

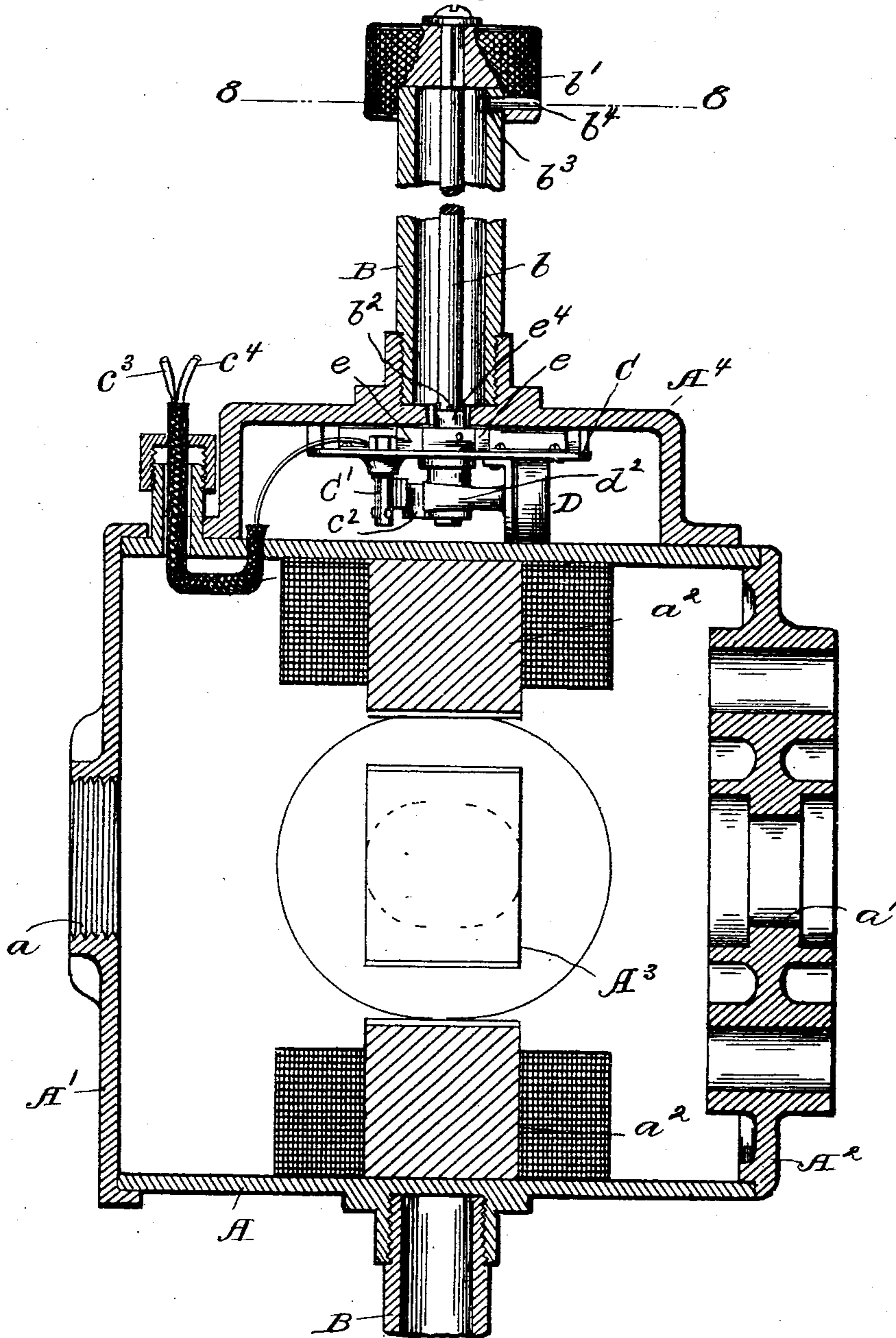
W. C. HAFEMEISTER.
COMBINATION SWITCH AND BLOW-OUT.
APPLICATION FILED JULY 12, 1907.

940,311.

Patented Nov. 16, 1909.

3 SHEETS—SHEET 1.

Fig. 1



Witnesses:

J. C. Turner
Jno. F. Oberlin

Inventor:

William C. Hafemeister

by J. B. Fay

his attorney.

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3 SHEETS—SHEET 2.

Fig. 2.

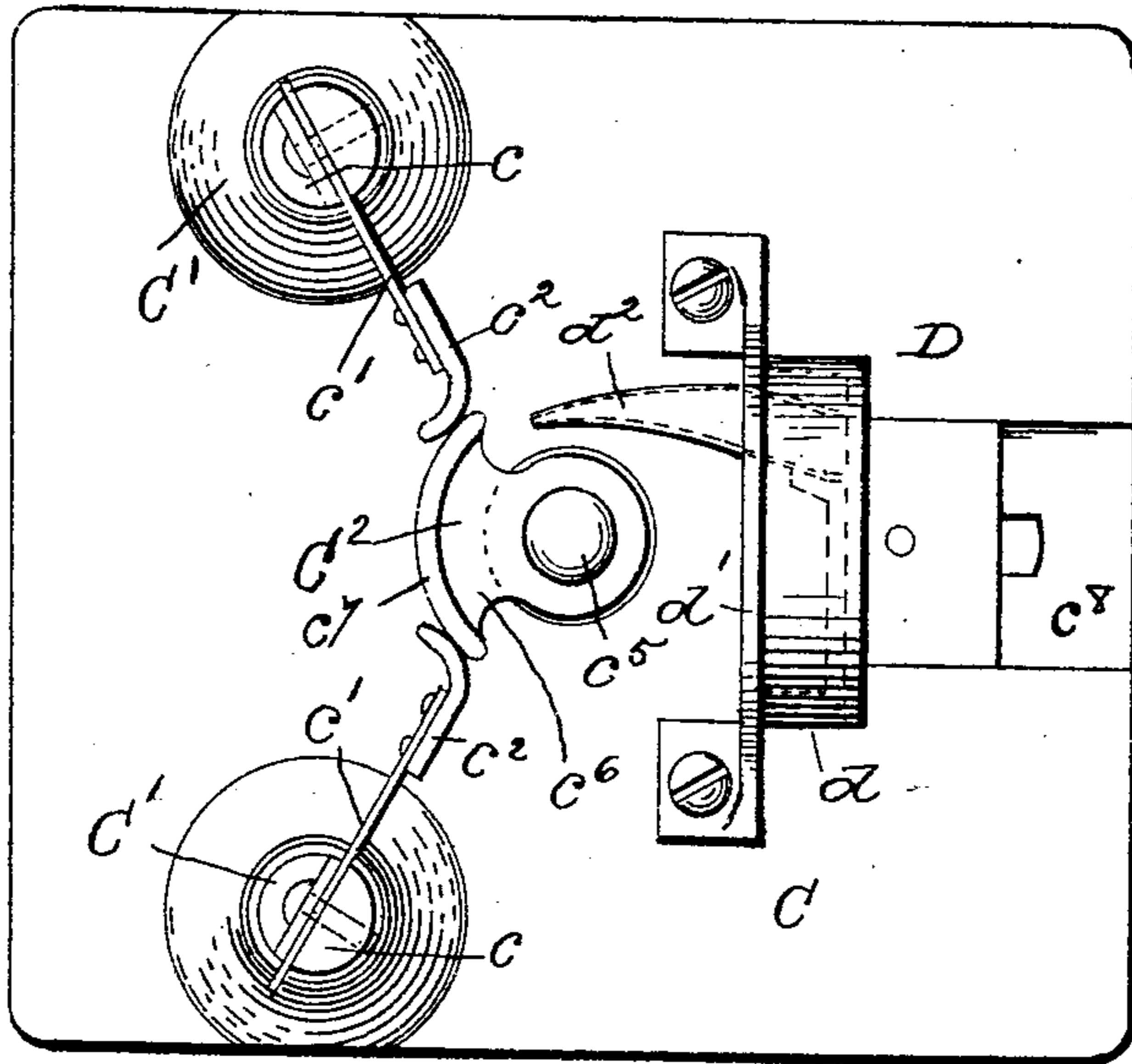


Fig. 6.

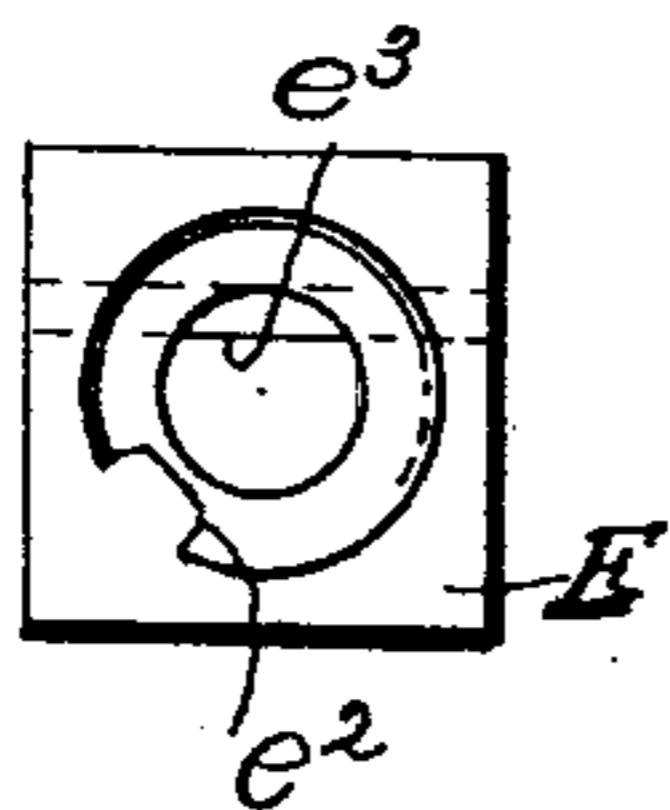


Fig. 7.

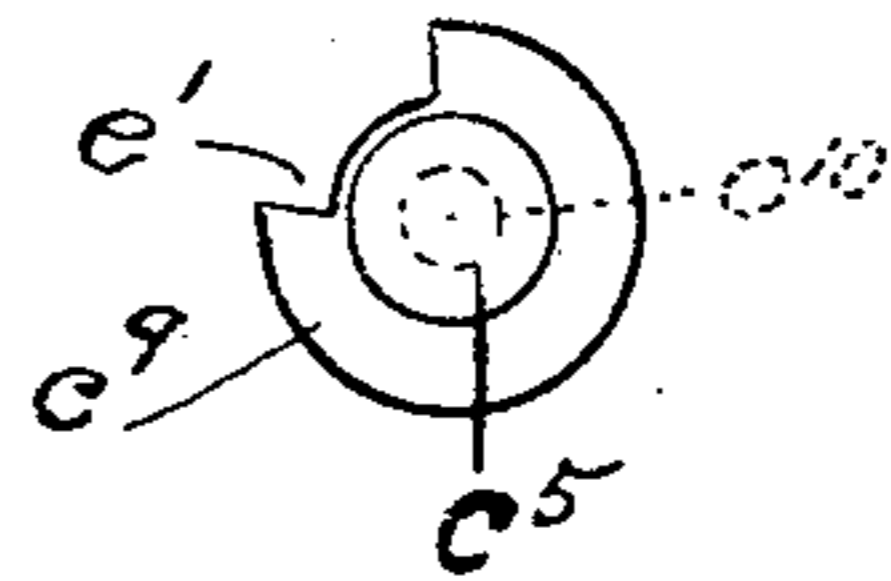
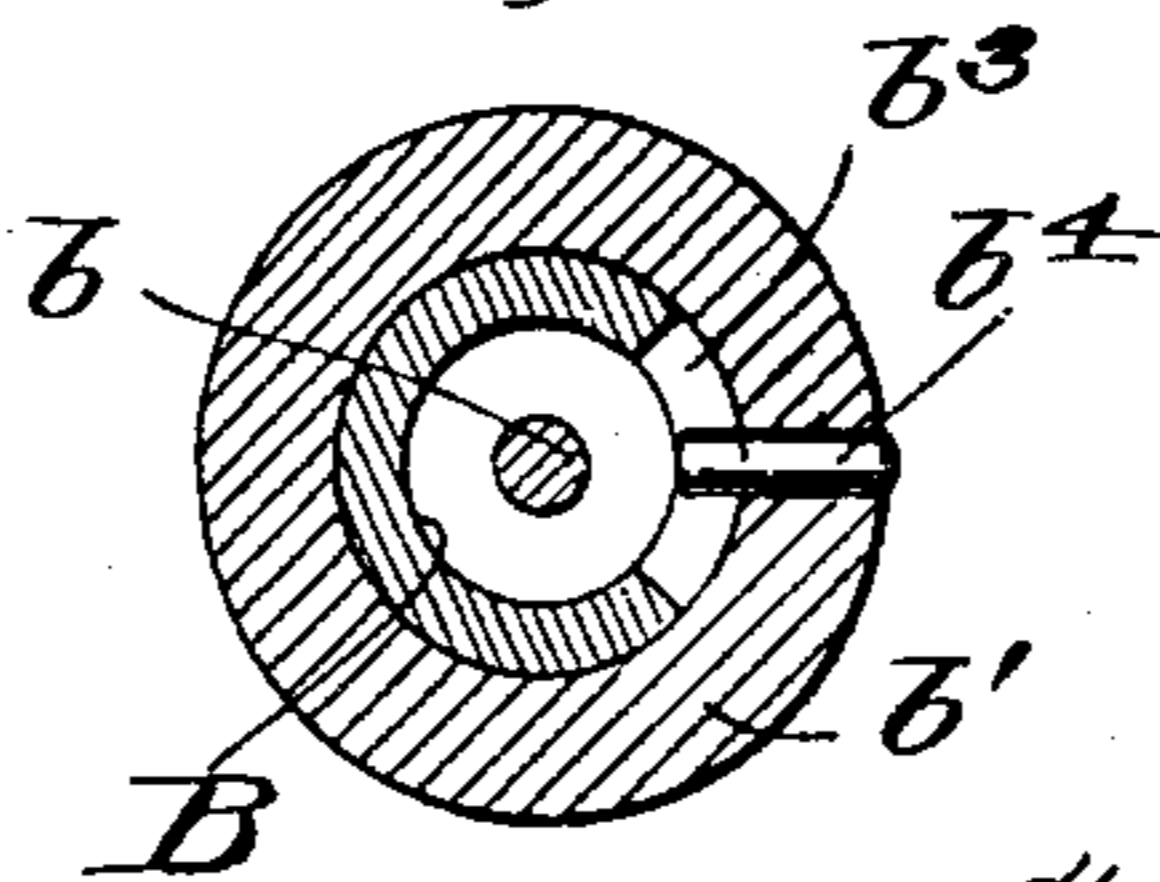


Fig. 8.



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3 SHEETS—SHEET 3.

Fig. 3

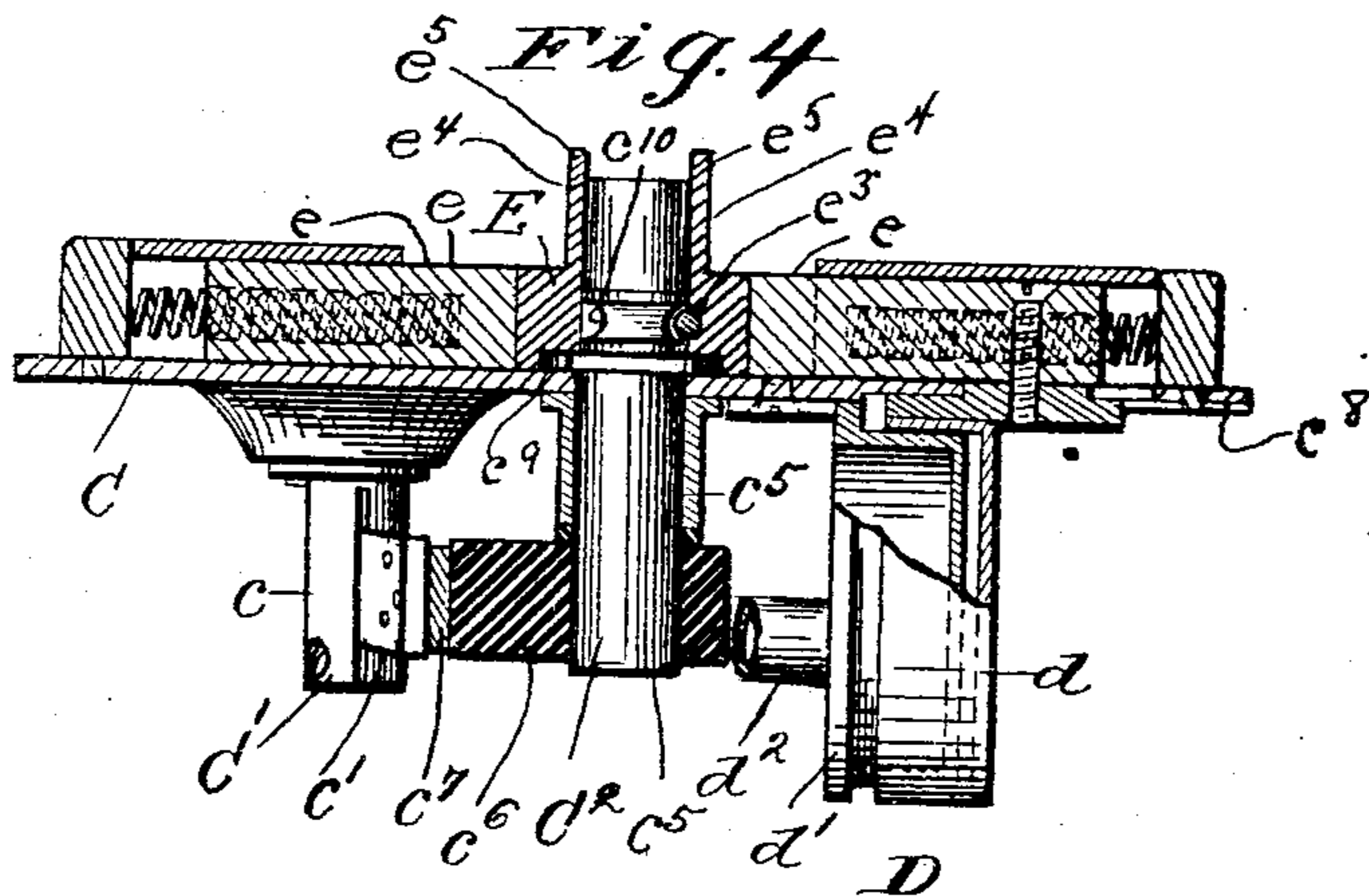
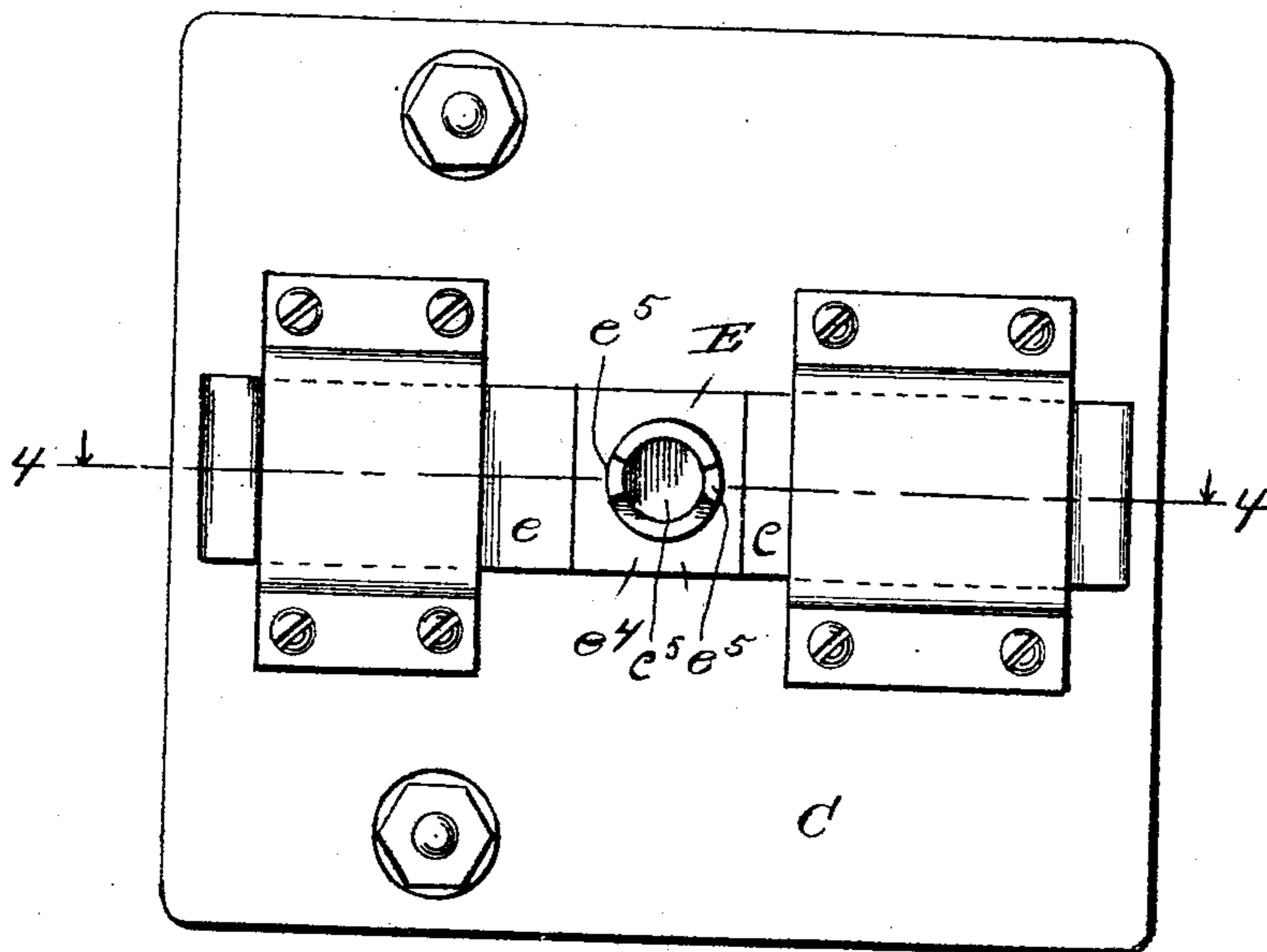
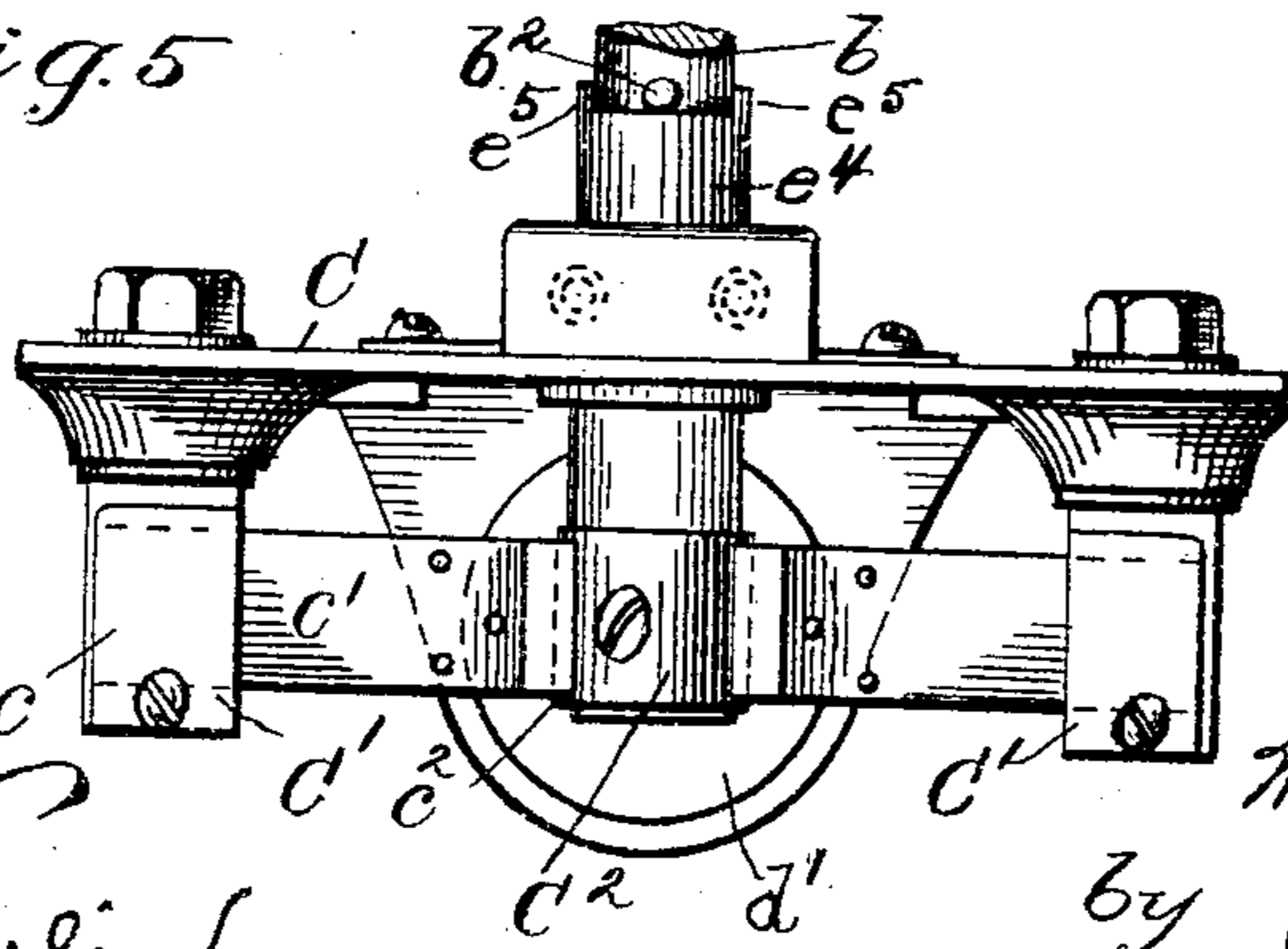


Fig. 5



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM C. HAFEMEISTER, OF CLEVELAND, OHIO, ASSIGNOR TO THE VAN DORN ELECTRIC AND MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

COMBINATION SWITCH AND BLOW-OUT.

940,311.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed July 12, 1907. Serial No. 383,384.

To all whom it may concern:

Be it known that I, WILLIAM C. HAFEMEISTER, citizen of the United States, resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Combination Switches and Blow-Outs, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

My present invention relates to circuit making and breaking devices and has as its object the combination with an improved electric switch or other circuit making and breaking device, of means for automatically and effectively blowing out the spark that, as is well understood, always attends the breaking of a circuit of other than very low potential.

To the accomplishment of this and related ends, said invention consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings: Figure 1 represents a vertical axial section of my improved combined switch and blow out as applied to a portable electric drill; Fig. 2 is a top plan view of such device taken apart from the drill; Fig. 3 is similarly a bottom plan view of the same; Fig. 4 is a transverse section taken on the line 4—4, Fig. 3; Fig. 5 is an end elevation of the device as viewed from the left in Figs. 2 and 3; Figs. 6 and 7 show details of the structure of the post whereby the movable parts of the switch are actuated; and Fig. 8 is a section through the handle taken on the line 8—8, Fig. 1.

As has been indicated, in Fig. 1, above described, my invention is shown in connection with a portable electrically operated drill. By this I do not mean to imply any limitation upon the field of usefulness of the device, but rather to indicate merely one specific connection in which a device embodying the features, presently to be described, will be of the greatest usefulness.

As is well understood, one of the prime dif-

ficulties that have been encountered in successfully adapting the electric current for use in the operation of portable tools such as are very largely used in metal structural work about ships and bridges, and about the steel frames of buildings, and the like, has been the rapid burning out of the contacts where the circuit is made and broken. The machine requiring, for obvious reasons, to be turned off and on very frequently, even a slight sparking will very rapidly effect the destruction of the parts named. The cost of the replacement of these, taken in connection with the loss of the use of the machine while undergoing repairs, has accordingly prevented the substitution of electrically operated tools for the pneumatic devices now generally employed, in spite of the numerous objections incidental to the use of the latter, which being well known need not be dilated upon here.

The portable electrically operated drill in which I then show my switch in Fig. 1, is shown in part only and need be no further described than to state that it is of the general type fully shown for instance, in United States Letters Patent No. 809,394. The mechanism of the drill proper is contained within a suitable casing A having its ends closed with a removable head A' and a diaphragm A², respectively, such head and diaphragm being provided with centrally aligned apertures *a a'* through which the spindle of the drill and the feed screw therefor (not shown) are adapted to be inserted. Within the casing A and suitably secured thereto are the four pole pieces *a*² of a field structure surrounding the armature A³ of an electric motor that is designed to be suitably secured to a motor shaft for driving the aforesaid drill spindle. In use, the drill is designed to be grasped by means of two handles B projecting laterally from casing A, and it is at the base of one of these handles, in a suitable casing A⁴, that I mount the mechanism constituting the subject matter proper of the present application, actuation of such mechanism being had through a suitable rotatable element mounted in connection with the said handle as will appear.

The several elements entering into the construction of the switch are suitably mounted upon a base plate C, Figs. 2 to 5, inclusive, that is supported upon blocks intermediate between the top and bottom walls

of casing A⁴, Fig. 1. The switch proper comprises simply two similar fixed contact members C' including posts *c* in which are adjustably mounted strips *c'* of spring brass bearing at their respective inner ends contact blocks *c*² of copper, whose ends are slightly recurved as shown in Fig. 2. Such posts *c* are of course insulated from the base C and connected with them are the respective conductors *c*³ *c*⁴ of the actuating electric circuit. Closure of the gap between the two terminals thus provided is designed to be had when desired by means of a movable contact member C² consisting of a short shaft *c*⁵ rotatably mounted in said base plate C and provided with a segmental block *c*⁶ of fiber or other insulating material, upon the outer face of which is mounted a heavy strip *c*⁷ of copper, the length of the latter being sufficient to bridge the gap between the two fixed contact members when the movable contact member is rotated into proper position. Inasmuch as the mechanism whereby such movable contact member is rotated to make and break the circuit is more or less intimately connected with the "blow-out" means D, description thereof will be deferred until the construction of the latter has been explained. Such "blow-out" means D comprise a relatively movable cylinder *d* and piston *d'* constituting a bellows, the tube *d*² of which is directed to discharge a jet of air between one of the fixed contact members C' and said movable member C². In the specific form of the device illustrated it is the second of the bellows members, or piston *d'*, that is fixed, as will be seen from an inspection of Figs. 2 and 4, such piston being rigidly mounted upon the underside of base plate C. Slidably mounted in a way *c*⁸ therefor provided on the same side of the plate is the cylinder *d*, actuation of which is had by the means now to be described. Such means include a polygonal block E, preferably square, that is mounted on the end of shaft *c*⁵ projecting above plate C, and between two spring pressed blocks *e* that normally tend to maintain said block with its flat faces squarely opposed to their ends, as will be easily understood. These spring-pressed blocks are alined with reciprocable cylinder *d* on the other side of the base plate, and one of the same is directly connected therewith so that any movement of the block will effect a corresponding movement of the cylinder and actuation of the bellows of which the latter forms a part.

Actuating block E has a limited rotative movement about shaft *c*⁵ the latter being provided with a recessed disk *c*⁹ in the recess *e'* of which fits a stop pin or lug *e*² borne by the underside of the block, as will be evident from an inspection of Figs. 6 and 7. Such block E is secured to the end of the shaft by means of a transverse pin

*e*³ mounted therein so as to intersect a groove *c*¹⁰ that encircles the shaft end. On its outer side the block bears a sleeve *e*⁴ in which is received the inner end of a shaft *b* mounted in handle B, by rotation of which actuation of the switch is designed to be had. To this end such shaft *b* is provided at its outer extremity with a knurled handle *b'*. The inner end of the shaft is likewise designed to have a limited rotative movement with respect to the sleeve *e*⁴ mounted on block, similar to that which the block has with respect to shaft *c*⁵. With this in view, the end of the sleeve is provided with two oppositely disposed lugs *e*⁵ by engagement with which a transverse pin *b*² near the end of shaft *b* is effective to communicate motion from the latter to the sleeve and thus to block E.

In order to prevent undue rotation of contact member C² it becomes desirable to provide suitable stop means. Such means may of course be provided in the form of stop blocks directly coöperative with said member, but a preferred arrangement illustrated in Figs. 1 and 8, consists in providing the outer end of the drill handle B with a notch *b*³ in which freely plays a pin *b*⁴ set in the overlapping flange of knurled handle *b'*. The notch *b*³ obviously limits the rotative movement of shaft *b*, and thus of movable contact member C² through the intermediate connecting mechanism.

The notch or recess *e'* in the disk *c*⁹ of shaft *c*⁵ and the stop pin borne by actuating block E are all relatively so disposed, that rotation of such block does not become effective to rotate the shaft, and therewith movable contact member C², until such block is brought substantially into a position with its greatest length in line with the direction of movement of spring pressed blocks *e*, as the result of which the latter are forced into their outer positions. A very slight movement of the block beyond this position not only serves then to actually break the circuit by moving the contact member C², but also brings the block E into position to be actuated by the spring pressed blocks as will be obvious. Such actuation of the spring pressed blocks is of course instantaneous, once this point is passed, and both a quick rotative movement of contact member C², as well as of the bellows, are accordingly produced. As a result of the actuation of the bellows, a sharp sudden puff, or jet, of air is directed into the gap in the circuit exactly timed with its formation. Any arc, is thus quickly dissipated and injurious sparking absolutely prevented, so that the contacts will last indefinitely. It will be, of course, understood that such variation may be made in the dimensions of the cylinder of the bellows as will produce a blast of the necessary strength in view of the

character of the current, although the actual volume of air requisite for the purpose is surprisingly small if applied at just the right moment. Of almost equal importance with such "blow-out" feature, is the instantaneous actuation of the switch itself, which I attain by means of the construction hereinbefore described. By virtue of the automatic device for rotating contact C² comprising angular block E and spring-pressed blocks e, both in the making and the breaking of the circuit, the switch is instantaneously snapped into place, it being impossible for the operator to interfere with the movement once it is started. An unskilled workman, into whose hands machines of the class to which my invention is peculiarly applicable are apt to come, cannot thus leave the contact or switch partly closed and fuse his contacts as now frequently happens.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any one of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. In a device of the character described, the combination of a fixed contact member, a movable contact member, a bellows provided with a tube directed to discharge a jet of air between the same, and an actuating member connected to operate both said movable contact member, and said bellows in one direction, said actuating member releasing said bellows after thus actuating the same, and means operating said bellows in the opposite direction.

2. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, a bellows provided with a tube directed to discharge a jet of air between the same, a spring for compressing said bellows, and an actuating member connected both to rotate said second contact member and to expand said bellows against said spring and thereupon release the same, said actuating member having limited rotative movement with respect to said second contact member whereby said bellows is expanded before the breaking of the circuit by movement of said contact member.

3. In a device of the character described, the combination of a fixed contact member, a movable contact member, and a cylinder and a piston therein, one of the same being provided with a tube directed to discharge a jet of air upon a point of contact between said members, an actuating member connected both to operate said movable contact member, and to move said piston and cylinder apart, said actuating member having

limited movement with respect to said contact member, and said actuating member releasing said cylinder and piston after thus moving the same apart, and means operating to move said cylinder and piston together.

4. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, an air cylinder and a piston therein, one of the same being provided with a tube directed to discharge a jet of air upon the point of contact between said members, a spring tending to move said cylinder and piston together, and an actuating member connected both to rotate said second contact member and to move said piston and cylinder apart against said spring, and thereupon release the same, said actuating member having limited movement with respect to said second contact member, whereby said cylinder and piston are thus moved apart before the breaking of the circuit by movement of said contact member.

5. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, a bellows provided with a tube directed to discharge a jet of air between said contact members, a spring for compressing said bellows, and joint actuating means for said second contact member and said bellows, said means including an angular block connected with said contact member and having a limited rotative movement with respect thereto, and a reciprocable member connected with said bellows and resiliently held in contact with said angular block, rotation of the latter being effective to reciprocate said member outwardly prior to actuating said contact member.

6. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, a bellows provided with a tube directed to discharge a jet of air between said contact members, a spring for compressing said bellows, and joint actuating means for said second contact member and said bellows, said means including an angular block connected with said contact member and having a limited rotative movement with respect thereto, and two oppositely disposed reciprocable members resiliently held in contact with said angular block, one of said members being connected to operate said bellows and rotation of said block being effective to reciprocate said members outwardly prior to actuating said contact member.

7. In a device of the character described, the combination of a fixed contact member, a pivotal contact member, a bellows provided with a tube directed to discharge a jet of air between said contact members, a spring for compressing said bellows and joint actuating means for said second contact mem-

ber and said bellows, said means including
an angular block connected with said con-
tact member and having a limited rotative
movement with respect thereto, a reciproca-
5 ble member connected with said bellows and
resiliently held in contact with said angular
block, rotation of the latter being effective
to reciprocate said member outwardly prior
to actuating said contact member, and means,
10 having limited rotative movement with re-
spect to said block, for rotating the latter.
8. In a device of the character described,
the combination of a fixed contact mem-
ber, a pivotal contact member, a relatively
15 reciprocable cylinder and piston forming a
bellows and joint actuating means for said
second contact member and said bellows,
said means including a square block con-
nected with said second contact member and
20 having a limited rotative movement with
respect thereto, and two oppositely disposed
reciprocable members resiliently held in con-
tact with said square block, one of said mem-
bers being connected with the movable ele-
25 ment of said bellows and rotation of said
block being effective to reciprocate said mem-

ber outwardly prior to actuating said con-
tact member.

9. In a device of the character described,
the combination of a fixed contact member, 30
a pivotal contact member, a relatively re-
ciprocable cylinder and piston forming a
bellows and joint actuating means for said
second contact member and said bellows,
said means including a square block con- 35
nected with said second contact member and
having a limited rotative movement with re-
spect thereto, two oppositely disposed re-
ciprocable members resiliently held in con-
tact with said square block, one of said mem- 40
bers being connected with the movable ele-
ment of said bellows and rotation of said
block being effective to reciprocate said mem-
ber outwardly prior to actuating said con-
tact member, and a manually operable shaft, 45
having limited rotative movement with re-
spect to said block, for rotating the latter.

Signed by me this 8th day of July, 1907.

WILLIAM C. HAFEMEISTER.

Attested by—

MARY ISRAEL,

JNO. F. OBERLIN.