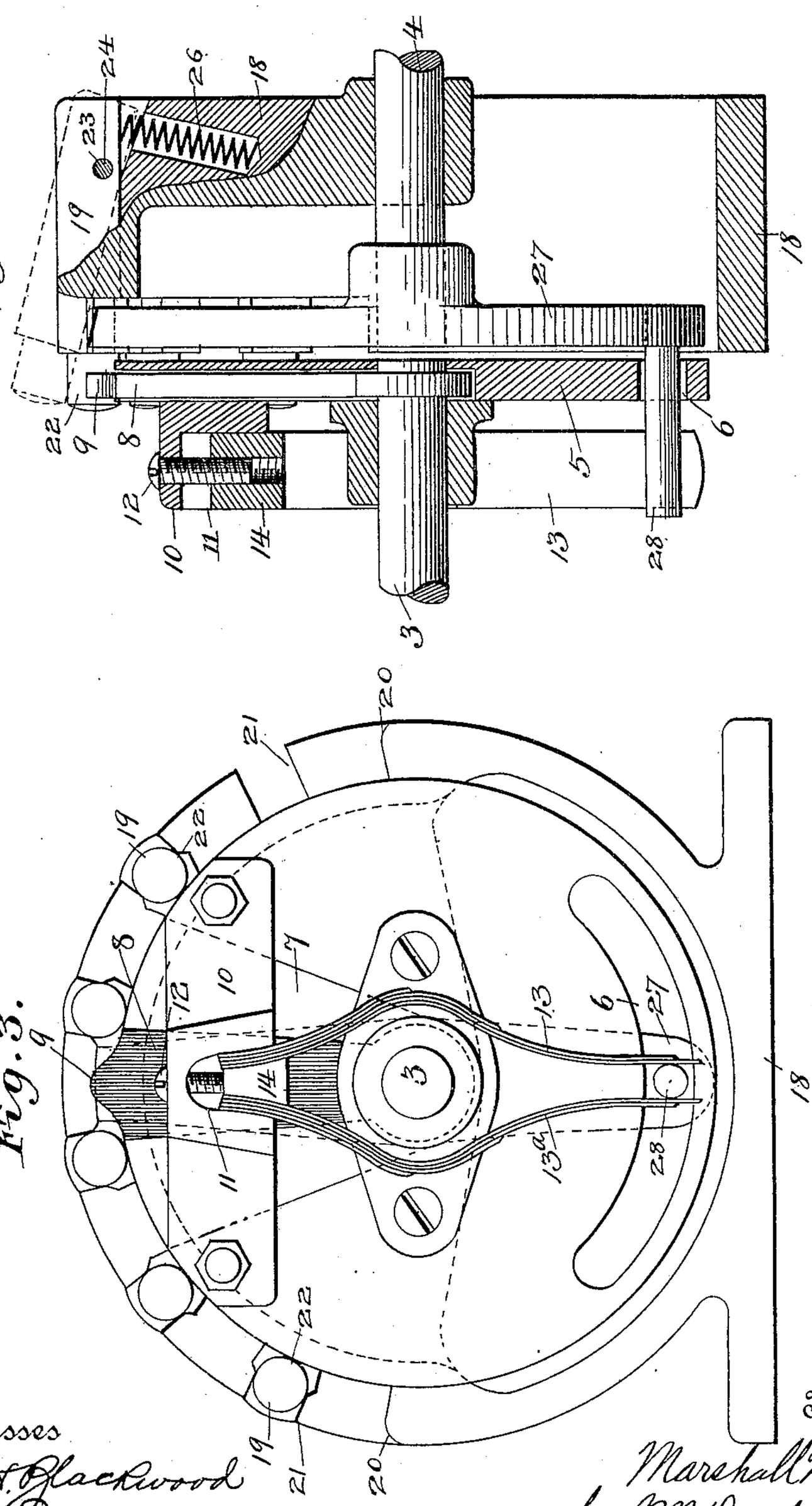

Fig. 3.

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M. W. HANKS.

ELECTRIC CONTROLLER.

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Fig. 4.

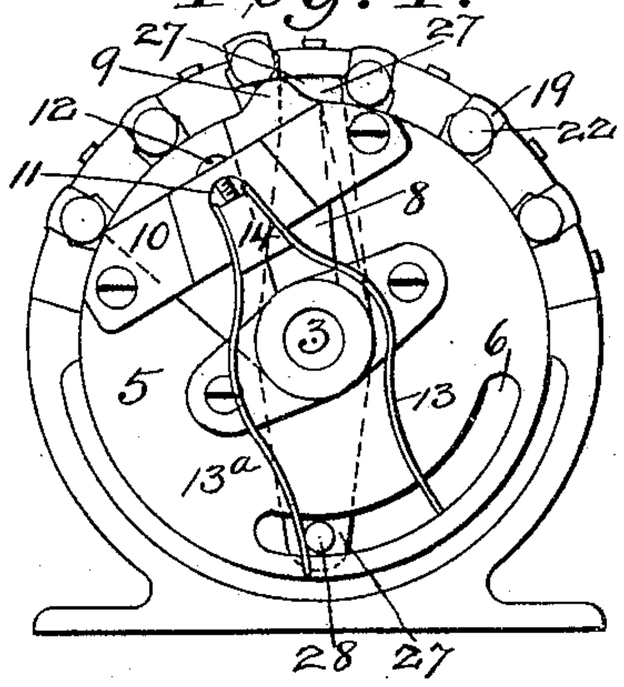


Fig. 5.

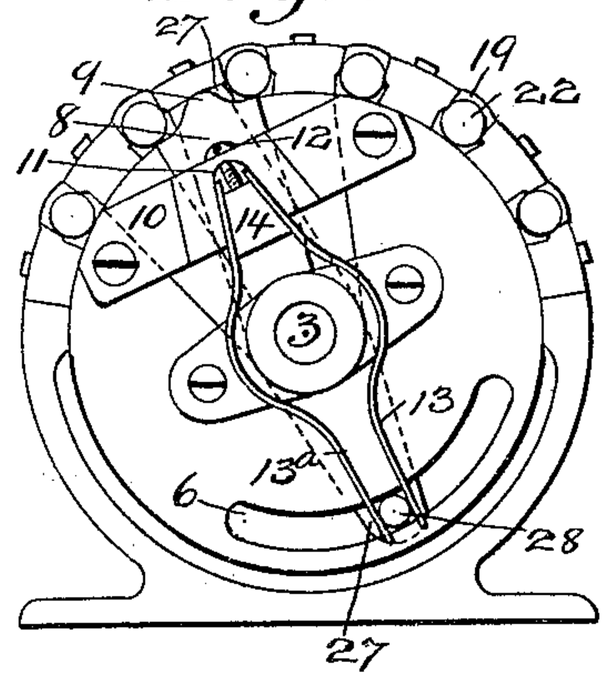


Fig. 6.

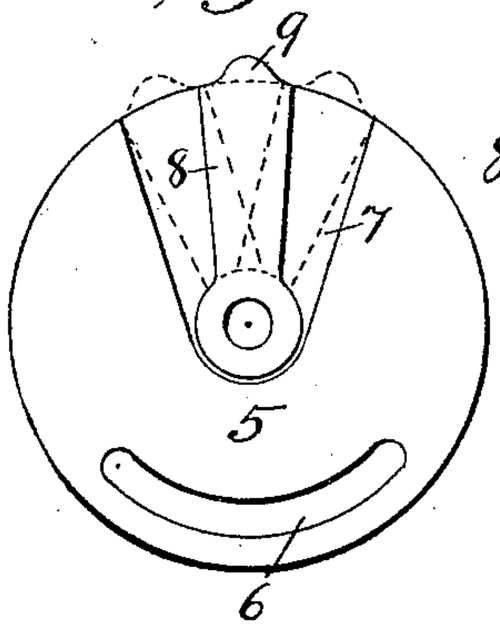


Fig. 7.

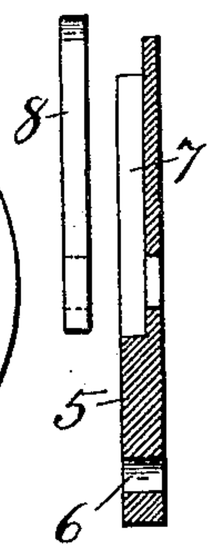


Fig. 8.

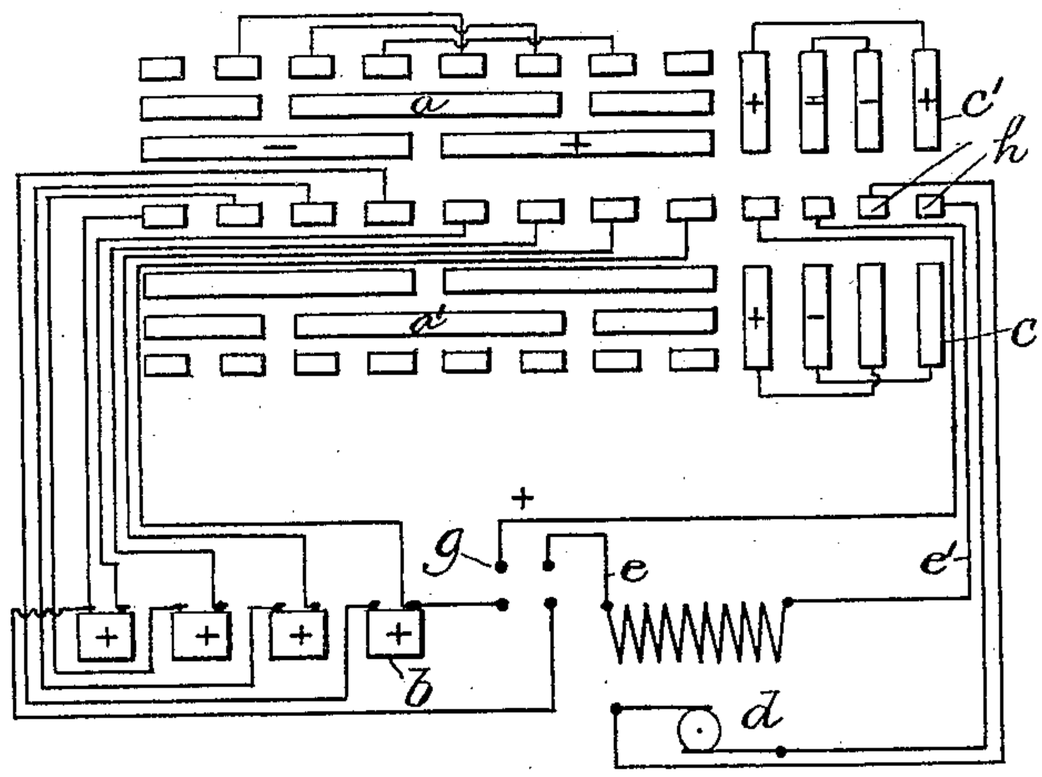
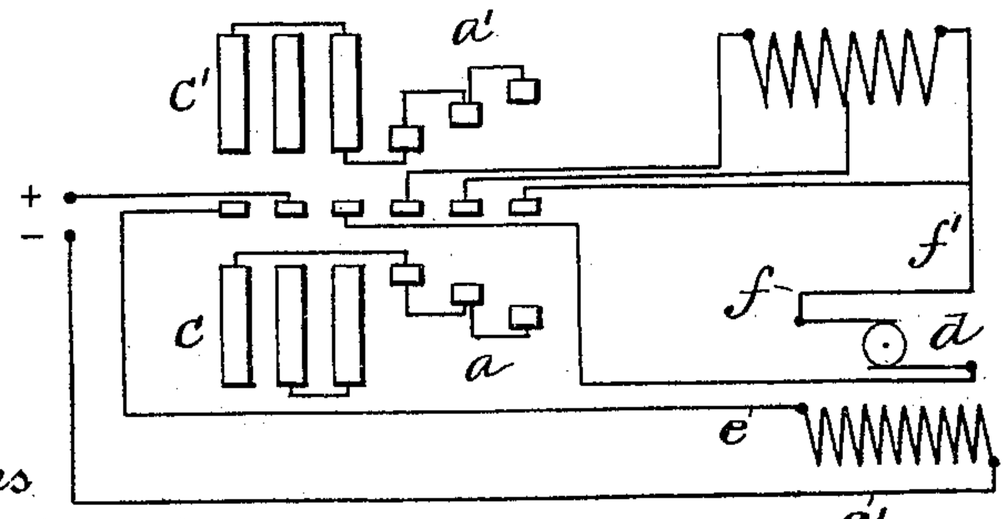


Fig. 9.



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UNITED STATES PATENT OFFICE.

MARSHALL W. HANKS, OF MADISON, WISCONSIN.

ELECTRIC CONTROLLER.

SPECIFICATION forming part of Letters Patent No. 606,009, dated June 21, 1898.

Application filed December 17, 1897. Serial No. 662,248. (No model.)

To all whom it may concern:

Be it known that I, MARSHALL W. HANKS, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Electric Controllers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in an electric controller designed for making and breaking current of motor, and reversing current in armature.

The objects of my invention are to provide new and improved means for instantaneously moving a revoluble contact-cylinder of an electric controller to its consecutive positions regardless of the rotative velocity of the actuating means, thereby preventing the arcing between contacts, and to provide means for the positive movements and stops of the contact-cylinder, thus enabling an inexperienced person to handle a controller with perfect safety; and to this end my invention consists in new and improved means for accomplishing the objects named and in certain combinations and features of construction, all as hereinafter set forth.

In the accompanying drawings, which illustrate an application of my invention, Figure 1 is a side view of an electric-launch controller with my improvement applied thereto; Fig. 2, a vertical section through switch-operating mechanism; Fig. 3, an end view of switch-operating mechanism from hand-wheel or actuating end; Fig. 4, an end view showing position of trip-disk and springs when hand-wheel is rotated to the left; Fig. 5, an end view showing position after first stop; Fig. 6, a plan view of trip-disk; Fig. 7, a sectional view through trip-disk, showing trip-arm removed a slight distance from the tapered slot; Fig. 8, a diagram illustrating a developed plan of contact-plates and wiring for a series-parallel battery and motor-controller, and Fig. 9 a diagram illustrating a developed plan of contact-plates and wiring using resistance for controlling speed of motor and means for reversing same.

Referring to the drawings, the frame 1 is provided with bearings 2 for the rotary shafts 3 and 4, which are concentric shafts, but independent of each other. A circular disk 5 is mounted on the inner end of the shaft 3 and is adapted to rotate with the shaft. The disk is provided with a circular slot 6 and a tapering cut-out portion 7, adapted to receive a trip-arm 8, which is loosely mounted on shaft 3 and is provided at its outer end with a curved lug 9. Extending outwardly from disk 5 and rigidly secured thereto, so as to rotate with the disk, is a plate or platform 10, provided with a V-shaped slot 11 and a screw 12. Flat curved springs 13 and 13ª surround the shaft and are firmly secured in the V-shaped slot 11 by a V-shaped wedge 14, which latter is drawn up tight into position by the screw 12. These springs are of such a nature that their free lower ends are normally almost in contact. They are, however, separated by a pin, as will be described farther on in the specification.

When my invention is employed on an electric launch, a steering-wheel 15 and a drum 16 may be very conveniently mounted on shaft 3, as shown by Fig. 1 of the drawings. The shaft 3 is provided on its outer end with a hand-wheel 17 for actuating the shaft. It will be noticed that the shaft may be rotated in two directions from the neutral point—that is, to the right or to the left, as desired. A cylindrically-shaped standard or frame 18, made integral with the frame 1 or rigidly secured thereto by any suitable means, is provided with a number of properly-spaced slots 21, in each of which is located a pivoted stop-lever 19. The number of the said slots and the spacing of same depend on the construction of the contact-cylinder and the location of the contact-plates thereon. A portion of the standard 18 near the disk 5 is cut away to form a passage-space between it and the disk 5 and to provide stops 20, the purpose of which will be hereinafter pointed out. The stop-levers are formed with a portion of their length having flat parallel sides, which guide them in the slots 21, the flat sides also forming stops for the crank-arm 27. A second portion of their length is formed of rounded sections 22, which are adapted to come in contact with the lug 9 of the arm 8, by which they are raised. 23 is a slot adapted to receive a

wire or rod 24, by which said levers 19 are pivotally mounted in the longitudinal slots above referred to. The wire 24 is held in position by means of the screws 25. Springs 26 are adapted to exert an upward pressure against the inner end of each of the stop-levers. These springs lie in holes in the casing 18, as shown.

On the inner end of shaft 4 is a crank-arm 27, provided at one end with an outwardly-extending pin 28, adapted to pass through the circular slot 6 in the disk 5 and be normally held between the free ends of springs 13 and 13ª. The other end of the crank-arm 27 is adapted to travel in the space between the disk 5 and the standard 18, its circular movement being limited by the stops 20. A contact-cylinder 29 is mounted on shaft 4 and is adapted to revolve with the shaft. Contact plates or bars 30 on the cylinder are employed to make contact with the brushes 31, which latter are adapted to connect the wires from the different circuits.

Referring particularly to Figs. 8 and 9, which are diagrams illustrating a developed plan of contact-plates and wiring for a series-parallel battery and motor-controller and a developed plan of contact-plates and wiring using resistance for controlling speed of motor and means for reversing same, in Fig. 8, *a* and *a'* are contact-plates on cylinder for coupling batteries *b* from parallel to parallel series. *c* and *c'* are contact-plates for reversing currents in armature. For positive rotation of armature contact-plates *a* and *c* come into action, and for a negative rotation of armature contact-plates *a'* and *c'*. The motor is represented by *d*, and the field connections by *e* and *e'*, and the armature connections by *f* and *f'*. *g* is a double break-switch for opening motor-circuit. *h* are contact-fingers. In Fig. 9, *a* and *a'* represent contact-plates for throwing more or less resistance in armature-circuit, and contact-plates *c* and *c'* are plates for reversing currents in armature. The motor, field connections, and armature are represented by *d*, *e*, and *e'* and *f* and *f'*, respectively.

The operation of my invention as illustrated in the drawings is as follows: The shaft 3 being rotated to the left by actuating the hand-wheel 17 causes the spring 13 to bear upon the pin 28, which projects from the lower end of a crank-arm 27 and passes through the circular slot 6 in the disk 5. This crank-arm 27 cannot rotate to the left until the stop-lever 19 is raised high enough for the upper end of the crank-arm 27 to pass under it. The trip-arm 8 is free to rotate on the shaft 3, but is limited in its independent movement by means of its relation with the disk 5—that is to say, it is only free to independently rotate within the portion 7 of said disk. From the relative position of the trip-arm and disk and owing to the fact that they are adapted to rotate with the shaft it is evident that a rotation of the disk in either direction of about twenty degrees will pick up the trip-arm 8 and cause the latter to rotate with it. The rounded lug 9 on the said arm will act on the rounded end of a stop-lever 19 and cause the end to be raised from its seat in the slot sufficiently to permit the upper end of the crank-arm 27 to pass under it. The instant the stop-lever is sufficiently raised to permit the crank-arm to pass the recoil of spring 13 rotates the crank-arm instantaneously to the left, bringing it in contact with the next stop-lever, when the raised pivoted stop-lever will snap back into its normal position in its slot, due to the action of spring 26. The crank-arm is now locked between two stop-levers, as shown in Fig. 5. The operation of the spring 13 is particularly shown in Fig. 4, which shows the position of the spring immediately preceding the release of the crank-arm. This figure also particularly shows lug 9 acting on the rounded portion of the stop-lever to raise it. As the crank-arm 27 is keyed to shaft 4, an instantaneous rotation of the former will impart a similar movement to the latter and to the contact-cylinder 29. By this movement the contact-cylinder is instantaneously brought to its first position regardless of the rotative velocity of the hand-wheel or the shaft 3. On rotating the shaft 3 still further by means of the hand-wheel the same action with respect to the next stop-lever will be repeated and the contact-cylinder brought to its second position instantaneously and independent of the rotative velocity of the shaft 3 and its actuating means.

When rotating the hand-wheel to the right, the same action as above described will be effected with reference to the stop-levers to the right of trip-arm 8.

It will thus be seen that I have provided new and effective means for instantaneously moving a contact-cylinder in either direction to its consecutive positions with reference to the fixed contact-points at a rotative velocity independent of the rotative velocity of the actuating means for operating the switch mechanism, and by thus doing so I am enabled to make and break the motor-current and reverse current in armature without causing arcing and its accompanying injurious effects.

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

1. In an electric controller, the combination with a contact-cylinder mounted on a rotatable shaft, of a second shaft provided with actuating means, and mechanism, interposed between the actuating means and the contact-cylinder, comprising a projecting part on the cylinder-shaft engaging with a spring on the second shaft whereby the contact-cylinder may be instantaneously rotated, in either direction, to its consecutive positions regardless of the velocity of the actuating means.

2. In an electric controller, the combination with a cylinder provided with contact-plates,

mounted on a rotatable shaft, of a shaft concentric with the cylinder-shaft and provided with actuating means, and mechanism, interposed between the actuating means and the contact-cylinder, comprising a projecting part on the cylinder-shaft engaging with a spring on the concentric shaft whereby the contact-cylinder may be instantaneously rotated, in either direction, to its consecutive positions regardless of the velocity of the actuating means.

3. The combination with an electric motor, an electric controller, a contact-cylinder provided with contact-plates lying in the path of fixed contact-points, said cylinder revolubly mounted on a rotatable shaft, a shaft concentric with the cylinder-shaft, provided at one end with actuating means and at its other end with mechanism engaging with means on the cylinder-shaft, whereby the cylinder is instantaneously rotated, in either direction, to its consecutive positions, regardless of the rotative velocity of the shaft engaging with the cylinder-shaft.

4. In an electric controller, the combination with a contact-cylinder mounted on a rotatable shaft, of a second shaft having actuating means and a disk provided with springs, said springs engaging with a pin extending from an arm on the cylinder-shaft, substantially as set forth.

5. In an electric controller, the combination with a contact-cylinder mounted on a rotatable shaft, of a second shaft having actuating means and a disk provided with springs, said springs engaging with a pin extending from an arm on the cylinder-shaft, a trip-arm, and stop-levers to lock the arm on the cylinder-shaft, substantially as set forth.

6. In an electric controller, the combination with a contact-cylinder having contact-plates lying in the path of fixed contacts, said cylinder mounted on a rotatable shaft, of a shaft concentric with the cylinder-shaft and having actuating means at one end and a disk provided with springs at its other end, the springs engaging with a pin extending through the disk from an arm on the cylinder-shaft, a trip-arm, a standard provided with longitudinal slots, and pivoted stop-levers in said slots, substantially as set forth.

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

MARSHALL W. HANKS.

Witnesses:
HENRY D. ATWOOD,
W. G. DOOLITTLE.