

(No Model.)

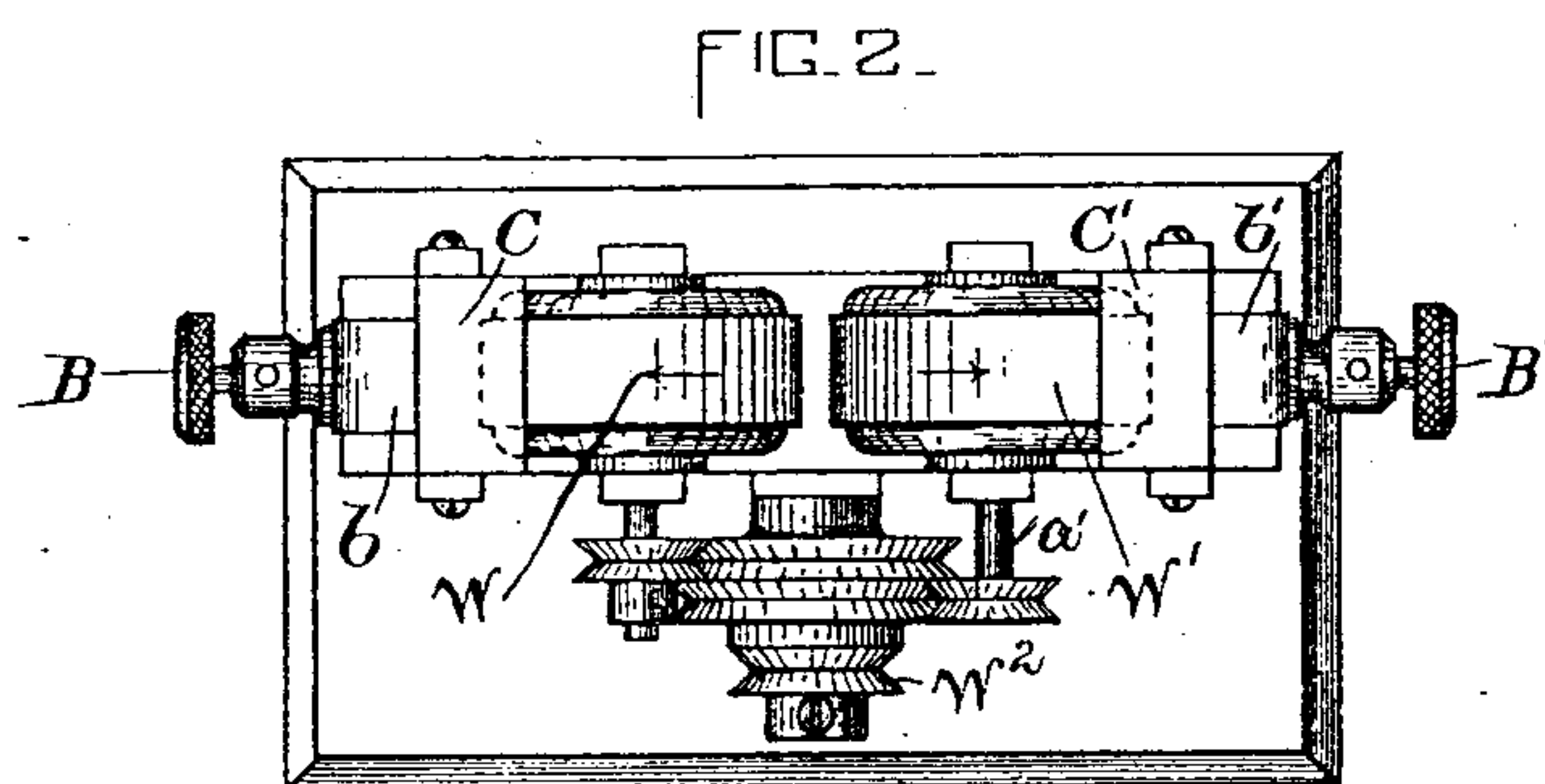
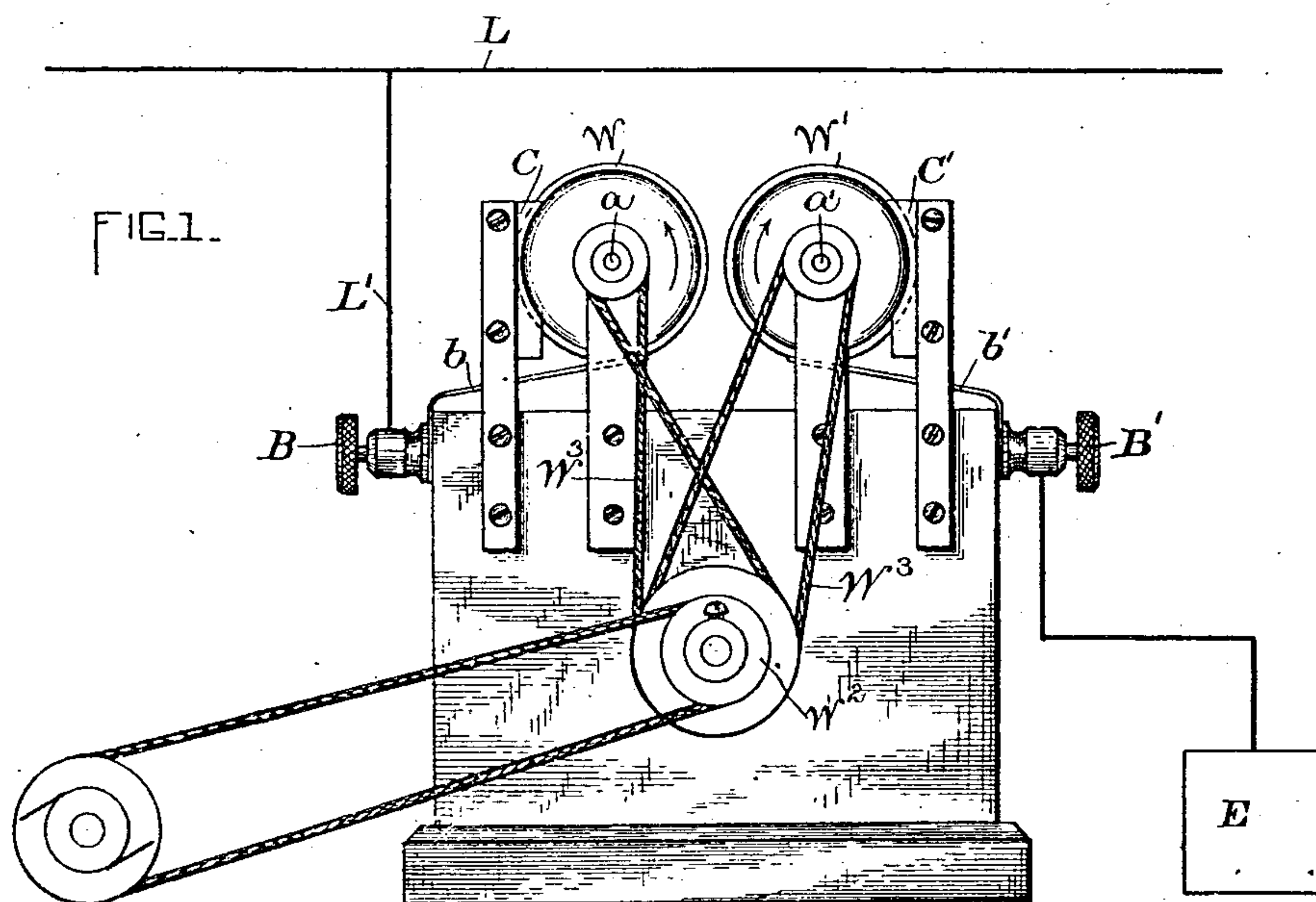
2 Sheets—Sheet 1.

E. THOMSON.

METHOD OF AND MEANS FOR INTERRUPTING ELECTRIC CURRENTS.

No. 468,120.

Patented Feb. 2, 1892.



WITNESSES.

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(No Model.)

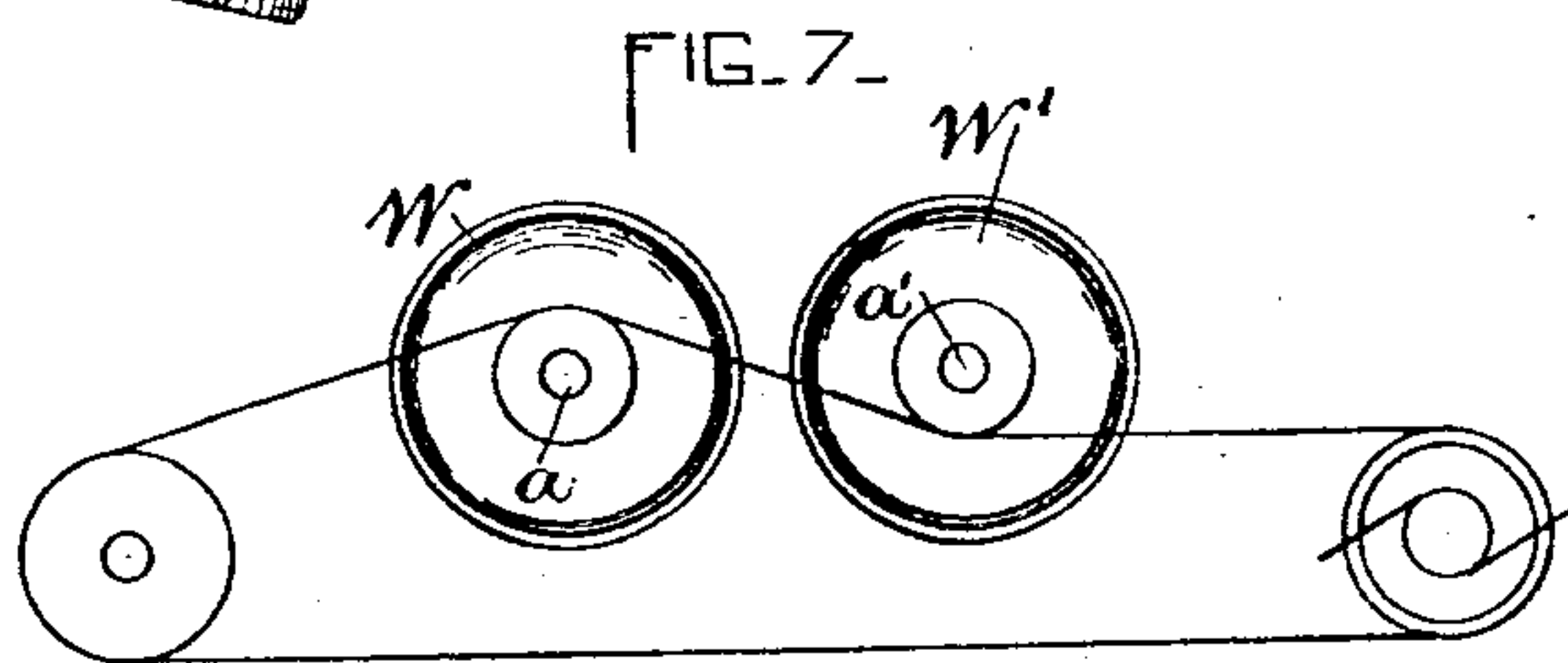
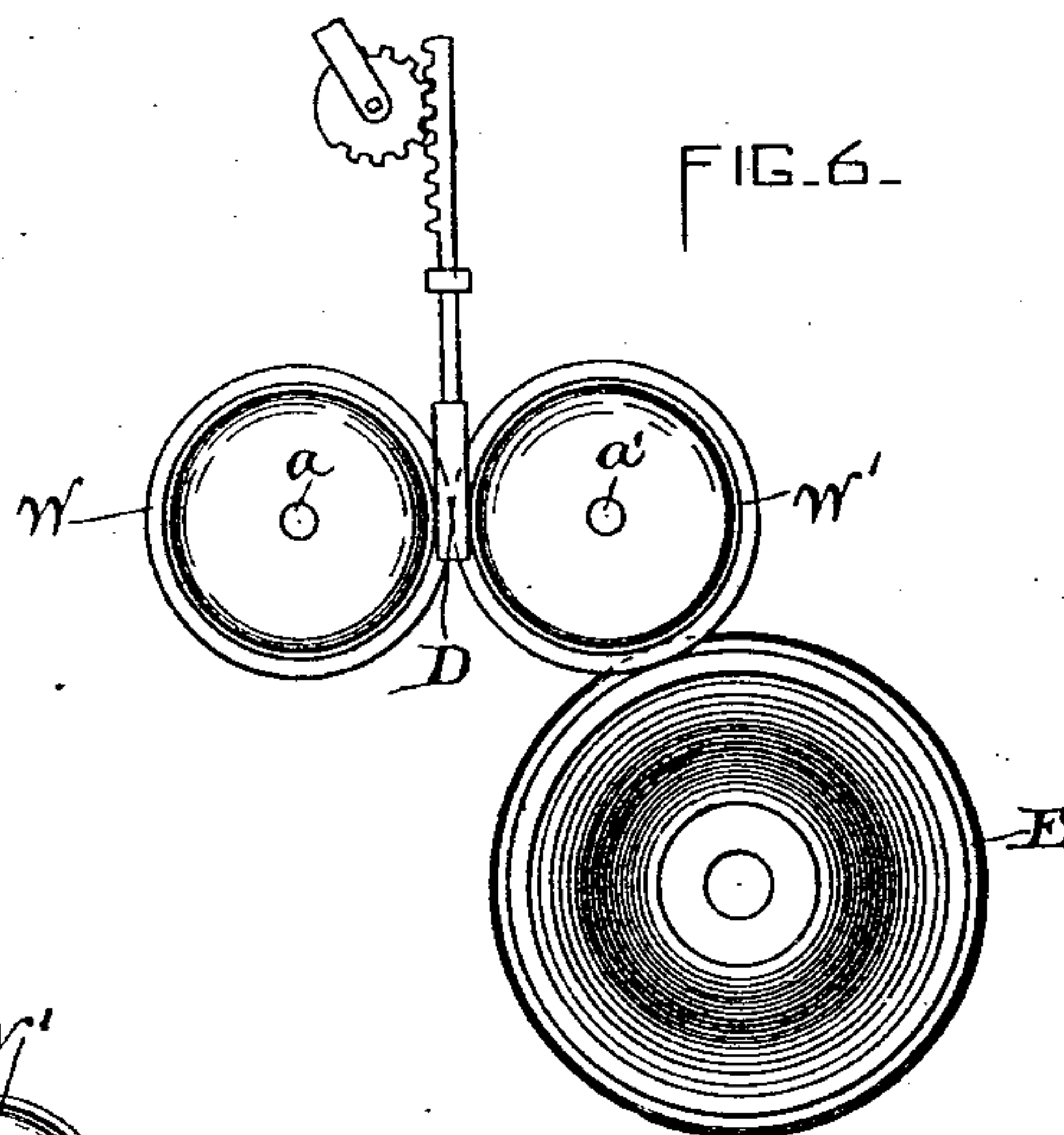
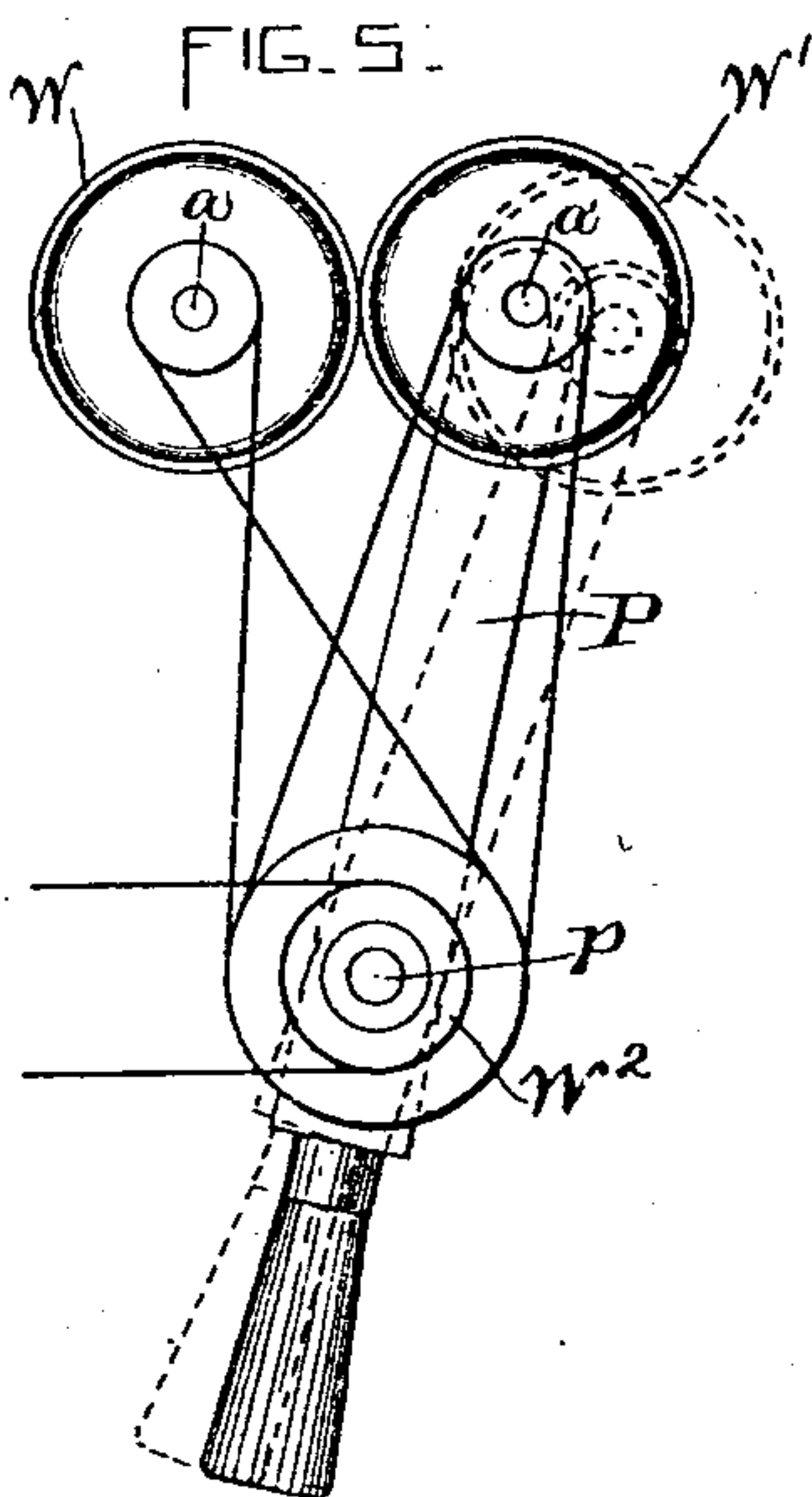
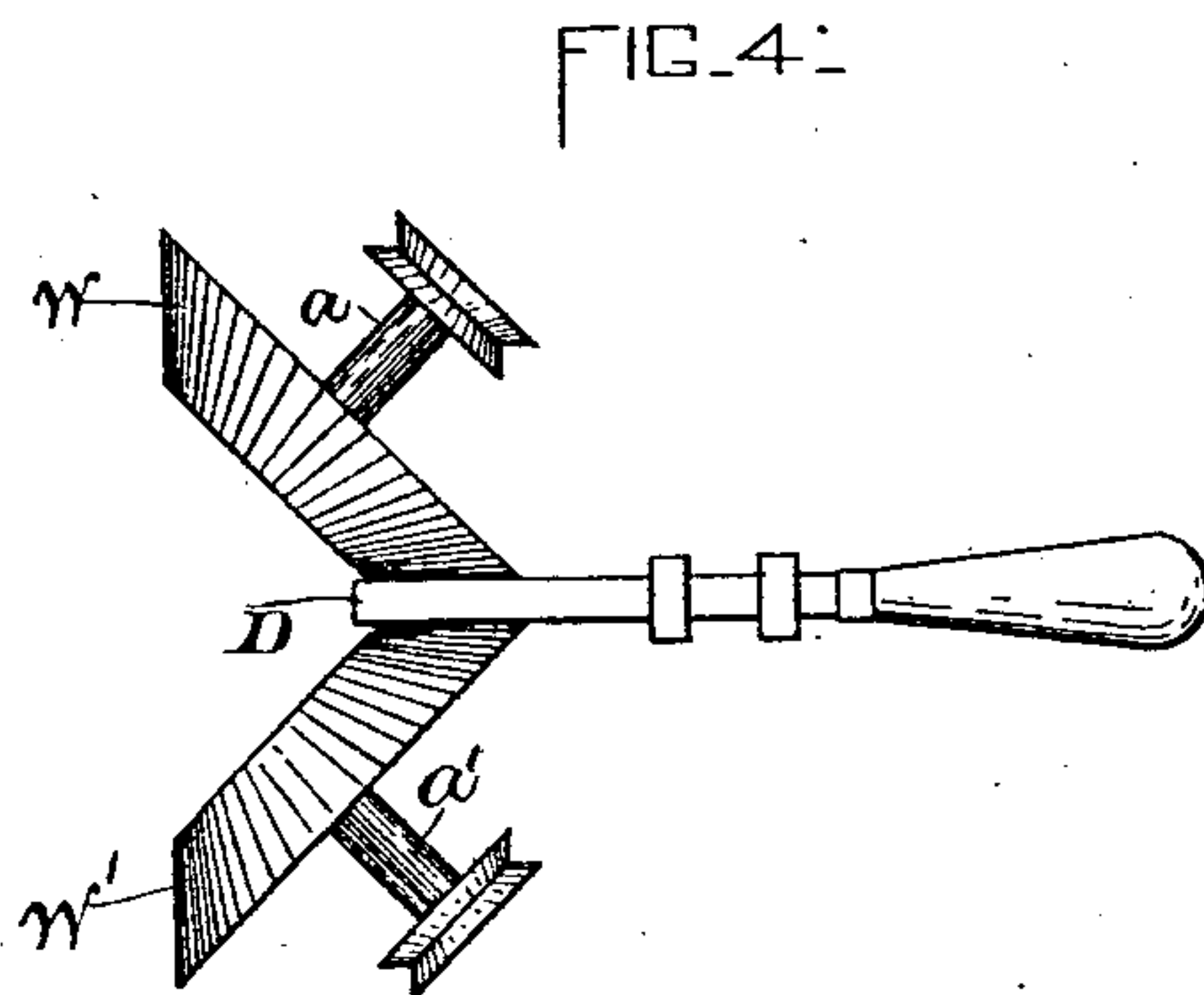
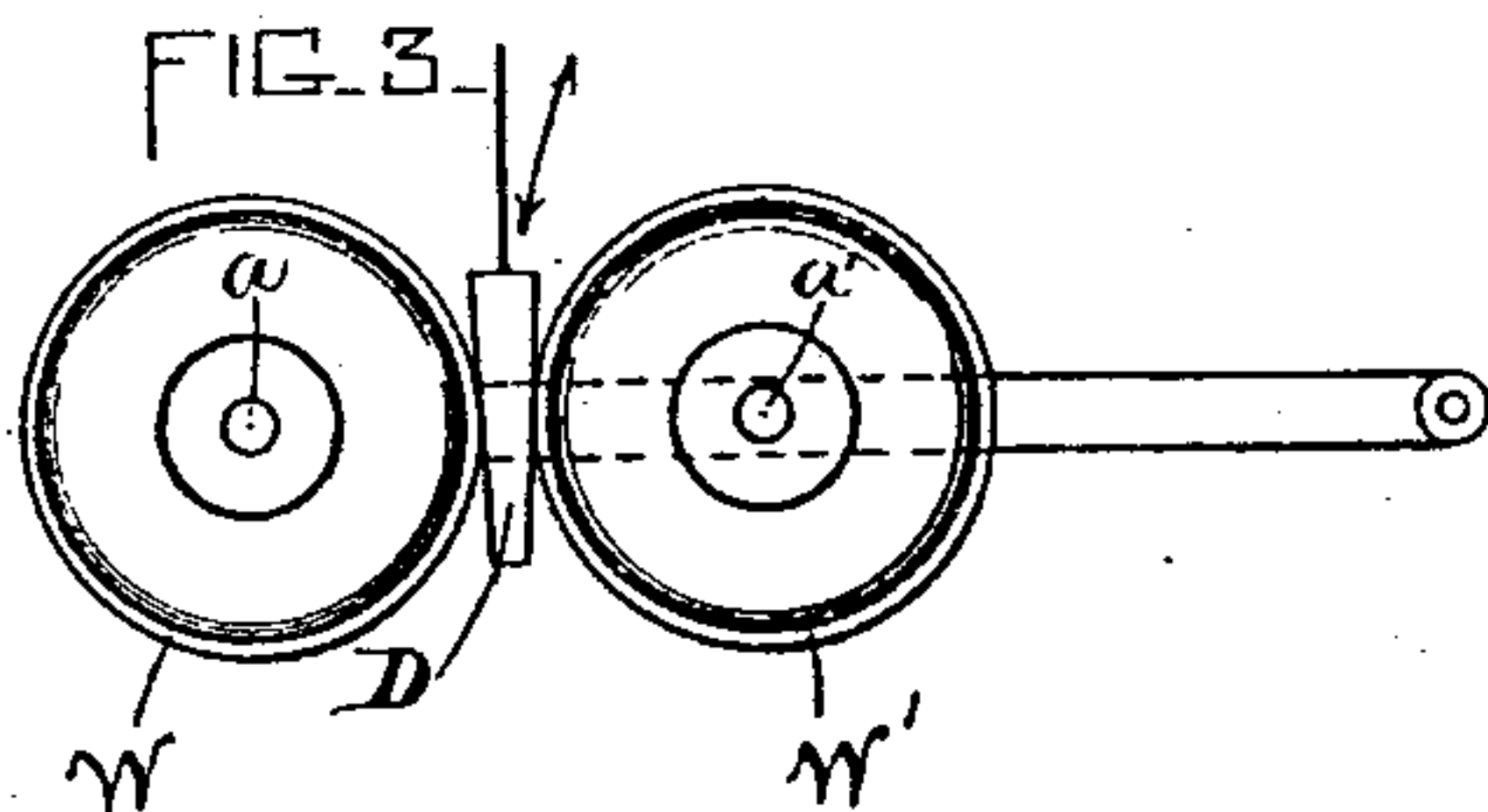
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METHOD OF AND MEANS FOR INTERRUPTING ELECTRIC CURRENTS.

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UNITED STATES PATENT OFFICE.

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METHOD OF AND MEANS FOR INTERRUPTING ELECTRIC CURRENTS.

SPECIFICATION forming part of Letters Patent No. 468,120, dated February 2, 1892.

Application filed September 1, 1890. Serial No. 363,681. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing at Swampscott, county of Essex, and State of Massachusetts, have invented a certain new and useful Improvement in Methods of and Means for Interrupting Electric Currents, of which the following is a specification.

My present invention relates to a new method of and means for avoiding arcing on the interruption of electric currents of considerable potential and is adapted for use at the jumping-spaces of lightning-arresters in connection with circuit-breaking switches, &c. It is based upon the fact that rapidly-moving conducting-surfaces conveying current are not liable to arcs, and that arcs upon these rapidly-moving surfaces may be extended or lengthened out without really moving the conducting-surfaces from one another, so as to alter the actual discharge distance between them.

My method therefore consists in causing a rapid movement of the discharge-terminals, one or both, at the point or points of interruption in the circuit where arcs are liable to occur, in order to present a continual supply of new metal to the discharge at such a rapid rate that the arc cannot take up the new discharge points or surfaces and is extended by reason of its tendency to hang to the old ones. This movement ordinarily will be one of rotation, and therefore is independent of and does not affect the actual discharge distance between the terminals.

In carrying out the above method two discharge-terminals are provided adjacent to one another, one or preferably both of which are rotated by suitable means, and when the invention is applied specifically to a switch additional means are provided for electrically connecting and disconnecting the terminals to open or close the circuit, as desired.

The invention worked out in a number of forms is illustrated in the accompanying drawings, wherein—

Figure 1 shows my improvement applied to a disruptive device, such as a lightning-arrester, for interrupting the discharge in case there is arcing to earth. Fig. 2 is a plan view of the same. Fig. 3 shows one form of switch embodying the invention, and Figs. 4, 5, 6, and

7 illustrate modifications comprising different forms of switches and various means for rotating the discharge-terminals.

In Fig. 1 a line-circuit is shown at L—as, for instance, a railway or power-distribution line—adapted for electric currents of considerable potential and volume, and in a branch L' taken therefrom is included a lightning-arrester in which my invention is made use of to prevent arcing to ground. Two wheels W W', of conducting material, serving as discharge-terminals and separated by a jumping insulation-space, are journaled on studs *a a'*, the former being in circuit with the line L through binding-post B and brush *b*, while the latter is similarly connected by *b' B'* to the earth-plate E. These wheels are caused to rotate in opposite directions, as indicated by the arrows, by any suitable means, that shown consisting of an electric motor M, belted to a driving-wheel W², which is connected by suitable pulleys and belts W³ with the rotating terminal wheels. The style of motor is, however, immaterial, and I use the word in a generic sense. In the rear of the wheels and close to, though not touching, their peripheries are placed arc-interrupting blocks C C', of insulating material, such as hard porcelain or slate, which are shaped to correspond with the wheels. The arc will tend to form at the point where the distance between the wheels is shortest; but owing to their rotation it will be carried upward and outward until finally it is disrupted upon reaching the insulating-blocks, or, as more often occurs, before reaching the blocks, because the mere lengthening of the arc as it follows around the discharge-terminals is sufficient to extinguish it.

In Fig. 3 the wheels W W' are arranged as in Fig. 1 and will be connected with the two sides of the line-circuit; but herein the apparatus is converted into a switch by the use of a wedge-shaped block D, of copper or other conducting material, which is inserted between the wheels, as shown, or removed therefrom, according as it is the desire of the operator to open or close the circuit. In this device, as well as in that shown in Fig. 4, which differs only in having the discharge-wheels conical in shape, the rotation of the wheels may be caused by belts, as in Fig. 1, or other means.

In Fig. 5 the circuit is closed by bringing the two discharge-wheels directly into contact with one another, and this is accomplished conveniently by journaling one of the wheels
 5 W' upon a supporting-arm P, which is pivoted at p upon a stud likewise forming the bearing for a driving-pulley W², which is belted to the terminal wheels.

When it is desired to open the circuit, the
 10 arm is turned into the dotted-line position, and this may be done without interfering with the continuous rotation of the wheels, as will be evident.

In Fig. 6 an arrangement similar to Figs.
 15 3 and 4 is shown, a wheel and ratchet being connected with the metal bar D and the terminal wheels being driven by a friction-gear E.

Fig. 7 illustrates a different arrangement
 20 for driving the wheels by an electric motor and belts. In this case a single belt W is used, passing under pulley w' and over w, so that it drives the wheels with which these pulleys are connected in opposite directions.

25 It will be understood that the different specific structures herein described are simply illustrative of my broad invention, and that it may be availed of in many other forms of apparatus as well.

30 What I claim as new, and desire to secure by Letters Patent, is—

1. The method of avoiding arcs upon the interruption of electric currents of considerable potential, which consists in causing a
 35 rapid movement of the discharge-terminals relatively to one another at the interrupted point, such that the said movement does not alter the distance between the terminals, as described.

40 2. The method of avoiding arcs upon the interruption of electric currents of considerable potential, which consists in rotating the discharge-terminals on either side of the interrupted point in relatively opposite direc-
 45 tions and thereby extending the arc without altering the distance between the said terminals, as described.

3. The method of avoiding arcs between discharge-terminals separated by an insula-
 50 tion-space, which consists in rapidly moving apart the discharge-points between which the current passes at any given instant and simultaneously presenting fresh metal thereat for the discharge to take up as far as may be—
 55 as, for example, by the rotation of a wheel forming one of the terminals.

4. The combination, with the terminals of an electric-circuit breaker, of a motor normally imparting a rapid relative movement
 60 thereto independent of the current flow across the terminals for its continuance or cessation,

whereby an arc, if formed, is automatically ruptured, as set forth.

5. The combination, with a line-circuit, of the metallic terminals separated by an insu- 65
 lation-space and a motor normally imparting a rapid rotation to said terminals in opposite directions sufficient to cause an arc, if formed, to become distended and ruptured, as set forth.

6. The combination, with the terminals of 70
 an electric-circuit breaker normally separated only by an air-space, of a motor normally imparting a rapid relative movement thereto constantly presenting fresh metal at the discharge-points.

7. The combination, with a centrally-piv- 75
 oted wheel forming one of the terminals of an electric-circuit breaker and normally separated from the other terminal by an air insu-
 lation-space, of a motor normally imparting 80
 a rapid movement of rotation to the wheel sufficient to distend and rupture any arc thereat.

8. The combination, with the terminals of an electric-circuit breaker, one at least of 85
 which is rotatable on a central axis, of a motor independent of the current imparting a rapid relative movement to the terminals, which continues whether current is flowing or
 90 not, as set forth.

9. The combination of a line-circuit with the rotating discharge-terminals, as described, connected to the two sides of the circuit and an arc-interrupting block or blocks in proxim- 95
 ity to the terminals, for the purpose set forth.

10. The combination of a line-circuit and the terminal wheels connected to the two sides of the circuit with a motor rotating said wheels in opposite directions and the arc-in-
 100 terrupting blocks of insulating material, as described.

11. The combination, in a switch, of the rotating terminals connected, respectively, to the branches of an electric circuit, means for imparting a continuous movement of rotation 105
 to one at least of said terminals, and independent means for connecting and disconnecting at will said terminals electrically, whereby the circuit can be opened and closed without affecting or being affected by the ro- 110
 tation of the terminals.

12. The combination, in a switch, of the rotating terminals connected to the branches of an electric circuit, means for rotating the terminals, and means for moving one of said 115
 terminals, so as to bring it into and out of contact with the other, as described.

ELIHU THOMSON.

Witnesses:

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 ROBERT SHAND.