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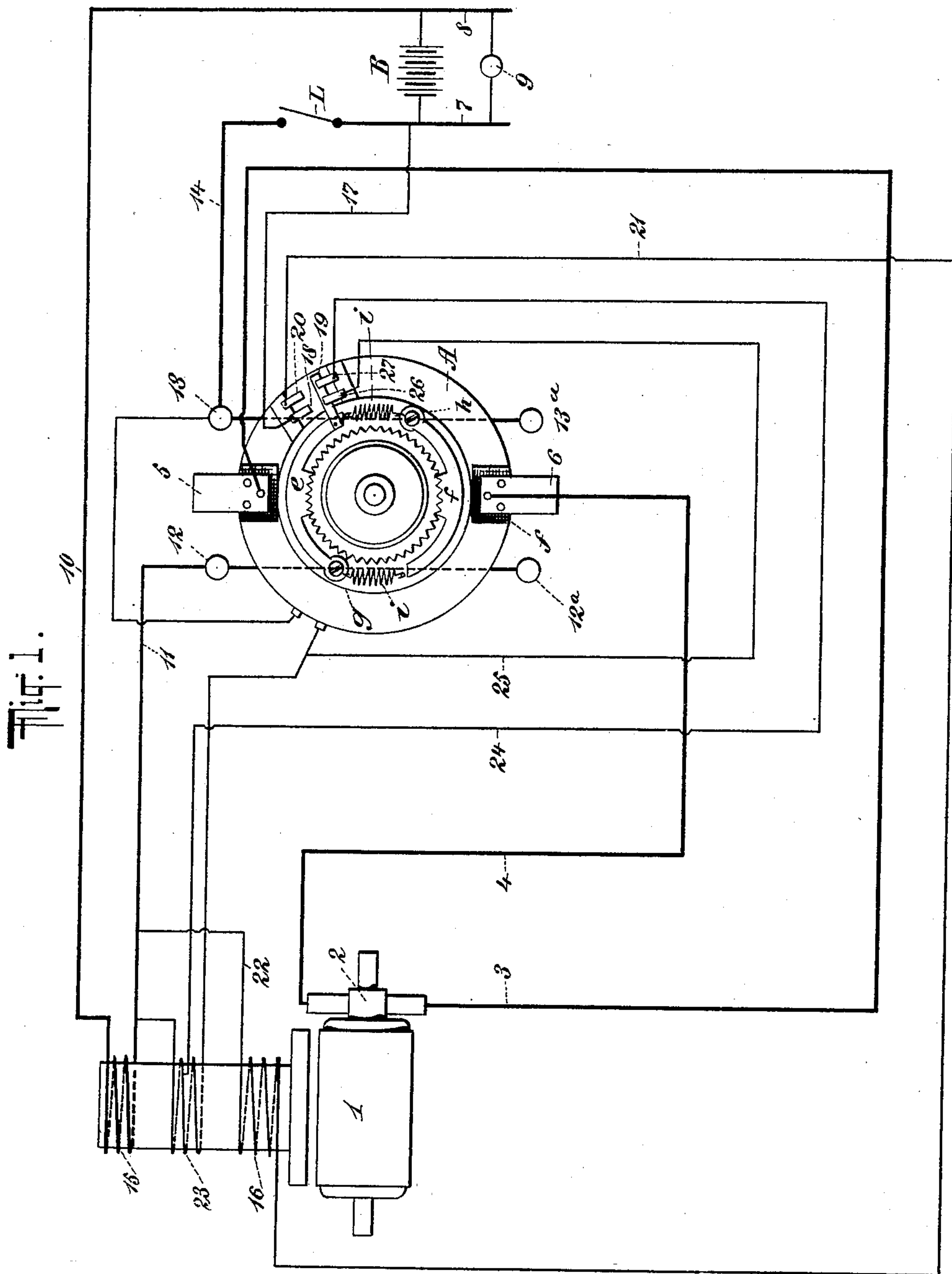
Patented Feb. 27, 1900.

J. L. CREVELING.
CAR LIGHTING SYSTEM.

(Application filed Oct. 28, 1899.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

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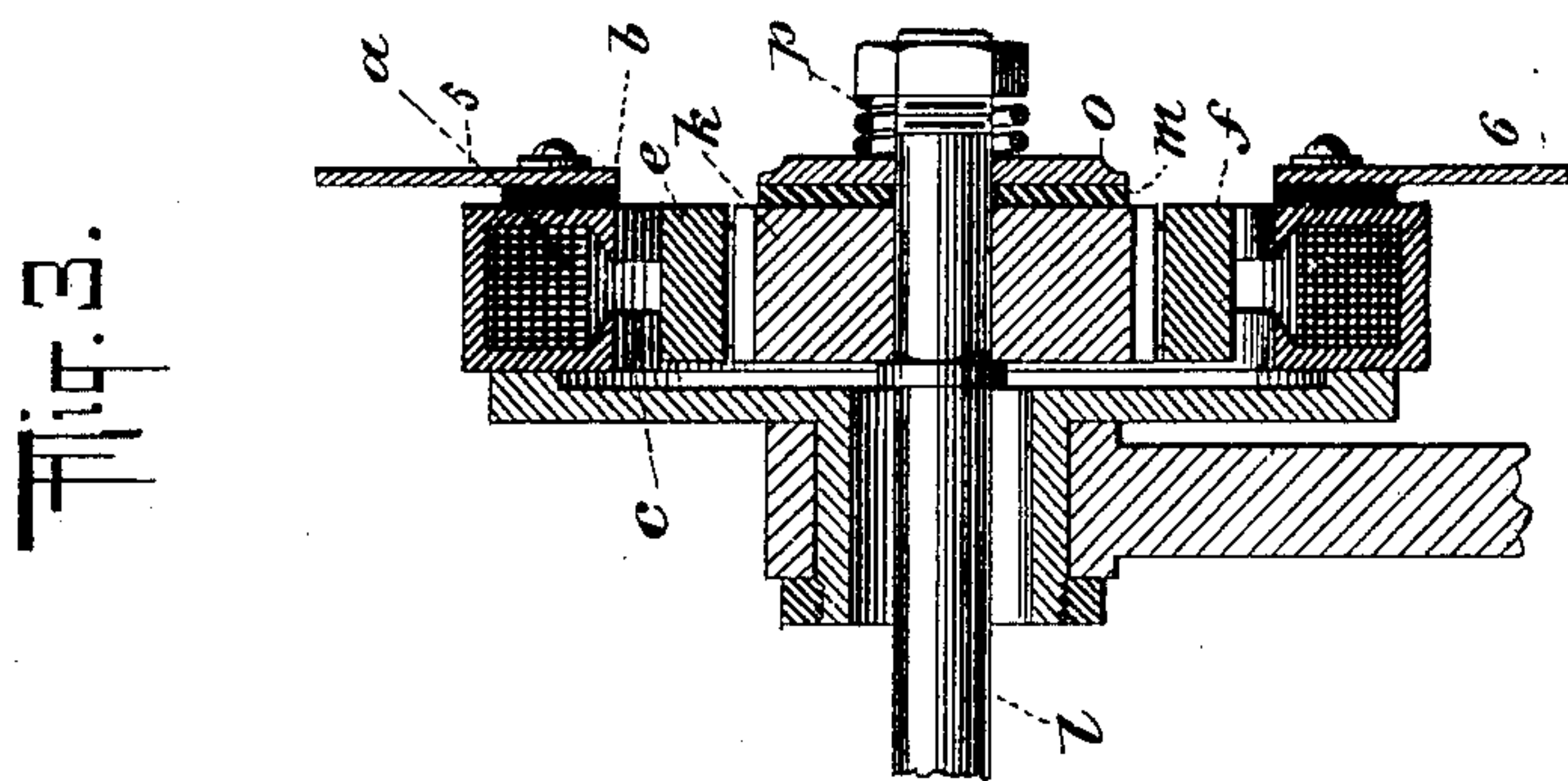
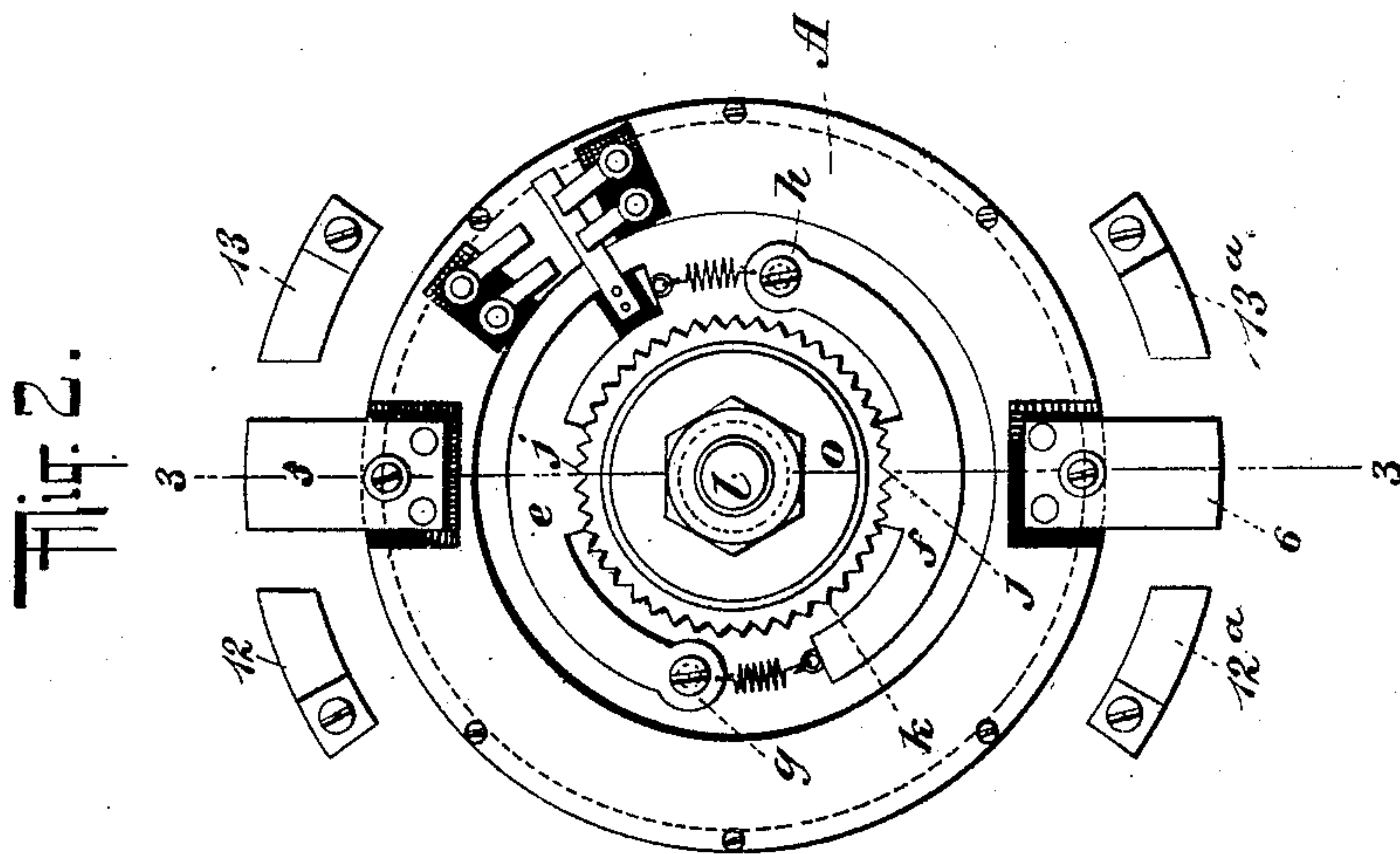
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4 Sheets—Sheet 2.



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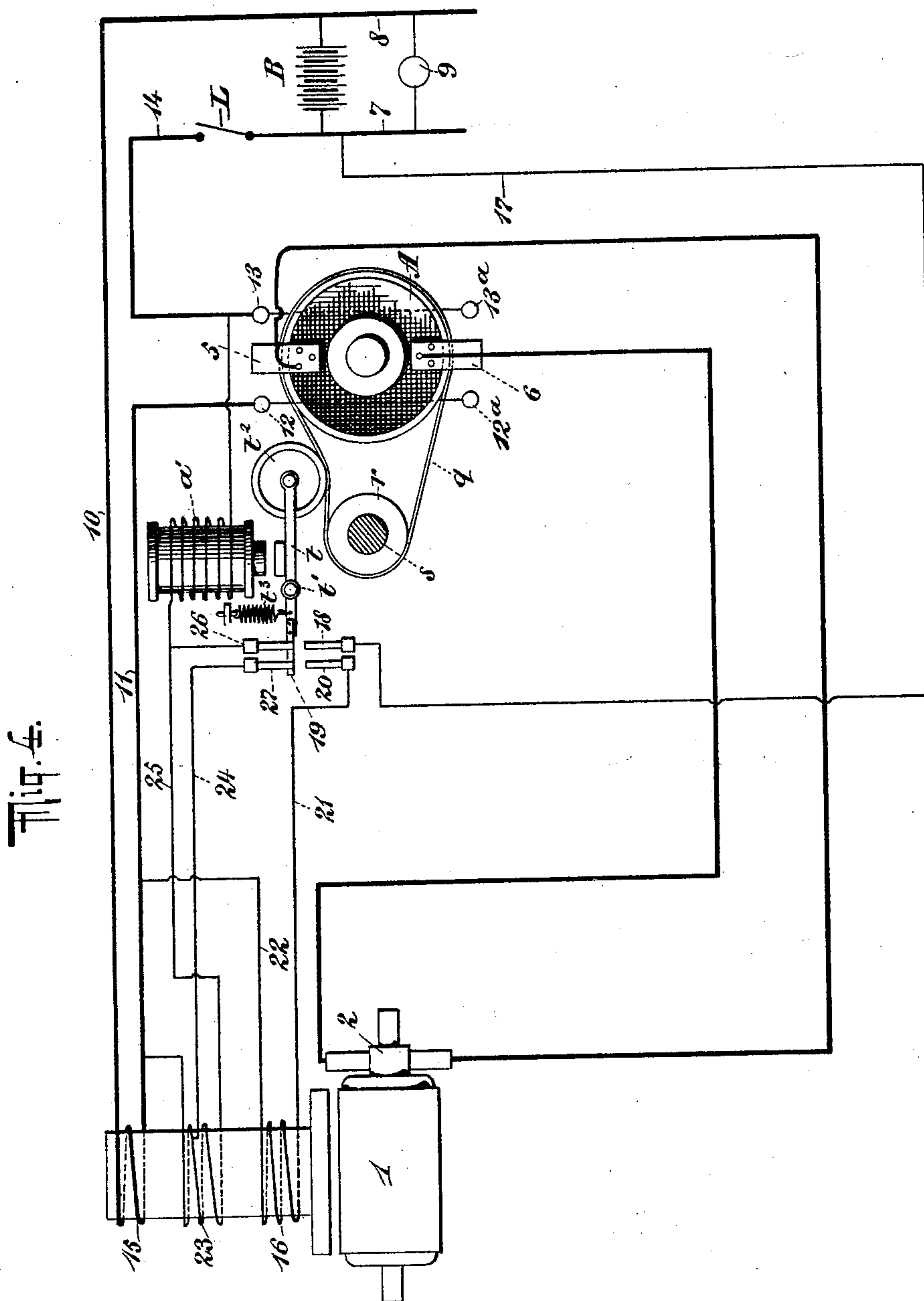
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4 Sheets—Sheet 3

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4 Sheets—Sheet 4

Fig. 5.

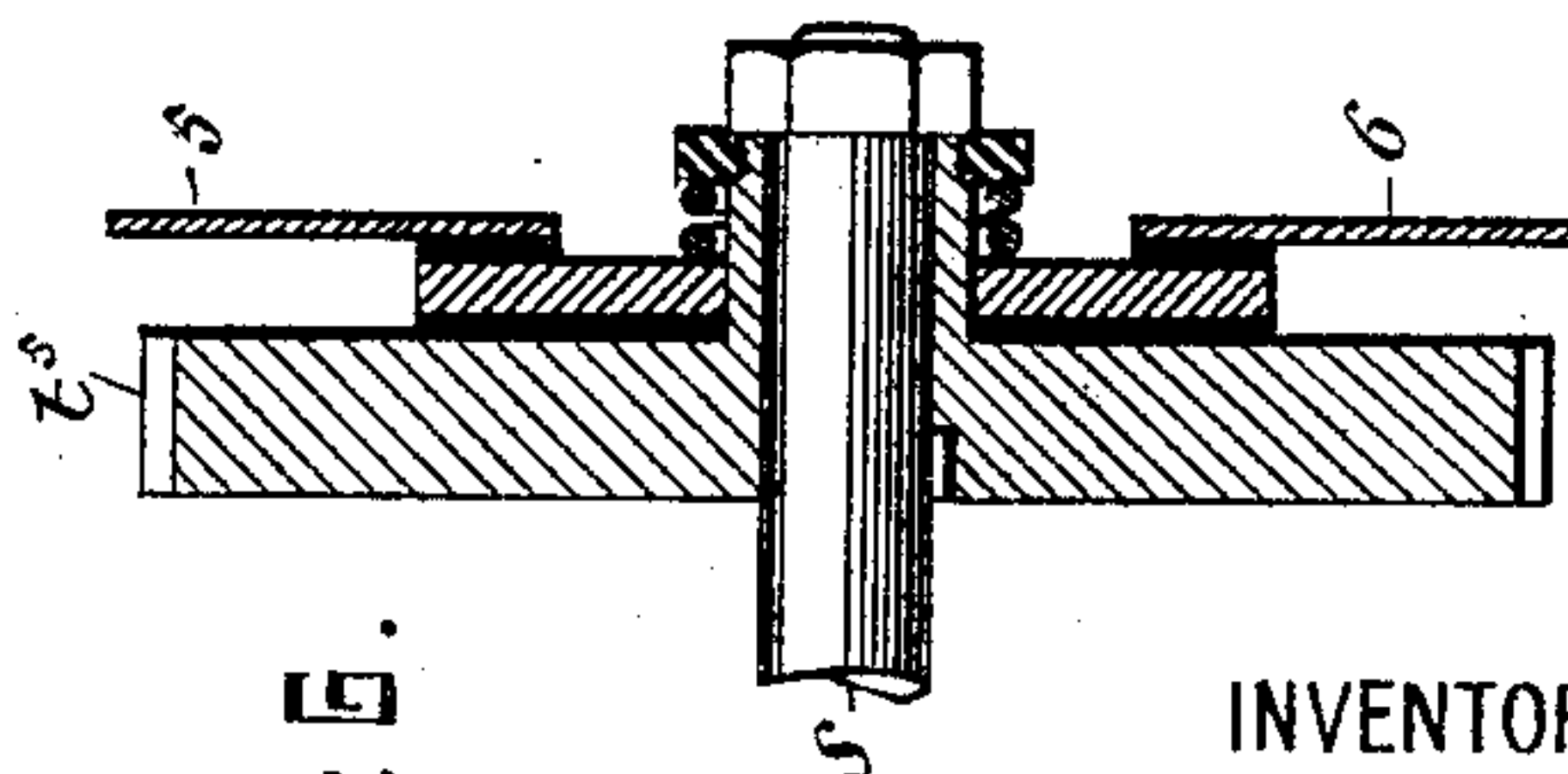
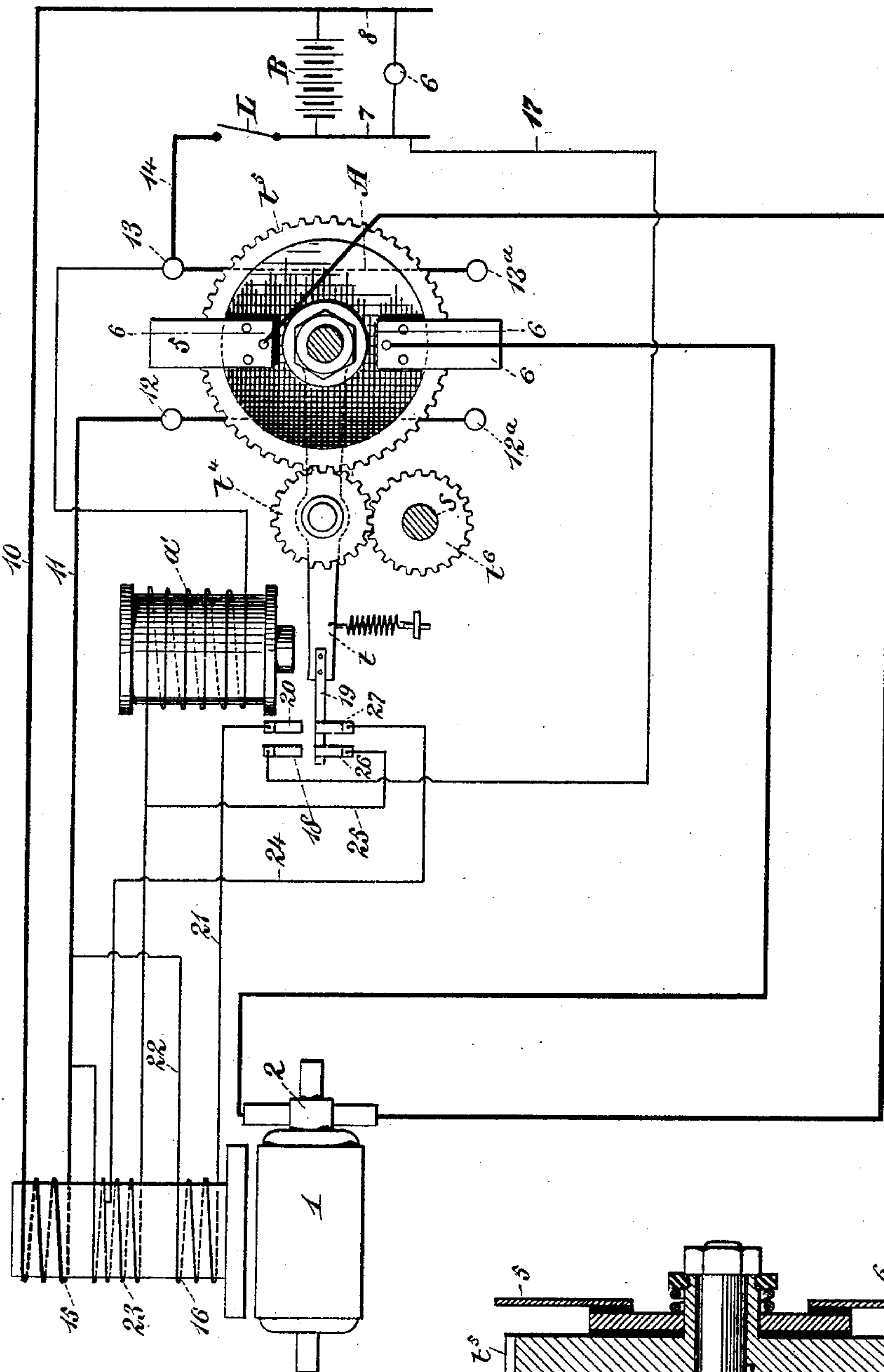


Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN L. CREVELING, OF NEW YORK, N. Y.

CAR-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 644,408, dated February 27, 1900.

Application filed October 28, 1899. Serial No. 735,038. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. CREVELING, a resident of the city of New York, borough of Manhattan, county and State of New York, have invented an Improved Car-Lighting System, of which the following is a specification.

My invention relates to systems of electrical distribution, and is especially adapted to car-lighting systems, although the invention is not confined to such car-lighting systems, but is applicable to other situations wherein a generator connected to a storage battery is liable to be run at varying speeds and to have its direction of rotation reversed.

My invention is principally directed to means for operating the pole-changing device upon the reversal of direction of rotation of the generator.

In the accompanying drawings I have illustrated several forms of apparatus in which my invention is embodied, it being understood that I do not thereby limit myself to what is shown, but that the forms shown are illustrative merely.

In the drawings, Figure 1 is a diagrammatic view of the circuits and the pole-changing switch embodying one form of my invention. Fig. 2 is a detached face view of the pole-changing switch upon an enlarged scale. Fig. 3 is a section on the line 3 3 of Fig. 2. Fig. 4 is another circuit diagram and pole-changer embodying my invention. Fig. 5 is a similar circuit diagram and pole-changer embodying my invention. Fig. 6 is a section on the line 6 6 of Fig. 5.

In a patent issued to me on June 20, 1899, and numbered 627,326 I have shown means for changing over or reversing the pole-changing switch when the direction of rotation of the dynamo is reversed. In this patent I have shown a disk rotated by the dynamo-shaft and provided with spring-actuated electromagnetically-released friction-brakes and have provided means whereby the electromagnets are actuated to lift the said friction-brakes from the disk upon passage of current through the said electromagnets, whereby the frictional connection of the pole-changing device with the rotating disk is broken.

By my present invention I seek to break

not merely a frictional connection, but the transmission.

The invention will be described in reference to the drawings and the essential features thereof pointed out in the claims.

In the drawings similar letters and numerals of reference indicate similar parts.

Referring for the present to Figs. 1, 2, and 3, 1 indicates the armature of the generator, 2 the commutator thereof, and 3 4 the dynamo-leads running to the knives 5 6, respectively, of the pole-changer A.

B indicates the secondary battery, which is to be connected to the dynamo-mains.

7 8 is the lamp-circuit, in which are suitable lamps or translating devices 9. The battery-circuits 10 and 11 are connected to one pole of the battery and to the contact 12 of the pole-changer. The contact 13 of the pole-changer is connected to the wire 14, which is connected to the opposite pole of the battery through the line-switch L.

15 is the differential winding of the generator. 16 is the battery-shunt of the generator, whose circuit may be traced as follows: from the battery by wire 17 to the contact 18, thence by switch-lever 19 and contact 20, when the said switch is closed by wire 21, through the shunt 16, by wire 22 to the wire 11, thence by coil 15 and wire 10 to the other pole of the battery. The regular shunt of the machine 23, which is in shunt to the mains 11 and 13, has in series with it the windings of the magnet *a* of the pole-changer. A portion of the coil 23 is shunted through the wires 24 25 and the contacts 26 27 by means of the switch-arm 19 to increase the amount of current passing through the winding *a* of the pole-changer magnet at a low voltage.

The pole-changer A is shown in Figs. 1, 2, and 3 as comprising a ring carrying the knives 5 6, which coöperate with the appropriate terminals. This ring is hollow and is provided with a magnet-winding *a* and with pole-pieces *b c*. These pole-pieces *b c* are adapted to act upon arms *e f*, pivoted at *g h*, respectively, upon the pole-changer and drawn together by suitable springs *i*—for instance, after the manner shown in my prior patent above mentioned. The pivoted arms *e f* are shown in Figs. 1, 2, and 3 as provided with toothed portions *j*,

which mesh with a toothed disk k , loosely carried upon a spindle l , which may be part of the armature-shaft or receive motion therefrom. Friction-disks m o upon the wheel k and spindle l , respectively, cause the wheel k to rotate with l , the friction-disks being held together by the spring and nut device p .

The operation of the device will be understood when it is explained that when the machine is running the arms e f are held out of engagement with the toothed disk k by the current flowing in the winding a , and as the rotation of the dynamo stops the cessation of current flowing in the winding a will permit the springs i to bring the swinging arms into engagement with the toothed disk or wheel k , whereupon the pole-changer will be swung into its opposite position, and as the dynamo rotates in the reverse direction the winding a will again be energized, thereby lifting the pivoted arms e f clear of the toothed disk and permitting the said toothed disk to rotate freely. It will thus be seen that instead of breaking the frictional contact I actually break the transmission, and when I speak of "breaking" the transmission I mean to exclude the idea of breaking frictional contact and to express the fact that an actual mechanical positive connection is broken. Of course for obvious reasons the frictional contact may also be employed, as shown in Figs. 1, 2, and 3.

In Fig. 4 I have illustrated a modified form of my invention, wherein like letters and figures of reference indicate like parts. In this construction, however, the pole-changer is driven by means of a belt q , passing around the pole-changer disk and a pulley r on a spindle, which, as before, may be either the armature-shaft or be driven therefrom. The contacts 18 and 20 are in this case not carried by the swinging pole-changer, and the switch-lever 19 cooperating therewith is carried by an armature-lever t , pivoted at t' , operated upon by the magnet a' , which corresponds to the magnet-winding a in Figs. 2 and 3 and carries a freely-rotating pulley t^2 , which is adapted to bear upon the belt q , so that when the dynamo is delivering no current, as at the instant of reversal, the spring t^3 will bring the pulley t^2 firmly against the belt q , tightening the same, and thereby transmitting motion from the pulley r to the pole-changer, which being thereby swung into its opposite position will properly reverse the dynamo connections, and as the dynamo turns in the opposite direction current will be again delivered to the magnet a' , which will thereby raise the pole t^2 , slackening the belt, and thereby breaking the transmission.

In Fig. 5 I have shown a modified construction which will be clearly comprehensible from the foregoing. In this case the arm t , which cooperates with the contacts 18 20 26 27, carries a stud-gear t^4 , which meshes with a gear t^5 , which operates the pole-changer, which stud-gear is adapted to be brought by

the movement of the lever t into gear with the pinion t^6 , carried by the rotating shaft s , which, as before stated, may either be the armature-shaft of the dynamo or a spindle driven therefrom. While the dynamo is running, the arm t will be firmly drawn up to the magnet a' , and the stud-gear t^4 will be out of contact with the pinion t^6 ; but at the instant of stopping of the rotation of the dynamo the arm t will drop, thereby bringing the pinion t^4 into mesh with the pinion t^6 , so as to reverse the pole-changer in case of reversal of direction of rotation. As soon as the dynamo delivers current the arm t will be drawn up by the magnet a' , thereby breaking the transmission by lifting the pinion t^4 clear of the gear t^6 .

Having described my invention and several modes of carrying the same into effect, I declare that what I claim, and desire to secure by Letters Patent, is—

1. In a system of electrical distribution containing a dynamo and storage battery and wherein the dynamo is liable to have its direction of rotation reversed, of a pole-changing device adapted to control the circuit, positive-transmission means intervening between the rotating armature and the pole-changing device and electromagnetic means in circuit with the dynamo for breaking the mechanical transmission, substantially as described.

2. In a system of electrical distribution containing a dynamo and storage battery and wherein the dynamo is liable to have its direction of rotation reversed, of a pole-changing device having both a frictional connection and a positive mechanical transmission connection with the dynamo-shaft, and means for breaking the mechanical transmission connection without breaking the frictional connection.

3. In a system of electrical distribution containing a dynamo and storage battery and wherein the dynamo is liable to have its direction of rotation reversed, of a pole-changing device adapted to control the circuit, positive transmission means intervening between the rotating armature and the pole-changing device, electromagnetic means in circuit with the dynamo for breaking the mechanical transmission and a shunt to one of the field-circuits of the generator controlled by the pole-changer-operating means.

4. In a system of electrical distribution containing a dynamo and storage battery and wherein the dynamo is liable to have its direction of rotation reversed, of a pole-changing device adapted to control the circuit, positive transmission means intervening between the rotating armature and the pole-changing device, electromagnetic means in circuit with the dynamo for breaking the mechanical transmission and means for controlling a battery-circuit through the field-magnet from the pole-changing device.

5. In a system of electrical distribution con-

5 taining a dynamo and storage battery and wherein the dynamo is liable to have its direction of rotation reversed, of a pole-changing device adapted to control the circuit, positive transmission means intervening between the rotating armature and the pole-changing device, electromagnetic means in circuit with the dynamo for breaking the mechanical transmission, a shunt to one of the field-circuits of the generator controlled by the pole-changer-operating means, and means for controlling a battery-circuit through the field-magnet from the pole-changing device.

15 6. In a system of electrical distribution containing a dynamo and storage battery and wherein the dynamo is liable to have its direction of rotation reversed, a pole-changer comprising in its structure a rotating toothed wheel, an arm engaging therewith and an electromagnet in the dynamo-circuit acting upon the said arm.

20 7. In a system of electrical distribution containing a dynamo and storage battery and wherein the dynamo is liable to have its di-

rection of rotation reversed, a pole-changer 25 comprising in its structure a rotating toothed wheel and an arm engaging therewith and an electromagnet in circuit with the dynamo acting upon the said arm and a frictional connection driving the said toothed wheel and 30 forming part of the means whereby the said toothed wheel is driven from the dynamo-shaft.

8. In a system of electrical distribution containing a dynamo and storage battery and 35 wherein the dynamo is liable to have its direction of rotation reversed, means for rectifying the direction of current delivered to the battery, comprising in its structure a positive mechanical transmission or connection driven 40 in harmony with the generator and means controlled by the flow of the generator-current for breaking the said transmission.

JOHN L. CREVELING.

Witnesses:

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