

W. J. KELLY.
ELECTRIC SWITCH.

(Application filed May 1, 1897.)

(No Model.)

2 Sheets—Sheet 1.

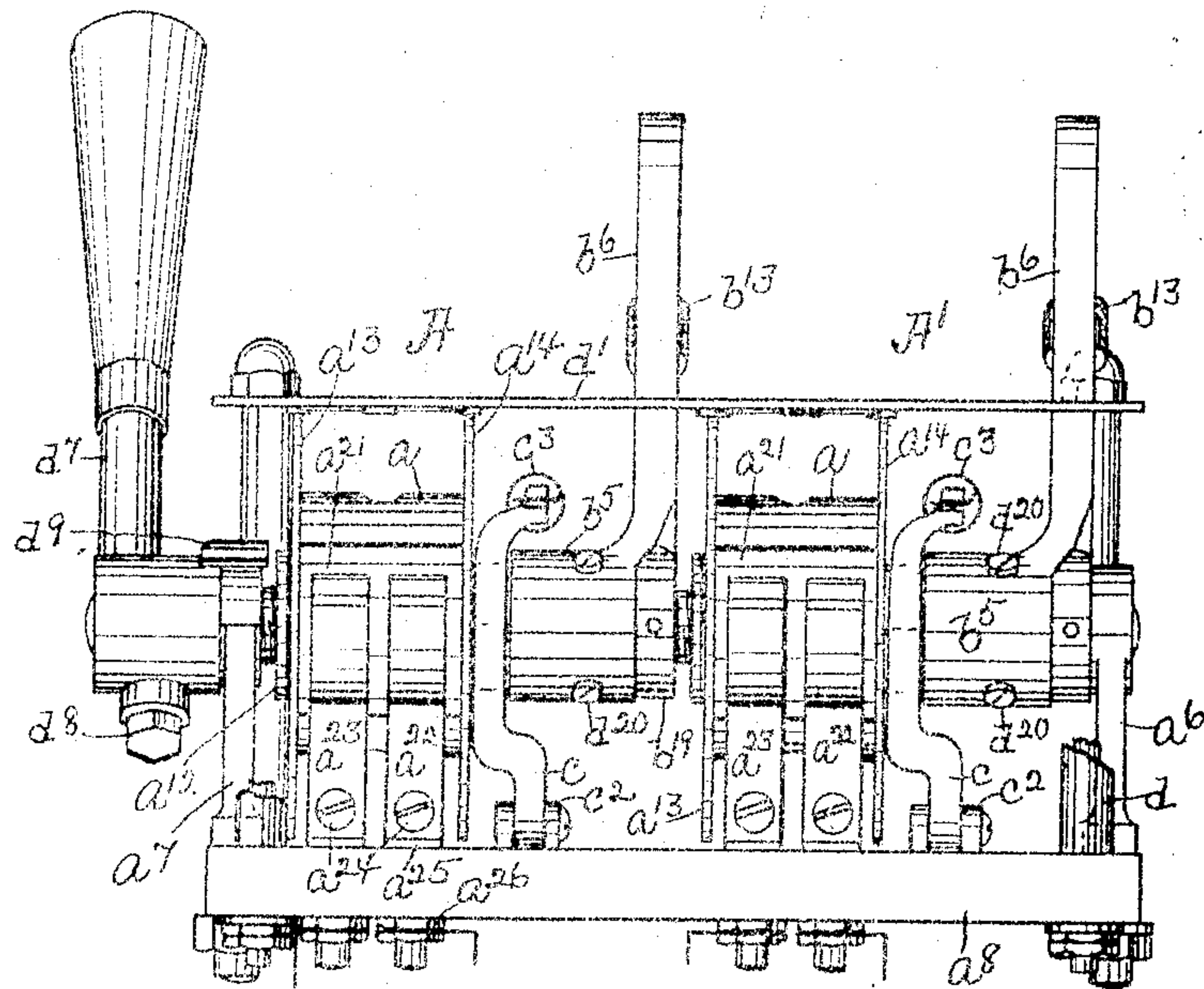


Fig. 1.

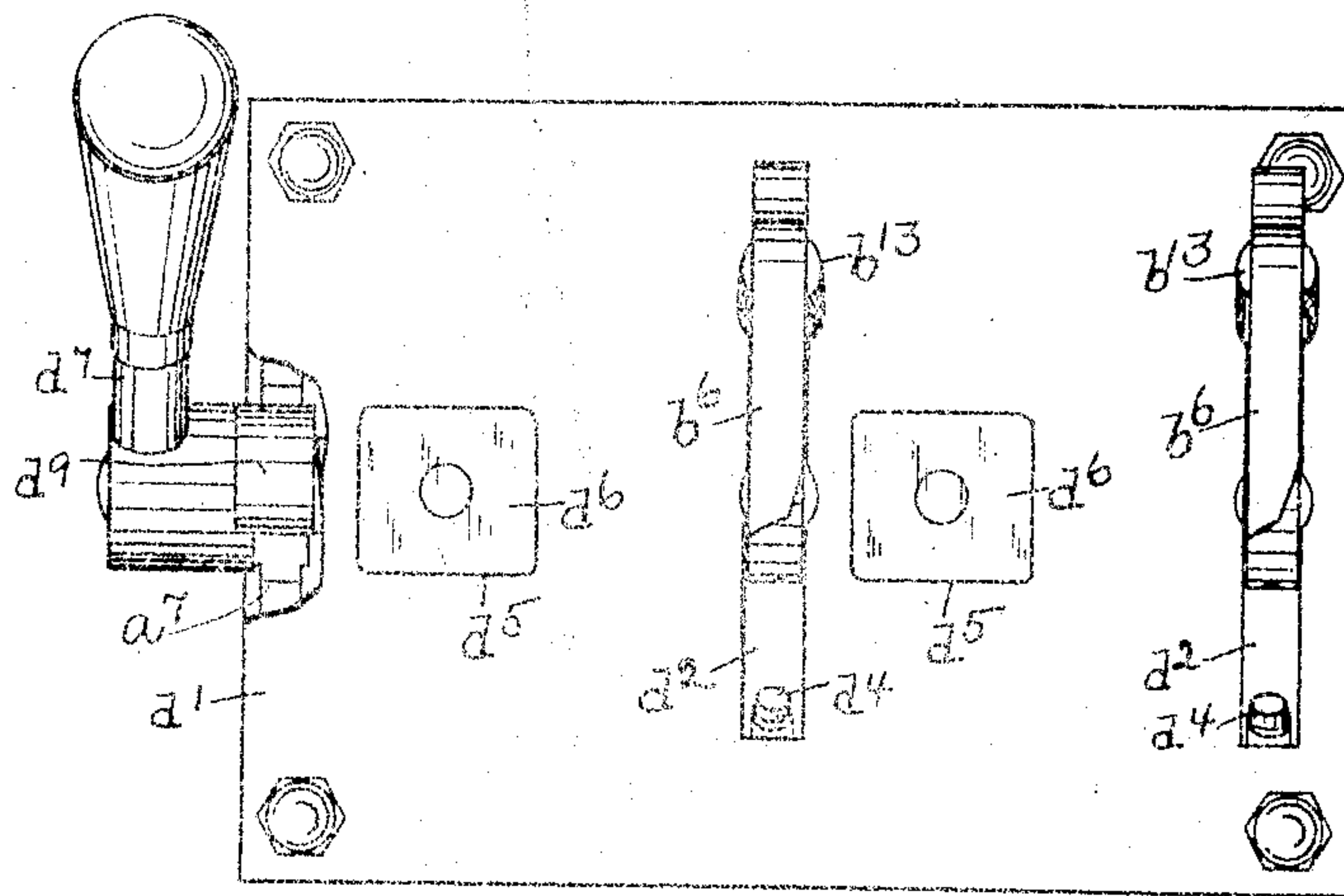


Fig. 2.

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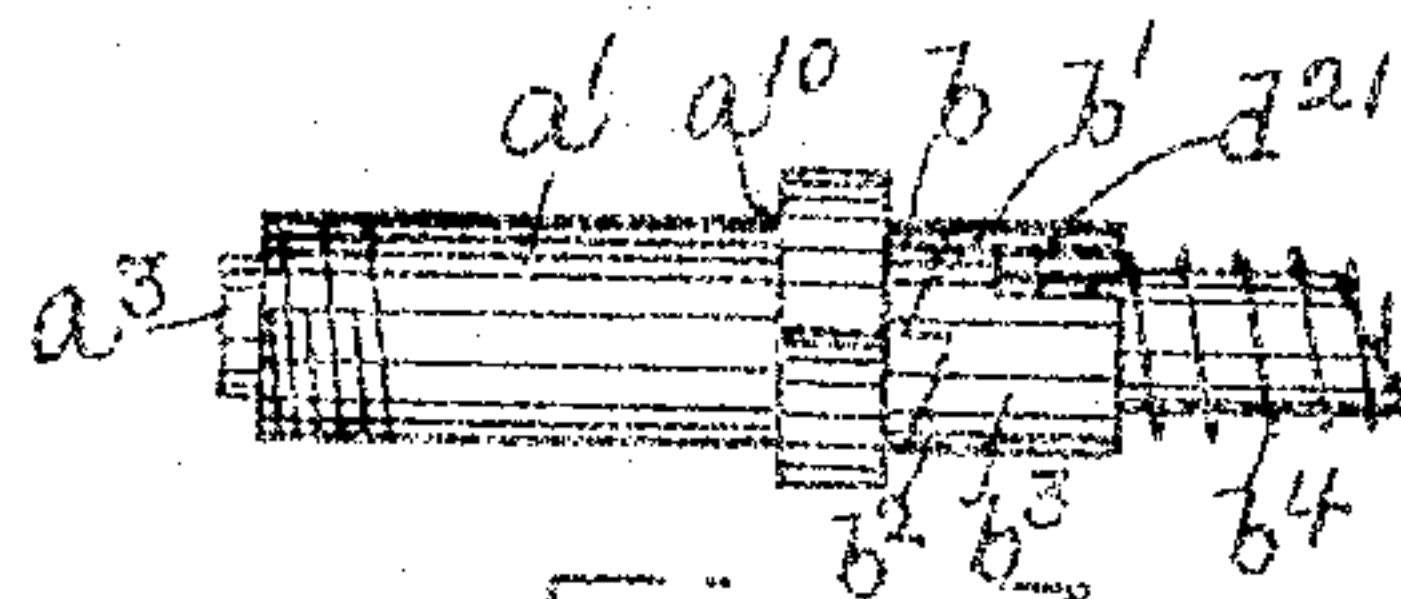


Fig. 3.

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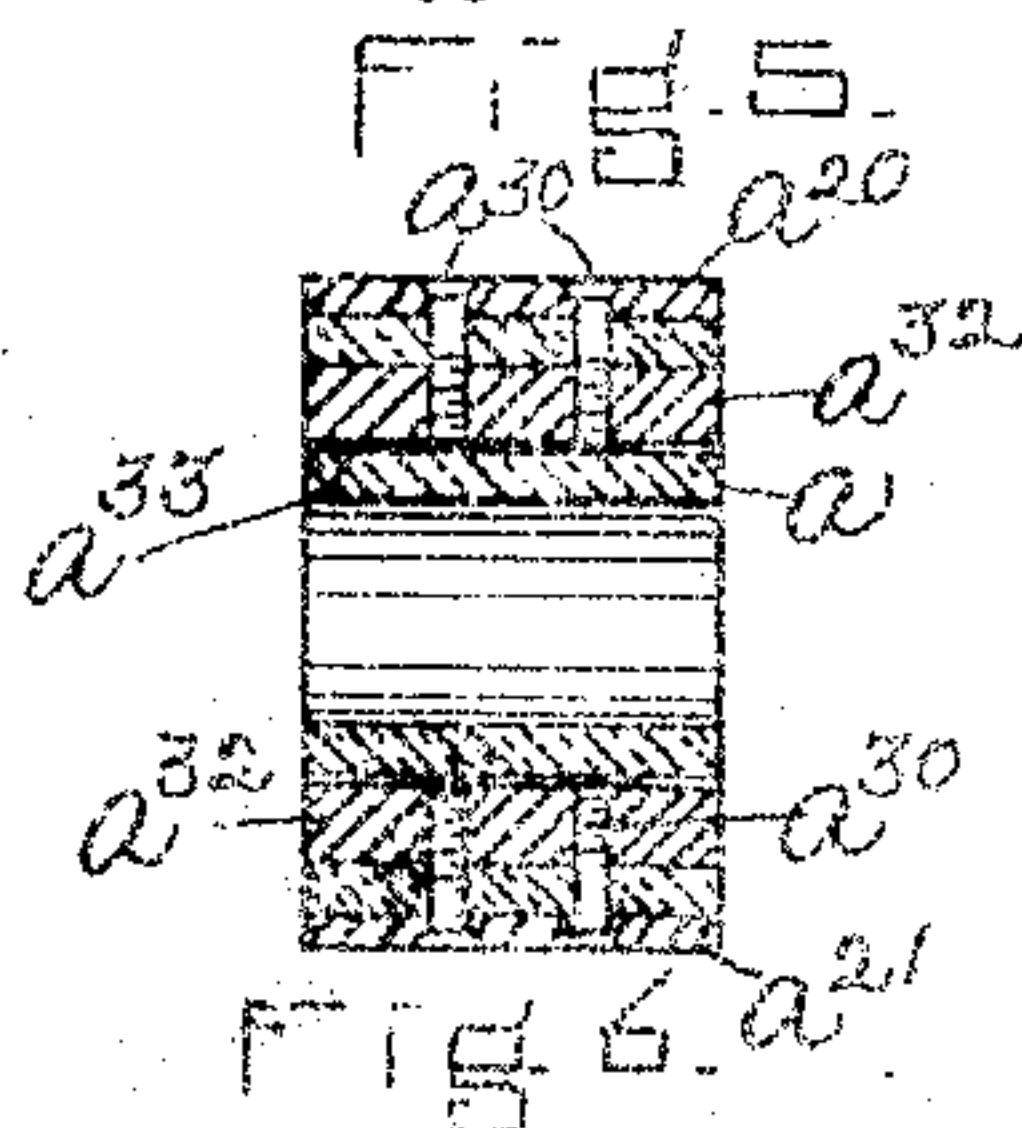
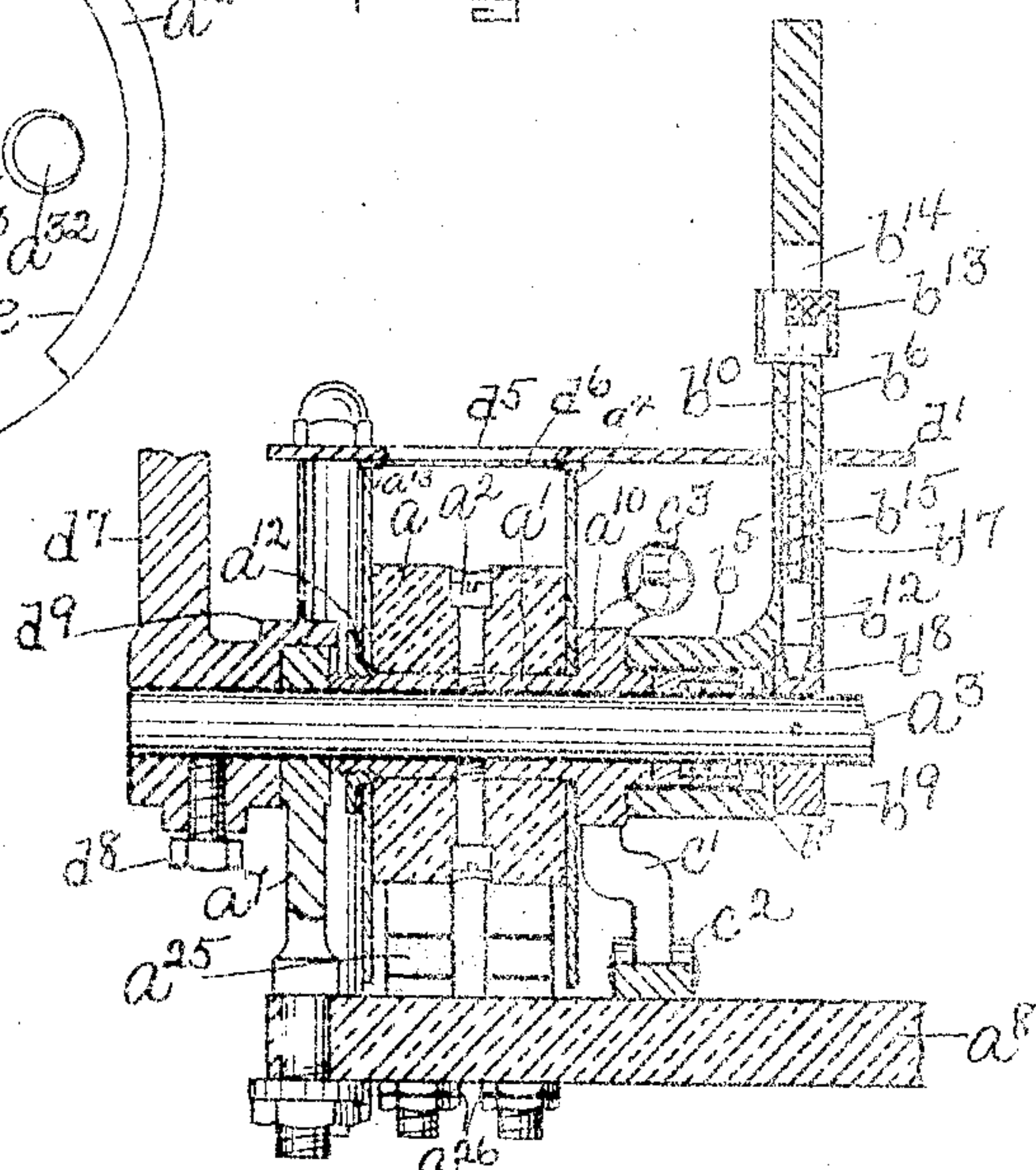
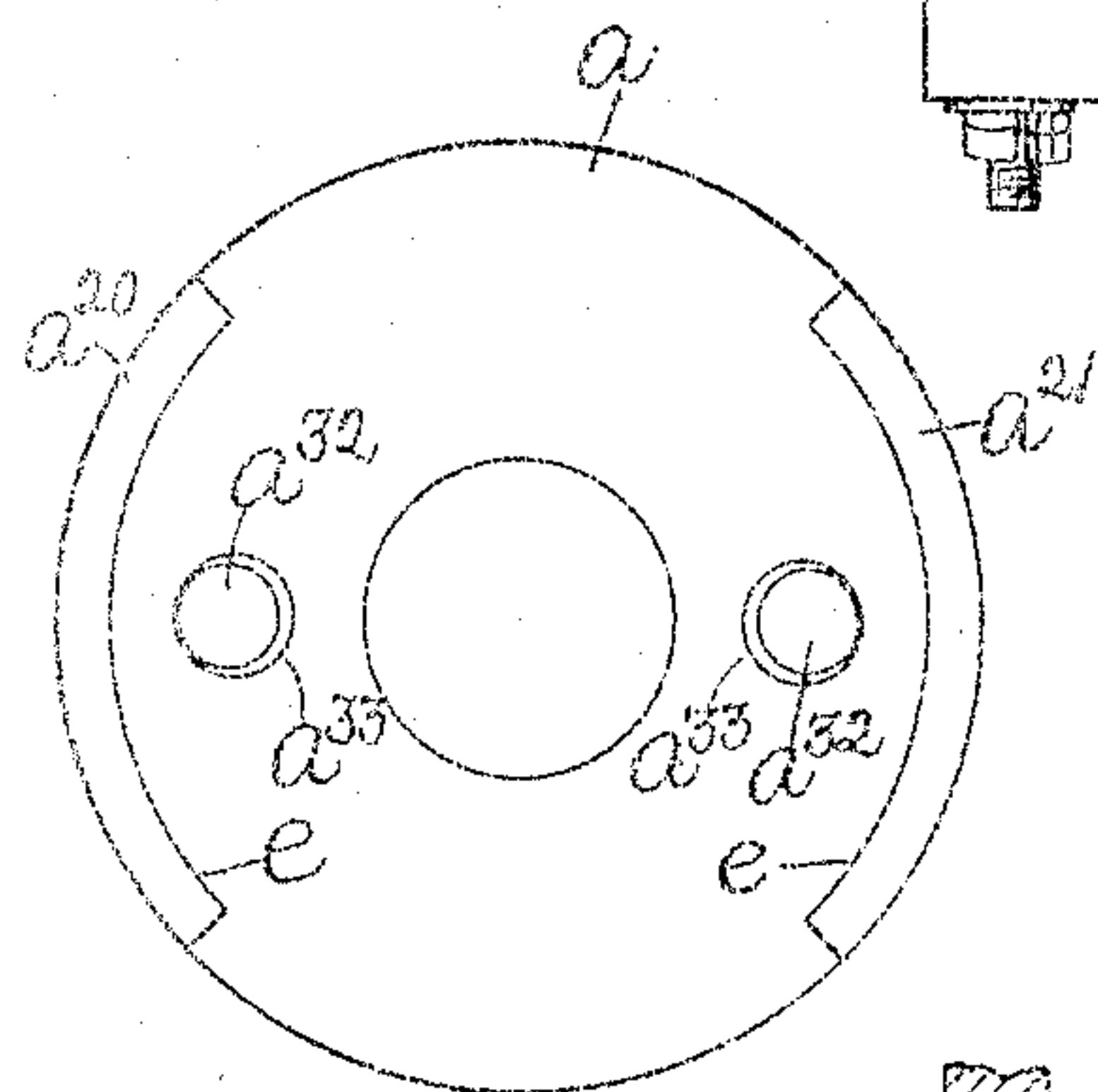
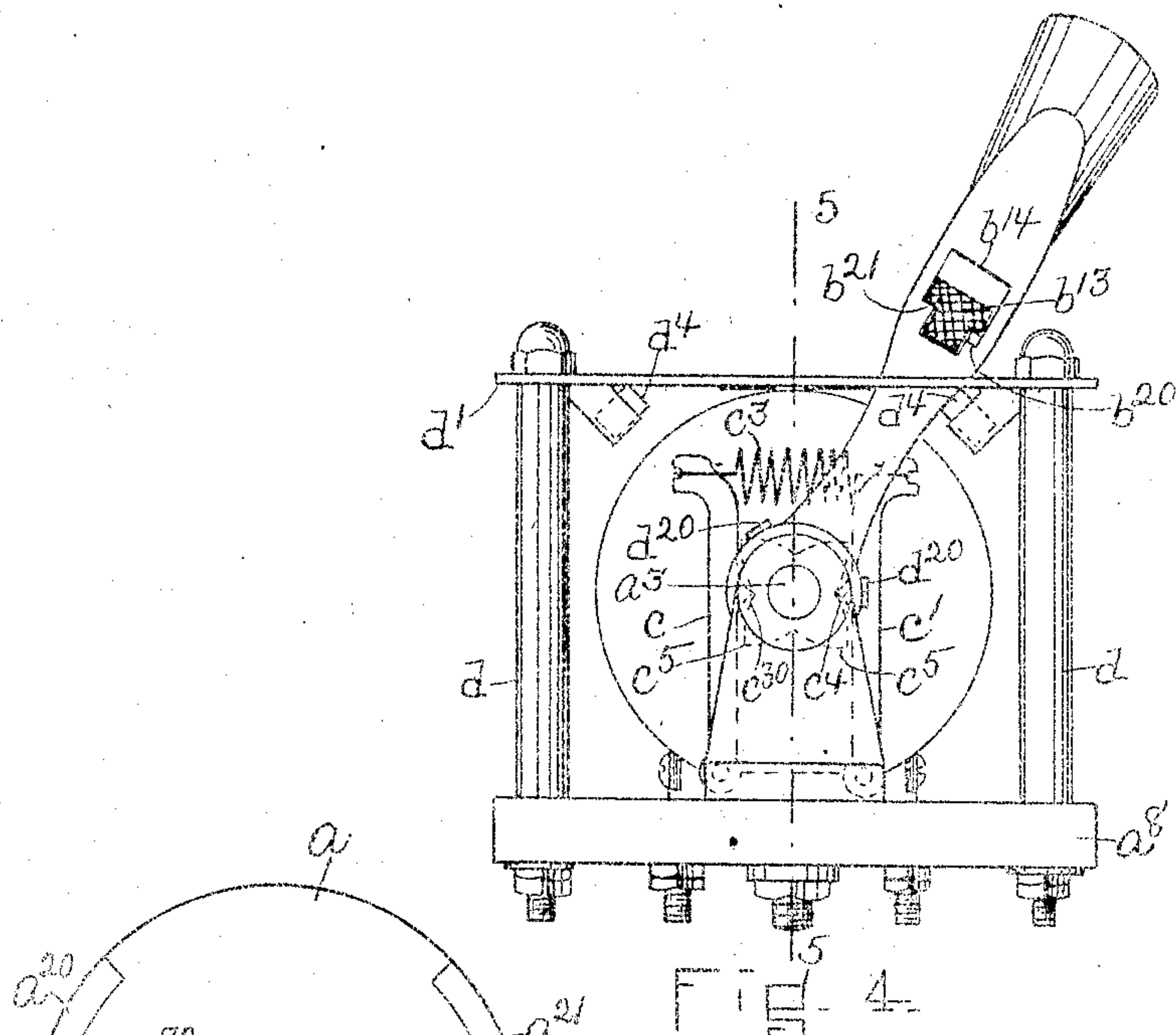
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2 Sheets--Sheet 2.



WITNESSES.

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J. Murphy.

INVENTOR-
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UNITED STATES PATENT OFFICE.

WILLIAM J. KELLY, OF BOSTON, MASSACHUSETTS.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 616,110, dated December 20, 1898.

Application filed May 1, 1897. Serial No. 634,703. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM J. KELLY, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Electric Switches, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to a multiple rotary circuit-controller or switch of that class commonly known as a "gang-switch" and especially adapted for use in the lighting of theaters and like places wherein in some instances it is desired to control a plurality of electric circuits simultaneously and in other instances to control the said circuits individually.

My present invention has for its object to provide a simple, cheap, efficient, and durable switch of the class referred to.

In accordance with this invention I employ a plurality of switches having their movable members mounted in a shaft, so that on one instance they are loose on said shaft and capable of being individually operated or turned on said shaft and in another instance they are connected to the said shaft to rotate therewith, as will be described. The rotary shaft is supported in bearings in a suitable framework having a front plate or cover provided with openings in line with the movable members or commutators of the switch, so that the condition of each switch may be readily seen by the operator, and the said openings are provided with pieces of mica or other suitable transparent material. The commutators of the individual switches are of a construction as will be described, whereby simplicity, durability, and efficiency are obtained, as will be described. These and other features of this invention will be pointed out in the claims at the end of this specification.

Figure 1 is an elevation of a multiple rotary switch embodying this invention; Fig. 2, a top or plan view of the switch shown in Fig. 1; Fig. 3, a detail to be referred to; Fig. 4, a side elevation of the switch shown in Fig. 1, looking toward the left; Fig. 5, a section on the line 5 5, Fig. 4, with the operating-handles in a vertical position; Fig. 6, a sectional detail of one of the commutators to be referred to, and Fig. 7 a side elevation of one of the commutators.

In the present instance I have chosen to illustrate my improved switch as provided with two individual switches A A'; but I do not desire to limit my invention in this respect, as it may be provided with or be composed of any desired number. The switches A A' are of like construction and a detailed description of one will suffice to enable my invention to be understood.

In accordance with this invention the switch A is provided with a rotatable member composed of a hub or sleeve a , of porcelain or other suitable insulating material, fastened onto a sleeve a' , (see Fig. 5,) as by a screw a^2 , and extended through a radial hole in the sleeve a and into a radially-extended threaded socket in the sleeve a' , which sleeve a' is loose on a rotatable shaft a^3 , having bearings in uprights or standards $a^6 a^7$, (see Fig. 1,) suitably secured to a base or plate a^8 , of porcelain or other suitable insulating material, which forms part of the framework of the switch. The sleeve a' is provided at one end, as herein shown, with a collar a^{10} , and at its opposite end the said sleeve is screw-threaded to receive a threaded ring or nut a^{12} , and the sleeve a' has mounted upon it on opposite sides of the hub or sleeve a disks $a^{13} a^{14}$, of mica or other suitable insulating material, the said disks being of greater diameter than the hub or sleeve a to serve as spark-arresters and prevent jumping of the current from one switch to another in case of accident. The threaded washer or nut a^{12} assists in firmly securing the sleeve a and the disks $a^{13} a^{14}$ on the sleeve a' . The sleeve a is provided on its periphery with one or more contact-plates, and in the present instance two such contact-plates $a^{20} a^{21}$ are shown, (see Figs. 6 and 7,) located substantially diametrically opposite and with each of which coöperate two line-terminals or contact-brushes $a^{22} a^{23}$, (see Fig. 1,) which are suitably secured to the base or plate a^8 , and in the present instance they are shown as secured by the screws a^{24} to lugs a^{25} , fastened to the base a^8 by nuts a^{26} . The contact-plates $a^{20} a^{21}$ are preferably secured to the insulating hub or sleeve a by means of screws a^{30} , extended through each contact-plate and a portion of the hub or sleeve a and into threaded sockets in a metal bar or rod a^{32} , inserted into an axially-extended hole a^{33} in the said

sleeve. In this manner the contact-plates a^{20} a^{21} are firmly secured to the porcelain hub or sleeve a at a minimum expense.

The sleeve or hub a , with its attached contact-plates, constitutes the rotatable member or commutator of the switch, and the said commutator is normally loose on the shaft a^3 and is adapted to be turned thereon, and it is also adapted to be rendered fast on said shaft, so as to turn therewith, as will now be described.

The sleeve or hub a' has coöperating with it a clutch comprising a stationary member b , which is shown as an extension of the sleeve a' beyond the collar a^{10} , (see Fig. 3,) and is provided with beveled teeth b' , with which coöperate correspondingly-shaped teeth b^2 on a sleeve b^3 , loose on the shaft a^3 and yieldingly engaged with the stationary member b by means of a spring b^4 , encircling the shaft a^3 and bearing at one end against the sleeve b^3 and at its other end against the end of the hub b^5 of a handle b^6 . The hub b^5 is normally loose on the shaft a^3 , but is adapted to be rendered fast thereon by means of a locking device consisting, as herein shown, of a rod b^{10} , extended up through the handle b^6 and provided at its lower end with a head b^{12} (see Fig. 5) and at its upper end with a removable thumb-piece b^{13} , located, as shown in the present instance, in a slot b^{14} in the handle b^6 . The rod b^{10} is acted upon by a spring b^{15} , which encircles the rod within a chamber b^{17} in the handle and acts under normal conditions to force the head b^{12} of the said rod into a socket b^{18} in a collar b^{19} , fast on the shaft a^3 . The slot b^{14} in the handle is substantially T-shaped, so as to form shoulders b^{20} b^{21} , (see Fig. 4,) upon which the shank of the thumb-piece is adapted to rest when the said thumb-piece is lifted to disengage the head b^{12} from the collar b^{19} , and then turned so as to lock the rod b^{10} in its elevated position until positively released, the spring b^{15} acting to keep the shank of the thumb-piece pressed down upon the shoulders b^{20} b^{21} .

The hub b^5 of the handle is preferably made of sufficient length to cover the clutch member b .

The sleeve a' is held from accidentally turning on the shaft a^3 by preferably two holding-pawls (shown in Fig. 4 as levers c c'), pivotally supported at their lower ends in lugs c^2 , secured to the base or plate a^8 and connected at their upper ends by a spring c^3 , the said levers having projections c^{30} c^4 , which are adapted to engage suitable projections or teeth c^5 on the collar a^{10} , the said teeth being indicated by dotted lines, Fig. 4. The base or plate a^8 has secured to or erected upon it suitable posts or standards d , to which are secured a plate or cover d' , which latter I prefer to designate the "front" plate.

The front plate d' , in accordance with this invention, is provided with slots d^2 , through which the handles b^6 are extended, and the said plate at the opposite ends of said slots is

provided with buffers d^4 , of rubber or like cushioning material, to receive the blow of the handles b^6 when the latter are turned individually or collectively. The plate d' is further provided with suitable openings d^5 in line with the commutators of the switch, and the said openings are closed by pieces d^6 , of mica or like transparent material, which enables the operator to see at a glance the condition of each switch.

The shaft a^3 may be turned by means of a handle d^7 , secured thereto by a screw d^8 and having a limited throw in opposite directions, which is effected in the present instance by providing the hub of the handle d^7 with a lug d^9 , which engages the upper end of the bearing a^7 when the said handle has reached the limit of its movement in opposite directions.

The movable member b^3 of the clutch is designed in practice to be moved longitudinally on the shaft a^3 in one direction by the beveled teeth of the stationary member and is moved in the opposite direction by the spring b^4 , and the said movable member may be connected to the hub b^5 of the handle by screws d^{20} , (see Fig. 4,) which are extended through the said hub and into longitudinal slots d^{21} in the movable member b^3 .

From the above description it will be seen that if the handle b^6 is locked to the shaft by the rod b^{10} engaging the socket b^{18} in the collar b^{19} the commutator of the switch will be rotated or turned when the shaft a^3 is turned by moving the handle forward from the position shown in Fig. 4. If, however, the locking-rod b^{10} is disengaged from the collar b^{19} , connection with the main shaft a^3 is broken and the commutator is placed under control of its individual handle b^6 , so that the said commutator may be rotated to effect a change in the electric circuit governed by it by moving its handle b^6 , or the commutators locked to the main shaft may be operated simultaneously, while the unlocked commutator remains stationary. It will thus be seen that the condition of all or some of the electric circuits governed by the individual switches may be simultaneously changed, or the condition of individual circuits may be changed without changing the condition of other circuits.

In order that the sleeve or hub a of the commutator may be made of porcelain without danger of breaking the same, the said sleeve is provided on its periphery with recesses or notches e of a depth substantially equal to the thickness of the contact-plates a^{20} a^{21} , so that when the said contact-plates are secured in the said recesses by the screws a^{30} , as above described, the outer surface of the contact-plates will be in the same, or substantially the same, circle as the intermediate insulating portion of the said hub or sleeve. This construction of commutator permits the contact-brushes a^{22} a^{23} to remain in continuous contact with the periphery of the commutator as the latter is turned and avoids the said brushes striking the porcelain hub a

blow when contact-plates are carried from under the said brushes, the same as would occur if the contact-plates were fixed to the full periphery of the hub. Owing to the fragile nature of the porcelain such a blow, if permitted to be given, would soon break the said hub and destroy the commutator. In other words, no break occurs in the contact of the brushes with the periphery of the porcelain hub during the rotation of the said hub, or the said break is reduced to such extent as to avoid the injurious effects of a blow from the contact-brushes upon the porcelain.

I claim—

1. In an electric switch, the combination of the following instrumentalities, viz: a rotatable shaft, a plurality of commutators loosely mounted thereon, operating-handles for the said commutators, clutch mechanisms to couple the said operating-handles with said commutators, and locking devices for the said handles to render the same fast to the said shaft, substantially as described.

2. In an electric switch, the combination of the following instrumentalities, viz: a rotatable shaft, a plurality of commutators loosely mounted thereon, clutch mechanisms cooperating with said commutators, actuating means to operate said clutch mechanisms and produce rotation of the commutators, and means to lock the said actuating means to the said shaft, substantially as described.

3. In an electric switch, the combination of the following instrumentalities, viz: a rotatable shaft, a plurality of commutators loose thereon, clutch mechanism cooperating with the commutators and comprising a fixed member attached to the commutators, and movable members cooperating with said fixed member holding devices to hold the commutators and fixed members stationary while the movable clutch members are being moved in one direction, means to move said movable members, and means to lock the movable members to the said shaft, substantially as described.

4. In an electric switch, the combination of the following instrumentalities, viz: a rotatable shaft, a plurality of commutators loose thereon, means to rotate said commutators on said shaft, and means to connect the said commutators to said shaft to rotate therewith, substantially as described.

5. In an electric switch, the combination of the following instrumentalities, viz: a shaft, a commutator loose thereon, a clutch mechanism cooperating with said commutator, means to hold the commutator from turning when the clutch is turned in one direction and to permit the said commutator to turn with the clutch when the latter is moved in the opposite direction, substantially as described.

6. In an electric switch, the combination of the following instrumentalities, viz: a shaft,

a commutator loose thereon, a clutch mechanism cooperating with said commutator, means to hold the commutator from turning when the clutch is turned in one direction and to permit the said commutator to turn with the clutch when the latter is moved in the opposite direction, and a handle connected to the movable member of the clutch to rotate the said member in opposite directions and yet permit the said member to move axially, substantially as described.

7. In an electric switch, a commutator consisting of a sleeve or hub of porcelain or like vitreous material provided with an axially-extended hole and with a radial hole extended from the axial hole to the periphery of the said sleeve or hub, a metallic bar or rod in said axially-extended hole, a contact-plate on the periphery of the sleeve or hub, and a screw extended through the radial hole in the sleeve or hub and into said metallic bar or rod to firmly secure said contact-plate to the porcelain or hub sleeve, substantially as described.

8. In an electric switch, the combination of the following instrumentalities, viz: a shaft, a commutator loose thereon and comprising a metallic sleeve provided at one end with a collar, and at its opposite end with screw-threads, a sleeve of insulating material fitted on the metallic sleeve, a threaded washer or nut engaging the threaded end of the metallic sleeve, a clutch member attached to the said metallic sleeve, a movable clutch member cooperating with said fixed member, a spring to keep the said members in engagement, and a handle having a hub connected to the movable member of the clutch, substantially as described.

9. In an electric switch, the combination with a metallic sleeve or shaft provided at one end with a head or collar and at its opposite end with screw-threads and at an intermediate point with a radially-extended threaded socket, a sleeve or hub of insulating material fitted on the metallic sleeve or shaft and provided with a radial hole extended from the inner bore to the circumference of the same, a nut or threaded washer engaging the threaded end of the metallic sleeve or shaft to clamp the insulating-sleeve between it and the said collar or head, and a screw extended through the radial hole in the insulating-sleeve and into the radially-extended threaded socket in the said metallic sleeve or shaft, substantially as described.

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

WILLIAM J. KELLY.

Witnesses:

JAS. H. CHURCHILL,
J. MURPHY.