No. 719,122. PATENTED JAN. 27, 1903.

W. LASAR.

AUTOMATIC ELECTRIC SWITCH.

APPLICATION FILED FEB. 11, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

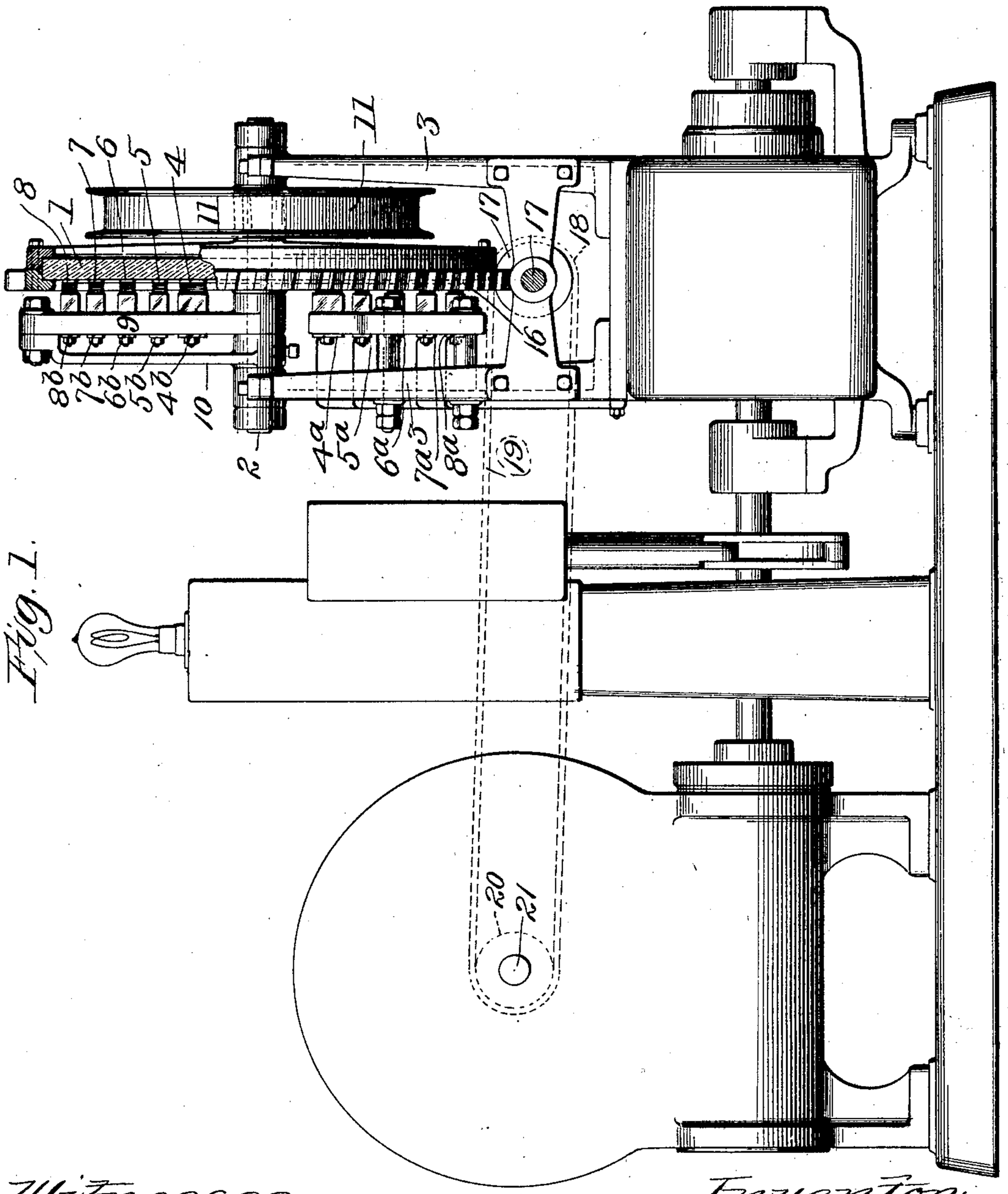

Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

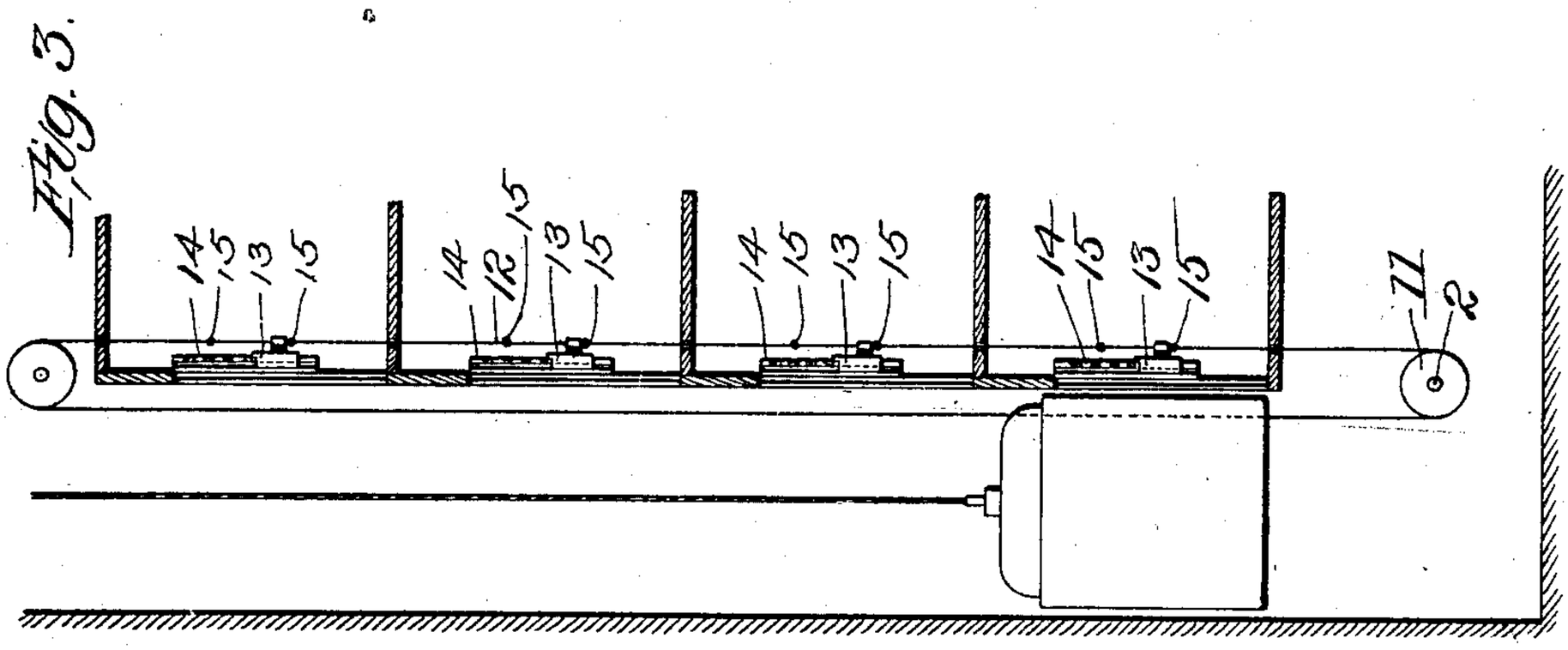
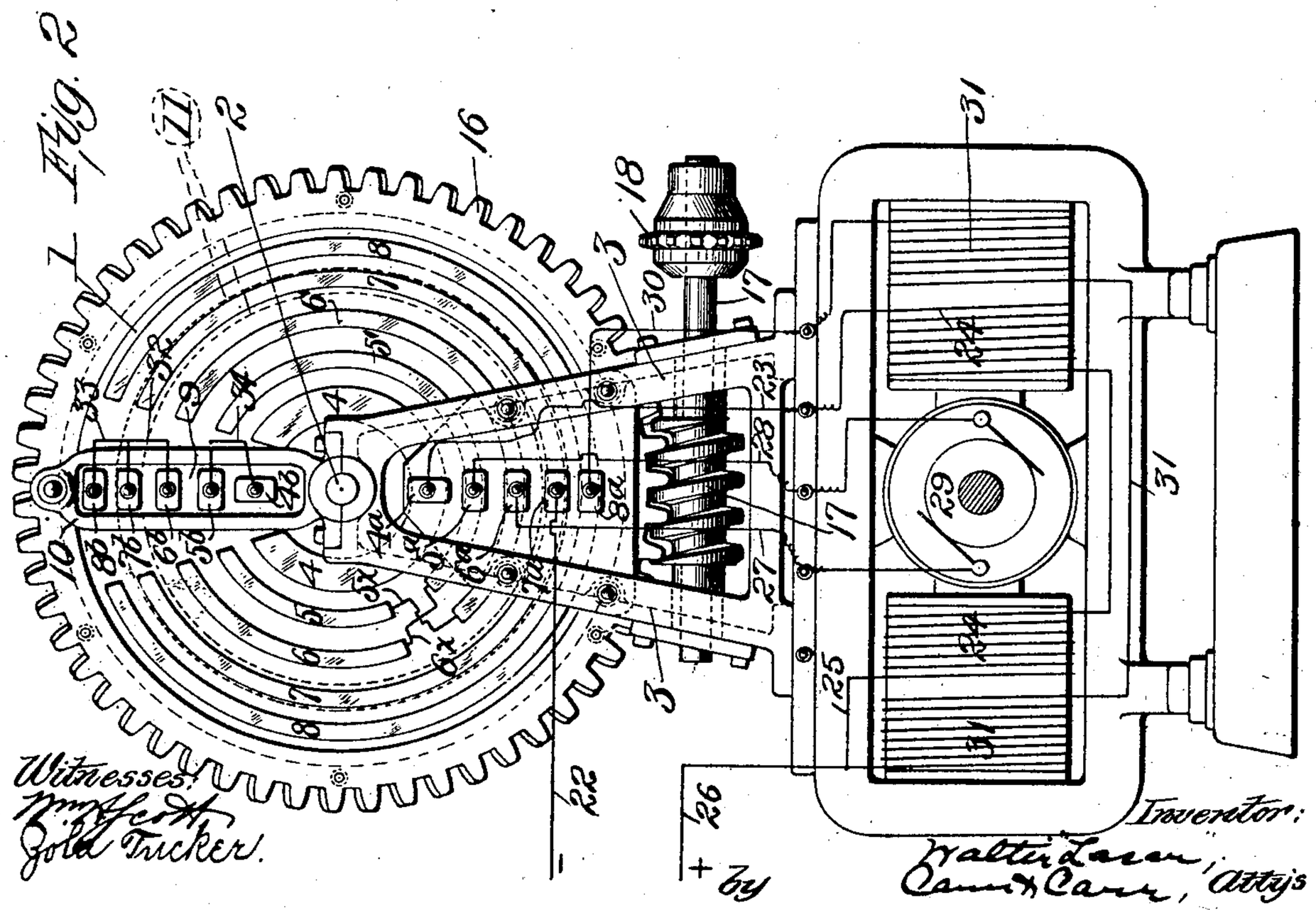


Fig. 2.



THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WALTER LASAR, OF ST. LOUIS, MISSOURI.

AUTOMATIC ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 719,122, dated January 27, 1903.

Application filed February 11, 1902. Serial No. 93,512. (No model.)

To all whom it may concern:

Be it known that I, WALTER LASAR, a citizen of the United States, and a resident of the city of St. Louis, State of Missouri, have invented a new and useful Improvement in Automatic Electric Switches, of which the following is a specification.

My invention relates to electric switches, and has for its principal object to provide for the positive setting of the switch and the automatic operation thereof at the point predetermined therefor.

My invention consists in the parts and in the arrangement and combination of parts hereinafter described and claimed.

In the accompanying drawings, which form part of this specification and wherein like symbols refer to like parts wherever they occur, Figure 1 is a side view of my switch applied to an electric hoisting mechanism. Fig. 2 is an end view thereof; and Fig. 3 is a detail of an elevator-shaft, showing the arrangement of the controller-rope and the indicator coöperating therewith.

My device comprises a disk 1, of insulating material, loosely mounted on a horizontal shaft 2, which is journaled in the framework 3. A number of contact-plates 4, 5, 5′, 6, 6′, 7, and 8 in the form of circular arcs are arranged upon said disk in a series of interrupted rings concentric with the shaft. Two of these rings are formed of two contact-plates each, 5 5′ and 6 6′, in circular alinement, but insulated from each other, and with the two gaps between the ends of the plates of one ring registering radially with the gaps in the other ring. One plate 5 of the inner ring is electrically connected by a wire $5^{\times}$ to that one, 6′, of the plates of the outer ring which occupies a different angle or radial position from its own. In like manner the other plate 5′ of the inner ring is electrically connected by a wire $6^{\times}$ to the plate 6 of the outer ring, which occupies a different angular position from its own. The remaining rings are composed of a single plate each, and the open gaps therein are arranged in radial alinement with one set of gaps in the sectional rings 5 5′ and 6 6′. Mounted in fixed position upon the framework are contact-brushes 4^{a}, 5^{a}, 6^{a}, 7^{a}, and 8^{a} in position to bear against the respective contact-rings. Fixed upon the shaft 2 is an arm 9, which carries a series of contact-brushes 4^{b}, 5^{b}, 6^{b}, 7^{b}, and 8^{b}. These brushes normally rest on the disk at the gaps in the respective rings, but are arranged to contact with the respective rings when the arm is moved. The brushes on the movable arm are divided into two groups, which groups are insulated from each other; but the brushes of each group are connected to each other. In order to brace the brush-carrying arm 9, a second arm 10 is fastened thereto and to the shaft, so as to turn with the arm 9. When the movable arm 9 is turned so as to bring its contact-brushes into contact with the respective contact-plates, the several motor-circuits are completed, so as to cause the operation of the motor, as hereinafter described. The turning of the movable arm 9 is effected, as follows: Fixed upon the shaft 2, on which the disk 1 is movably mounted, is a pulley or friction-drum 11. Around this pulley passes a rope or belt 12, which extends along the elevator-shaft and through the elevator, as shown in Fig. 3, or elsewhere, as desired, according to the use made of the driving-motor. This belt is arranged to move one or more indicators 13, which slide along indicator-plates 14, respectively, and are held in position by friction. In the case of elevators it is preferable to provide an indicator for each floor and to mark the indicator-plate to correspond with the several stories of the building. In order to move the indicator 13, the rope is provided with knobs or projections 15 above and below the indicator or a projection thereon arranged to coöperate with said knobs. As the indicator is moved from one indication of the plate 14 to another the rope 12, by which it is actuated, causes the pulley 11 and its shaft 2 to be rotated, carrying therewith the arm 9, mounted on said shaft, and thereby bringing the brushes on said arm into contact with the respective annular contact-plates on the disk 1, and thereby closing the several circuits. In order to allow the movable arm to travel across the gaps in the rings without affecting the indicator 13, the knobs 15 on the rope 12 are arranged to constitute a lost-motion connection. For this purpose they do not bear on opposite sides of the indicator projections simultaneously, but are spaced apart an addi-

tional distance equal to the travel of the rope corresponding to the movement of the movable arm across such gap.

The motion of the driving mechanism is made to rotate the disk 1 by the following arrangement: The disk 1 has a worm-gear 16 arranged on its periphery, and this worm-gear meshes with a worm or screw shaft 17, journaled in the frame. This screw-shaft 17 carries a pulley or sprocket-wheel 18, which is driven by a belt or chain 19, which passes over a pulley or sprocket-wheel 20, provided therefor on the shaft 21 of the hoisting or other driving mechanism. By this arrangement motion is transmitted from the driving mechanism to the disk, and the movement of the disk continues until the annular contact-plates on the disk are carried out of contact with the contact-brushes on the movable arm 9, whereupon the several motor-circuits are broken and the machinery comes to rest. During this operation the movable arm 9 remains in the position where it was set by the shifting of the indicator-rope. As the movement of the disk is transmitted from the driving mechanism, its extent is proportional to the number of revolutions of the driving mechanism. Consequently the circuits are broken at the point predetermined by the setting of the circuit-closing arm. It is noted that the several stationary brushes are at all times in contact with the respective contact-plates upon which they bear normally. It is also noted that the movable brushes 4^b, 7^b, and 8^b contact with the plates 4, 7, and 8, respectively, whenever the movable arm is moved in either direction from the gaps in the rings; but the movable brushes 5^b and 6^b under the same circumstances contact, respectively, with the plates 5 and 6 or 5′ and 6′, according to the direction of movement of the movable arm.

The circuit connections are as follows: One of the stationary brushes 7^a is directly connected with one of the line-wires. One of said stationary brushes 4^a is connected by a wire 23 to one of the windings 24 of the field-magnet and thence by means of a wire 25 to the line-wire 26. Two of the stationary brushes 5^a and 6^a are connected by wires 27 28 to opposite sides of the motor-armature 29. The stationary brush 8^a is connected by the wire 30 to the second winding of the field-magnet 31 and thence directly to the line-wire 26. The movable brushes are connected as follows: The movable brush 4^b, corresponding with the stationary brush 4^a, which is connected to one of the field-windings of the motor, is directly connected by the wire 34 to the movable brush 5^b, which corresponds with the stationary brush 5^a, which is connected to the armature. The movable brush 6^b, which corresponds with the stationary brush 6^a, connected to the opposite side of the armature, is connected by a wire 32 to the movable brush 7^b, corresponding with the stationary brush 7^a, which is directly connected to the line-wire 22. The movable brush 8^b, corresponding to the stationary brush 8^a, which is connected to the second winding 31 of the field-magnet, is also directly connected by a wire 33 to the movable brush 7^b. By the foregoing connections the various circuits of the motor are completed as follows: from the line-wire 22 to the contact-brush 7^a, and thence to the contact-plate 7, and thence to the contact-brush 7^b, where the circuit divides through the wires 33 and 32 to the two movable contact-pieces 8^b and 6^b, leading, respectively, through the field-magnet and the armature of the motor. The circuit of the field-magnet is completed from the movable brush 8^b to the contact-plate 8, and thence to the stationary brush 8^a, and thence by the wire 30 to the winding 31 of the field-magnet, and thence directly to the line-wire 26. The circuit through the armature is completed from the movable brush 6^b to the contact-plate 6 or 6′, according to the position of the movable arm 9. When the movable arm is in position for the brush 6^b to bear against the contact-plate 6, the current passes from the plate 6 through the wire $6^\times$ to the contact-plate 5′, and thence to the stationary brush 5^a, and thence by the wire 28 to the armature, and through the armature 29 to the wire 27, and thence to the stationary contact-brush 6^a, and thence to the contact-piece 6′, and thence by the wire $5^\times$ to the contact-piece 5, and thence to the movable contact-arm 5^b, and thence by the wire 34 to the contact-brush 4^b on the movable arm, and thence to the contact-plate 4, and thence to the stationary contact-brush 4^a, and thence by the wire 23 through the first winding 24 of the field-magnet, and thence by the wire 25 to the line-wire 26. In case the movable arm 9 is in position for the brush 6^b to bear upon the contact-plate 6′ the circuit is completed from said brush 6^b to the contact-plate 6′, thence to the stationary brush 6^a, thence by the wire 27 to the armature 29, and through the armature to the wire 28, and through it to the stationary contact-brush 5^a, and thence to the contact-piece 5′, and thence to the movable contact-brush 5^b, from which the circuit is completed to the line, as above decribed. The current through the armature is thus reversed according as the movable arm is shifted so that the contact-brushes 5^b and 6^b bear against the contact-plates 5 and 6 or against the contact-plates 5′ and 6′.

The accompanying drawings show my device applied to an electric elevator, for which it is particularly adapted; but it is obviously applicable to other machinery, and I do not wish to restrict myself to any particular kind of machinery. So, too, the number of contact-plates and their coöperating brushes and connections may be changed without departing from my invention.

What I claim is—

1. An electric switch comprising a rotatable switchboard, a worm-gear thereon, and a worm operatively connected to the driving mechan-

ism to be actuated thereby, said switchboard having a number of contact-plates electrically connected to the several motor-circuits, and a pivotally-mounted arm having brushes arranged to coöperate with said plates, and means independent of the driving mechanism for moving said arm independently of the switchboard, and a plurality of indicators, the means for moving said arm being arranged to operate the several indicators simultaneously, substantially as described.

2. An electric switch comprising a rotatable switchboard operatively connected to the driving mechanism to be actuated thereby and having a number of contact-plates electrically connected to the several motor-circuits, and a pivotally-mounted arm having brushes arranged to coöperate with said plates, and means independent of the driving mechanism for moving said arm independently of the switchboard, said means comprising a pulley fastened to move with said arm and an endless rope for operating said pulley, substantially as described.

3. An electric switch for elevators comprising a rotatable switchboard operatively connected to the driving mechanism to be actuated thereby and having a number of contact-plates arranged concentrically thereon and electrically connected to the several motor-circuits, and a pivotally-mounted arm having brushes normally out of contact with said plates but arranged to coöperate with said plates when the arm is turned and means independent of the driving mechanism for turning said arm independently of the switchboard, said means extending along the elevator-shaft and having an indicator at each floor, substantially as described.

4. An electric switch comprising a rotatable switchboard operatively connected to the driving mechanism to be actuated thereby and having a number of contact-plates electrically connected to the several motor-circuits, and a pivotally-mounted arm having brushes arranged to coöperate with said plates, and means independent of the driving mechanism for actuating said arm, said means comprising a pulley fastened to the shaft upon which said arm is mounted and an endless rope for operating said pulley, and an indicator arranged to be actuated by said rope, substantially as described.

5. An electric switch comprising a rotatable switchboard having a number of contact-plates electrically connected to the several motor-circuits, and a pivotally-mounted arm having brushes normally out of contact with said plates but arranged to coöperate therewith when the arm is turned, a pulley fastened to the shaft upon which said arm is mounted, an endless rope for operating said pulley, an indicator in position to be actuated by said rope and a lost-motion connection between said rope and said indicator, substantially as described.

6. An electric switch for elevators comprising a rotatable switchboard operatively connected to the elevator-driving mechanism to be actuated thereby and having a number of nearly-complete rings constituting contact-plates arranged concentrically thereon and electrically connected to the several motor-circuits, two of said rings being composed of two sections each which are cross-connected as described, and a pivotally-mounted arm movable independently of the switchboard and having brushes normally out of contact with said contact-plates but arranged to coöperate therewith when the arm is turned, and means independent of the driving mechanism for moving said arm, said means comprising a rope extending along the elevator-shaft and having an indicator at each floor, substantially as described.

7. The combination with an electric elevator mechanism of an electric switch comprising a rotatable switchboard operatively connected to said mechanism to be actuated thereby and having a number of nearly-complete rings constituting contact-plates arranged concentrically thereon and electrically connected to the several motor-circuits, the two rings connected to the armature being composed of two sections each which are cross-connected as described, and a pivotally-mounted arm movable independently of the switchboard and having brushes normally out of contact with said contact-plates but arranged to coöperate therewith when the arm is turned and means for actuating said arm, said means comprising a rope extending past a plurality of stations and arranged to be manipulated at each of said stations, substantially as described.

8. The combination with electric elevator mechanism of an electric switch comprising a rotatable switchboard operatively connected to said-mechanism to be actuated thereby and having a number of nearly-complete rings constituting contact-plates arranged concentrically thereon and electrically connected to the several motor-circuits, the two rings connected to the armature being composed of two sections each which are cross-connected as described, and a pivotally-mounted arm movable independently of the switchboard and having brushes normally out of contact with said contact-plates but arranged to coöperate therewith when the arm is turned, a tiller-rope arranged along the elevator-shaft for operating said arm, an indicator, and a lost-motion connection whereby said indicator is operated by said rope, substantially as described.

9. The combination with electric elevator mechanism of an electric switch comprising a rotatable switchboard operatively connected to the driving mechanism to be actuated thereby and having a number of nearly-complete rings constituting contact-plates arranged concentrically thereon and electrically connected to the several motor-circuits, the two rings connected to the armature be-

ing each composed of two sections cross-connected as described, a pivotally-mounted arm movable independently of the switch-board and having brushes normally out of contact with said contact-plates but arranged to coöperate therewith when the arm is turned, an indicator, and a tiller-rope independent of the driving mechanism arranged to move said arm and said indicator, substantially as described.

St. Louis, Missouri, February 7, 1902.

WALTER LASAR.

In presence of—
ZOLA TUCKER,
JAMES A. CARR.