

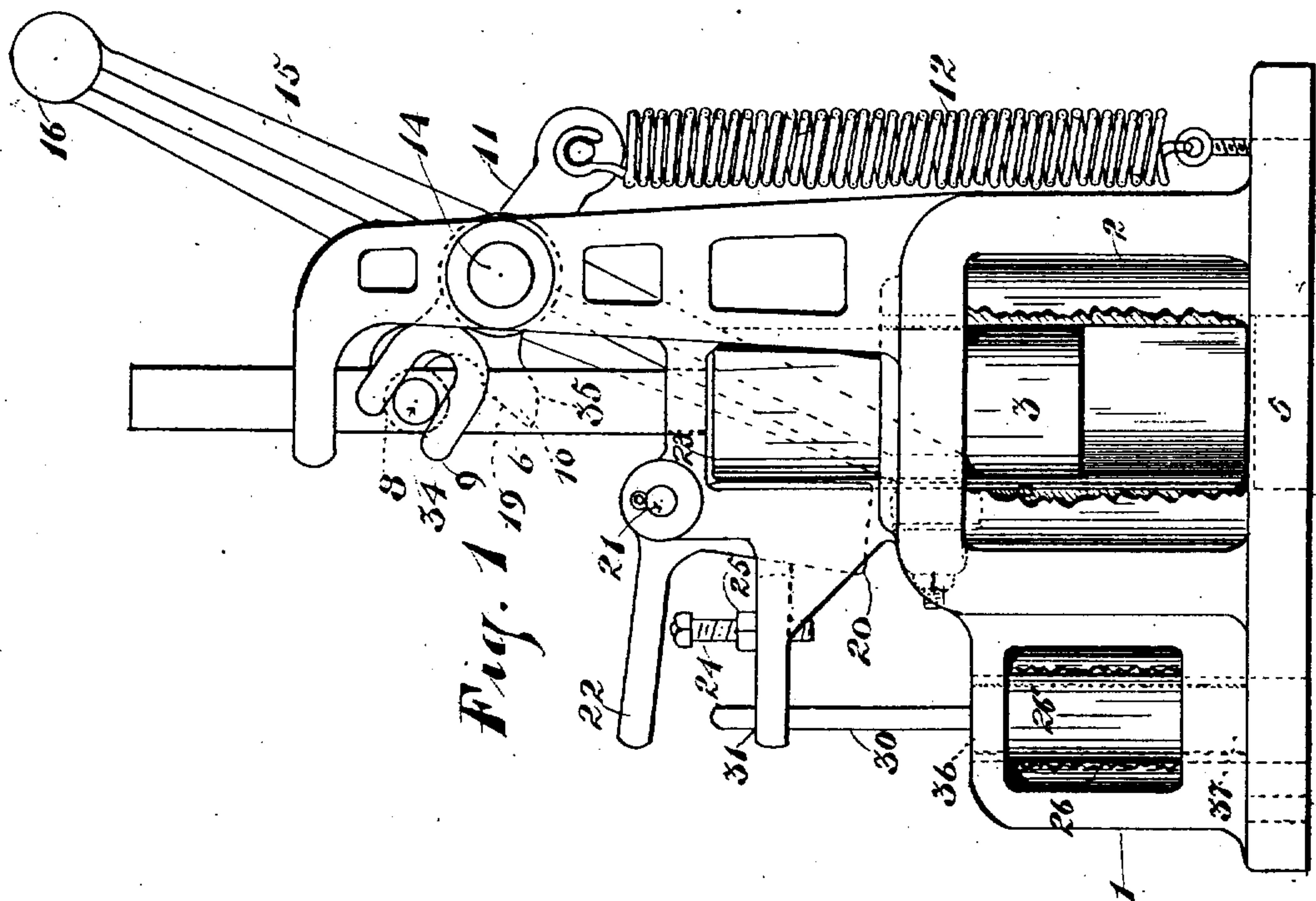
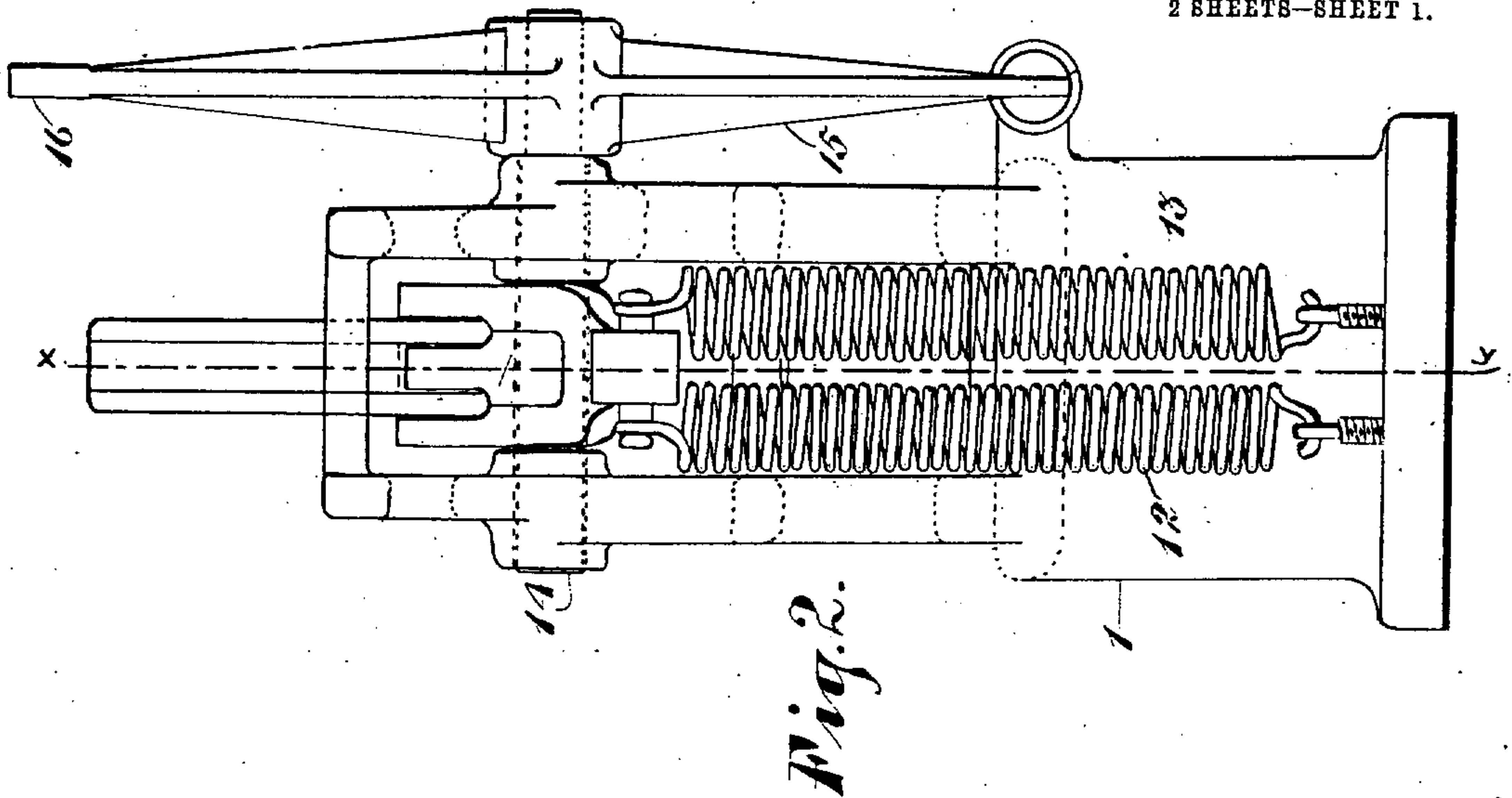
No. 891,617.

PATENTED JUNE 23, 1908.

L. A. HEDGER.
ELECTRIC SWITCH OPERATING MACHINE.

APPLICATION FILED JAN. 7, 1907.

2 SHEETS—SHEET 1.



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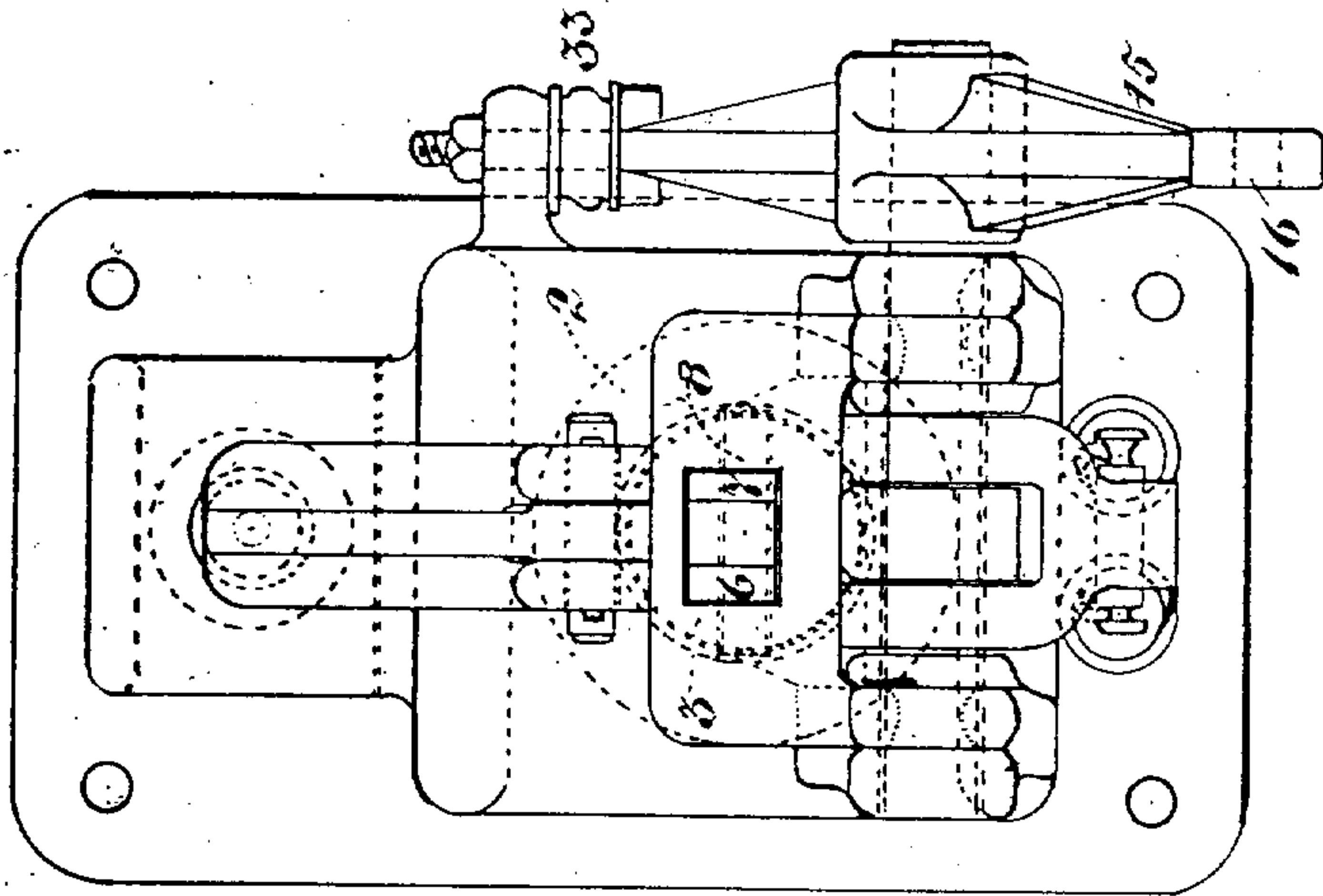


Fig. 4.

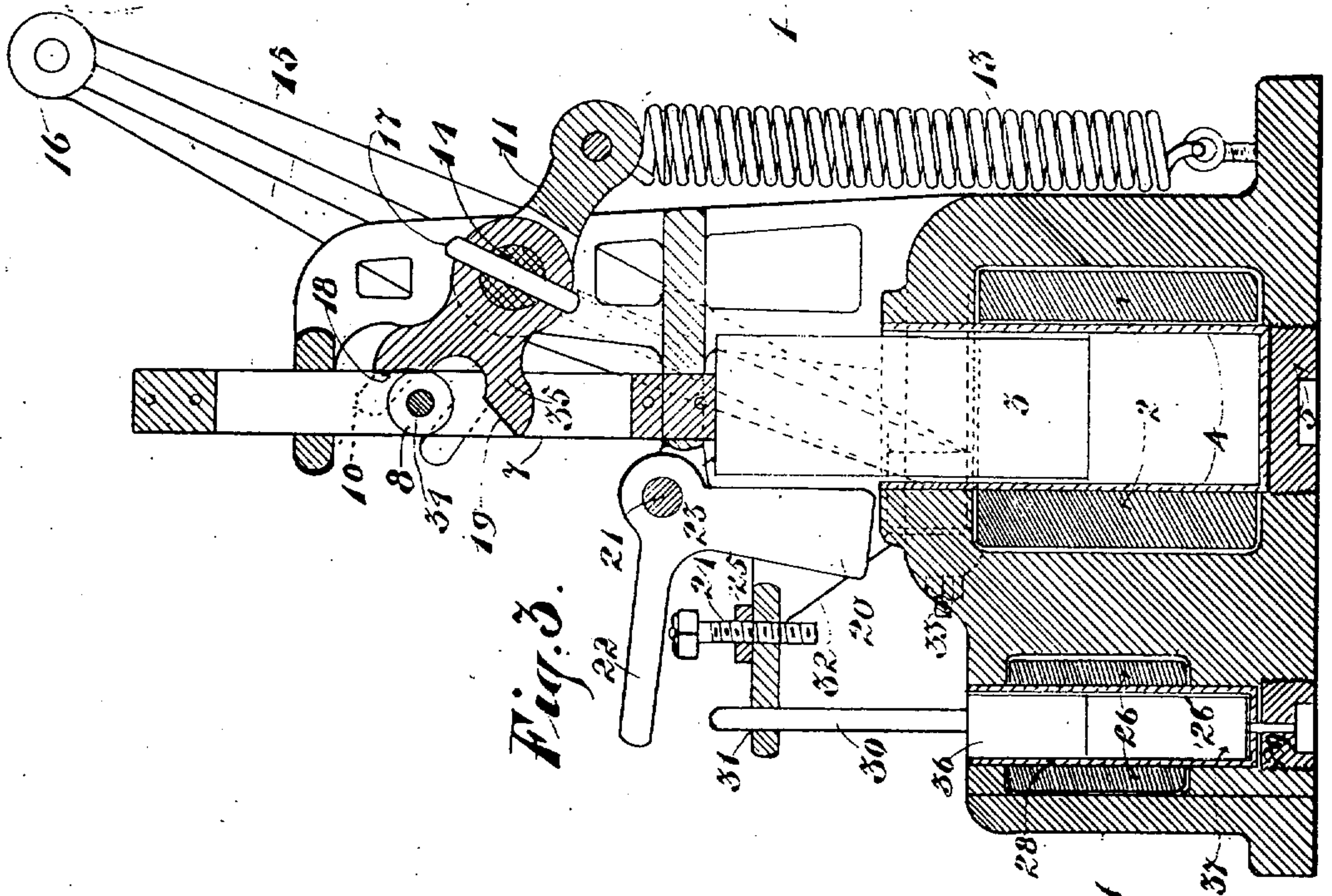


Fig. 3.

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LESLIE ARTHUR HEDGER, OF MILL VALLEY, CALIFORNIA.

ELECTRIC-SWITCH-OPERATING MACHINE.

No. 891,617.

Specification of Letters Patent.

Patented June 23, 1908.

Application filed January 7, 1907. Serial No. 351,155.

To all whom it may concern:

Be it known that I, LESLIE ARTHUR HEDGER, a citizen of the United States, residing at Mill Valley, Marin county, State of California, have invented a new and useful Electric-Switch-Operating Machine, of which the following is a specification.

My invention relates not to switches themselves or to the mechanism thereof, but to auxiliary devices for operating said switches from a distance.

In the operation of electric switches it is very desirable that the knives and jaws thereof should come together with a measurably slow but positive movement for the purpose of making contact, and should be separated by a sudden movement of the parts concerned. It is also expedient that switches should be locked in both their open and closed positions.

The object of my invention is to provide an electric switch-operating machine of novel construction adapted to close a switch or a plurality of switches slowly and positively, and to open the same quickly, and to lock the same in both their open and closed positions.

A further object of my invention is to provide an electric-switch-operating machine of novel construction adapted to close a switch or a plurality of switches slowly and positively, to open the same quickly, to lock the same in both their open and closed positions, and to operate the same in their opening, closing, and locking functions from a distant point.

I accomplish my objects by the means illustrated in the accompanying drawing of which

Figure 1 is a side elevation of my novel switch-operating machine; Fig. 2 is an end elevation thereof; Fig. 3 a vertical sectional view along the lines $x-y$ Fig. 2; and Fig. 4 a top plan view.

Similar numerals of reference refer to similar parts throughout the various views.

In general terms, my device consists of mechanism for closing a switch or plurality of switches slowly and positively, means for opening said switches with a sudden and rapid movement, means for locking said switches in both their open and closed positions, and means for operating said mechanism and said other means from a distant point.

Describing my invention specifically I will

first call attention to the cast iron frame 1 which supports the mechanism above referred to, and which is made of cast iron or other suitable material and shaped substantially as shown in said drawings.

Explaining first the mechanism for slowly and positively closing switches from a distant point, I direct attention to the solenoid 2 partially inclosed within frame 1 and supported thereby. To solenoid 2 suitable electric wires leading to the distant point aforesaid are attached, and suitable currents either direct or alternating are transmitted through the coils. But in the case of alternating currents being used, the coils are to be divided into a plurality of sections connected in parallel, in a well-known way, for the purpose of lessening the retarding effects of self-induction.

An iron plunger 3 is provided for solenoid 2 and is adapted to slide longitudinally in an inner brass casing 4, the bottom thereof resting on a brass plug 5. To the upper end of said plunger, standards 6, 7 are rigidly attached and said standards support a shaft 34, the ends of which engage the forks 9 and 10, said forks being extensions of rocker arm 11, loosely mounted on shaft 14 to the other end of which retractile springs 12, 13 are attached. Shaft 14 has rigidly attached thereto the arm 15. To the end 16 of arm 15 the switch or switches to be operated are connected by any suitable means, but in such manner that the movement of the end 16 toward the left operates to close said switches and movement towards the right opens them.

Observe now the operation of my mechanism for closing switches connected to arm 14, from a distant point. Solenoid 2 is magnetized by a current passing over the wires aforesaid, and is magnetized with sufficient strength to overcome the tension springs 12, 13. Plunger 3 is thereupon drawn downward into said solenoid carrying with it the standards 6 and 7. A roller 8 mounted on shaft 34 engages cam 35 said cam being rigidly fixed to shaft 14 by key 17 and revolves shaft 14 and cam 15 by a movement which is slow by reason of the tension of springs 12, 13, and positive by reason of the continuous application of the operating force until plunger 3 is drawn into said solenoid and is arrested in its movement by the bottom thereof.

The operation of quickly opening the switches is accomplished by the springs 12, 13 in the absence of magnetizing current in

solenoid 2, said springs acting on rocker arm 11, to raise standards 6, 7, and thereby reversely rotate shaft 14 and arm 15 through cam 35. The desired speed of said movement is effected by said springs, because they are at their greatest tension when arm 15 is farthest toward the left, and because they have only small counteracting forces to overcome.

Turning now to the means provided for locking the switch or switches in both their open and closed positions, and explaining first the open-position locking means, attention is again directed to the cam 35, keyed to shaft 14 by key 17. The apparatus is shown in its open position in the drawings, and it will be noted that roller 8 in said position engages face 18 of cam 35. Wherefore movement of arm 15 from its open position is resisted by the pressure of said roller against said face, and the mechanism is locked.

As to the locking in closed position, it will be borne in mind that in order to close the switches, plunger 3 is drawn into solenoid 2, and carries said standards and roller with it, rotating shaft 14 as aforesaid, and with it cam 35. Roller 8 is carried downward over face 19 of cam 35, and while current continues to flow through said solenoid, any tendency for arm 15 to leave its closed position is resisted by pressure of said roller against face 19, thus preventing rotation of shaft 14, and effectually locking my device in the closed position. But this locking is effective only while current is flowing through solenoid 2; and as it is not desirable to continue the closing current through said solenoid after the closing of the switches is effected, auxiliary locking means are provided. Said means consist of the latch 20 which is loosely mounted on a pivot 21, and is provided with an arm 22. When plunger 3 is drawn far enough into solenoid 2 to bring its upper end 23 below the lower edge of latch 20, said lower edge is gravitatively moved over said upper end, and locks it securely in its lowermost position against the pull of springs 12, 13, when current in solenoid 2 ceases. Said latch is maintained in its inoperative position by pressure against the cylindrical surface of plunger 3. The movement of latch 20 is checked by regulating screw 24, which is arranged to engage arm 22 and to stop it at any desired point, said screw being secured in the desired position by lock-nut 25.

Attention is now directed to my novel means for releasing said latch, which consist in the solenoid 26, connected with said distant point by suitable electric wires. A plunger 26 is provided the upper part 36 of which is made of brass and the lower part 37 of iron. When no current is passing through said solenoid the iron part extends below and outside said solenoid, resting on the bottom of brass lining 28 and brass plug 29. To the

upper face of said plunger a rod 30 is rigidly attached, being longitudinally movable through a guiding slot 31 in bracket 32.

The operation of my releasing device is as follows: A current is transmitted through solenoid 26, which causes said solenoid to draw plunger 26 upward, and causes the upper end of rod 30 to strike arm 22 of latch 20, drawing said latch out of engagement with the upper surface of plunger 3, and allowing springs 12 and 13 to operate for opening the switches.

To lessen the shock of the sudden return of arm 15 in its opening movement I provide a buffer 33 to receive the lower end of said arm.

I claim:

1. An electric switch operating machine comprising mechanism for slowly and positively closing electric switches and for rapidly opening the same, a solenoid and plunger for operating the said mechanism, means for locking the switch in the open position, and a gravity catch for locking the switch in the closed position.

2. An electric switch-operating machine comprising, a pivoted arm for attachment to electric switches, mechanism, for slowly and positively closing said switches and for rapidly opening the same, means carried by the arm pivot for locking said mechanism in the open position of said switches, and a solenoid and plunger for operating said mechanism from a distant point.

3. An electric switch-operating machine comprising, a pivoted arm for connection with electric switches, mechanism for slowly and positively closing said switches, and for rapidly opening the same, means carried by the arm pivot for locking said mechanism in the open position of said switches, means for locking the switches in the closed position, a solenoid and plunger for operating said mechanism from a distant point, means for securing and releasing said plunger, and a second solenoid and plunger for operating said means from a distant point.

4. An electric switch-operating machine comprising mechanism for slowly and positively closing electric switches and for rapidly opening the same, means for locking said mechanism in both the open and closed positions of said switches, a solenoid and plunger for operating said mechanism, a latch operative gravitatively to secure said plunger in its downward position, a rod adapted to release said latch, and a solenoid and plunger for operating said rod.

5. In a device of the character described, mechanism operative from a distant point, for slowly and positively closing electric switches and for rapidly opening the same, comprising the combination with a closing solenoid and plunger, of opening springs opposing the operation of said solenoid but having less energy than the same, a pivoted arm

connectible with an electric switch and adapted by rotation in one direction to close, and in the opposite direction to open the same, means carried by the arm pivot to lock the arm in the open position, a connection from said plunger through the locking means to said arm for rotating the same to switch-closing position, and a connection from said springs through the locking means to said arm for rotating the same to the switch-opening position.

6. In a device of the character described, mechanism operative from a distant point for slowly and positively closing electric switches, comprising in combination a rotatable arm mounted on a shaft supported in main frame and connectible with an electric switch and adapted by rotation in one direction to close said switch, a closing solenoid and plunger, standards on said plunger carrying a shaft and a roller mounted on said shaft, a cam rigidly fixed on said frame supported shaft and arranged to engage said roller, whereby the downward movement of said roller rotates said frame supported shaft and said rotatable arm, and springs for retarding the downward movement of said plunger.

7. In a device of the character described means for slowly and positively closing electric switches from a distant point comprising a solenoid, a plunger longitudinally movable therein, standards fixed to said plunger, a shaft on said standards, a roller on said shaft, a shaft supported in the main frame of said device, a cam rigidly fixed on said shaft and adapted to engage said roller, an arm rigidly fixed to said shaft adapted to connect with an electric switch, an arm loosely mounted on said shaft having forks engageable with aforesaid shaft on said standards, and springs attached to said loosely mounted arm.

8. In a device of the character described means for rapidly opening electric switches

comprising a shaft supported in main frame, an arm rigidly mounted on said shaft adapted to connect with an electric switch, a cam rigidly mounted on said shaft, standards having a shaft and a roller mounted thereon, said cam being engageable with said roller, an arm loosely mounted on said frame-supported shaft, and springs attached to said loosely mounted arm.

9. In a device of the character described, the combination with a pivoted arm connectible with an electric switch, of a closing solenoid, a plunger, and mechanism for converting the movements of said plunger into rotatory movements of said arm, and means carried by the arm pivot to lock the arm in one position.

10. In a device of the class described, a pivoted arm, a plunger for moving said arm, a latch adapted to hold said arm in one position and carried by the pivot, and a gravity latch adapted to hold the arm in the opposite position.

11. In a device of the class described, a pivoted arm, a plunger adapted to move said arm, means carried by the arm pivot to lock the arm in one position, a roller adapted to slide over the face of said means, and a gravity catch adapted to hold the plunger in its closed position.

12. In a device of the class described, a pivoted arm, a plunger adapted to move said arm, means carried by the arm pivot to lock the arm in the open position, a solenoid to move the arm, a gravity latch adapted to lock the solenoid in the closed position, a plunger for tripping the gravity latch, and a solenoid for operating said tripping means.

LESLIE ARTHUR HEDGER.

Witnesses:

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WILLIAM JOSEPH DRYNEN.