

No. 659,824.

Patented Oct. 16, 1900.

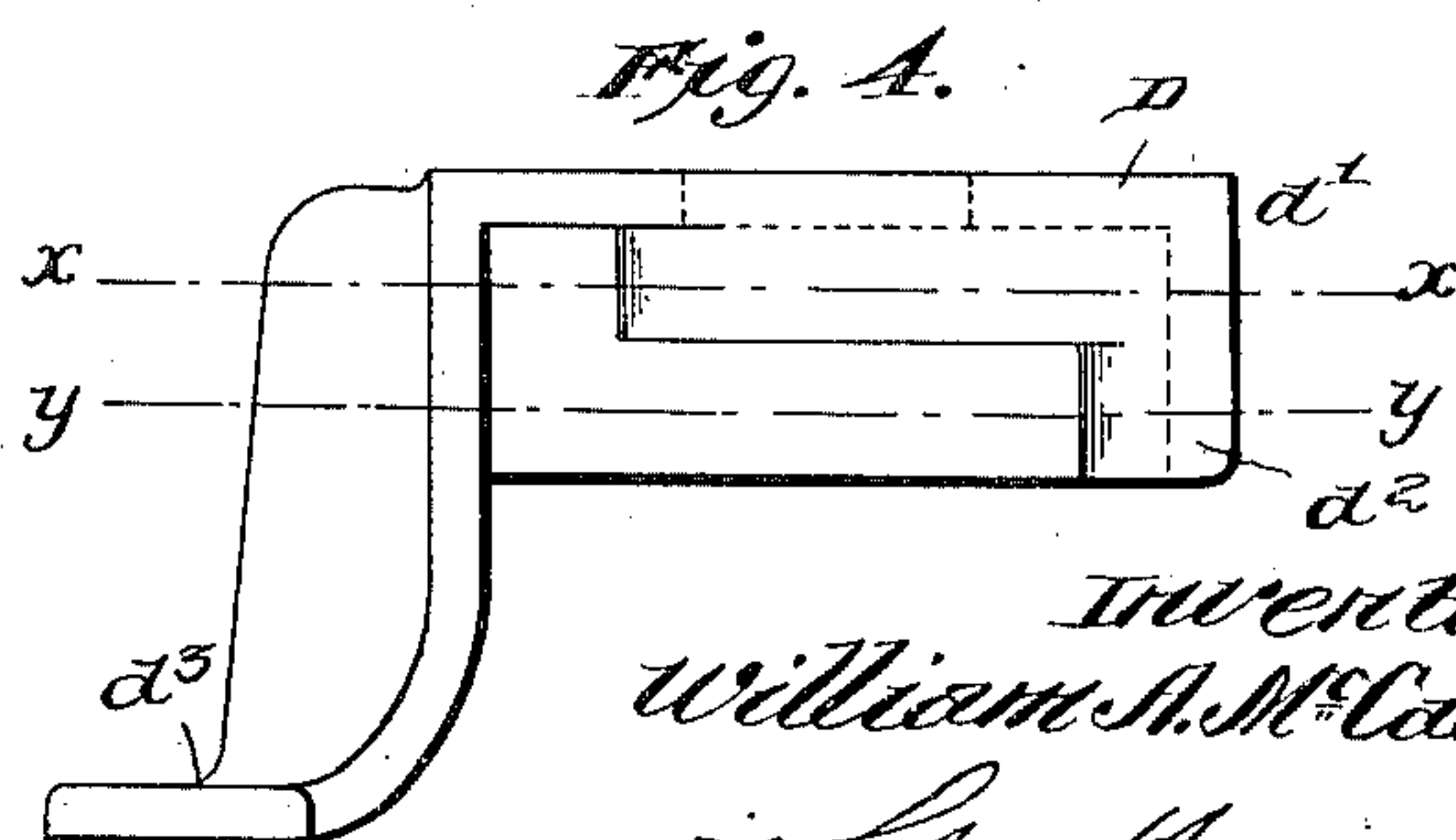
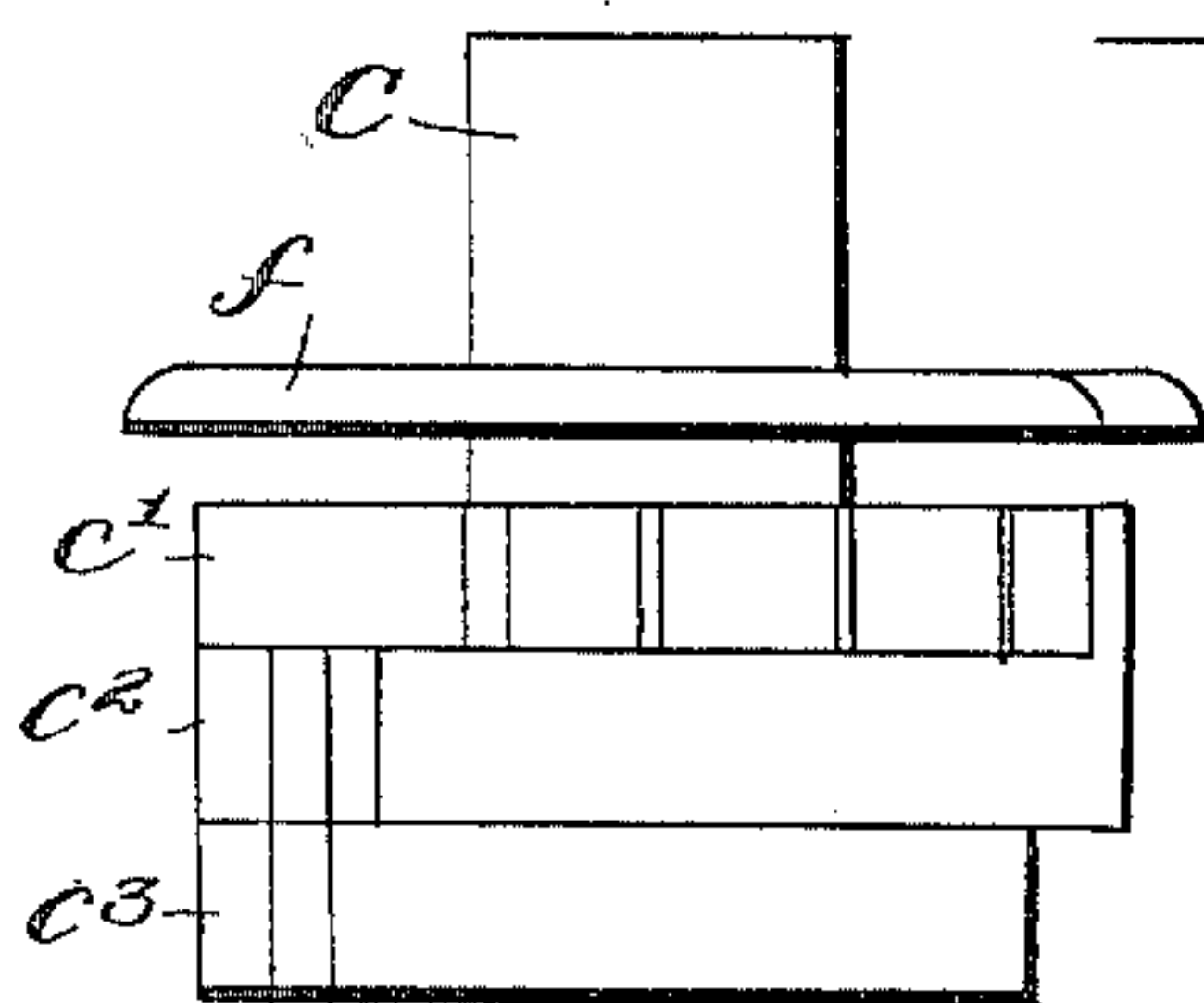
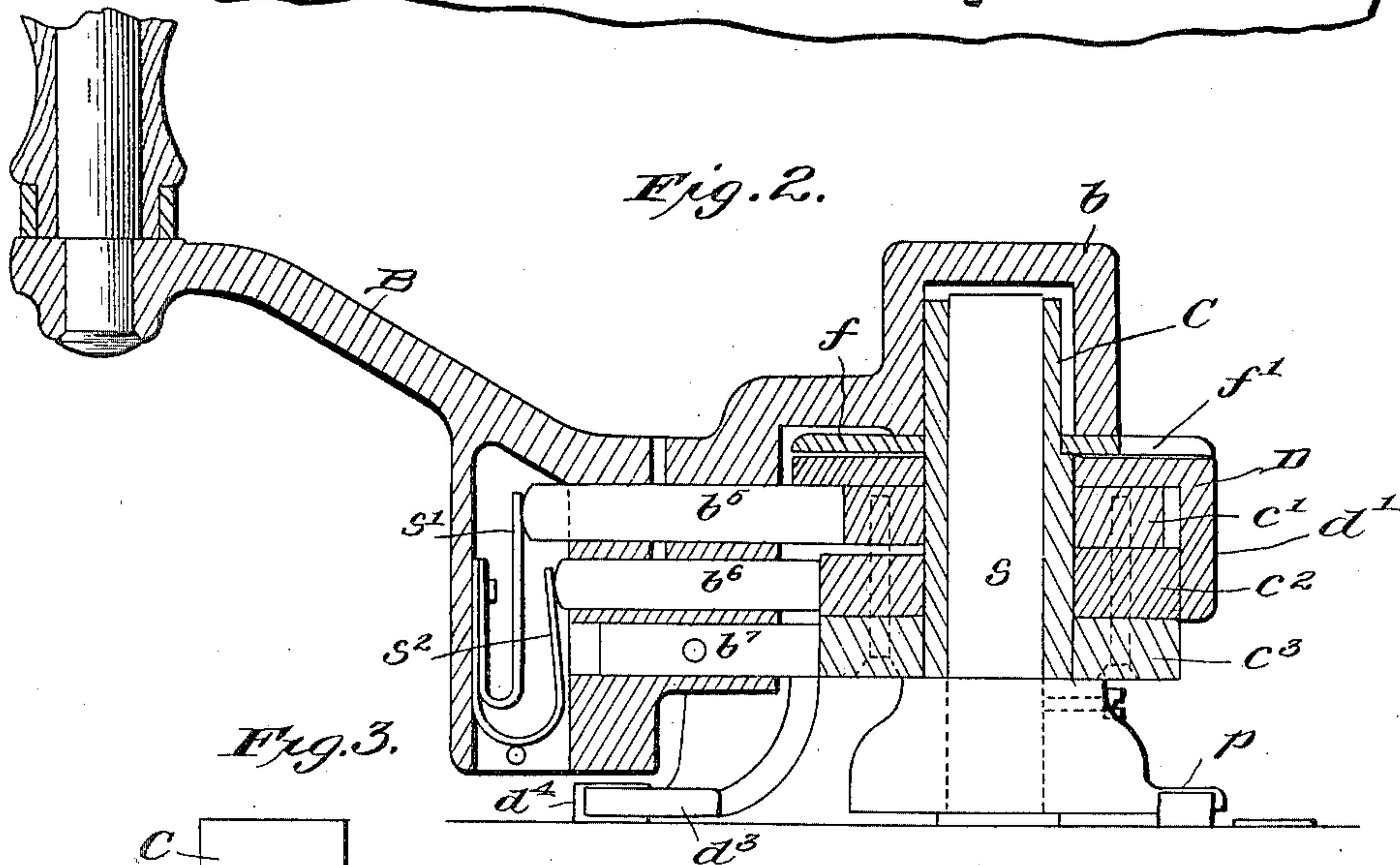
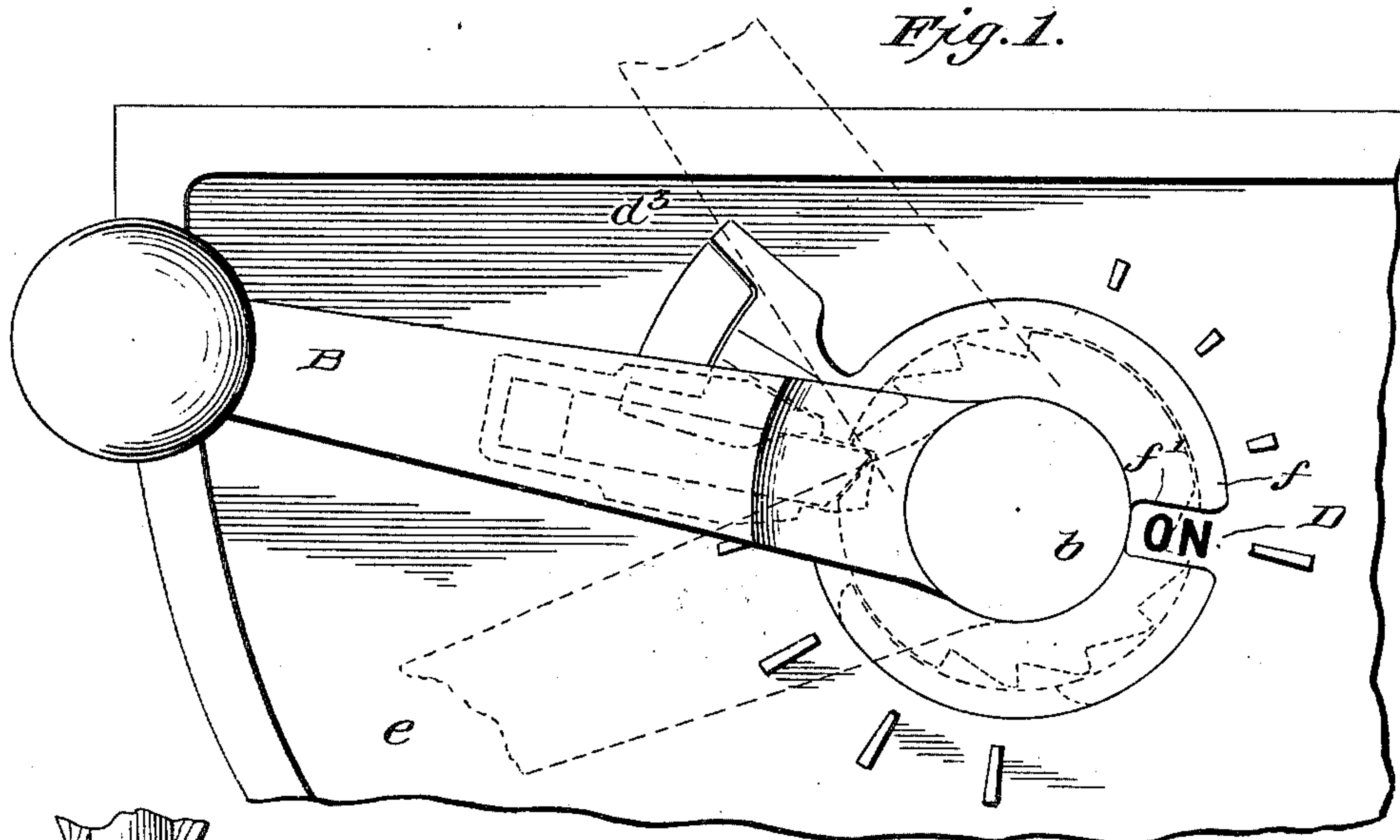
W. A. McCALLUM.

CIRCUIT CONTROLLER FOR ELECTRICAL MECHANISMS.

(Application filed Apr. 17, 1900.)

(No Model.)

2 Sheets—Sheet 1.



witnesses:
C. D. Hester,
J. B. Kuef

Inventor
William A. McCallum.
By A. M. Kosa.
Atty

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2 Sheets—Sheet 2.

Fig. 6.

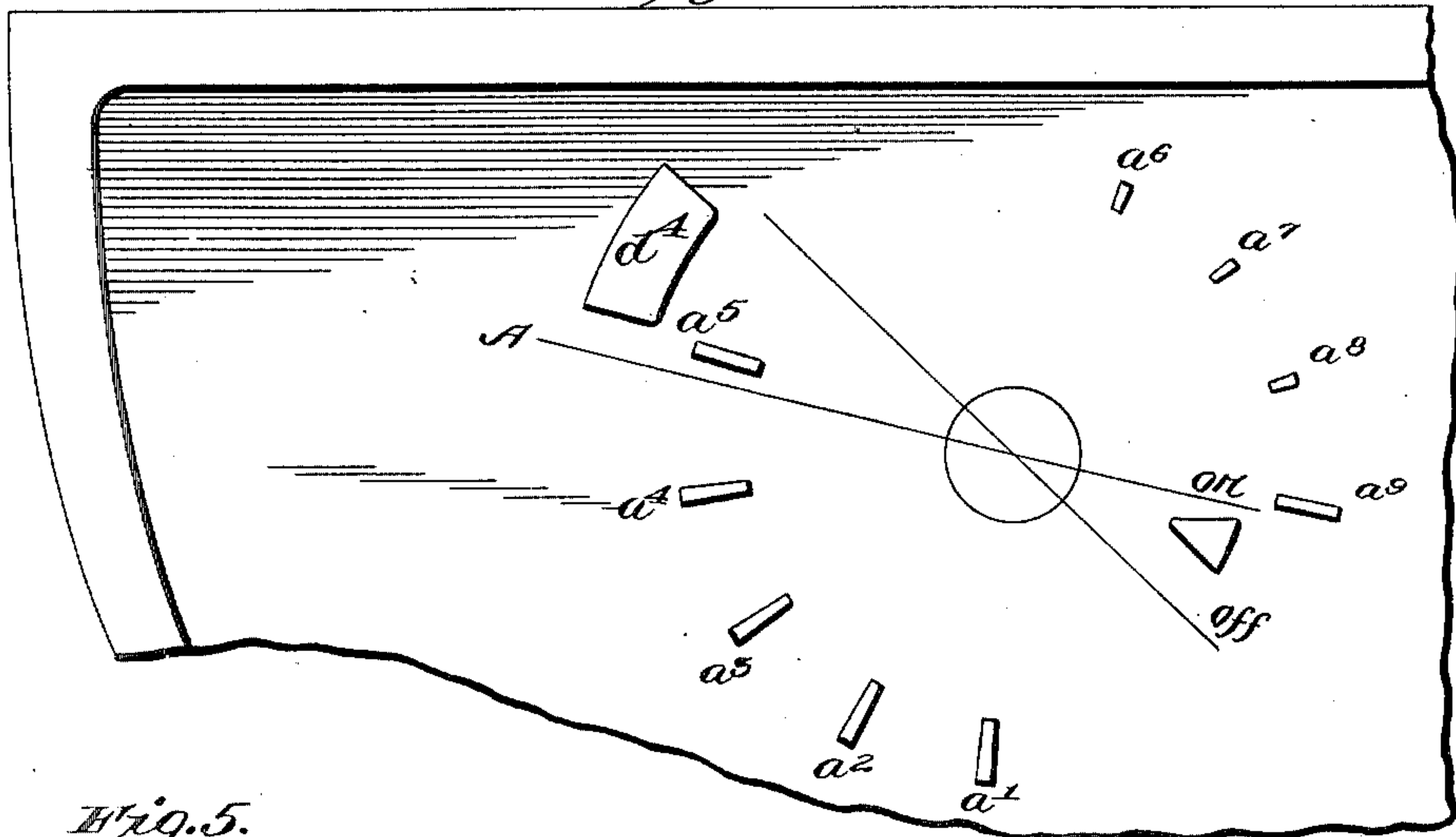


Fig. 5.

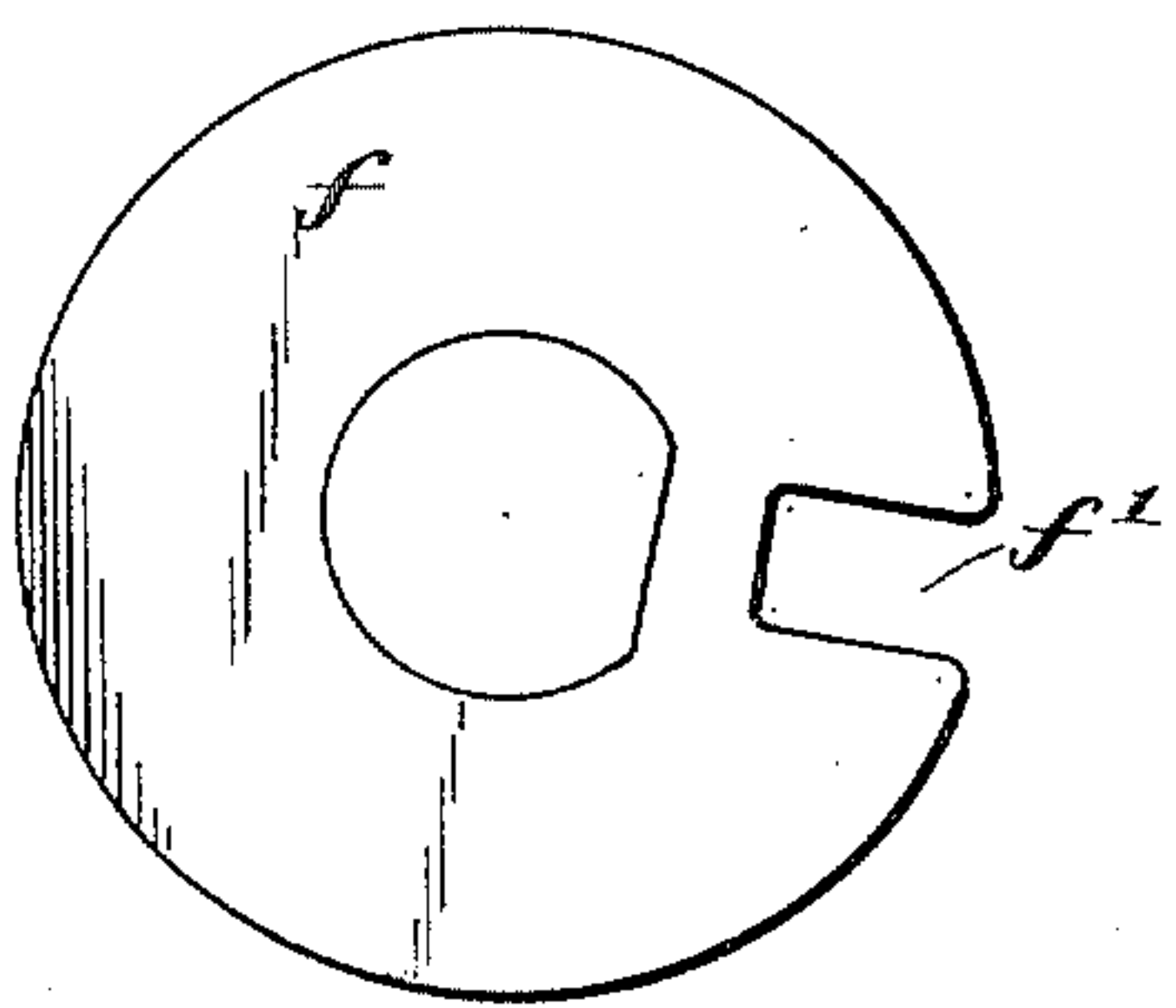


Fig. 10.

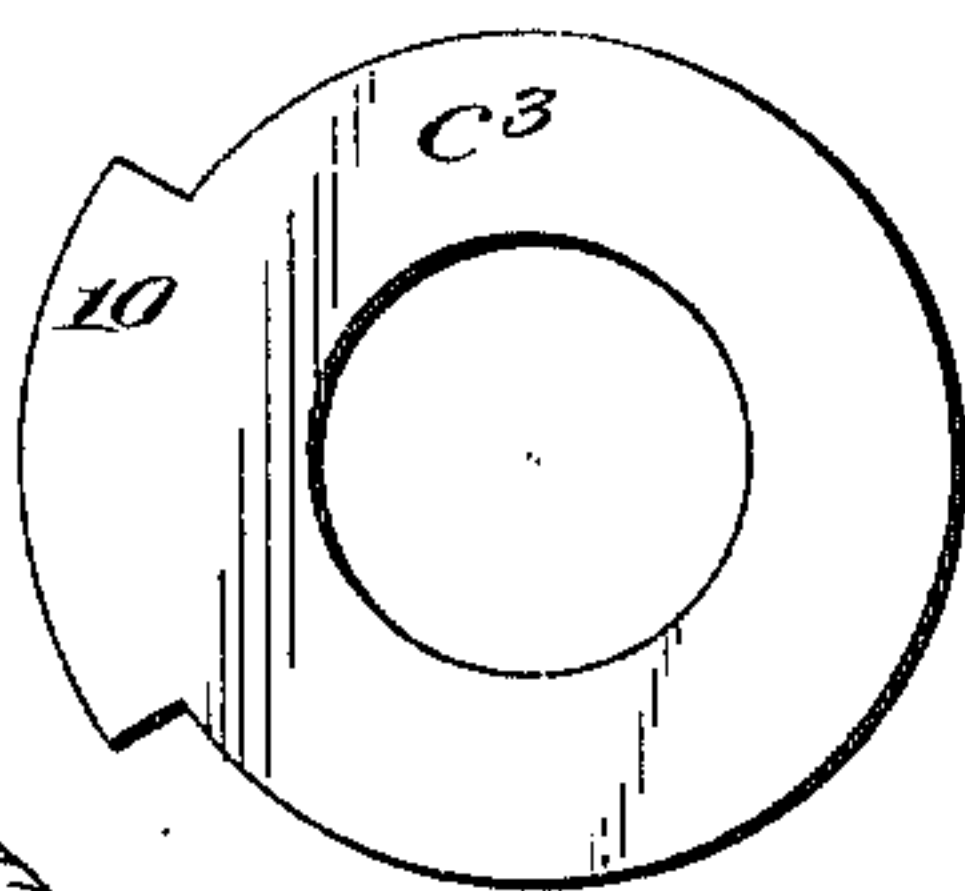


Fig. 9.

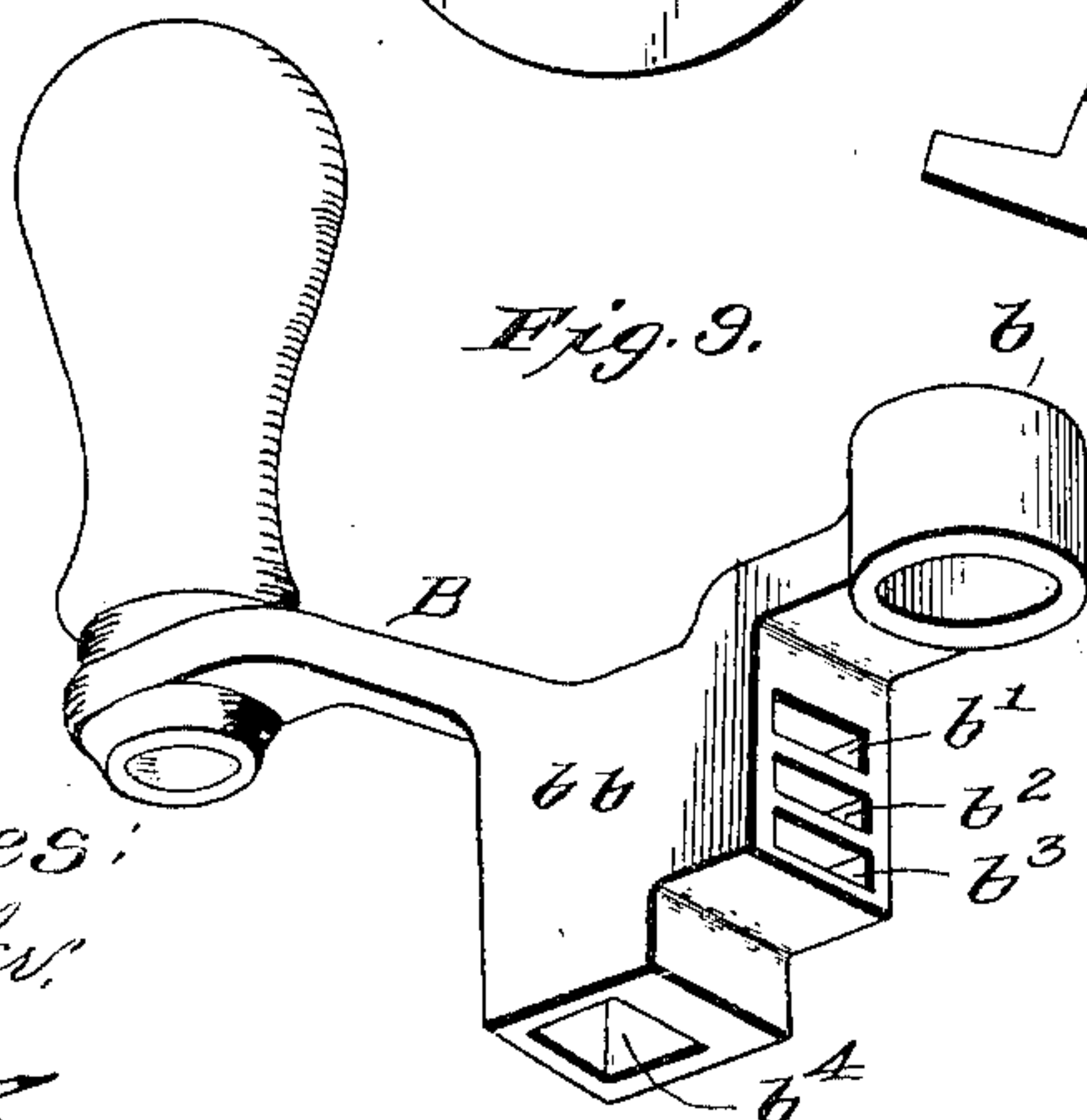


Fig. 7.

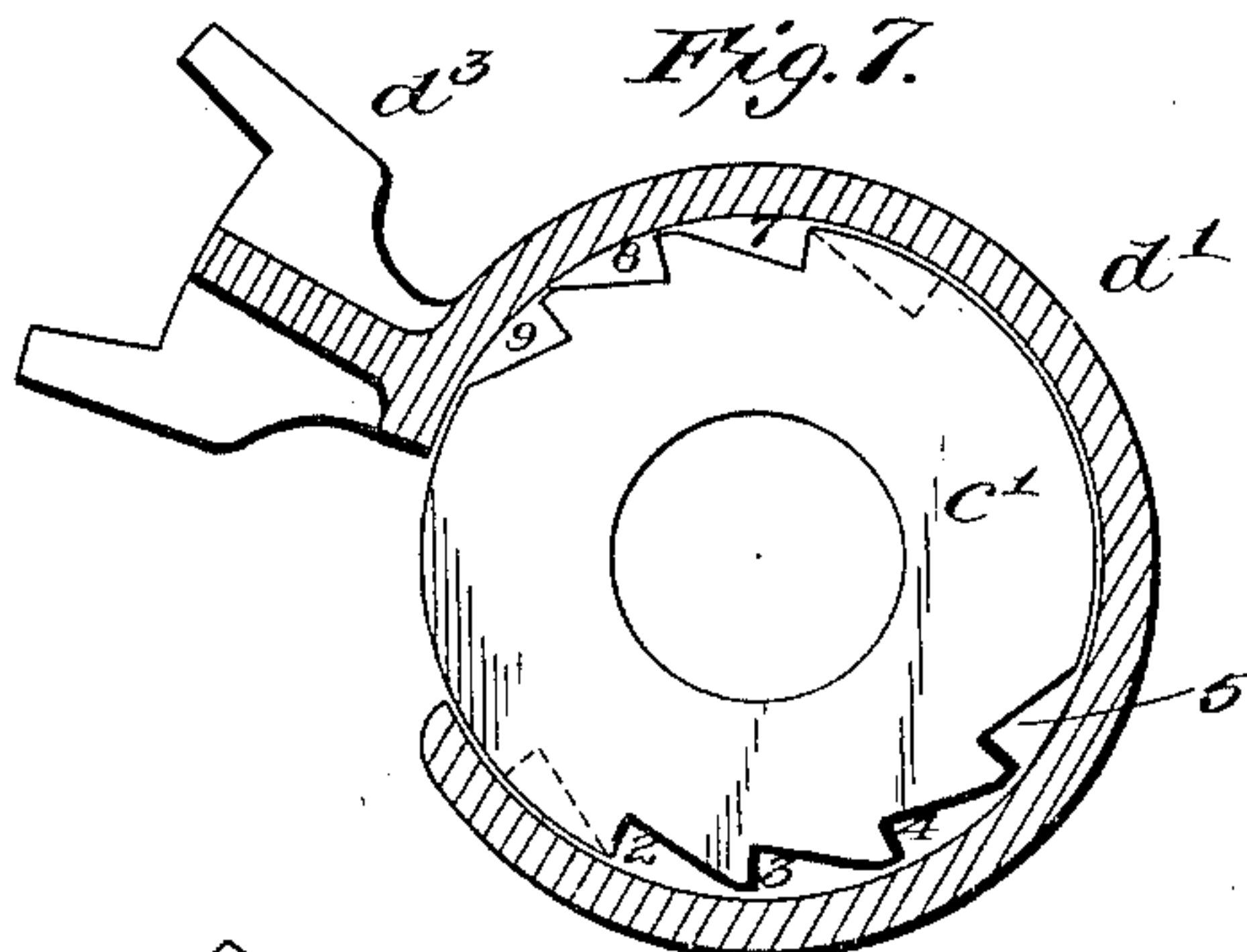
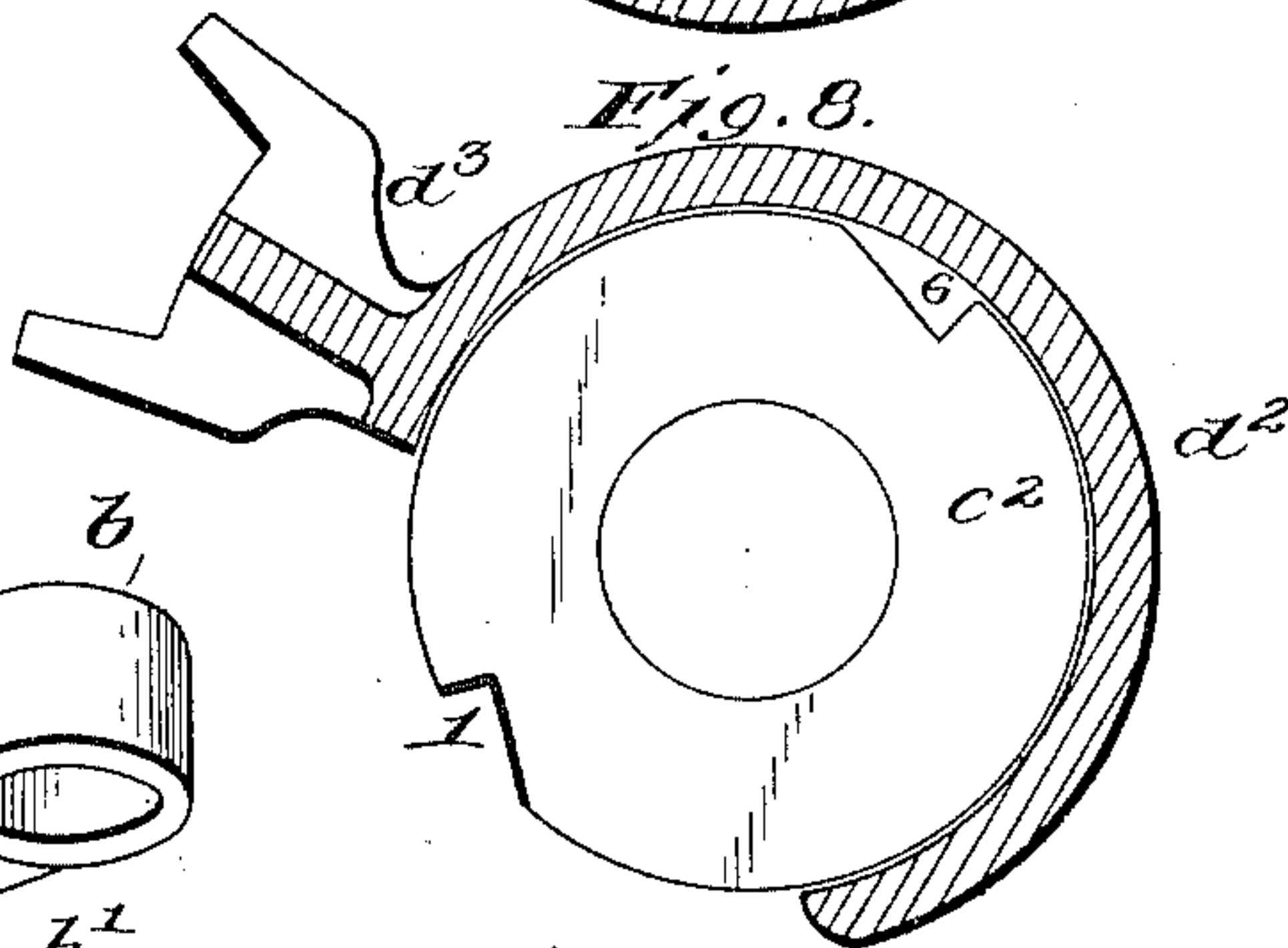


Fig. 8.



Witnesses:

C. D. Hesler,

J. B. Keefe

Inventor:

William A. McCallum

By J. M. H. H. H.

Atty

UNITED STATES PATENT OFFICE.

WILLIAM A. McCALLUM, OF CINCINNATI, OHIO.

CIRCUIT-CONTROLLER FOR ELECTRICAL MECHANISM.

SPECIFICATION forming part of Letters Patent No. 659,824, dated October 16, 1900.

Application filed April 17, 1900. Serial No. 13,277. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. McCALLUM, a citizen of the United States, residing at Cincinnati, Hamilton county, and State of Ohio, have invented new and useful Improvements in Circuit-Controllers for Electrical Mechanism, of which the following is a specification.

My invention relates to circuit-controllers for electric cars and other uses where the electric current is utilized for mechanical power, its object being to provide a means of control whereby the current may be let on in successive graduated increments with certainty without special skill or care on the part of the operator. Sudden shocks to machinery, &c., are thus avoided, and waste of current is saved. In its application to street-railways, all inconvenience to passengers from sudden starting and stoppage is also avoided besides realizing a considerable economy in the use of the current.

Mechanism embodying my invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my improved controller as applied to the top of the switch-box, such as is commonly used on street-cars; Fig. 2, an axial sectional elevation of the controller complete; Fig. 3, a side elevation of the hub portion of the controller detached; Fig. 4, a side elevation of the shield portion of the controller employed to govern the action of the pawls upon the ratchet-faces of the hub; Fig. 5, a plan or face view of the indicator. Fig. 6 is a diagrammatic plan of the switch-box cover, showing the ordinary indicating-marks used to illustrate the action of my controller. Figs. 7 and 8 are horizontal cross-sections in the planes x and y , respectively, of Fig. 4, through the shield, with face views of the corresponding disks, showing the relation of one with the other and the relative positions of parts with the handle in position "full off;" and Fig. 9, a perspective view of the controller-handle detached.

Referring to the drawings, the parts embodying my improvement are a ratchet-handle B, a ratchet-hub C, fitting upon the shafts of the ordinary rotating-switch and a fixed circular shield D to regulate the action of the ratchets. A cover-plate f may also be used as a register, as hereinafter explained.

The ratchet-handle B (shown in axial section in Fig. 2) is extended rearwardly into a head or cap b , adapted to fit over the cylindrical hub C, presently to be described, which embraces the shafts of the switch. Between the outer extremity of the handle B and the head b is a lower extension bb , having slots or recesses $b^1 b^2 b^3$, extending horizontally through the rear face and merging in an inner recess b^4 , open below. Within these horizontal recesses are pawls $b^5 b^6 b^7$, respectively, the first two of which are sliding bolts held rearward by springs $s^1 s^2$, respectively secured within the recess b^4 . The third pawl b^7 is fixed in position. The latter and its recess may be omitted in the construction and its function performed by a solid inward projection of the extension bb .

The hub C is a cylindrical piece provided with a squared axial aperture adapted to fit over and engage the squared shafts of the switch. (Not shown.) It is provided with three ratchet-disks $c^1 c^2 c^3$, as shown in elevation in Figs. 2 and 3 and in plan in Figs. 7, 8, and 9, respectively. The disks are fitted upon the cylindrical hub C in contact one upon another and are rigidly secured together and to the hub in a relation presently to be explained. The first or uppermost disk c^1 is provided at its periphery with ratchet-recesses numbered 2, 3, 4, 5, 7, 8, and 9, Fig. 7; the second or middle disk c^2 with two opposite ratchet-recesses numbered 1 and 6, Fig. 8, and the third or lowermost disk c^3 with a recess extending around the periphery, leaving only a relative projection 10, Fig. 9. The relative positions of the several disks with reference to their ratchet-recesses are indicated in Figs. 5, 6, and 7 with reference to a supposed diameter-line common to all the disks. Instead of separate disks fitted and secured to the hub C the latter may be turned with a portion of correspondingly-enlarged diameter provided with recesses in appropriate zones or with a flange in lieu of the lower disk, to which the upper disks are secured.

The so-called "shield" D is a somewhat cup-shaped cover fitting over the hub C and resting upon the disks. It is formed with a cylindrical downward extension d' , covering a considerable circumferential portion of the zone of the disk c^1 , and a further downward

extension d^2 , covering a lesser portion of the zone of the disk c^2 . At one side of the shield is a lateral foot extension d^3 , adapted to straddle and engage a stud d^4 upon the top plate A of the switch-box (presently referred to) to prevent rotation of the shield when the hub C is rotated by means of the ratchet-handle.

The parts above described are placed together as indicated in Fig. 2—the hub C upon the shaft s , the shield D upon the hub and disks and secured against rotation by its foot d^3 engaging the stud d^4 , and the head b of the ratchet-handle over the hub and shield D. In this position the ratchet-pawl b^5 plays against the disk c' , the pawl b^6 against the disk c^2 , and the fixed pawl b^7 against the disk c^3 .

The operation is as follows, premising a brief reference to the switch-box cover A, (shown in Fig. 6:) A designates the top plate of the ordinary switch-box, marked with graduations a' a^2 a^3 a^4 a^5 , indicating the positions of the pointer p (attached to and moving with the switch-shaft s) for the successive increments of current admitted to the first motor of an electric car, and a^6 to a^9 , inclusive, the similar increments admitted to second motor. This is in accordance with a common type of structures in use, selected to show the application of my improvement to existing conditions in street-railway service. In the initial position, with the current entirely off, the handle B occupies the position shown by the radial line "off," Fig. 6. The pawls b^5 and b^6 are now forced backward in their slots, riding upon the shield extensions d' d^2 . To turn on the current, the handle B is first rotated to the right, like a clock-hand in normal motion, entirely around to the opposite limit of rotation to the position shown in Fig. 1 and on radial line "on" of Fig. 6. Just before reaching this position the pawl b^6 will have passed off the extreme circumferential limit of the shield extension d^2 and engaged with the recess numbered 1 of disk c^2 and will thence carry the hub C (and with it the shaft s) in partial rotation, thereby rotating the switch to the first contact, which will be indicated by the position of the pointer p opposite the mark a' on the switch-box cover A. As the hub and the disks are thus rotated in unison, the movement described will have uncovered the recess numbered 2 of disk c' from the shield extension d' . To turn on the next increment of current, the handle B is brought back to the position indicated by dotted radial line e , whereupon the pawl b^5 drops into the uncovered recess numbered 2 on disk c' , and the handle being again rotated to the limit "on" the pointer p is advanced to mark a^2 . Then by similar alternate movements the pointer is successively advanced to mark a^3 and to a^4 , indicating the limit of power applied to one motor. It will be seen that the first installation of power, being the limited amount indicated by the

pointer p at mark a' , requires the revolution of the handle from one extreme position to the other and that the next successive increments can be accomplished only by the short reverse movements described, which can take place only one at a time by certain uniform limited movements admitting no discretion on the part of the motorman, with an appreciable interval of time between. It is therefore impossible through any unskilfulness of the motorman to start the car or other machinery too suddenly or to apply power except in successive limited increments, thereby avoiding sudden shocks. To apply current to the second motor requires that the handle B shall be then brought back until the pawl b^6 drops into the recess numbered 6 of disk c^2 , which from the position attained requires about a quarter of an entire revolution backward, and the handle is then carried forward again to the limit "on," and the additional movements are but repetitions of those first described, carrying the pointer p to marks a^6 a^7 a^8 a^9 , the extreme limit, utilizing pawl b^5 as before, but in recesses numbered 7, 8, and 9 of disk c' . At the conclusion of these movements or at any intermediate position the projection 10 of disk c^3 is in position to be immediately engaged by the fixed pawl b^7 when the handle B is rotated backward, and all power may be thrown off by the backward rotation of the handle to the initial position on radial line "off," Fig. 6.

The indicating-plate f is a mere washer fitted over and rotating with the hub C and provided with the radial opening f' , as shown, to expose the word "on," cast in raised letters on the upper face of the shield-cap D, as indicated in Fig. 1, or the word "off," when the handle B is at the opposite limit. It is intended rather as a guide to show when the parts are in proper relation when entirely detached from the car, for it will be understood that the controller is entirely removable as a whole, as is the ordinary handle in common use.

The construction hereinbefore described may be somewhat simplified by omitting the central disk c^2 , the shield extension d^2 , and the pawl b^6 and altering the form of the containing parts accordingly. In this case the upper disk c' is provided with additional ratchet-recesses 1 and 6 (corresponding with those of the omitted disk c^2) and with a series of similar recesses in equidistant relations occupying the space between recesses 5 and 7. These are indicated in dotted lines on Fig. 7, including Nos. 1 and 6, transferred from disk c^2 . The shield extension d' is slightly shortened circumferentially to expose the recess No. 1 in the first instance. These changes introduce a slight modification in the action, namely: Instead of passing from the position of "full on" for the first motor to "connecting" in the second motor by a single extended sweep, as herein-

before described, it is accomplished by repeating the short reverse movements applicable to the increments of power.

5 The construction first shown and described is preferable only as meeting established conditions; but in new work the modification suggested may be preferable.

I claim as my invention and desire to secure by Letters Patent of the United States—

10 1. In a circuit-controller, the combination with a switch-spindle, of a cylindrical hub adapted to removably fit over and engage the same and provided with ratchet-teeth spaced apart correspondingly with the resistance-
15 contacts of the switch apparatus, and a rotating handle seated on said hub and engaging therewith by one or more yielding pawls, substantially as set forth.

20 2. A circuit-controller embodying in combination a cylindrical toothed hub adapted to fit over and engage with the switch-spindle, a rotating handle seated on said hub and engaging therewith by one or more yielding pawls, and a stop limiting the movement of
25 the handle, substantially as set forth.

3. A circuit-controller embodying in com-

bination a cylindrical toothed hub adapted to fit over and engage with the switch-spindle, a rotating handle seated on said hub and engaging therewith by one or more yielding
30 pawls, a stop limiting the movement of the handle, and a fixed circular shield partially embracing the hub circumferentially and co-operating to cause the pawls to engage only in a predetermined order with the teeth of
35 the hub, substantially as set forth.

4. A removable controlling device embodying the hub, adapted to fit and engage removably, with the switch-spindle, the circumferential shield adapted to engage a pro-
40 jection of the switch-box cover, and the ratchet-handle pivotally seated on the hub, combined and arranged to operate as described and be removable as a self-contained circuit-controller, substantially as set forth. 45

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM A. McCALLUM.

Witnesses:

L. M. HOSEA,

WALTER A. KNIGHT.