

No. 776,849.

PATENTED DEC. 6, 1904.

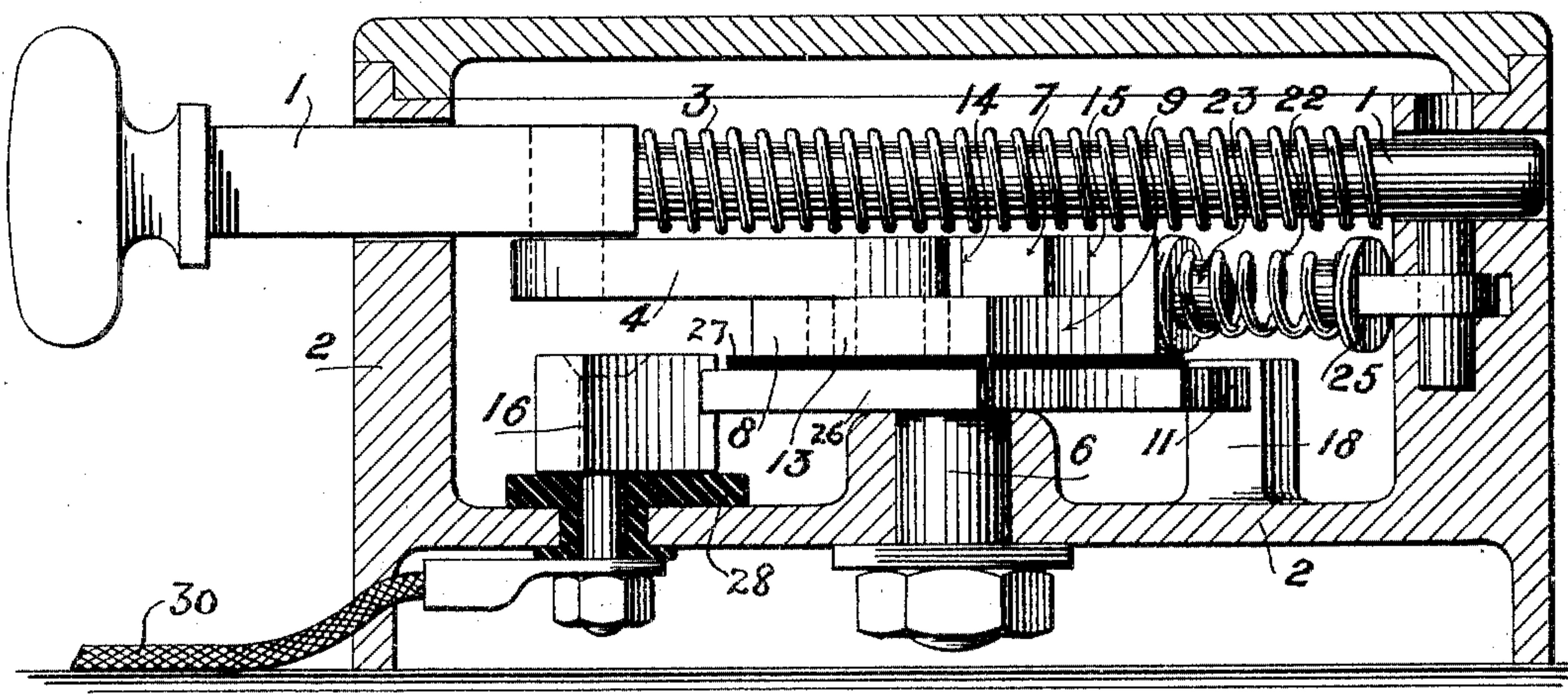
W. KINGSLAND.
ELECTRIC SWITCH.

APPLICATION FILED MAR. 7, 1904.

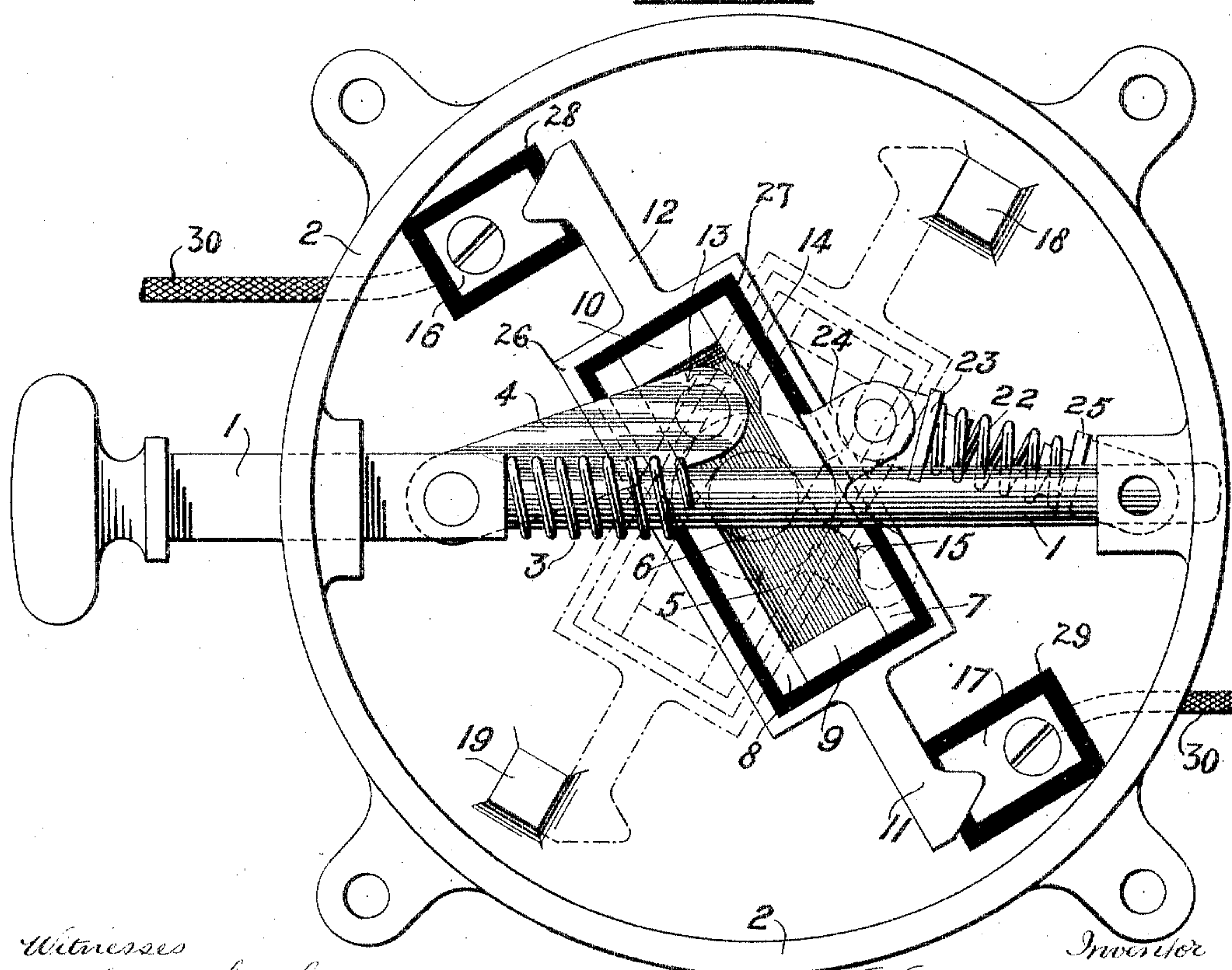
NO MODEL.

2 SHEETS—SHEET 1.

—FIG. 1.—



—FIG. 2.—



Witnesses
Charles Smith,
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Inventor
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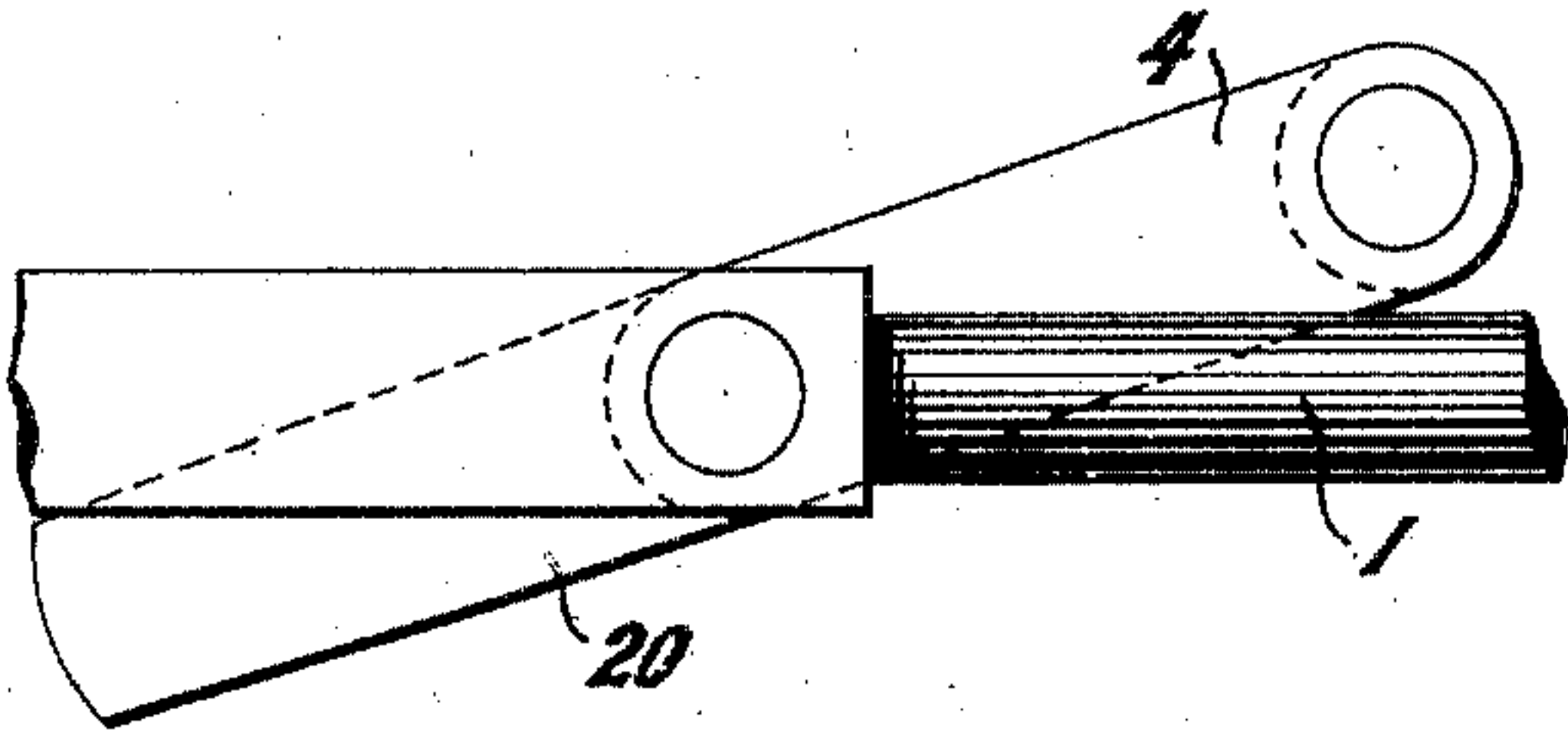
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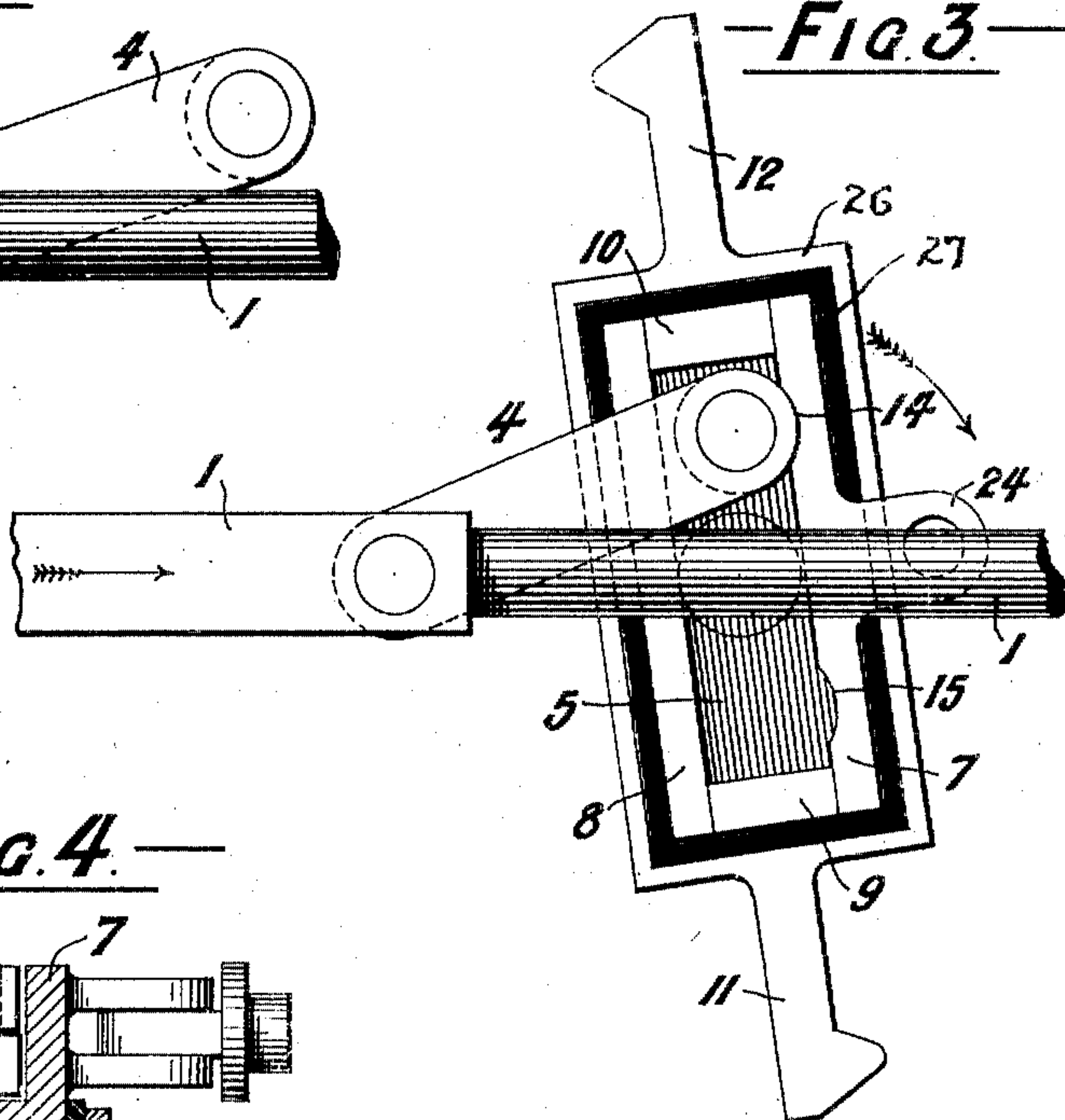
NO MODEL.

3 SHEETS—SHEET 2.

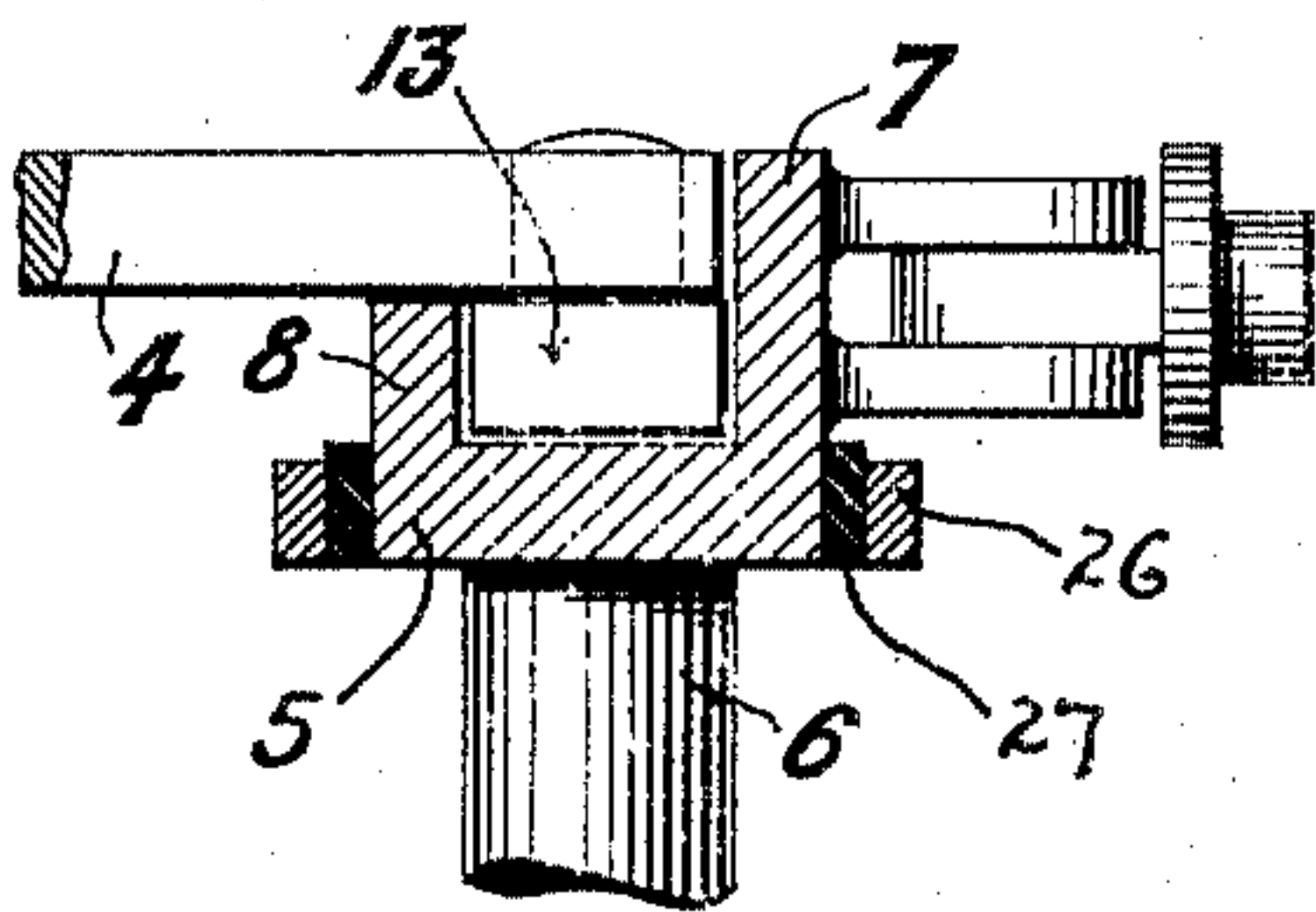
—Fig. 6.—



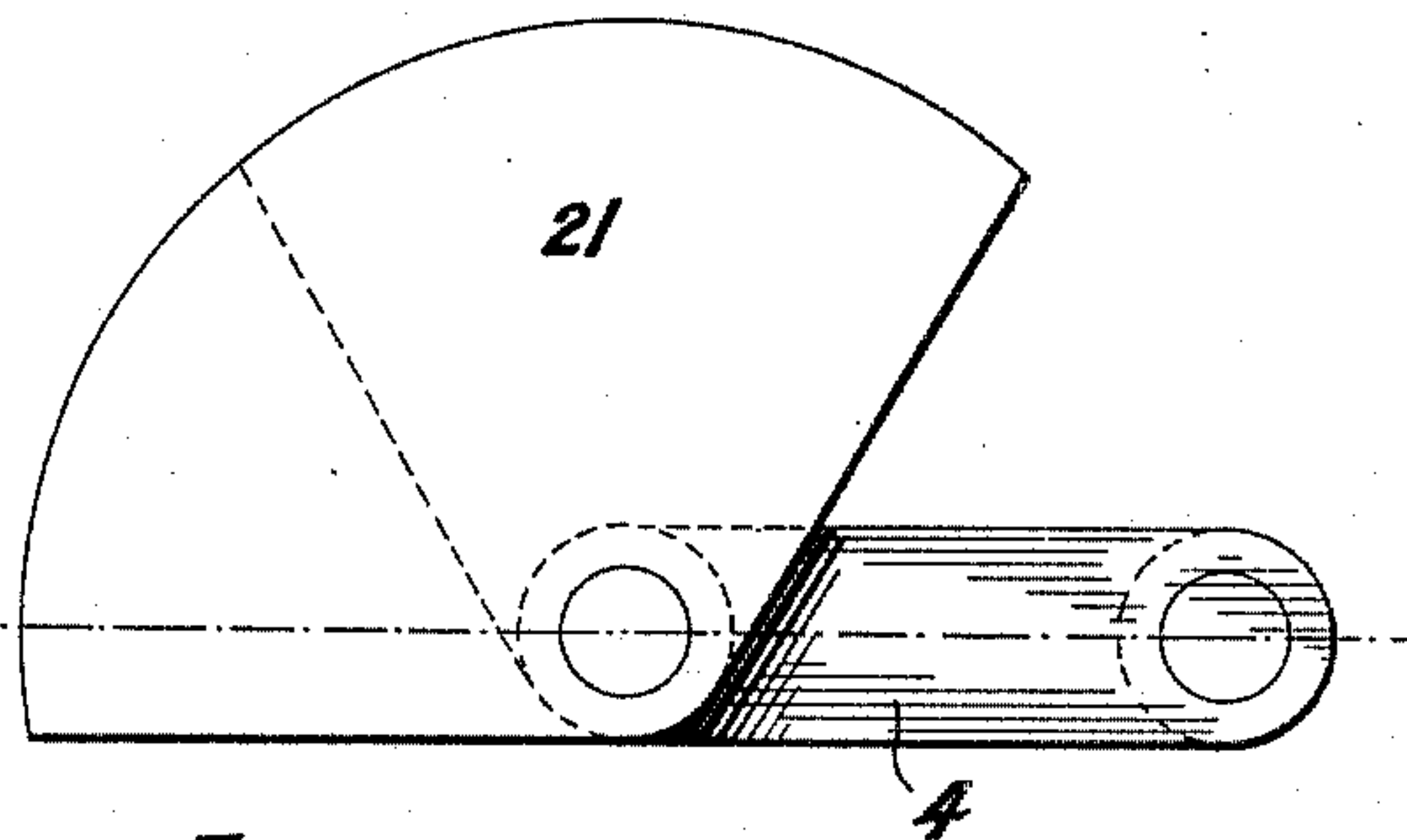
—Fig. 3.—



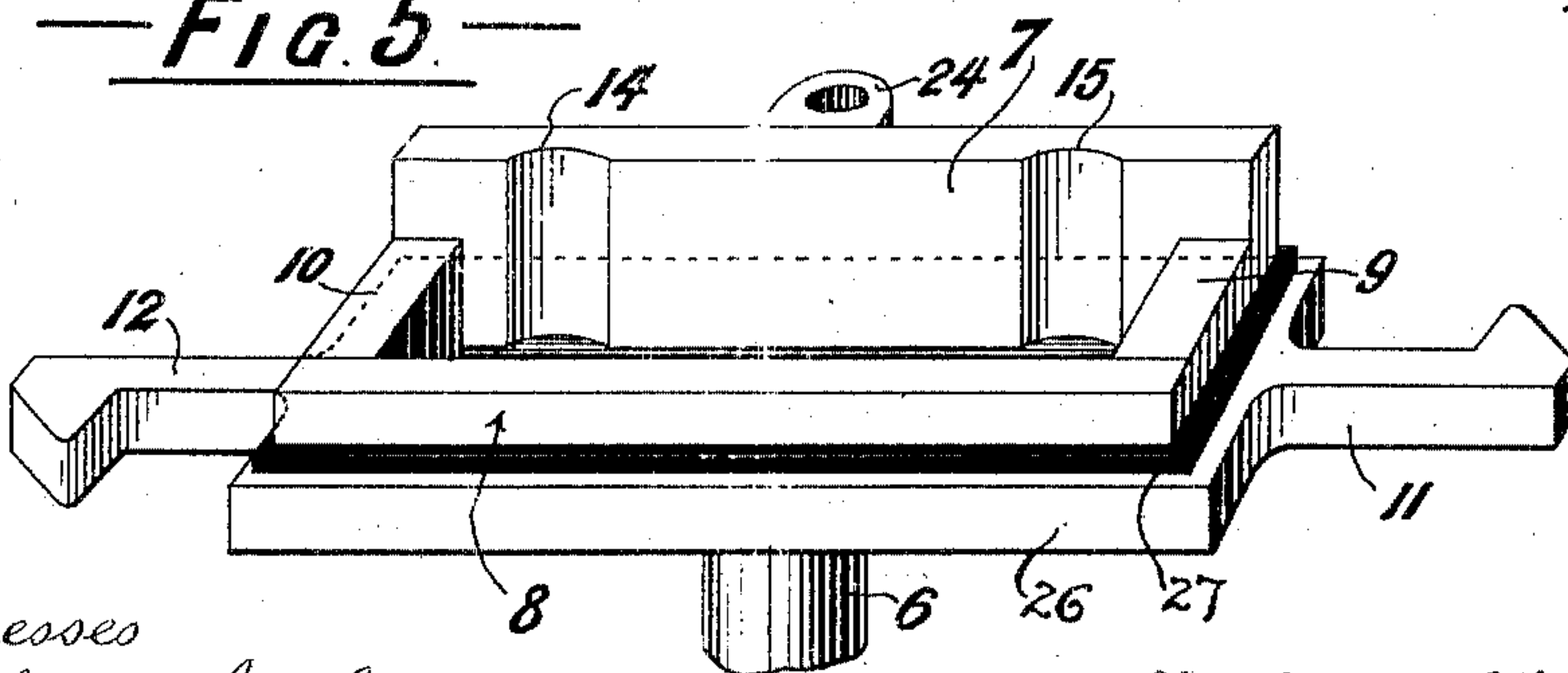
—Fig. 4.—



—Fig. 7.—



—Fig. 5.—



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UNITED STATES PATENT OFFICE.

WILLIAM KINGSLAND, OF LONDON, ENGLAND.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 776,849, dated December 6, 1904.

Application filed March 7, 1904. Serial No. 197,021. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KINGSLAND, a subject of the King of Great Britain, residing at London, England, have invented a certain new and useful Improvement in Electric Switches, of which the following is a specification.

This invention refers to electric switches calculated for alternately making and breaking an electric circuit, for inserting or cutting out resistances, and for other similar purposes.

The said invention relates to a type of switch by which upon similar motions being communicated to an operating member a circuit, for example, is alternately made and broken—that is to say, for instance, at one movement given by any suitable means to the operating member a circuit is connected, at the next precisely similar operation of the same member the said circuit is disconnected, and again connected at the succeeding operation, and so on.

The present invention therefore refers to the novel combinations and arrangements of parts, as hereinafter claimed, whereby a device is produced having few moving parts, and these so arranged that there is practically no lost motion to be taken up by the operating member before the movement of the switch can be effected and completed, while the use of springs, although such may generally be employed, are yet not essential to the proper efficiency and sure working of the instrument.

The instrument according to this invention comprises an operating member capable of being given reciprocative rectilinear motions in the direction of its axis, and an arm is pivoted at one end to this operating-slide and at the other engages on or in a guideway formed on or in a movable switch part, which latter is carried so as to permit of it having angular motions about an axis at right angles and coincident with the axis of the operating-slide. The switch part is adapted to make electrical connection when in one angular position relatively to the operating-slide and to break same when in an opposite angular position when such is the function of the switch. The guideway of the movable switch part extends generally for equal distances on each side of

its axis of revolution, but not necessarily so, and means are provided to prevent the engaging end of the arm from slipping on the guideway of the switch part while operating the latter. At the commencement of each operation the end of the arm is located at the nearer end of the guideway of the switch part thereof and is at that time in a position to act to turn the switch part about its center immediately the slide is moved, and having so turned the switch part through the predetermined angle upon the return of the slide by a spring or equivalent means the arm is mechanically brought back and during that return movement is caused to travel to the opposite end of the guideway of the switch part, so as to be ready for the next operation. The rocking switch part has conducting-arms or itself forms a conducting member, and in one angular position its opposite ends are brought into contact with oppositely-placed contact-pieces to complete a circuit, and at its other angular position it is brought into contact with stops, the circuit being then broken.

An example of construction and arrangement of the parts composing the improved switch will now be described with reference to the accompanying drawings, whereon—

Figure 1 is a vertical longitudinal section of the apparatus; and Fig. 2 is a plan view with the cover of the surrounding casing removed and a portion of the spring of the operating-slide removed, the switch part being shown in position to connect a circuit. Fig. 3 shows the moving switch part and the arm which coacts therewith in the relative positions they occupy during a period of the motion. Fig. 4 is a vertical section through the guideway of the switch part, showing the end of the arm engaging therewith. Fig. 5 is a perspective view of the said moving switch part. Fig. 6 is a diagram view showing the operating-slide with its pivoted arm counterweighted to better adapt the device for being placed in such a position that the switch part has its angular motions in a vertical plane, and Fig. 7 shows a modified form of such a counterweight.

The operating-slide 1 is supported in bearings formed in a casing 2, from which the op-

erative end of the slide projects. The operating-slide 1 in the construction shown is formed cylindrical at its rear part and is surrounded by a helical spring 3, acting between a shoulder on the slide and the opposite side of the switch-casing 2 and tending to hold the slide in the position shown in Fig. 1. The arm 4 within the casing 2 is pivoted by its rear end to the slide 1 and is calculated to freely move about its pivot in a plane parallel with the operating-slide, while the said pivot accompanies the motion of the slide. The movable switch part 5 is carried by a projecting stud-axle 6, which has a bearing in the casing and is located with its axis at right angles to the axis of the slide 1 and in the same plane therewith.

The movable switch part, which is shown in perspective at Fig. 5 detached, has its guideway composed of two parallel walls 7 8, forming a kind of trough with end pieces 9 10, and is provided with projecting arms or extensions 11 12, while the forward end of the arm 4, Fig. 4, is provided with a downward projection, which by preference, in order to obviate friction, may be composed of a roller 13, which enters the trough of the switch part 5. The rearward wall 7 of the trough should be formed with serrations, vertically-extending teeth, or recesses in order to retain the forward end of the arm in position relatively to the length of the trough during its forward pushing action, and I have found in practice that such requirement is well satisfied by the formation of the two recesses 14 15 as shown, one near each end of the trough of the switch part.

Contact-pieces 16 17 are provided, arranged diametrically opposite to each other and in the construction shown at equal distances from the center about which the switch part is capable of turning, and these contact-pieces form the two ends of the circuit which are to be connected by the switch part, the arms 11 12, of which latter in one position engage the said contact-pieces, as in full lines at Fig. 2, and in the other position, as in dotted lines at same figure—that is, with the circuit disconnected—are brought up against stops 18 19, mounted upon the casing 2.

It will now be understood that upon pushing the slide 1 inward (and this may be effected by any suitable means, or even by hand) the forward end of the arm 4 will immediately move a short distance forward and engage in the recess 14, Fig. 2, and the continued motion of the slide 1 will then rock the switch part 5 about its axis 6 into the position shown by dotted lines at the said Fig. 2, and the circuit will be disconnected. Upon the release of the slide 1 it will be returned by the spring 3, (or obviously if not by a spring by a counterbalanced lever, or even by hand,) and this action will bring the projection or roller 13 of the arm 4 into contact with the

forward wall 8 of the switch part 5, which being in an inclined position will cause the arm 4 to be rocked about its pivot upon the slide 1 until it reaches the opposite end of the trough part 5 to that shown in the drawing at Fig. 2 and leaves the device ready for the next operation.

In the example of construction now being described the device may be considered to be in a horizontal position—that is, the movable switch part may be supposed to have its motions in a horizontal plane; but obviously the device may be placed in other positions—for instance, upright, so that the movable switch part has its angular motions in a vertical plane. When the device is so placed with the switch part 5 having motions in a vertical plane, I have found it preferable to counterweight the arm 4, which is pivoted to the operating-slide 1, as, for instance, is shown in the diagram at Fig. 6, where a counterweight 20 is attached to the arm 4 upon the forward side of the pivot, by which such arm is connected to the operating-slide 1. Such a counterweight may be of any suitable shape or form, either being, as shown, a simple extension of the arm 4 or it may be made of such a form that there shall be a slight preponderance of weight tending to keep the arm 4 in one or other of its two positions, and this I have found advantageous and have indicated such a construction at Fig. 7 of the drawings. In this construction the counterweight 21 may be made of quadrant formation extending upon either side of a line drawn through the pivot of the arm at right angles to the length thereof, so, as aforesaid, to maintain the arm in one or other of its two positions.

In some instances, as in the example shown at Figs. 1 and 2, I may provide a spring 22 acting in compression between the casing 2 and the moving switch part 5, so as to hold the latter part firmly in either of its two positions. In the construction shown a head 23 is pivoted to an extension 24 on the wall 7 of the switch part 5, and a similar head 25 is pivoted on the casing, the spring 22 acting between these two pivoted heads.

The projecting arms 11 and 12 are preferably carried by a frame 26, surrounding the walls 7, 8, 9, and 10 of the switch part 5 and insulated from the same by an intervening layer of insulating material 27. The contact-pieces 16 and 17 are also preferably mounted on suitable blocks of insulating material 28 and 29, respectively, and 30 represents the circuit-wires leading to and from the switch.

Such a switch as I have now described is applicable to numerous purposes, as will be well understood, and among those purposes it may be used in electrical traction and can be operated by tappet-action in order to alternately make and break an electrical circuit. In this connection I would mention that the

operating-slide may receive its motion by being connected to such a motor-screw 10 as is referred to and described in the specification of a United States patent granted to myself, No. 743,173, or may receive its motion from such a clutch device as is described in the specification of United States Patent No. 713,992, also granted to myself.

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

1. In electric switches for alternately making and breaking an electric circuit, for alternately inserting and cutting out resistances, and the like by similar consecutive motions of an operating member; the combination of an operating-slide capable of receiving rectilinear reciprocating motions, a casing, bearings in the casing to carry the slide, an arm pivoted at one end to the slide, a movable switch part to make electric connection when in one angular position relatively to the operating-slide and to break same when in an opposite angular position, means for supporting the movable switch part from the casing to permit it to have angular motions about an axis at right angles to the axis of the operating-slide and in a plane parallel with the latter, a guideway on the switch part extending on each side its axis of revolution, means for engaging the free end of the arm with the guideway of the movable switch part to permit it to slide lengthwise of same, means to prevent the engaging end of the arm from slipping on the guideway of the switch part while operating the latter, and means to cause the return of the operating-slide and the engagement end of the arm after each operation into position for the next succeeding operation, substantially as set forth.
2. In electric switches for alternately making and breaking an electric circuit, for alternately inserting and cutting out resistances, and the like by similar consecutive motions of an operating member; the combination with an operating-slide capable of receiving rectilinear reciprocating motions, a casing, bearings in the casing to carry the slide, a movable switch part to make electric connection when in one angular position and to break same when in another position, and means for supporting the movable switch part from the casing to permit it to have angular motions about an axis at right angles to the axis of the operating-slide and in a plane parallel with the latter; of a guideway on the switch part extending on each side of the axis and having a recess formed therein near each end thereof, an arm pivoted at one end to the operating-slide, a projection on the free end of the arm to slide freely upon the said guideway and to engage in one or other of the recesses of the guideway while operating the switch part, and means for returning the operating-slide and arm after each operative

motion to position for the next operation, substantially as set forth.

3. In electric switches for alternately making and breaking an electric circuit, for alternately inserting and cutting out resistances, and the like by similar consecutive motions of an operating member; the combination of an operating-slide capable of receiving rectilinear reciprocating motions, a casing, bearings in the casing to carry the slide, an arm pivoted at one end to the slide, a movable switch part to make electric connection when in one angular position relatively to the operating-slide and to break same when in an opposite angular position, a stud-axle on the switch part, a bearing in the casing to support the said axle at right angles to and in the same plane as the axis of the operating-slide, a trough in the switch part extending on each side of its axis, a projecting part on the free end of the arm to enter the trough, means to prevent the end of the arm slipping in the trough while operating the switch part, and means to cause the return of the operating-slide and of the engagement end of the arm after each operation into position for the next succeeding operation, substantially as set forth.

4. In electric switches for alternately making and breaking an electric circuit, for alternately inserting and cutting out resistances, and the like by similar consecutive motions of an operating member; the combination with an operating-slide capable of receiving rectilinear reciprocating motions, a casing, bearings in the casing to carry the slide, a movable switch part to make electric connection when in one angular position and to break same when in another position, and means for supporting the movable switch part from the casing to permit it to have angular motions about an axis at right angles to the axis of the operating-slide and in a plane parallel with the latter; of a guideway on the switch part having two parallel walls extending on each side of the axis, and having a recess formed in the face of one wall near each end thereof, an arm pivoted at one end to the operating-slide, a roller on the free end of the arm of a diameter to enter and run freely in the said guideway, to engage in one or other of the recesses in the wall thereof while operating the switch part, and to return freely on the non-recessed wall of the latter on its return motion, and means for returning the operating-slide after each operation to position for the next motion substantially as set forth.

5. In electric switches; the combination with an operating-slide capable of receiving rectilinear reciprocating motions, a casing, bearings in the casing to carry the slide, a movable switch part to make electric connection when in one angular position and to break

same when in another position, and means
for supporting the movable switch part from
the casing to permit it to have angular mo-
tions about an axis at right angles to the axis
5 of the operating-slide and in a plane parallel
with the latter; of a guideway on the switch
part, two parallel walls to the said guideway
extending on each side of the axis of the
switch part, a recess formed in the face of
10 one wall near each end thereof, and end walls
to the guideway to limit its length, an arm
pivoted at one end to the operating-slide, a
roller on the free end of the arm of a diame-
ter to enter and run freely in the said guide-
15 way and adapted to engage in one or other
of the recesses in the wall thereof while oper-
ating the switch part, and to return freely on
the non-recessed wall of the latter on its re-
turn motion, and a spring on the operating-
20 slide acting against the casing to return the
said slide and the roller-carrying arm after
each operation to position for the next motion,
substantially as set forth.

6. In electric switches; the combination with
25 an operating-slide capable of receiving recti-
linear reciprocatory motions, a casing, bear-
ings in the casing to carry the slide, a mov-
able switch part to make electric connection
when in one angular position and to break
30 same when in another position, and means for
supporting the movable switch part from the

casing to permit it to have angular motions
about an axis at right angles to the axis of
the operating-slide and in a plane parallel
with the latter; of a guideway on the switch 35
part, two parallel walls to the said guideway
extending equal distances on each side of the
axis of the switch part, a recess formed in
the face of one wall near each end thereof,
and end walls to the guideway to limit its 40
length, an arm pivoted at one end to the op-
erating-slide, a roller on the free end of the
arm of a diameter to enter and run freely in
the said guideway and adapted to engage in
one or other of the recesses in the wall thereof 45
while operating the switch part, and to re-
turn freely on the non-recessed wall of the
latter on its return motion, a lateral extension
about centrally of the length of the moving
switch part, and a spring acting in compres- 50
sion between the said extension and the cas-
ing to hold the switch part firmly in either of
the two positions in which it may have been
placed, and a spring on the operating-slide
acting against the casing to return the said 55
slide and the roller-carrying arm after each
operation to position for the next motion, sub-
stantially as set forth.

WILLIAM KINGSLAND.

Witnesses:

THOMAS W. ROGERS,
WM. A. MARSHALL.