

(No Model.)

2 Sheets—Sheet 1.

W. H. DINGLE & J. M. URQUHART.
ELECTRIC SWITCH.

No. 501,707.

Patented July 18, 1893.

Fig. 1.

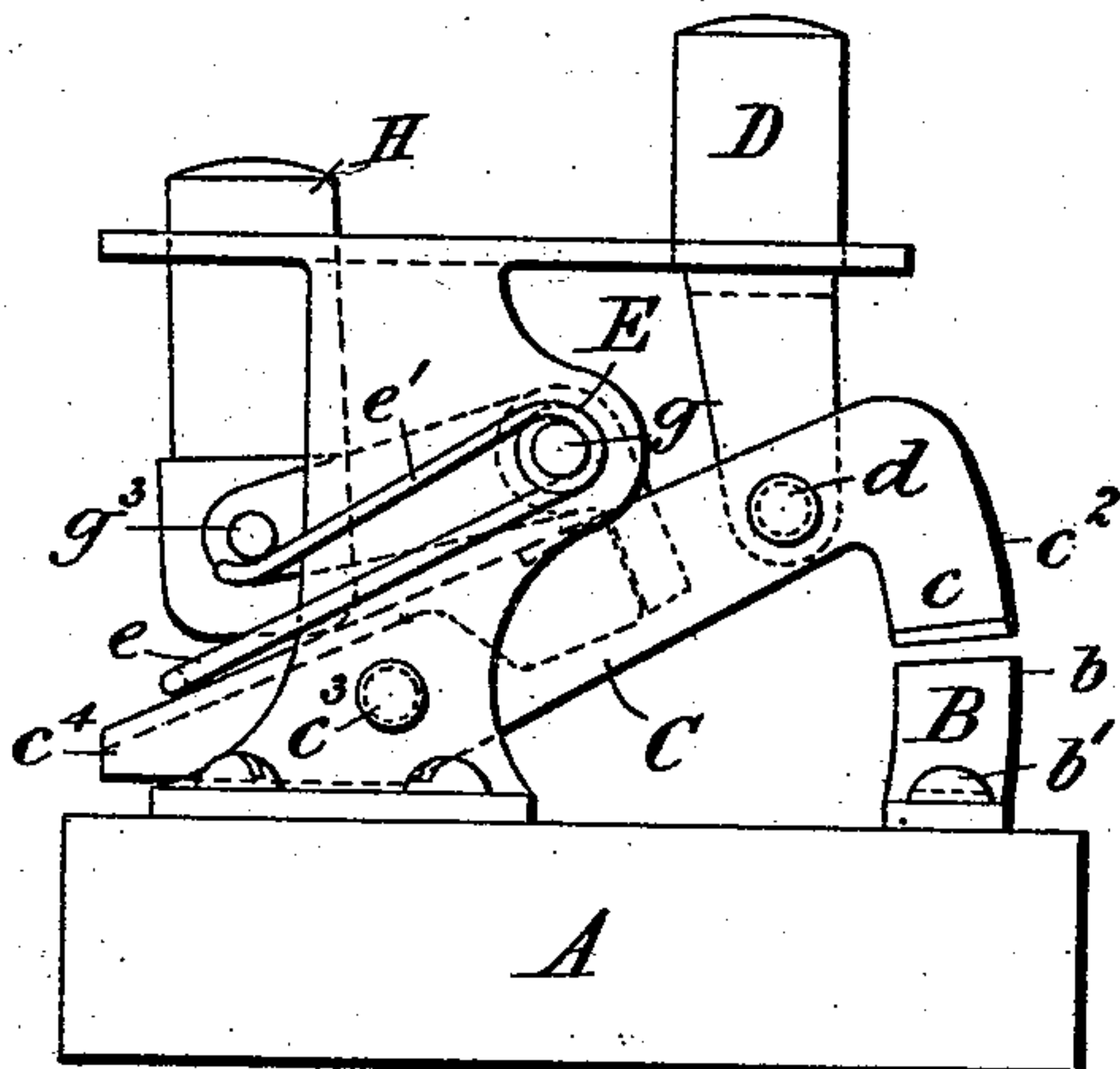


Fig. 3.

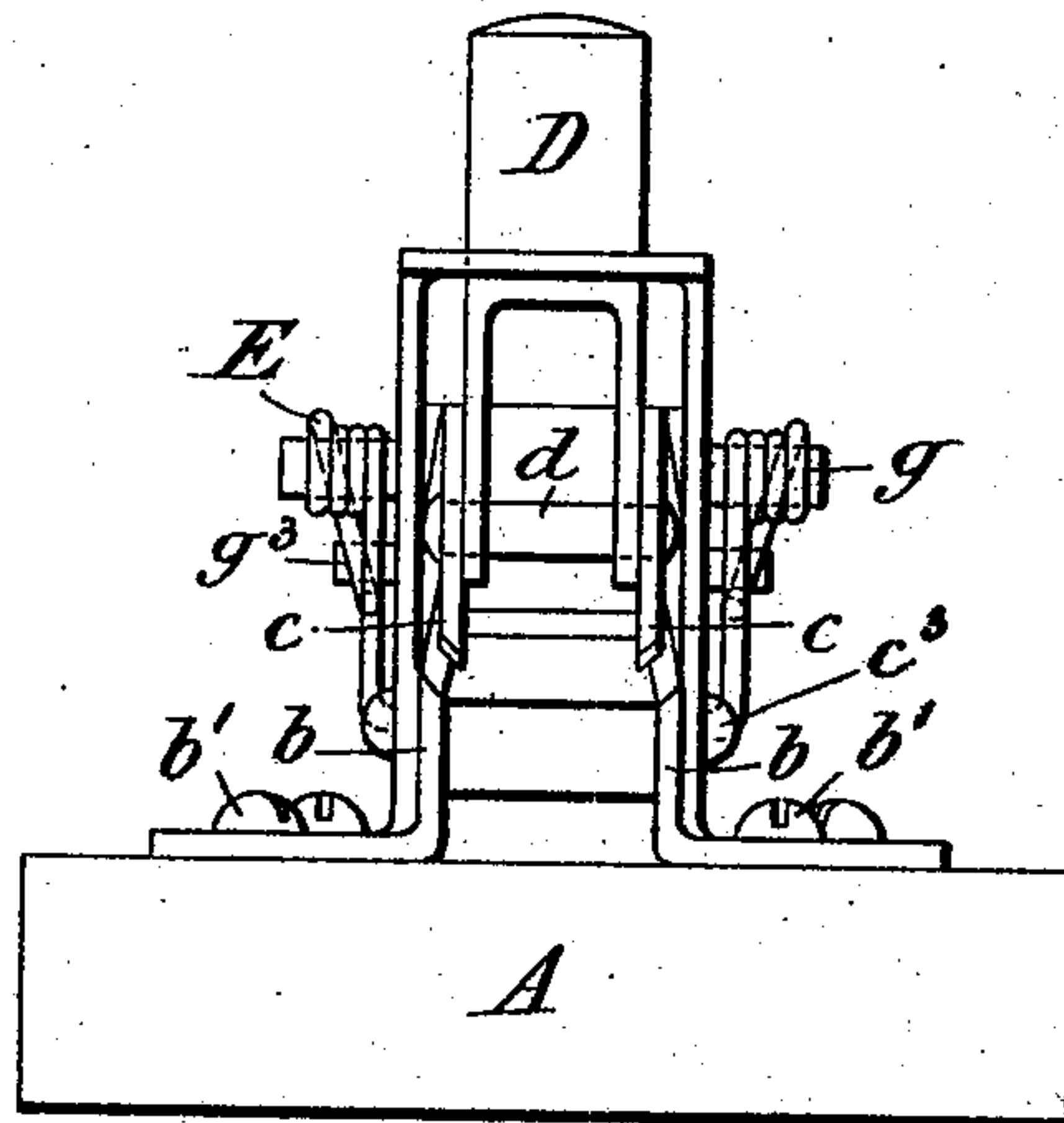


Fig. 2.

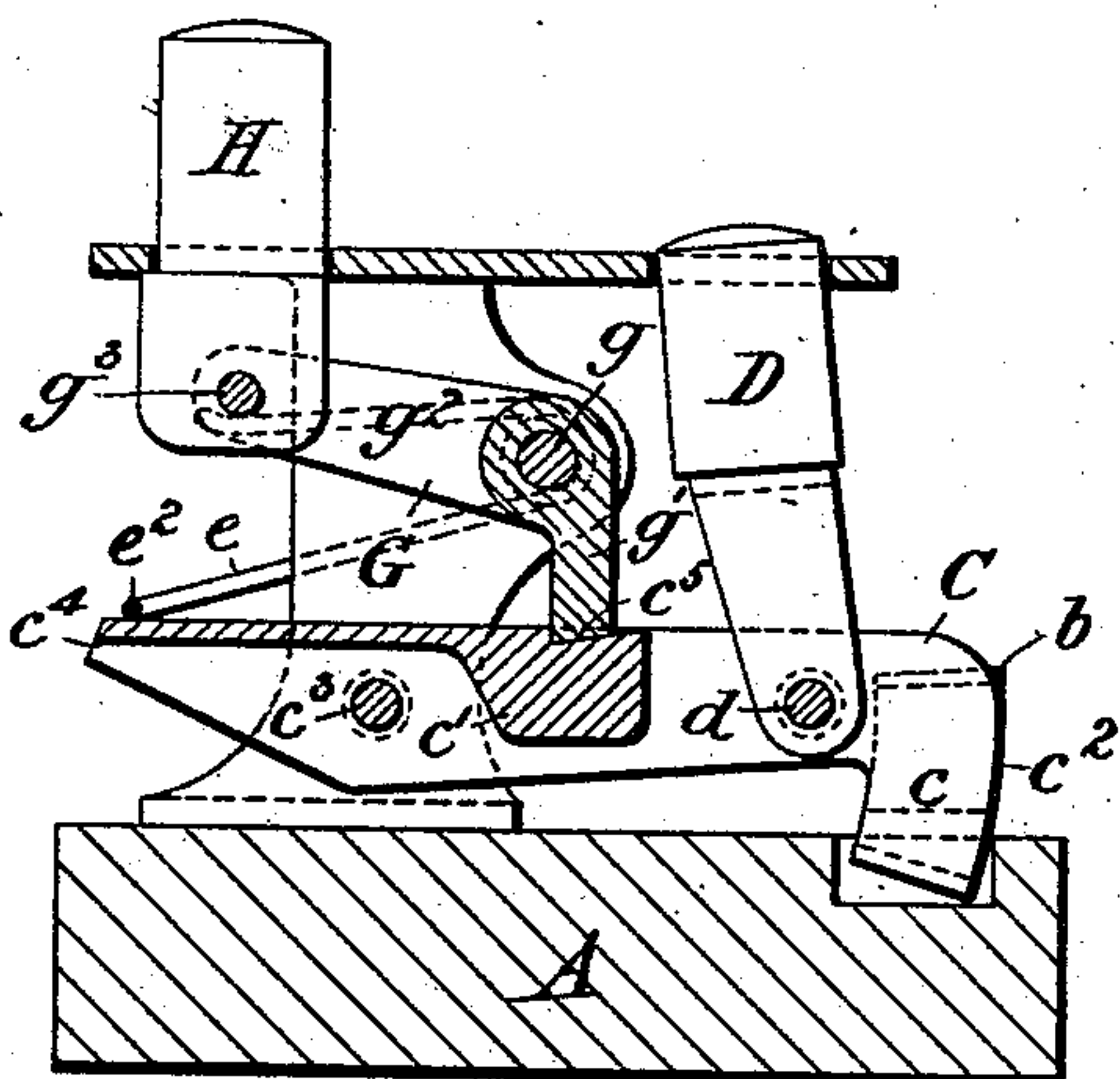
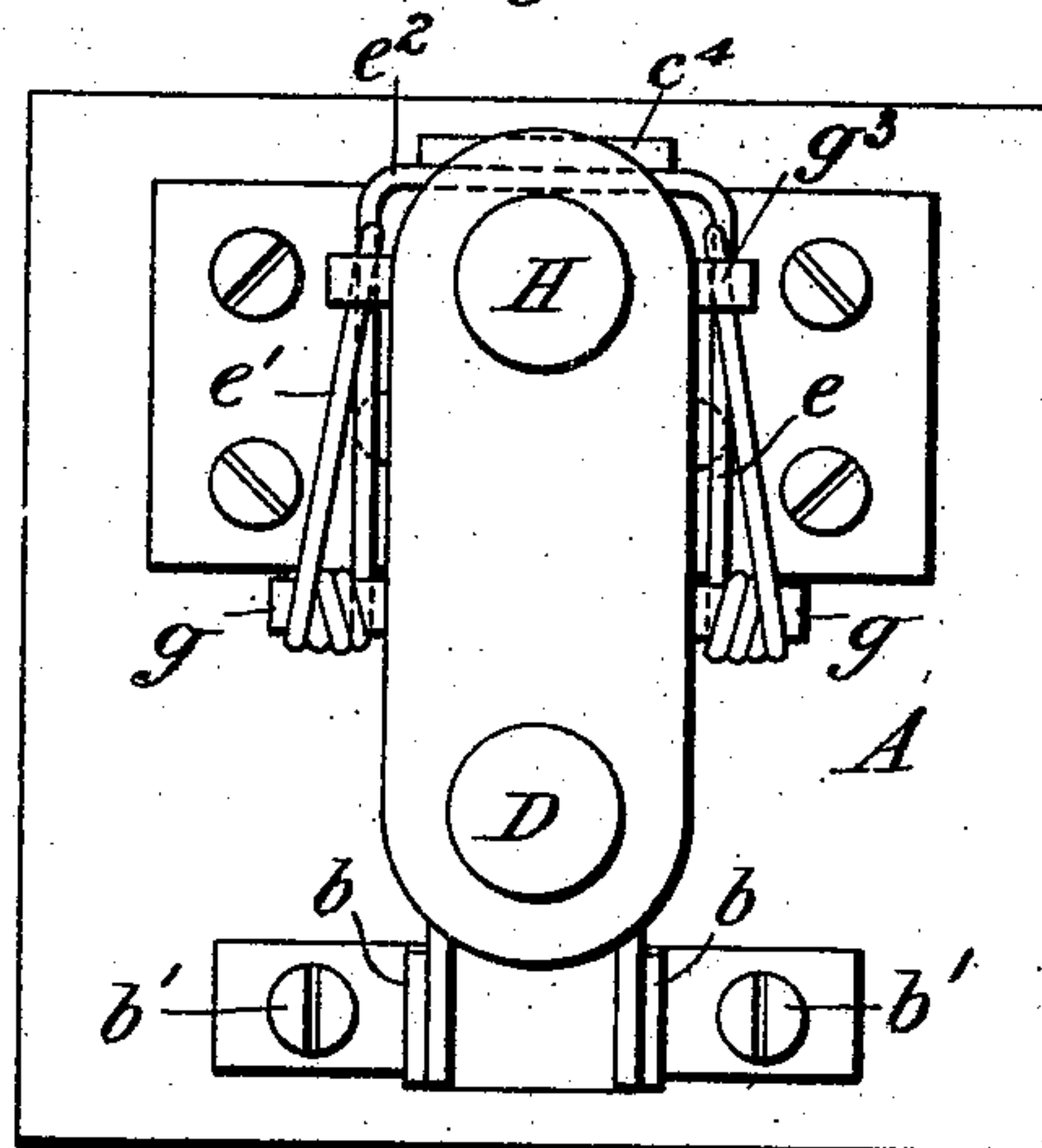


Fig. 4.



Witnesses
James G. Lorrain.
Ernest J. Elington.

Inventors
William H. Dingle
John M. Urquhart

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2 Sheets—Sheet 2.

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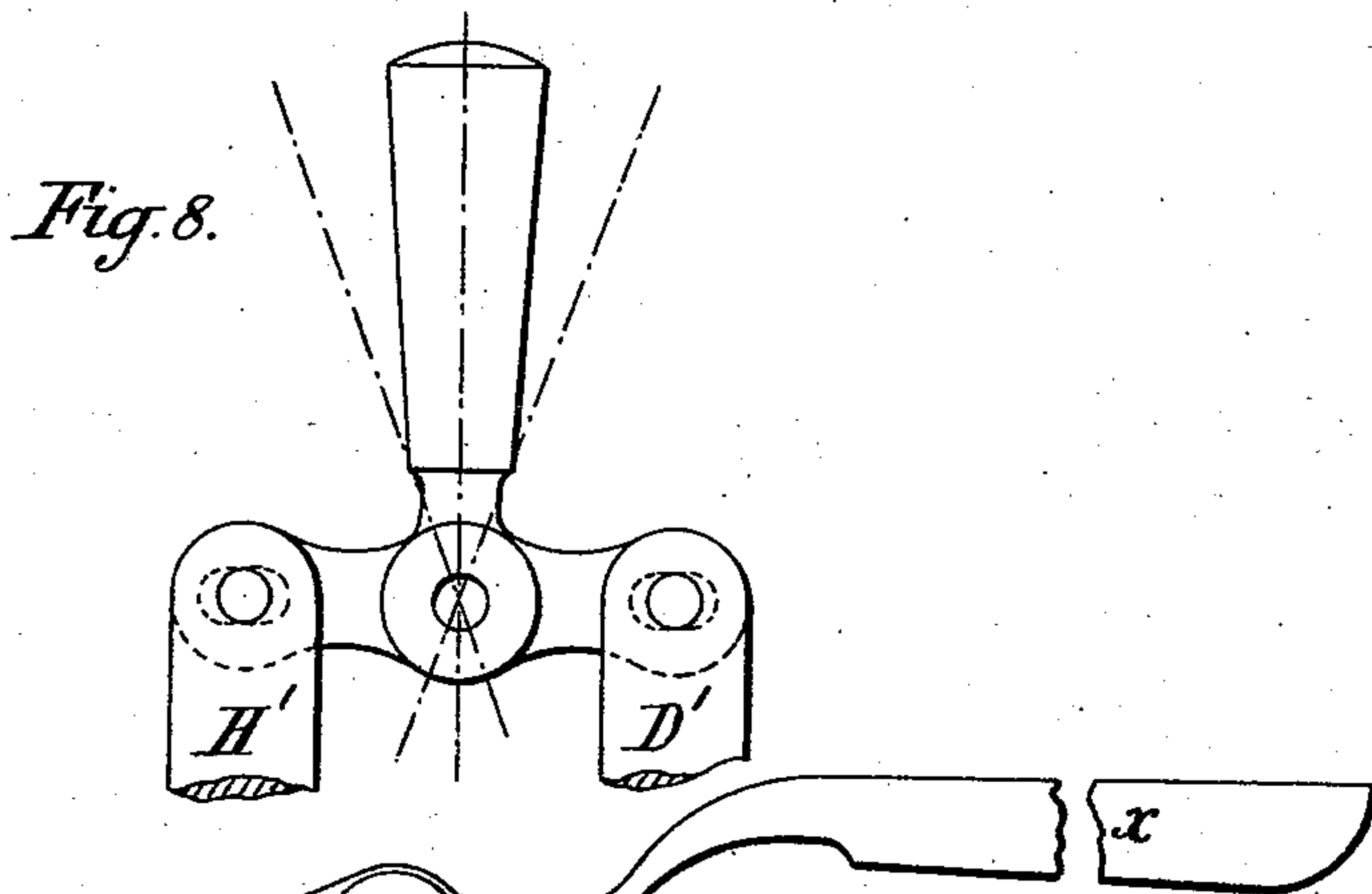


Fig. 5.

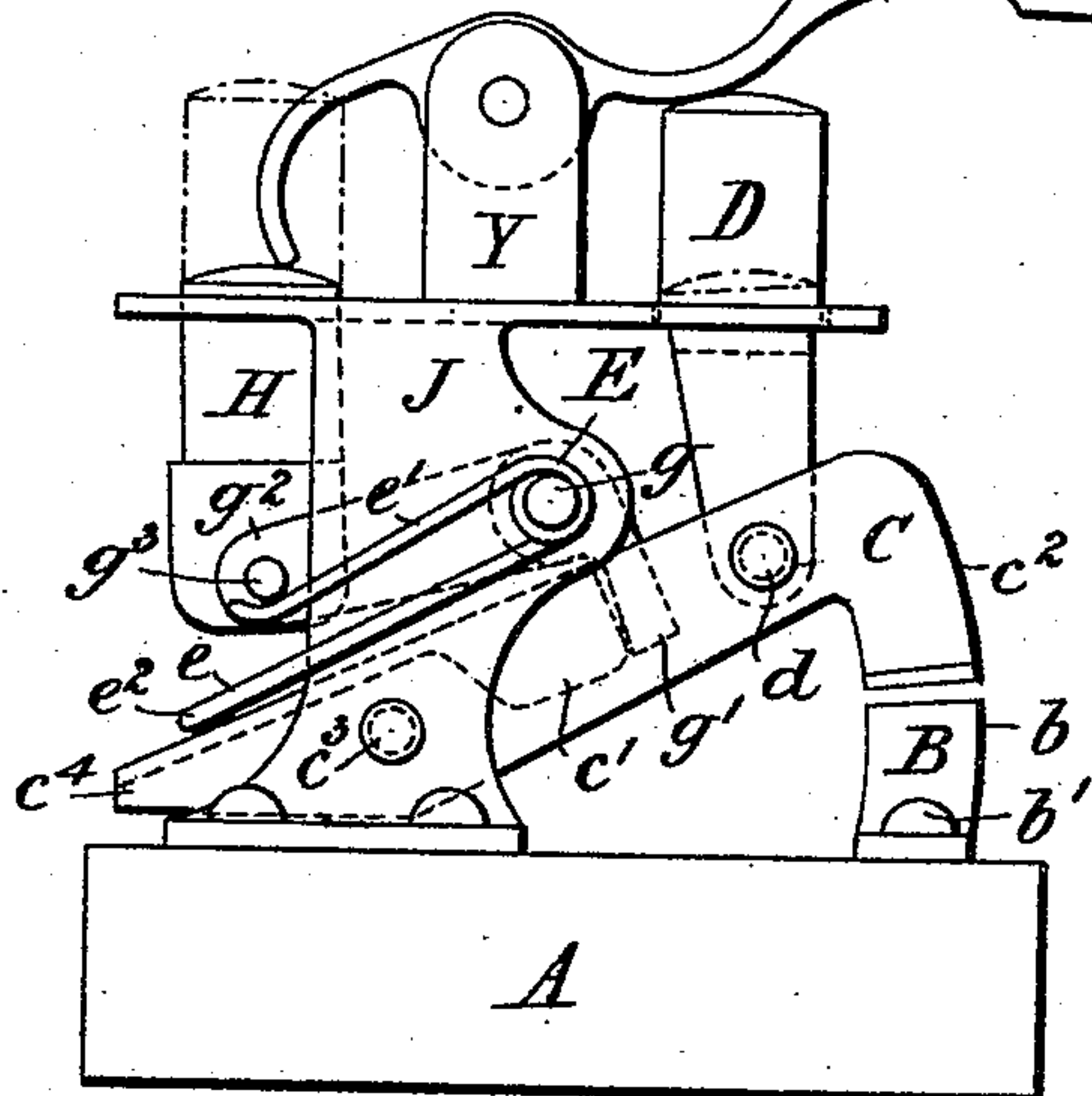


Fig. 6.

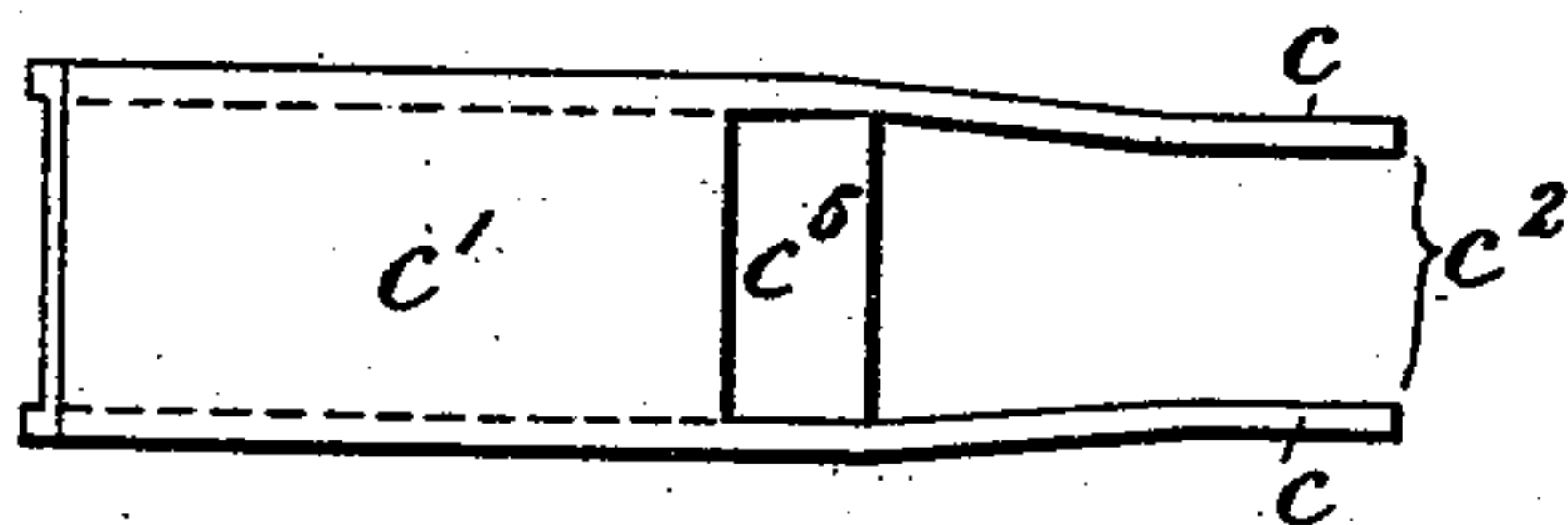


Fig. 6^a

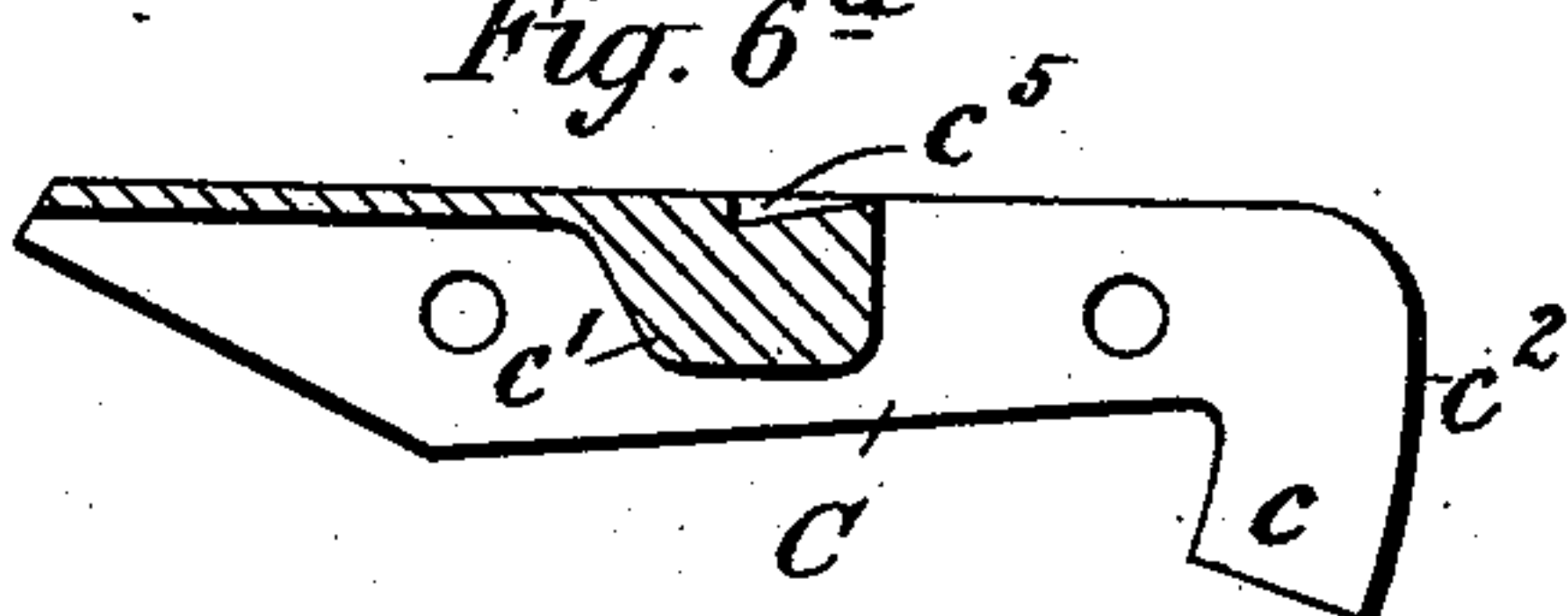


Fig. 7.

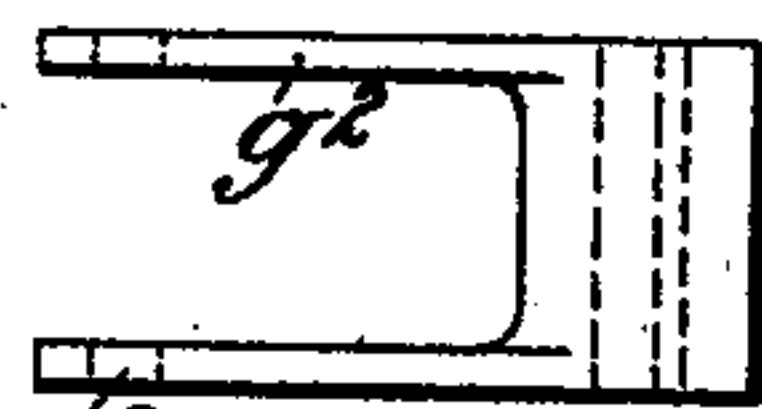
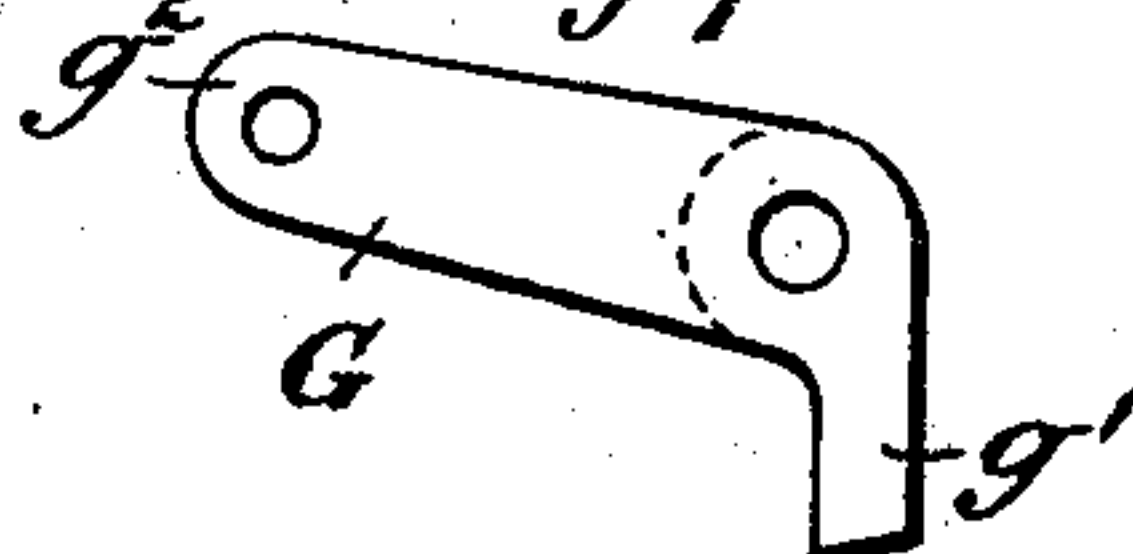


Fig. 7^a



Witnesses.
James B. Lorrain.
Ernest J. Elington.

Inventors
William H. Dingle
John M. Urquhart

UNITED STATES PATENT OFFICE.

WILLIAM H. DINGLE AND JOHN M. URQUHART, OF LONDON, ENGLAND.

ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 501,707, dated July 18, 1893.

Application filed April 23, 1892. Serial No. 430,330. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM HENRY DINGLE and JOHN MACKENZIE URQUHART, subjects of the Queen of Great Britain, residing at London, in the county of Middlesex, England, have invented certain new and useful Improvements in Electric Switches; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

In carrying our invention into effect we employ two contact pieces (frequently duplicated) as is usual in electric switches one of which, namely the one which is fixed as a rule to the base of the switch, we shall hereinafter refer to as the "base piece" and the other namely that which is moved to make and break contact with the base piece we shall hereinafter term the "rocking lever" for the reason that it is in our invention made in the form of a rocking lever or lever of the first order. One end of the said rocking lever is caused to come into contact with the base piece for the purpose of making or closing the electric circuit; and this end we shall hereinafter call the "active end" while we shall term the other end the "free end."

To the active end of the rocking lever (or to a part of the rocking lever between its fulcrum and the active end) we attach a push piece or plunger (hereinafter termed the "making" plunger) which when depressed depresses the active end of the rocking lever into contact with the base piece so as to make or close the electric circuit while at the same time the free end of the rocking lever is raised. Over this free end (or between it and the fulcrum) is placed a spring which, as the said free end is raised, is deflected or put under tension so that it will tend to depress the said free end, and so raise the active end out of contact so as to break the circuit. This however it is prevented from doing by a detent lever which engages a notch or projection or the like on or connected to the rocking lever. The said detent lever is maintained in engagement with the said notch or projection by a spring. To differentiate these two springs we shall term that just mentioned the detent spring and that previously mentioned we shall

term the rocking lever spring. A second push or plunger, which for distinction we shall term the "breaking" plunger, acts upon this detent lever so as when depressed to release it from the notch or projection on the rocking lever, and at the same time to deflect or otherwise put tension upon the detent spring. The said detent spring is now maintained in its deflected state, that is to say in a state of tension, by the rocking lever spring acting say through the rocking lever and detent lever.

We have hereinbefore spoken of two springs, the rocking lever spring and the detent spring. In practice we generally find it convenient to substitute a single double acting spring for these two separate springs. A convenient form of double acting spring for our purpose is one of V shape. It will be seen that if such a spring be fixed at its angle or part where the two limbs meet, the said two limbs will act in opposite directions so that the one limb may serve as the rocking lever spring and the other limb as the detent spring.

Having now described our invention in general terms so as to define its scope we shall proceed in order to show clearly how it is to be or may be carried into effect to describe in detail and by way of a type or example a switch in which the various features of our invention are embodied. In order that this example may be more fully and readily understood we append hereto two sheets of drawings illustrating the said switch which is in fact that form of our invention which we have hitherto found to give the best results in practice.

In the drawings Figure 1 is a side elevation showing the parts in the positions which they occupy when the circuit is open or broken; and Fig. 2 is a longitudinal section showing the parts in the position which they occupy when the circuit is made or closed. Fig. 3 is an end elevation and Fig. 4 a plan. Fig. 5 is designed to show how a lever handle may be adapted to actuate the switch as hereinafter to be mentioned. In all these figures the switch is shown with the cover removed. Figs. 6, 6^a, 7, 7^a and 8 are details.

A is the base of the switch formed of slate, wood or other suitable material upon which is mounted the base piece B, in this case con-

sisting of two separate pieces of sheet brass $b\ b$ bent at right angles as shown. These two pieces are fixed to the base by the screws b' which may also serve for the attachment of the wires in the usual way.

C is the rocking lever (shown separately in plan in Fig. 6 and in section in Fig. 6^a) in this case consisting of two stampings $c\ c$ of sheet brass soldered to and united by the piece of metal c' . This construction of rocking lever provides the necessary elasticity at the active end c^2 to insure good contact with the base piece.

c^3 is a pin constituting the fulcrum on which C rocks.

D is the making plunger articulated to C by the pin d .

c^4 is the free end of C.

E is a double acting V shaped spring attached at its angle to the pin g by being taken two or three turns around the same. The limb e of the said spring serves as the rocking lever spring and the limb e' as the detent spring. In the case illustrated instead of having such a double acting V spring on each side of the switch we use a single piece of spring wire as shown in the figures where it will be noticed that this arrangement is equivalent to two separate V shaped springs joined at the part e^2 .

G is the detent lever turning on the pin g hereinbefore mentioned. G is shown separately in plan in Fig. 7 and in elevation in Fig. 7^a.

g' is the part which engages in the notch c^5 of C and g^2 is the arm on which the detent spring (in this case limb e') acts by pressing on the pin g^3 . This pin g^3 also serves to articulate the breaking plunger H to the said arm g^2 of the detent lever.

The action is as follows: Let us assume that the circuit is normally open and that we wish to make or close it. We do so by the following method, the parts being in the position shown in Fig. 1. We press down the making plunger D until the active end c^2 of the rocking lever C is in contact with the base piece B, that is to say until the active ends of the pieces $c\ c$ are between the pieces $b\ b$. The circuit is now completed between the screws $b'\ b'$ and the current can pass. At the same time this movement has raised the free end c^4 of the rocking lever C, deflected or put tension on the rocking lever spring e , removed the notch c^5 from the part g' of the detent lever G and so allowed the detent spring e' to cause the part g' of the detent lever G to engage notch c^5 in its new position and at the same time raise the breaking plunger. The parts are now locked in the position shown in Fig. 2. Let us now assume that we wish to break or open the circuit. We do this by the following method: We press down the breaking plunger H. This movement will deflect or put tension on the detent spring e' , disengage part g' of the detent lever G from the notch c^5 and so release the rocking lever spring e so

that the latter will force down the free end c^4 of the rocking lever C and thus suddenly force the active end c^2 of C away from the base piece B, thus quickly breaking or opening the circuit and at the same time causing the notch c^5 of C to engage the part g' of G and lock the parts in the position shown in Fig. 1 again. It will be seen that at any time only that plunger which is the one which requires to be actuated is elevated or in a position to be actuated. This fact and the quick action of the springs prevent any mistake in handling. It will also be noticed that just as the detent lever retains the rocking lever in position against the action of the rocking lever spring when the parts are in one position, so the rocking lever serves to retain the detent lever in position against the action of the detent lever spring when the parts are in the other position.

Instead of actuating the two plungers by hand we sometimes find it convenient, especially in the case of switches for large currents, to attach a lever handle to our apparatus which according as it is moved in one direction or the other will depress one or other of the plungers. A switch so provided with a handle is shown in Fig. 5. In this switch X is the handle pivoted on the bracket or fork Y which is screwed to the top plate j of the frame J. As the end of this handle is raised or lowered it will be seen that one or other of the two plungers is actuated so as to make or break the circuit. When Y is unscrewed from the top plate the handle is removed and we have an ordinary switch as shown in Figs. 1 to 4. Instead of employing a replaceable handle of this kind we generally use for large currents a switch with a handle permanently attached: and in that case we prefer a handle in the form of an inverted T as shown in Fig. 8. In this figure it will be seen that the links D' and H' correspond with the plungers D and H in Figs. 1 to 5 and that circuit is made or broken, according as the handle is moved to one side or the other. It will be seen that the action of the rocking lever spring is such as to insure a quick break, as it is called, so that sparking at the contact surfaces is reduced to a minimum.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an electric switch, the combination of a rocking-contact lever, a circuit-making plunger acting upon said contact lever, a detent-lever interlocking with said contact lever, and a circuit-breaking plunger acting upon said detent-lever.

2. In an electric switch, the combination of a rocking contact-lever and a detent-lever interlocking therewith, a circuit-making plunger acting upon said contact-lever, a circuit-breaking plunger engaging said detent-lever and a spring arranged between said circuit-breaking plunger and said contact-lever.

3. In an electric switch, the combination of

a spring-actuated rocking-lever for making and breaking the circuit, a circuit-making plunger acting upon one end of said lever, and a circuit-breaking plunger acting upon the other end of said lever, a spring-actuated detent lever pivoted to a fixed point and having one end thereof connected with one of said plungers and its free end adapted to engage the said rocking-lever and lock it in position when the circuit is open and also when the circuit is closed.

4. In an electric switch, the combination of a spring-actuated rocking-lever, a circuit-making plunger acting upon one end of said lever and a circuit-breaking plunger acting upon the other end of said lever, a detent lever engaging said rocking-lever and locking it in position when the circuit is open and also when the circuit is closed, said detent lever being released from engagement with the rocking-lever by the action of the two said plungers.

5. In an electric switch, the combination of the spring-actuated lever C and the fixed-piece B, a circuit-making plunger D acting upon one end of said rocking-lever and a circuit-breaking plunger H acting upon the other end of said lever, a spring-actuated detent G for engaging and locking the said rocking-lever in both open and closed positions, respectively, and having its movements controlled by the movement of said plungers.

6. In an electric switch, the combination of a spring-actuated rocking-lever C for making and breaking the circuit and provided with a shoulder or cross-piece *c'*, a spring-actuated detent lever G pivoted to a fixed-point at *g*

and adapted to engage with the shoulder or cross-piece *c'* of the rocking-lever and to lock said lever in both open and closed positions respectively, a hand-operated device for rocking said lever and said detent lever connected with and operated by said device, substantially as and for the purpose set forth.

7. In an electric switch, the combination of a spring-actuated rocking-lever C for making and breaking the circuit and provided with a shoulder or cross-piece *c'*, a spring-actuated detent lever G pivoted to a fixed-point at *g* and adapted to engage with the shoulder or cross-piece *c'* of the rocking-lever and to lock said lever in both open and closed positions, respectively, a circuit-making plunger D connected with and acting upon one end of said rocking-lever, a circuit-breaking plunger H acting upon the other end of said rocking-lever and the said detent lever pivoted thereto, substantially as and for the purpose set forth.

8. In an electric switch, the combination of a rocking-lever for making and breaking the circuit, a detent lever G for engaging and locking said rocking-lever in both open and closed positions, respectively, a double V-shaped spring E suitably secured to a fixed-point and having one free part engaging one end of said rocking-lever and the other free part engaging said detent lever, substantially as and for the purpose set forth.

WILLIAM H. DINGLE.
JOHN M. URQUHART.

Witnesses:

JAMES G. LORRAIN,
ERNEST J. ELKINGTON.