

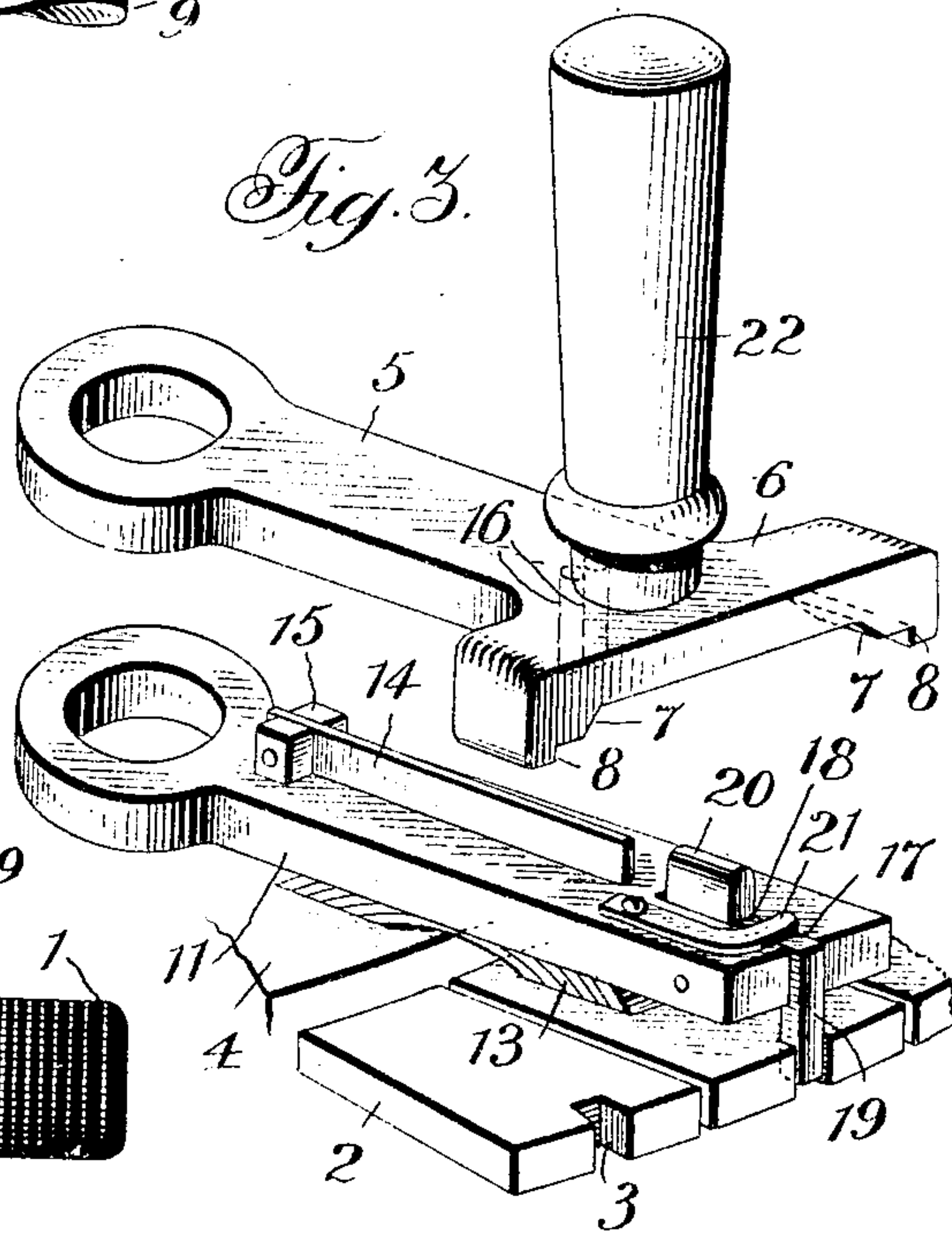
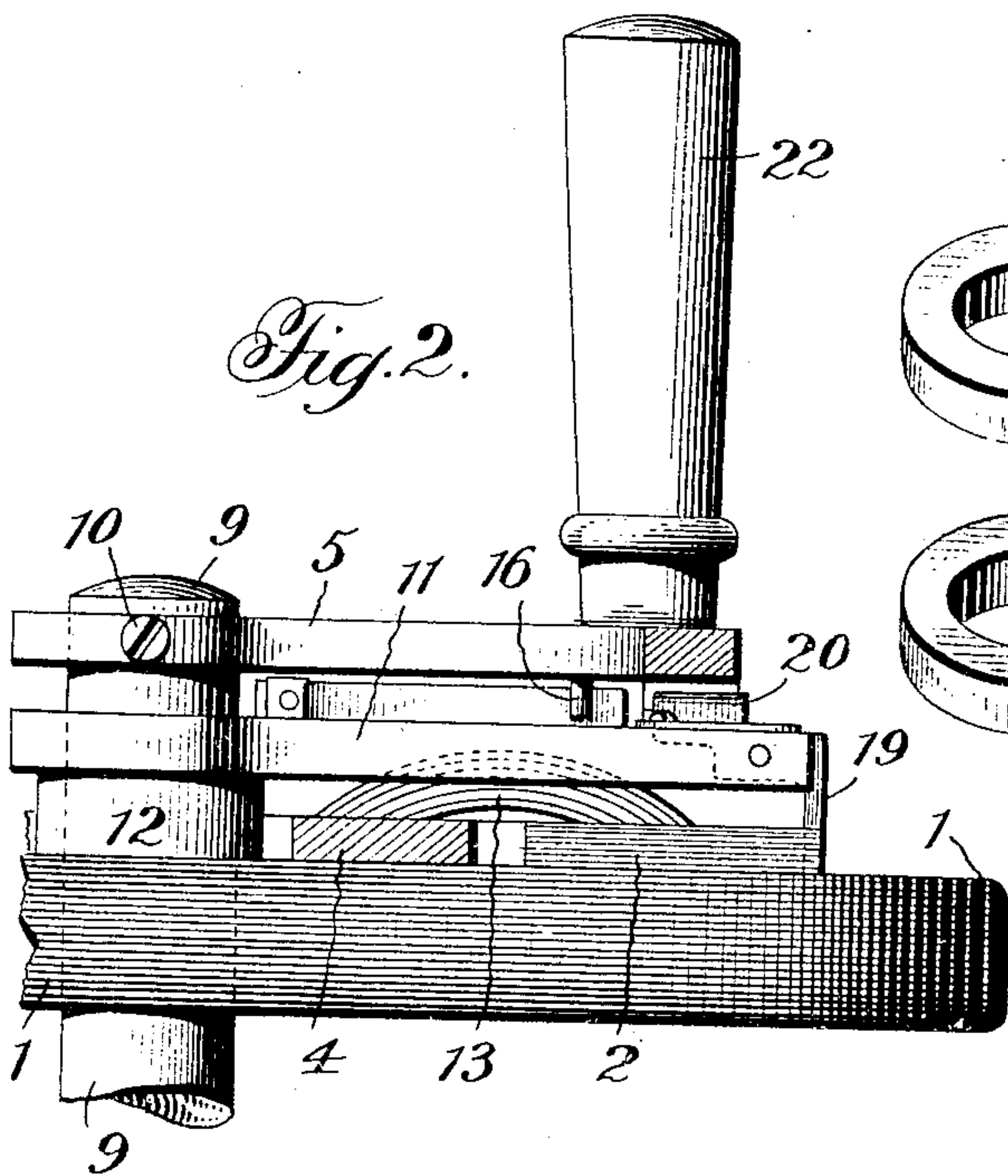
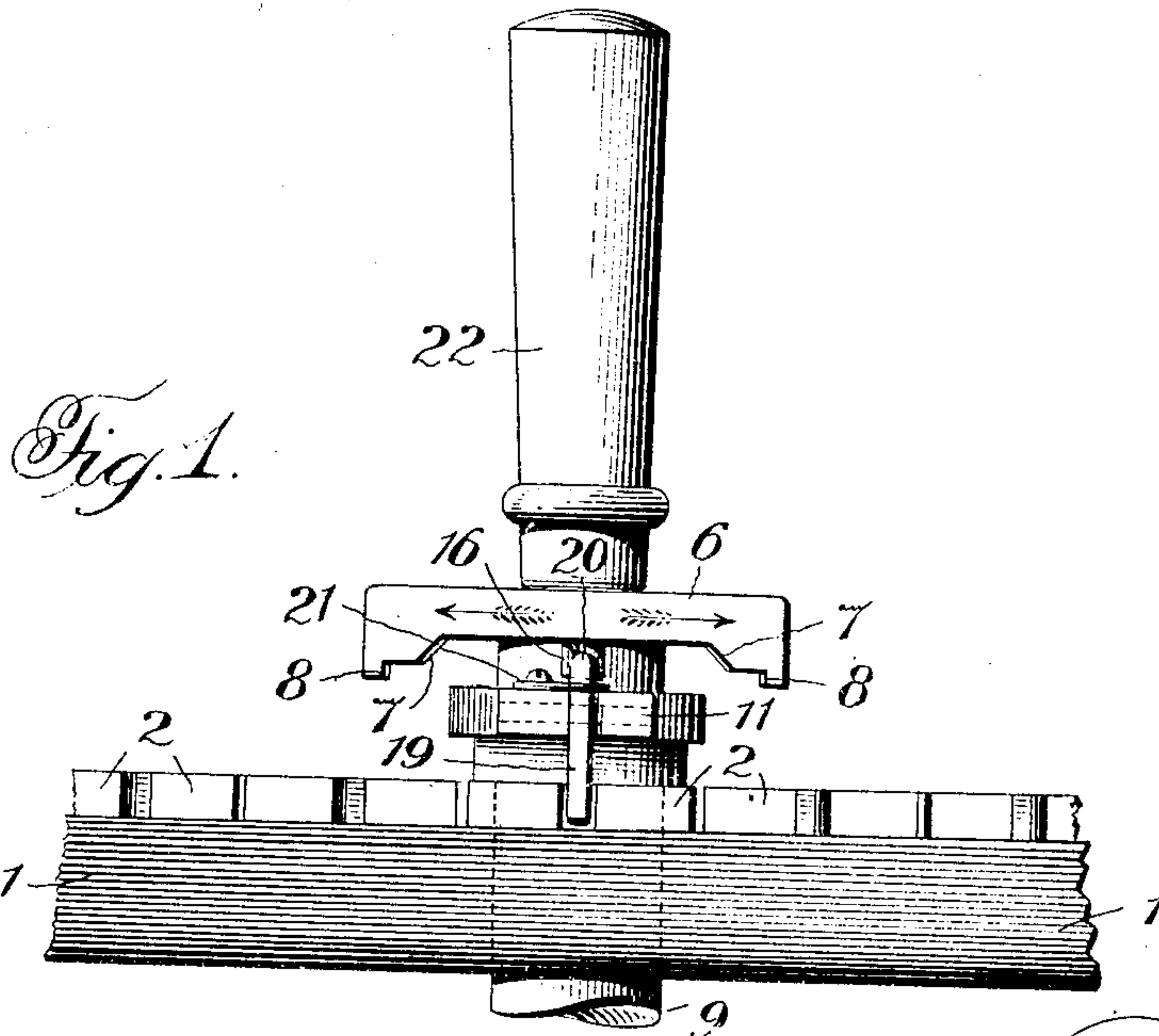
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I. B. SMITH.
STEP MOTION FOR CONTROLLER LEVERS.

APPLICATION FILED DEC. 9, 1903.

NO MODEL.



Witnesses
Jas E Hutchinson
Jas H Blackwood

By

Inventor
Irving B. Smith,
John H. Stolz
his Attorney

UNITED STATES PATENT OFFICE.

IRVING B. SMITH, OF PHILADELPHIA, PENNSYLVANIA.

STEP-MOTION FOR CONTROLLER-LEVERS.

SPECIFICATION forming part of Letters Patent No. 768,198, dated August 23, 1904.

Application filed December 9, 1903. Serial No. 184,429. (No model.)

To all whom it may concern:

Be it known that I, IRVING B. SMITH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Step-Motions for Controller-Levers, of which the following is a specification.

The object of this invention is to insure where one element of a current-carrying device moves with respect to one or more other moving or stationary elements that the first-mentioned element shall only come to rest in a predetermined position or positions with respect to the other moving or stationary elements.

The chief value of this invention lies in its application to controllers, rheostats, and the like where a current passes between a moving element and one or more other elements.

In a controller or rheostat wherein a sliding contact-brush passes over a series of stationary contacts the movement of the sliding contact in one direction operates to include more resistance into some desired circuit as the movement of said contact progresses in one direction and operates to cut out resistance as this movement progresses in the opposite direction. When moving so as to add resistance, if the contact is stopped, so as to have only a small portion of its contact-surface in contact with the block it was in the operation of leaving, then most of the current may pass across this restricted area of contact and before a small portion could by way of the larger area, for the reason that the latter path may offer a much greater resistance to the passage of the current by reason of a certain amount of resistance having been included there purposely. In this case the switch-contacts may be unduly heated and even injured. This would be particularly so were the moving contact resting with its larger area on a dead block and its smaller area on the last active block.

The object of this invention is to insure that the moving contact shall not rest in such a detrimental position, but shall travel on until it shall have severed its connection with the block upon which it was resting with small

contact. It is, moreover, designed to insure that the moving contact shall move far enough to prevent maintaining any arc that may have been drawn when leaving the block. In certain classes of controllers it may be desirable that the automatic movement and stopping of the moving contact shall operate in either direction from a central position, whereby the moving member cannot be left in poor contact with any block nearer the central position than the one upon which it is designed to rest at the time.

With the above objects in view my said invention consists in the combination and arrangement of parts hereinafter described and claimed, and illustrated in one form in the accompanying drawings, which form a part of this specification, and in which—

Figure 1 represents a controller-lever in end elevation with associated parts. Fig. 2 represents the same in side elevation, and Fig. 3 is a perspective view of the lever and associated parts with the lever proper separated therefrom to more clearly show constructional details.

In the accompanying drawings, 1 represents the insulating or insulated switch-base of a rheostat, controller, or the like, upon the upper face of which is mounted a plurality of contact-blocks 2, arranged in the case shown in the arc of a circle, though obviously they may be in a straight line if the moving parts of the apparatus are constructed to have a rectilinear motion. The preferred arrangement, however, is in the arc of a circle. Each of these contact-blocks is provided on its outer edge with a centrally-located notch 3. The said blocks 2 may be connected in the usual manner or in any desired way to the resistance elements and in the case shown are arranged around a continuous terminal contact-ring 4. This ring, however, forms no part of my invention, being merely a common part of a controller. The controller-lever in this case consists of an arm 5, provided at one end with a yoke 6, having at its ends cam-faces 7 and stops 8 and mounted at its other end upon a shaft 9 or other suitable support concentric with the contact-blocks. The said lever is held fast on said shaft by means of a set-screw

or other suitable means 10, though, as shall hereinafter be shown, this lever may be loose upon said shaft.

Mounted at one end loose upon the shaft 9 and just below the lever-arm 5 is an auxiliary arm 11, resting on a shoulder 12 on said shaft and extending over the switch-blocks, as shown. This auxiliary arm carries the moving switch contact or brush 13, which makes electrical contact in the usual manner with the switch-blocks 2 and the central ring 3.

The lever-arm 5 and arm 11 are connected by means of a resilient connection, which consists in the case shown of a straight spring 14, secured at one end rigidly to a lug or block 15 upon the upper face of the auxiliary arm, while the other end of the spring passes between two pins 16, carried by the lever-arm 5. This resilient connection may, however, be effected in any suitable way. Pivoted in a slot 17 in the outer end of the auxiliary arm is a latch 18, having a lip 19, adapted to engage the notches 3 in the switch-blocks, and provided upon its other end with an upwardly-extending portion 20, the lip 19 being held normally in engagement with one of said notches under the tension of a spring 21 or other suitable means. The upwardly-extending portion 20 of the latch is located directly beneath the face of the yoke 6, upon which is formed the cam-faces above referred to.

Obviously both the switch-lever 5 and auxiliary arm 11 may be loose on the shaft 9 or either one fixed thereon, while the other is loose.

Supposing the switch lever-arm 5 and its related parts to be in a position of rest in Figs. 1 and 2 and that it is desired to move the contact-brush from the block upon which it rests to some other block, the operation is as follows: The lever-arm 5 is moved in the case shown by the handle 22 to approximately the point to give the desired resistance. The first portion of the movement of the lever-arm 5 does not move the auxiliary arm 11, but merely bends the spring 14. As the arm 5 continues to move, however, one of the cam-faces 7 will engage the extension 20 of the spring-latch, and as the said arm continues to move the said cam-face will depress the extension 20, causing the lip 19 of said latch to disengage its notch. If the arm 5 is stopped at this point, the latch being released the auxiliary arm 11 will be sent forward by the spring 14 in the direction in which the arm 5 is moved. As soon, however, as the extension 20 of the latch passes off the elevated or cam surface of the arm 5 the lip 19 will be forced into engagement with the ends of the switch-blocks by the spring 21 and will engage the first notch which it reaches—that is, the notch in the adjacent block—inasmuch as the distance from the center of the arm 5 to the shoulder 8 is preferably greater than the

distance from one notch to the next. In like manner the contact may be sent to the next block, and so on over all the contacts. If the movement of the controller-arm is continuous—that is, moved without interruption over several contacts—the arm 11 will follow, with the extension 20 engaging one of the stops 8, since the spring 14 will not be made stiff enough to immediately snap the auxiliary arm 11 forward as soon as its latch is released, provided the arm 5 is moved reasonably fast. Owing to the fact that during the continuous movement of the arm 5 the portion 20 of the spring-latch is upon the elevated cam-surface, the lip 19 is obviously prevented from falling into any of the notches and thereby stopping the arm 11. When, however, the switch-arm 5 is stopped, the spring 14 causes the arm 11 to continue, when the portion 20 of the latch will disengage the cam-surface and the lip 19 will be sent into engagement with the next notch—that is, with the first notch which it engages after the arm 11 has moved far enough to disengage the extension 20 from the elevated surface of the arm 5. If the latch engages a notch behind the point where the arm 5 is stopped, the said lever will then drop back when the pressure of the operator's hand is removed until it assumes a position over the arm 11, owing to the fact that the spring 14 is under tension whenever one of the two arms is not directly over the other. It will therefore be seen that in whatever position the controller-operating lever-arm is stopped the brush or moving electrical contact-maker will always assume a position in the center of a block and will not stop with a portion partly on one block and partly on an adjacent block, since the spring-latch in moving toward the center of the controller-arm when the latter is stopped is bound to drop into a notch in the center of one of the blocks. It will be seen, furthermore, that the moving contact may be made to pass over the stationary contacts either step by step or continuously—that is, over successive contacts without interruption of its motion until stopped intentionally. If it is desired in any case to have the moving contact always bridge two adjacent contacts when it comes to rest, the notch which the spring-latch is adapted to engage may be located between adjacent blocks. Also while the auxiliary arm is shown as carrying the electrical contact 13 this arm may or may not carry such contact. For example, in case this invention is applied to a controller of the drum type where the brushes are stationary and the blocks are in the form of segments upon the surface of a drum rotated by the controller-arm the arm 11 would not carry a moving electrical contact-maker, nor would the blocks 3 perform any electrical function. In this case the blocks 3 may be in the form of lugs upon the controller-head.

The invention is by no means limited to any

specific form of rheostat or the like nor to the specific constructional details herein shown, for there are a number of different specific ways of accomplishing the objects of the said invention without departing from the spirit thereof.

What I claim as my invention is—

1. In a step-motion of the character described, the combination with a plurality of switch contact-blocks, of electrical conducting means adapted and arranged to be brought without interruption of movement into engagement with successive switch-blocks and to be brought to rest upon any of said blocks, and automatic means adapted and arranged to limit said points of rest to a predetermined position on each of said blocks.

2. In a step-motion of the character described, the combination with a switch-lever adapted and arranged to move uninterruptedly and to be brought to rest at desired points, of automatic means adapted and arranged to adjust the final points of rest of said lever to predetermined positions.

3. In a step-motion of the character described, the combination with a switch-lever, of a pivoted arm in proximity thereto, resilient connecting means between said lever and said arm, a catch carried by said arm, a plurality of stops adapted to be engaged by said catch when the switch-lever is brought to rest, and means carried by said switch-lever, adapted, upon the angular displacement of the same, to disengage the said catch from its stop.

4. In a step-motion of the character described, the combination with a switch-lever, of a concentrically-pivoted arm capable of angular displacement relative to said lever, resilient connecting means between said lever and said arm adapted and arranged to bring said arm to a predetermined position relative to said lever after the latter has come to rest, a spring-latch carried by said arm, stops adapted to engage said latch in positions of rest of said arm, and cam-faces carried by said lever adapted to engage said spring-latch and disengage the same from its stop upon angular displacement of the switch-lever to a predetermined extent.

5. In a step-motion of the character described, the combination with a switch-lever, of a concentrically-pivoted arm capable of angular displacement relative to said lever, an electrical contact-maker carried by said arm, resilient connecting means between said lever and said arm adapted and arranged to bring said arm to a predetermined position relative to the said lever after the latter has come to rest, a spring-latch carried by said arm, a plurality of switch contact-blocks provided each with a recess adapted to be engaged by said spring-latch when the movable contact-maker comes to rest on one of said blocks, and cam-faces carried by said lever adapted

to engage said spring-latch and disengage the same from the recess in a switch-block upon angular displacement of the switch-lever to a predetermined extent.

6. In a controller provided with automatic means to cause the movable current-carrying contact element to come to rest in predetermined positions, means to cause said contact to move with uninterrupted motion over two or more contact positions.

7. In controllers and the like, the combination with a contact element having a plurality of electrical contacts, of a second contact element comprising a contact device adapted to engage the contacts of the first element, means for effecting relative movement between said elements whereby said contact device may be made to pass over one or more of said plurality of contacts by a continuous relative movement between said elements, and automatic means to cause one of said elements to come to rest in predetermined positions only with respect to the other element.

8. In controllers and the like, the combination with the relatively movable current-carrying contact elements, of an operating-lever, means operating in conjunction with said lever to effect relative motion between said elements and to automatically adjust the positions of rest of the movable element to predetermined points of contact with respect to the other element, and means arranged to cause a continuous motion of said lever to impart a continuous motion to said movable element.

9. In controllers and the like, the combination with an operating-lever, of a pivoted arm capable of angular displacement relative to said lever, a plurality of contact-segments, a contact device connected to said arm and adapted to engage said segments, resilient connection between said lever and said arm arranged to be placed under tension by relative angular displacement between said lever and said arm and to cause said arm to follow said lever when said arm is set free, means operating in conjunction with said resilient connection and said arm to cause said contact device to come to rest in predetermined positions only on said segments and to lock the same in such positions, means to set said arm free when the said lever has been angularly displaced relative to said arm to a predetermined extent, and means adapted and arranged to impart a positive motion from said lever to said contact device independent of said resilient connection, whereby said contact may be made to pass by a continuous motion over two or more of said contacts.

10. In controllers and the like, the combination with an operating-lever, of a pivoted arm capable of angular displacement relative to said lever, a plurality of contact-segments, a contact device connected to said arm and adapted to engage said segments, resilient con-

nection between said lever and said arm arranged to be placed under tension by relative angular displacement between said lever and said arm, and to cause said arm to follow said lever when set free, locking means operating in conjunction with said resilient connection and said arm to cause said contact device to come to rest in predetermined positions only on said segments, a cam carried by said lever and adapted to release said locking means and set said arm free when said lever has been angularly displaced relative to said arm to a predetermined extent, and a lug carried by said lever adapted and arranged to impart a positive motion from said lever to said contact-maker and arm independent of said resilient connection, whereby said contact device may be made to pass by a continuous motion over two or more of said contact-segments.

11. In controllers and the like, the combination with an operating-lever, provided with side extensions at one end, of a lug carried by each extension, a pivoted arm capable of angular displacement relative to said lever between said lugs, a plurality of contact-segments, a contact device connected to said arm and adapted to engage said segments, resilient connection between said lever and said arm arranged to be placed under tension by relative angular displacement between said lever and said arm and to cause said arm to follow said lever when set free, locking means operating in conjunction with said resilient connection and said arm to cause said contact device to come to rest in predetermined positions only on said segments, a cam carried by each of said extensions of said lever and adapted to release said locking means and set said arm free when said lever has been angularly displaced relative to said arm to a predetermined extent, said lugs carried by said

lever adapted and arranged to impart a positive motion from said lever to said contact-maker and arm independent of said resilient connection, whereby said contact device may be made to pass by a continuous motion over two or more of said contact-segments.

12. In controllers, and the like, the combination with an operating-lever, of a pivoted arm capable of angular displacement relative to said lever, a plurality of contact-segments each provided with a recess, a contact device carried by said arm and adapted to engage said segments, a spring connection between said lever and said arm arranged to be placed under tension by relative angular displacement between said lever and said arm and to cause said arm to follow said lever when the said arm is set free, a spring-latch carried by said arm arranged to automatically engage said recesses one at a time when said arm is sent forward by said spring connection, said latch operating in conjunction with said resilient connection and said arm to cause said contact-maker to come to rest in predetermined positions only on said segments, cams carried by said lever adapted to engage said latch when said lever is angularly displaced relative to said arm to a predetermined extent and to thereby release it from said engagement with said recesses, lugs carried by said lever and adapted and arranged to cooperate with said lever to impart a positive motion from said lever to said contact-maker and arm independent of said resilient connection.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

IRVING B. SMITH.

Witnesses:

LINDA COPE SMITH,
WM. O. HOWELL.