

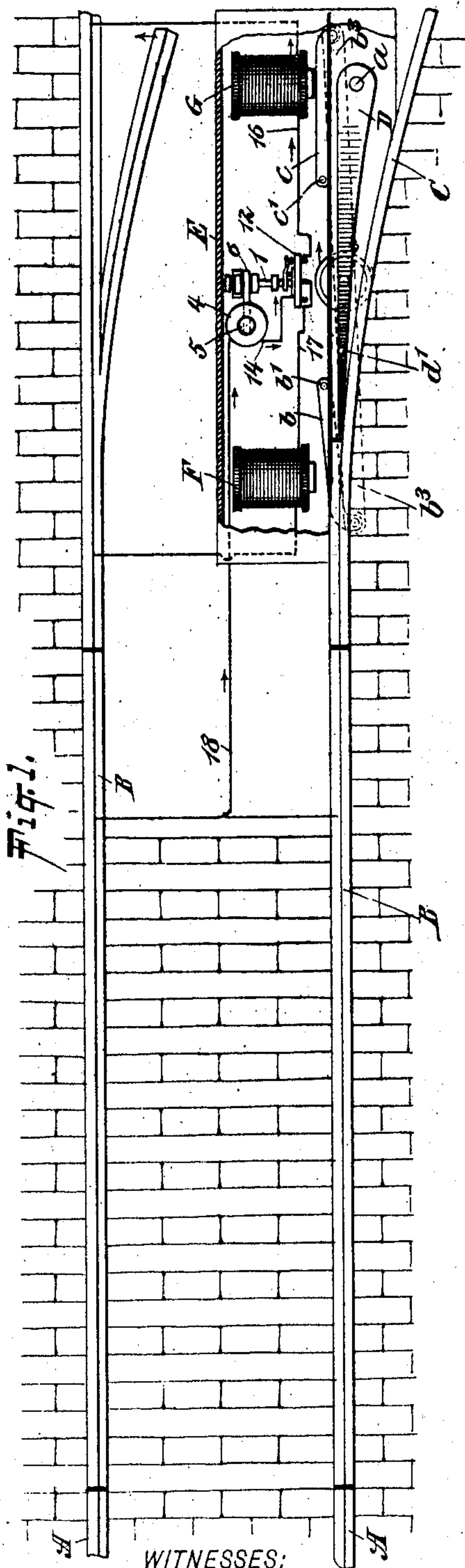
No. 631,791.

Patented Aug. 29, 1899.

J. W. HEARN.
ELECTRIC SWITCH.

(Application filed Feb. 7, 1899.)

(No Model.)



WITNESSES:

William P. Goebel.
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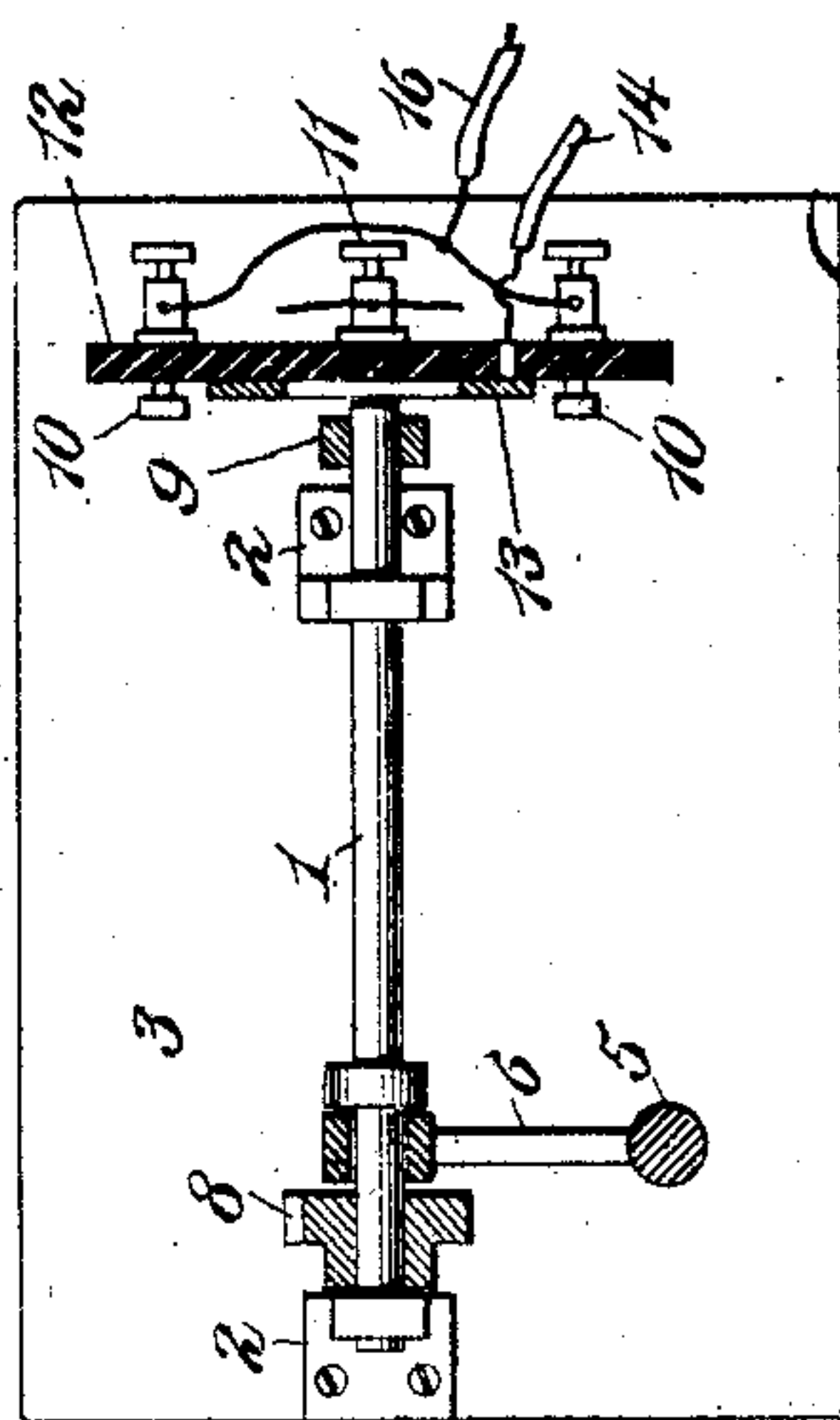
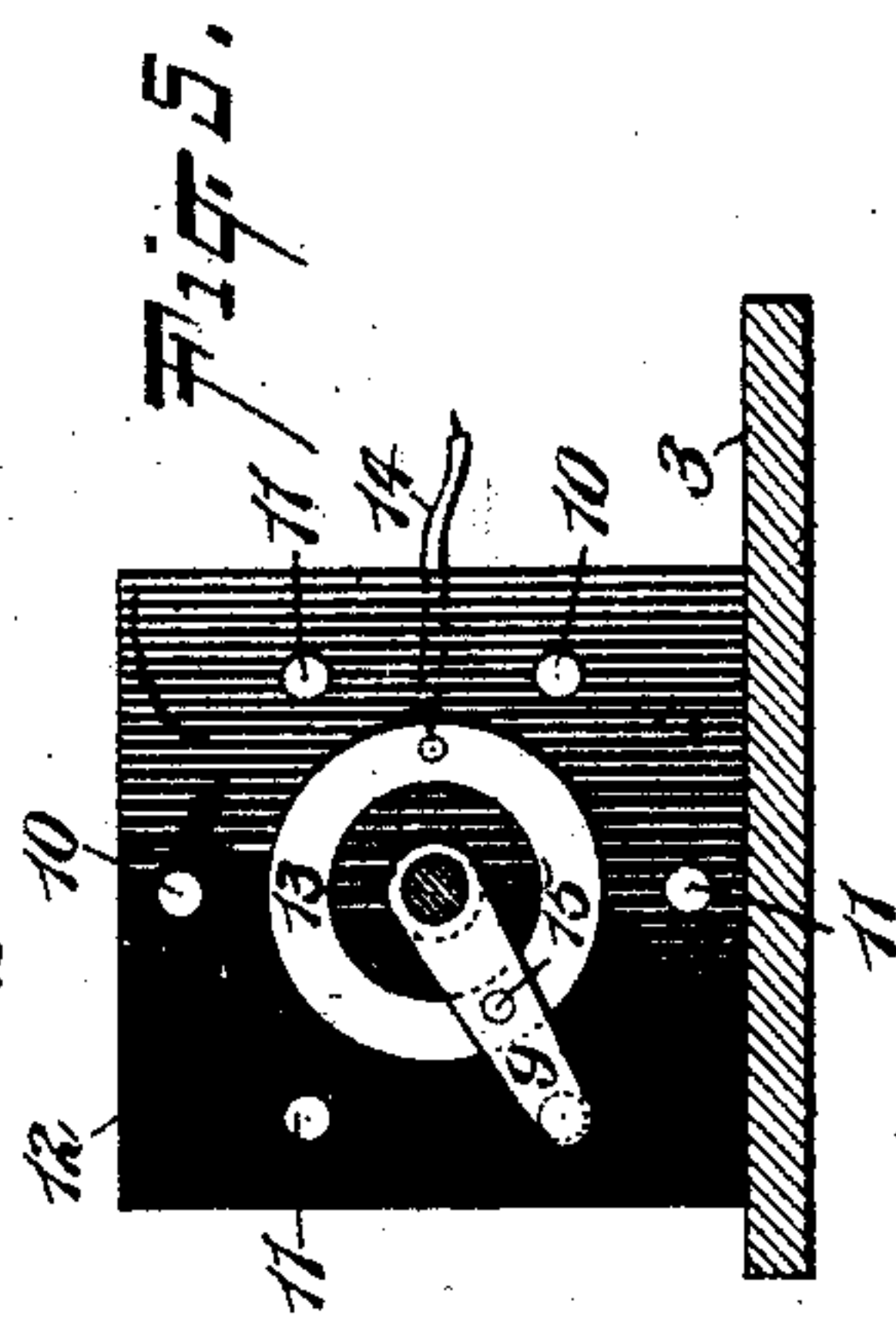
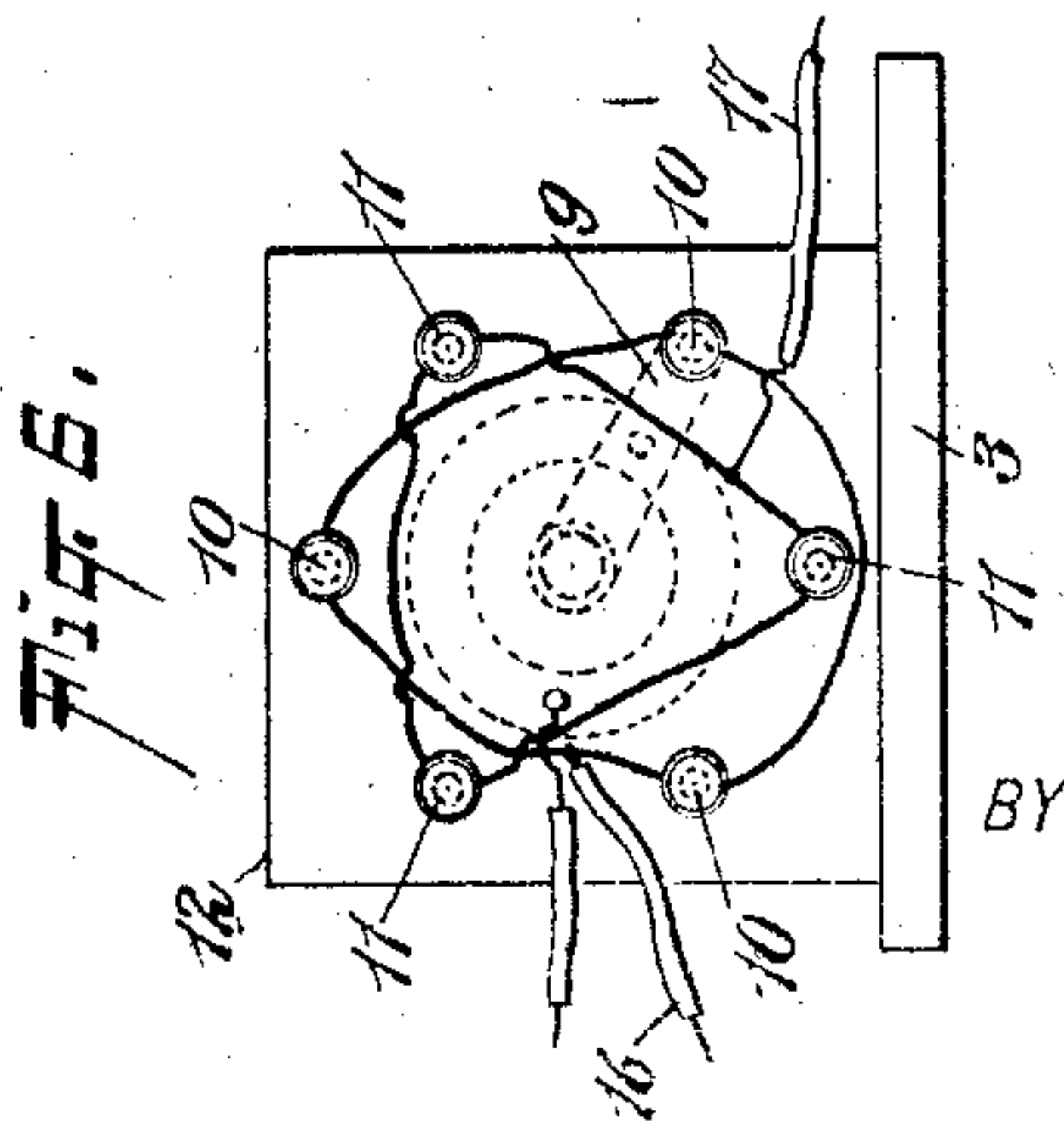
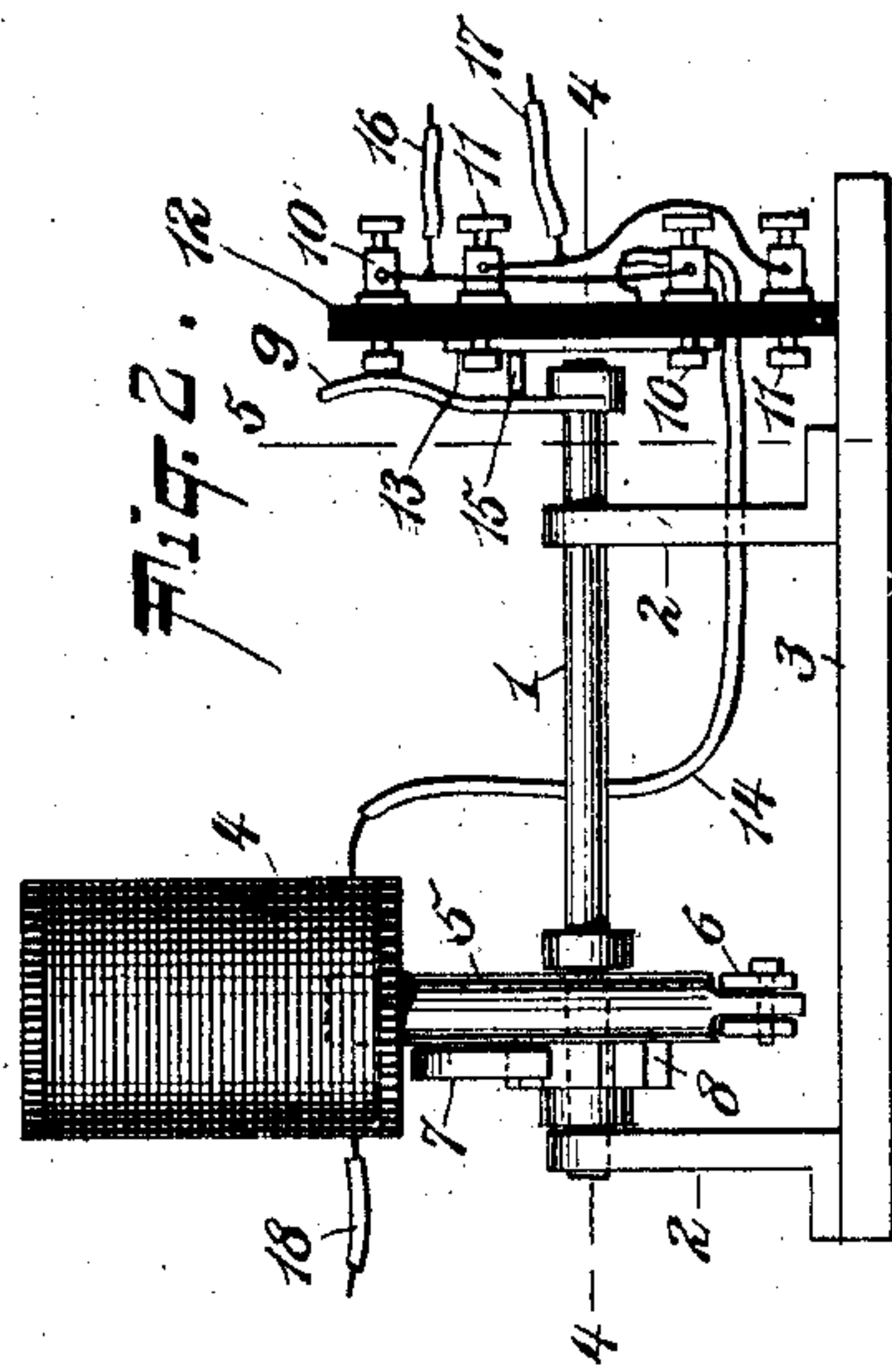
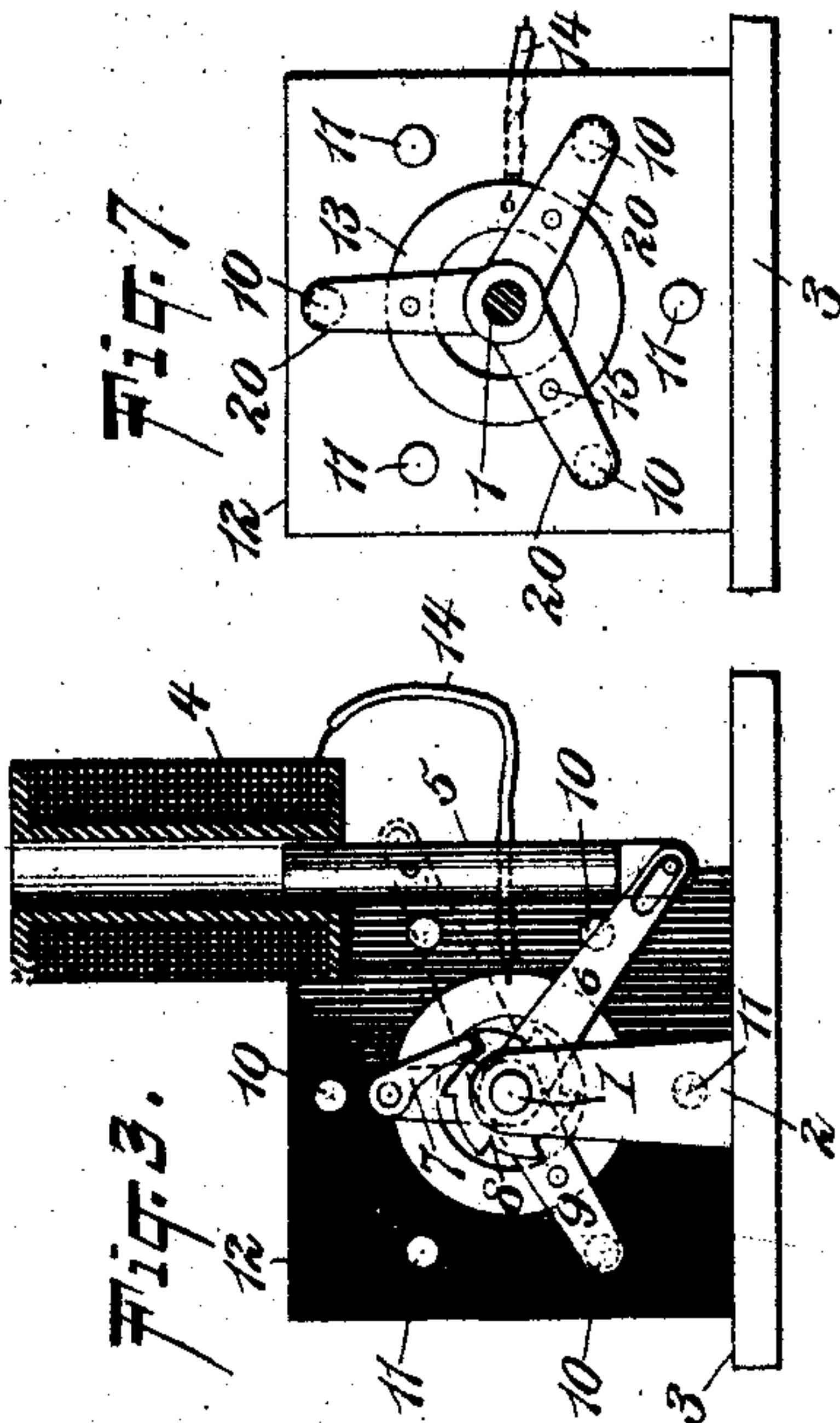


Fig. 4.

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ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 631,791, dated August 29, 1899.

Application filed February 7, 1899. Serial No. 704,796. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. HEARN, a citizen of the United States, and a resident of New York, borough of Brooklyn, in the county of Kings and State of New York, have made and invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

My invention relates to an improvement in electric switches, and more particularly to improvements upon the switch shown and described in Letters Patent granted to me July 23, 1895, and numbered 543,181. At the time that the above-mentioned patent was secured by me much shorter rails were in use than is the case at the present time, and therefore it was desirable in the case of my former switch to insulate two sections of the rail to insure the proper working of the device. At the present time, however, it is the general rule that longer sections of rails are used, in most instances about sixty feet in length, and it is the object of my present invention to so construct and arrange the several parts of the switch that but one section of the rail be insulated. As in my former device, the present invention contemplates the use of the current, after passing through the motor of the car, to operate the switch-point without the employment or addition of any extra parts, appliances, or devices upon the car itself, but, on the other hand, to so construct and arrange the switch that the motorman may simply allow his car to proceed in case the switch-point or tongue is properly set, the current which propels the car being utilized to hold it in this adjustment, and, further, that if upon his approach to the switch the point or tongue be improperly set he may by simply cutting off the current for an instant and then turning it on again properly set the switch, thereby in both instances utilizing the current for maintaining the switch-point in its proper position or moving it to its proper position.

With these and other ends in view my invention consists in the employment of two magnets, so arranged with relation to their two armatures secured at opposite ends of a lever as to move the switch-point in opposite directions, and a movable contact operated by a third magnet for the purpose of exciting

one or the other of the two switch-magnets to properly set the switch-point.

My invention further consists in certain novel features of construction and combinations of parts, as will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of my improved switch, the box containing the magnets, armatures, and levers being cut away to show the latter parts. Fig. 2 is a side view of the movable contact with its controlling-magnet. Fig. 3 is a front end view of the same. Fig. 4 is a sectional view taken on the line 4 4 of Fig. 2. Fig. 5 is a view taken on the line 5 5 of Fig. 2. Fig. 6 is a rear end view of the movable contact shown in Fig. 2, and Fig. 7 shows a modified form of the contact-arm.

Referring to the drawings, A represents the car-rails, B the insulated section thereof, and C the switch-rail, the section B, located just forward of the switch, being insulated from the other portions of the rails.

D represents the switch point or tongue, pivoted at *a*. Near the switch is located a well or receptacle E, as shown in Fig. 1, the top or cover thereof being broken away to expose the magnets and other devices for operating the switch-point. To the bottom of the box or receptacle E is centrally pivoted a lever *b*³, to the ends of which are in turn pivoted the armatures *b* *c*, the opposite ends of the latter being pivoted at *b'* *c'* to the bottom of the box or receptacle. These armatures are located in close proximity to the magnets F G, arranged near the ends of the box E. The switch-tongue D is provided with a pin or lug *d'*, which passes down into an opening or recess formed in the lever *b*³ to receive it, the above parts—that is, the magnets, levers, armatures, and switch-point—being constructed and arranged to operate as shown and described in my aforesaid patent, and hence need not here be described with greater detail, it being sufficient to say that when the magnet G is excited the armature *c'* will be pulled toward the same, thus pulling the respective end of the lever *b*³ in the same direction and the opposite end of the lever in the opposite direction, the switch-tongue assuming the position as illustrated in Fig. 1 of the drawings. It will of course

be understood that when the magnet F is excited the switch-point, through the medium of the lever b^3 and armature b , will be forced in the opposite direction—in other words, in a position to allow the car to pass onto the switch-rails C.

Within the box E and between the magnets F and G or in some other desirable or convenient place is located a movable contact the purpose of which is to direct or conduct the current to either one of the magnets F or G, as desired, in order that the switch-tongue may be maintained in its position or changed to its opposite position, in accordance with the direction in which it is desired the car shall proceed. The movable contact consists of a rod or shaft 1, mounted in the standards or brackets 2, secured to the base 3, which in turn rests upon and is secured to the bottom of the box or receptacle E. Above this shaft is supported, in any desired manner, a solenoid 4, 5 representing the core or armature in the form of a bar or rod, the lower end of this armature 5 being pivotally connected to one end of the bell-crank lever 6, which latter is loosely mounted on the shaft 1 and provided at its opposite end with a pawl 7, adapted to engage with the ratchet 8, rigidly secured to the shaft, this construction and arrangement of parts resulting in turning the shaft 1 when the core 5 is raised by the excited solenoid 4.

To one end of the shaft 1, which extends through the bracket 2, is secured the arm 9, adapted, upon being turned by the shaft 1, to come in contact with and bear upon the pins 10 and 11, passing through the plate 12, made of rubber or other insulating material and secured to the base 3. The number of these pins correspond with the number of the teeth in the ratchet 8, in the present instance three pins 10 being employed, which are electrically connected, and three pins 11, which are electrically connected as shown in Fig. 6, thus in effect forming two contacts.

To the plate 12 is secured a metal ring 13, which is electrically connected by means of a wire 14 with the solenoid 4, a lug or projection 15, formed on the arm 9, bearing on the ring 13, thus always insuring an electrical contact between said arm 9 and said ring.

From the contact-pins 10 leads a wire 16 to the magnet G, and from the contact-pins 11 leads a wire 17 to the magnet F, this arrangement resulting in the excitement of either the magnet F when the arm 9 is in contact with one of the pins 11, or the magnet G when the arm 9 is in contact with one of the pins 10. In other words, when the car passes onto the insulated rails B the current after passing through the motor and wheels of the car is directed through the wire 18, connecting the insulated rails to the solenoid 4, which is immediately excited, and thereupon raises the arm 5. The current passing through the wire 14 to the ring 13 is directed through the lug 15, which is in contact therewith through

the arm 9, and to the pin 10, from which the wire 16 leads the current to the magnet G. This magnet upon being excited by the current draws the armature c toward it, thereby, as before described, moving the lever b^3 and switch-point D to the positions as illustrated in Fig. 1 of the drawings. Presuming that the switch is thus set right the motorman proceeds upon the main line. If, however, he desires to go upon the branch, it will only be necessary for him, while on the insulated rails B, to cut off the current for an instant, whereupon the arm 5 will immediately fall by its own weight to a position as illustrated in Figs. 2 and 3, thus turning the shaft 1, as before described, and moving the arm 9 from the contact-pin 10 to the contact-pin 11, the effect being that the current is directed from the solenoid 4 through the wire 14, through the ring 13, lug 15, arm 9, pin 11, through the wire 17 to the magnet F, which is thereby excited and draws the armature b toward it, thus shifting the switch-point D to the opposite position, (not illustrated,) and thereby allowing the car to proceed upon the branch.

From the foregoing it will be understood that by reason of the construction and arrangement of the several parts the motorman upon passing onto the insulated rails B will allow his car to proceed, provided the switch tongue or point is moved to its proper position. If it happen that the switch-point is moved to the wrong position, it will simply be necessary for him to turn off the current for a moment and then turn it on again, this operation resulting in moving the contact-arm to the proper contact-pin for exciting the magnet for moving the switch-point from the wrong position to the right one. It will further be understood that the switch-point is moved into both positions by means of the current operating to drive the car, instead of into one position by means of a weight or gravity or by a spring, as has in many instances heretofore been done. In other words, in my invention I rely upon gravity for partially operating the contact-point and not upon gravity for operating or moving the switch-point.

I would have it understood that I do not limit my invention to the exact construction and arrangement of the several details herein shown and described, as any one skilled in the art will readily understand that such details, both in construction and arrangement, may be varied in many ways without departing from the spirit and scope of my invention. For instance, instead of forming the contact-arm 9 with one single arm it might be made with two or more, Fig. 7 showing such part made with three arms 20, the end of each of which will come in contact with the three contact-pins 10 or the three contact-pins 11, thus rendering it more certain that a perfect contact will be made and the current properly directed to the magnets F and G. Again, it will be understood that instead of having

a section of the rail immediately forward of the switch insulated, as shown in Fig. 1, said insulated section may include the casting or bed-plate for supporting the switch-point, this construction and arrangement operating to hold or lock the switch-point in its proper position while the car is upon said insulated section. It will be further understood that instead of arranging or locating the movable contact within the box or receptacle holding the switch-magnets it may be located at any distance therefrom or in any convenient place—as, for instance, upon a pole or post—where access may be conveniently had to the same. Further, instead of using a solenoid 4, as described, with the post or core 5, an ordinary magnet may be substituted therefor, the armature being made in any form desired, the only requirement being that such armature will drop or fall in order to rotate the shaft and thereby move the contact-arm from one contact pin or point to the other, and, finally, instead of relying upon gravity for the falling or dropping of the armature a spring of any desirable form may be employed for assisting the fall thereof. As such changes will be readily understood by persons skilled in the art, further illustration or description of such is unnecessary.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric switch, the combination with two switch-magnets, of armatures indirectly connected with the switch-point for moving the same in opposite directions, and a movable contact connected with said magnets for alternately exciting the same, said contact consisting of a solenoid and an armature, arranged to move the contact-arm from one contact-pin to the other, substantially as described.

2. In an electric switch, the combination with two switch-magnets, of armatures indirectly connected with the switch-point for moving the same in opposite directions, and a

movable contact connected with said magnets and consisting of a solenoid and an armature connected with a shaft for rotating the same, said shaft having an arm thereon, and contact-pins connected with said switch-magnets and with which pins said arm comes in contact, for alternately exciting said magnets and moving said switch, substantially as described.

3. In an electric switch, the combination with two magnets, of armatures indirectly connected with the switch-point for moving the latter in opposite directions, and a movable contact, the latter consisting of a solenoid, an armature connected with a shaft, and contact-pins electrically connected with said magnets and with which pins said arm comes in contact, and a ring upon which said contact-arm bears, and with which the solenoid is electrically connected, whereby the switch-magnets are alternately excited and the switch-point moved in opposite directions, substantially as described.

4. In an electric switch, the combination with two magnets for moving the switch-point in opposite directions, of a movable contact for alternately exciting said switch-magnets, said contact consisting of a solenoid, a post or armature adapted to be raised thereby when said solenoid is excited, a shaft adapted to be rotated by said post or armature, a contact-arm on said shaft, a plate formed of insulating material, contact-pins secured to said plate and connected with said magnets, and a ring secured to said plate upon which ring said arm bears and which is electrically connected with said solenoid, substantially as described.

Signed at New York, in the county of New York and State of New York, this 6th day of February, A. D. 1899.

JOHN W. HEARN.

Witnesses:

G. BANCKER,
M. VAN NORTWICK.