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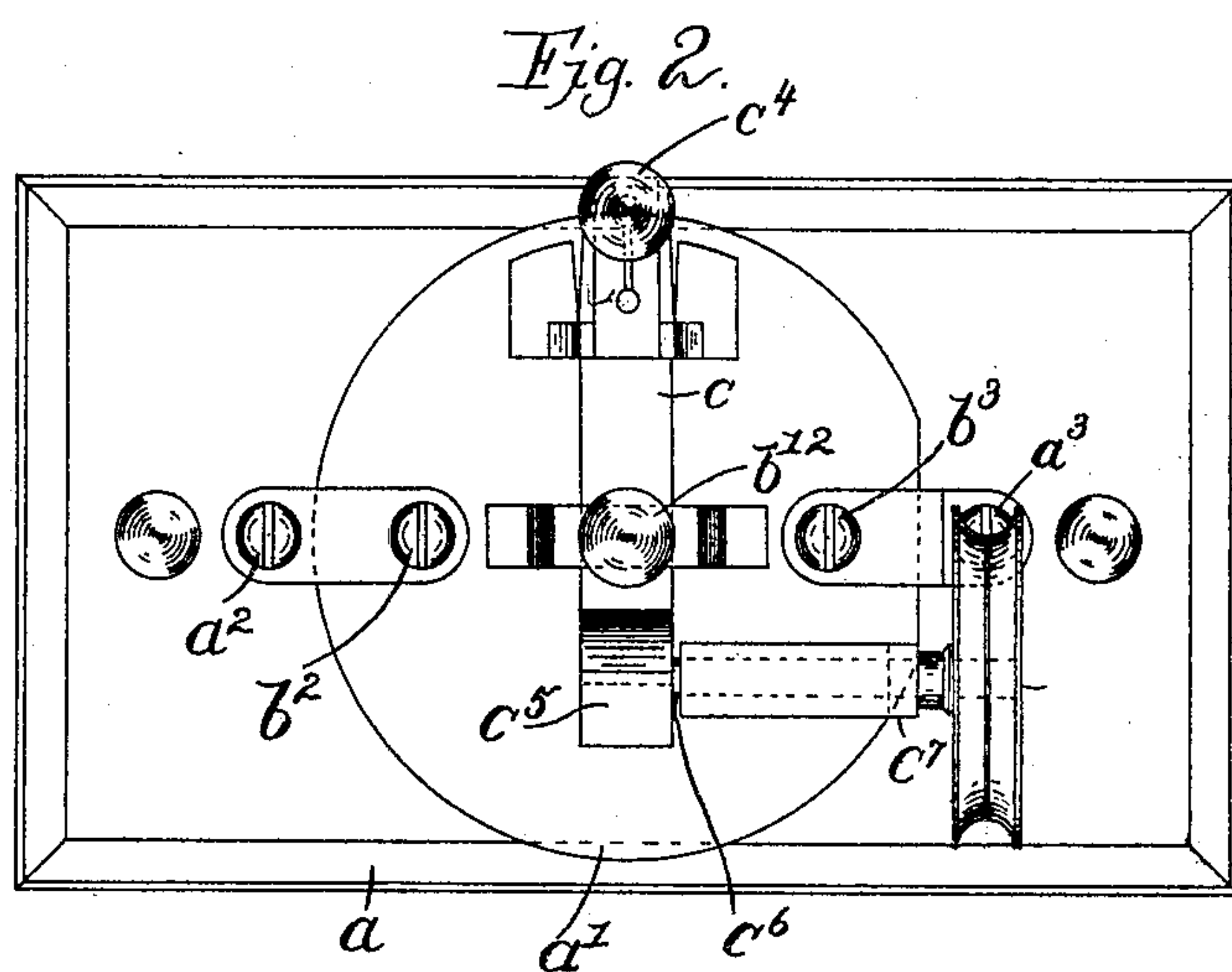
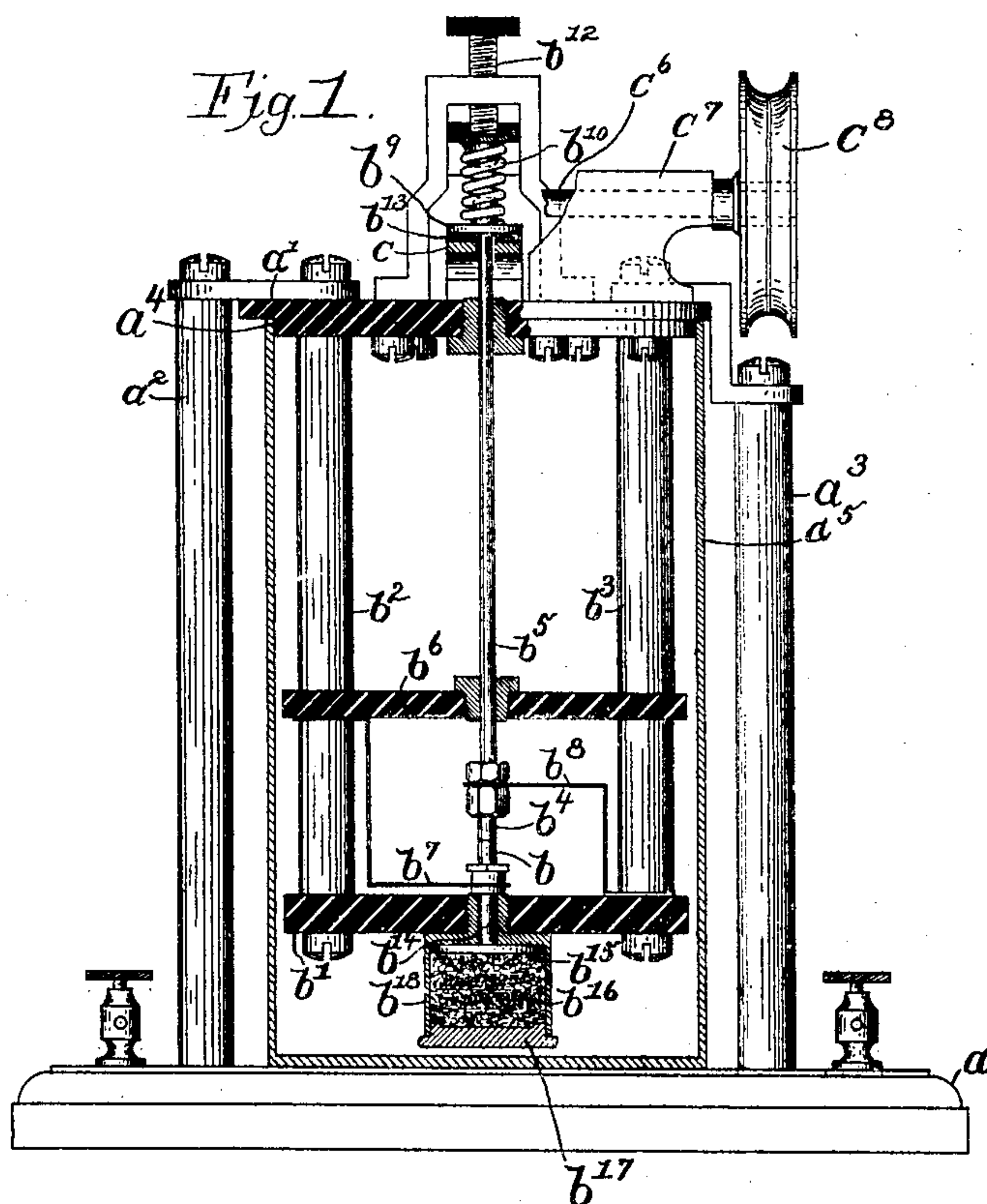
PATENTED SEPT. 20, 1904.

T. B. KINRAIDE.  
INTERRUPTER.

APPLICATION FILED APR. 6, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses.  
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Inventor.  
Thomas B. Kinraide,  
by Geo. H. Maxwell  
Att'y.

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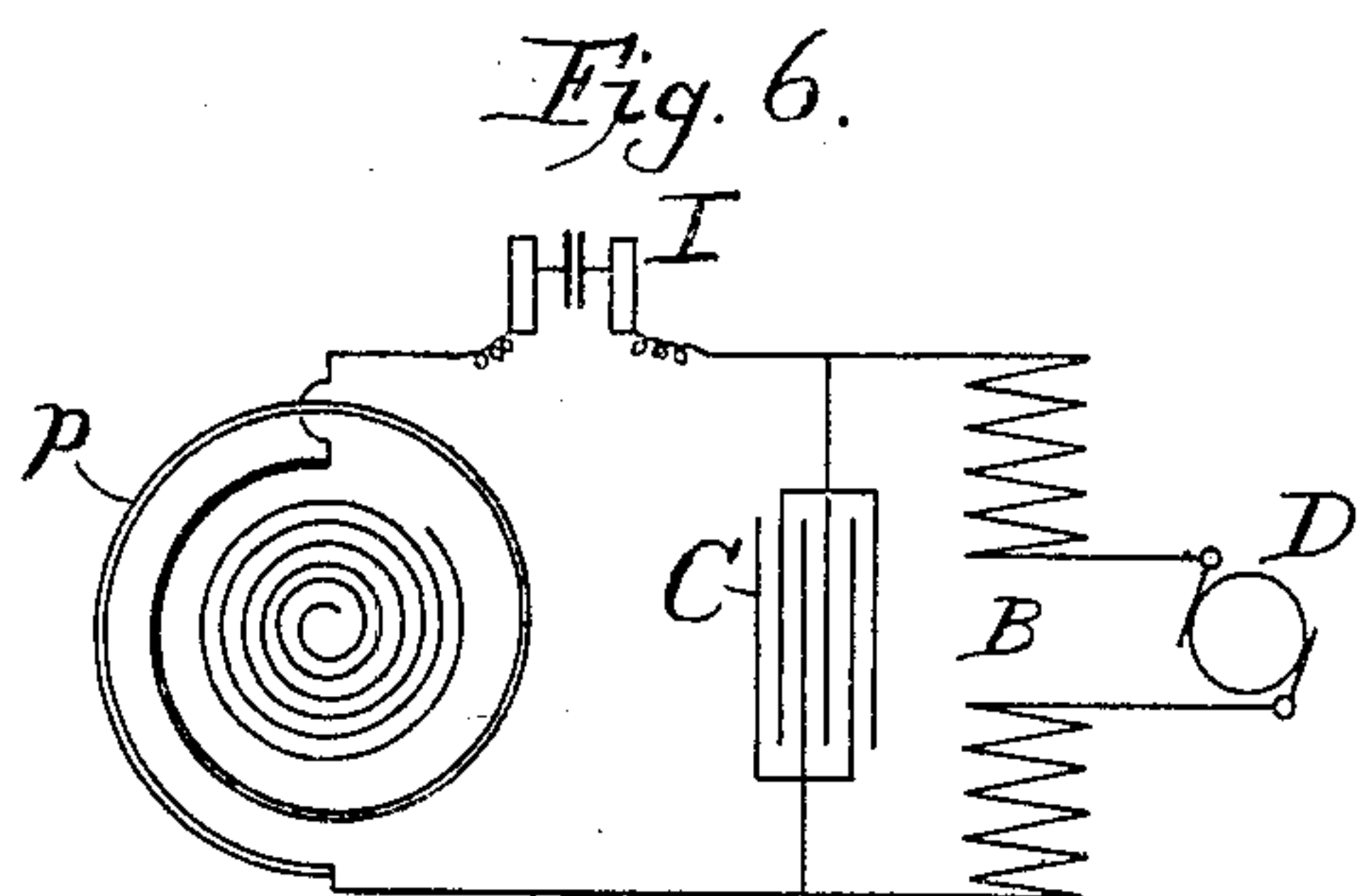
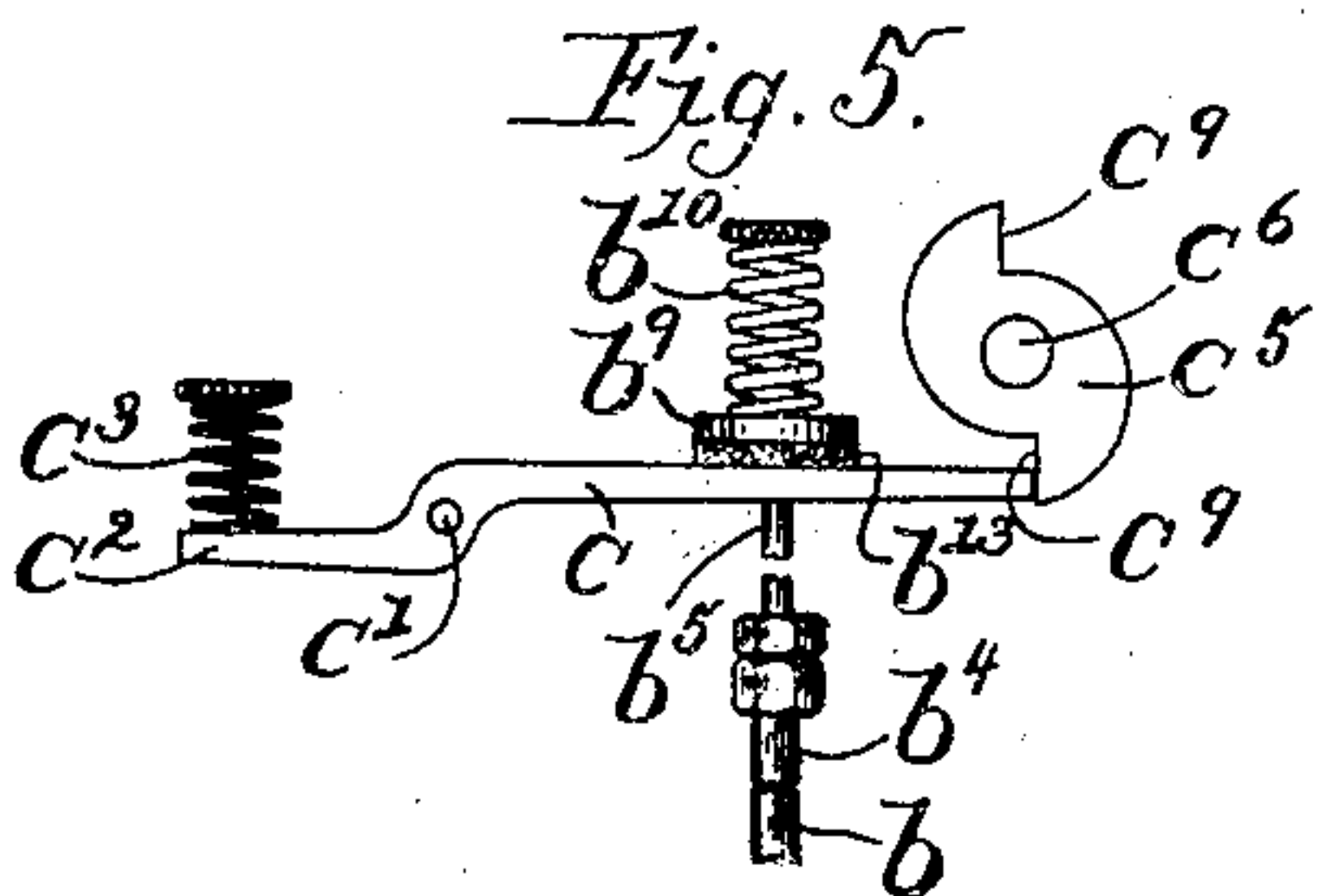
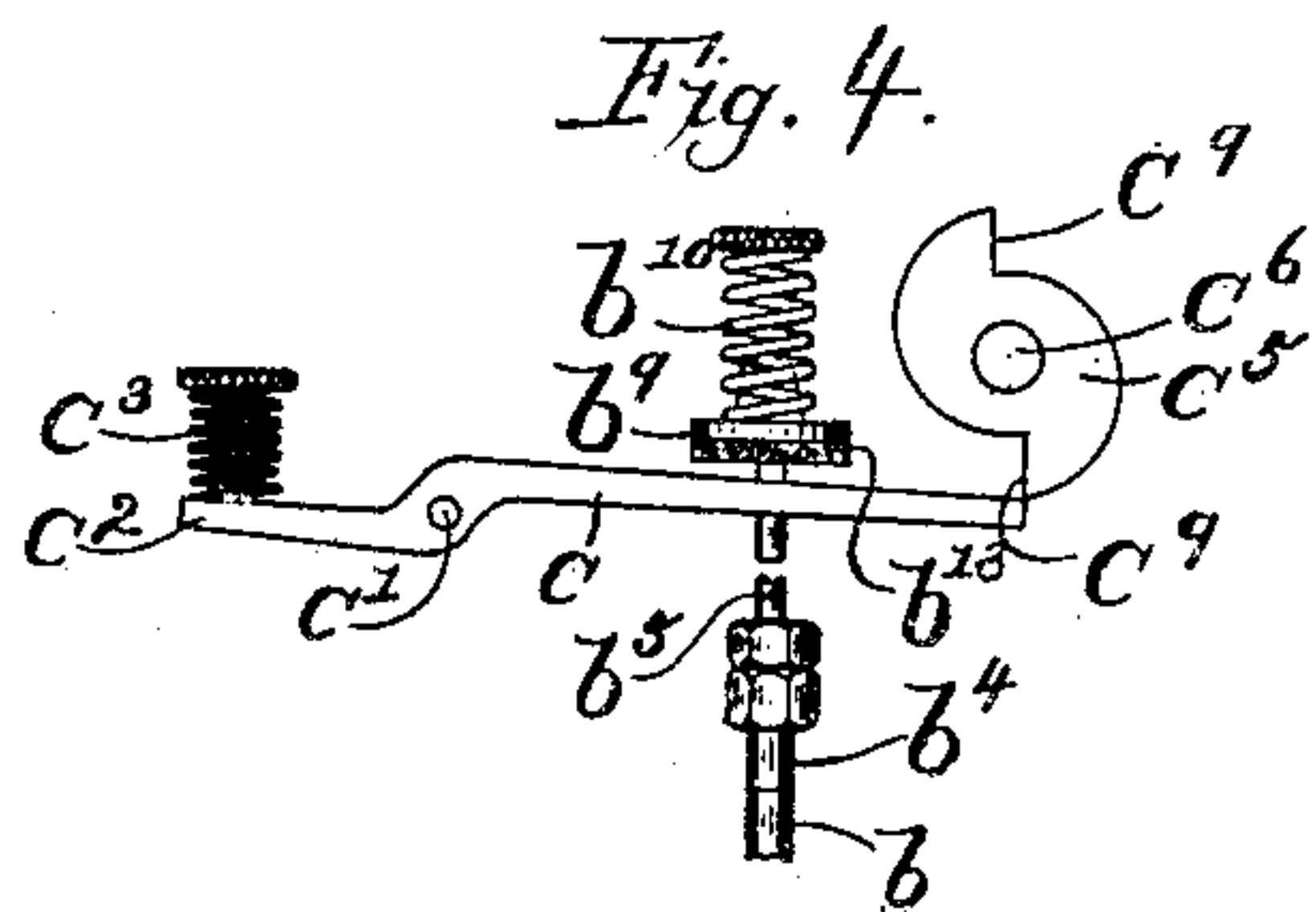
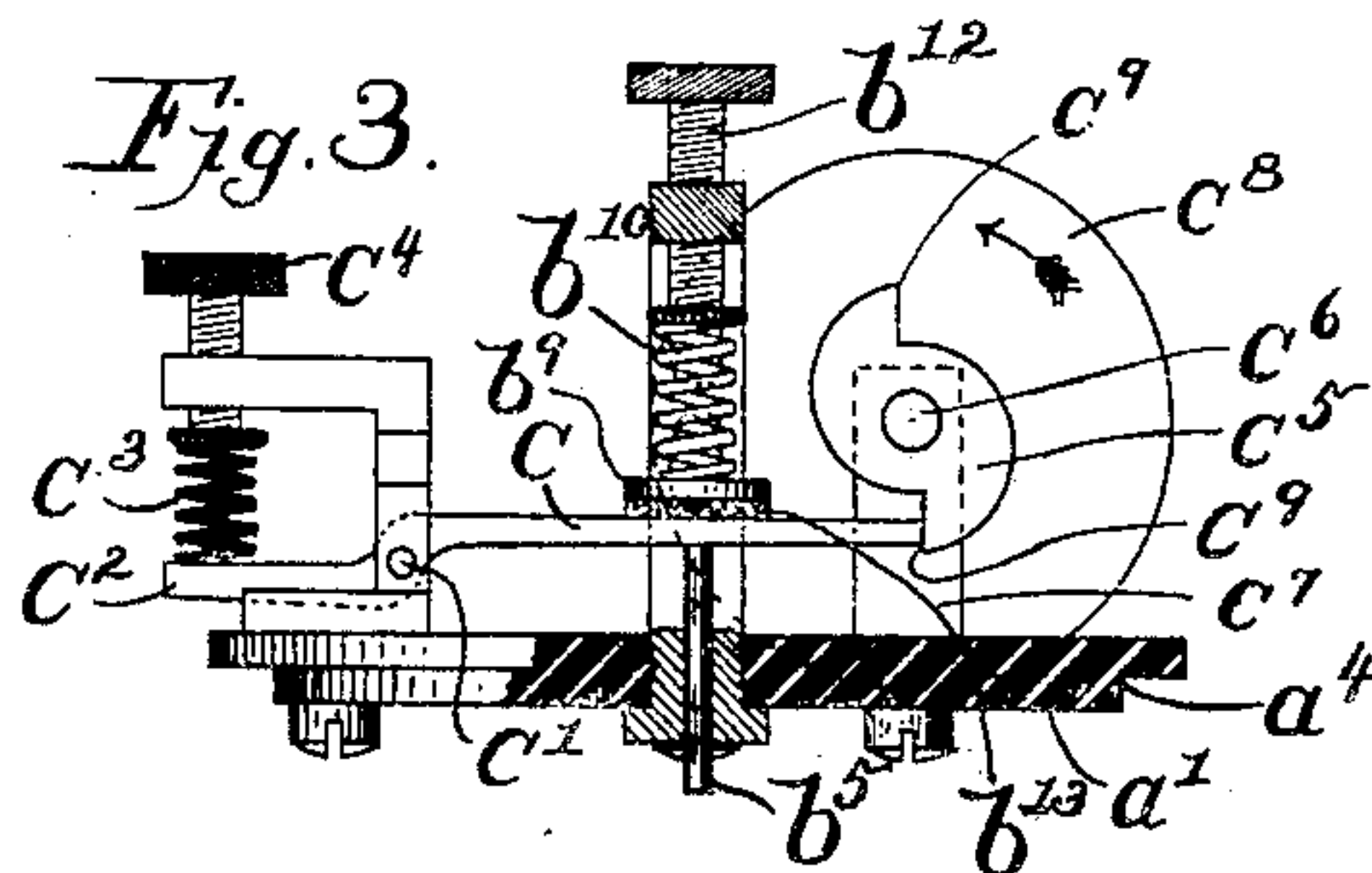
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2 SHEETS—SHEET 2.



Witnesses.

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## UNITED STATES PATENT OFFICE.

THOMAS B. KINRAIDE, OF JAMAICA PLAIN, MASSACHUSETTS.

## INTERRUPTER.

SPECIFICATION forming part of Letters Patent No. 770,431, dated September 20, 1904.

Application filed April 6, 1904. Serial No. 201,941. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS B. KINRAIDE, a citizen of the United States, and a resident of Jamaica Plain, in the Commonwealth of Massachusetts, have invented an Improvement in Interrupters, of which the following description, in connection with the accompanying drawings, is a specification.

My invention is an improvement in interrupters, and has for its object the provision of means for obtaining a quick short break, the means for obtaining the same, as herein shown, being mechanical. In other words, the object of my invention is to cause a break for the least possible time and to keep the circuit closed the longest possible time, and to accomplish this result it is necessary as far as possible to do away with momentum, having no hammer as such, but providing a striking device operating against the tension of a spring suddenly released.

In my Patent No. 623,318, dated April 18, 1899, I have shown and described a "spark-gap" composed of plates one of whose functions is to receive a condenser discharge when properly adjusted, and one of the objects of the present invention is to obtain certain of the advantages of the aforesaid construction by means of an interrupter, and I obtain the same by having the separation of the electrodes so brief and sudden that the movable electrode returns just in time to take the condenser discharge and prevent the surging back of the impulse or wave from the condenser which would otherwise take place through the inductance-coil, but which by having the break short and quick (and the parts free of momentum) permits the gap to close in time to direct the condenser discharge through the primary of the induction-coil, and the break or gap can be so adjusted as to consume or receive all the condenser discharge as fast as conveyed to it, thereby preventing all surging back, and hence securing the greatest efficiency at the primary.

Various other advantages and further constructional details of my invention will be pointed out and the operation thereof will be fully set forth in the course of the following description, reference being had to the accom-

panying drawings, in which I have illustrated a preferred embodiment of my invention.

In the drawings, Figure 1 is a central vertical section of one form of my interrupter. Fig. 2 is a top plan thereof. Fig. 3 is a fragmentary view in vertical cross-section, taken at right angles to Fig. 1. Figs. 4 and 5 are fragmentary details similar to Fig. 3, showing, respectively, the interrupter in position about to give a break and in position just causing a break. Fig. 6 is a diagrammatic view showing the circuit connections for which my interrupter is particularly adapted.

The main principle of my interrupter is that the break is caused by a striker propelled by a suddenly-released spring or by equivalent means, which causes the same to give a hammer-like blow, without, however, employing a hammer. The old interrupter employs a swinging hammer or momentum device and is practically limited in its operation to the momentum due to its weight, and this very weight also renders its action necessarily sluggish, which is further increased by the action of the electromagnet, which tends to hold the hammer until deenergized. Having premised this much, my invention will be readily understood from the following brief description.

Mounted on a suitable base *a* is a top plate or support, herein shown as a cap *a'*, retained by posts *a<sup>2</sup>* *a<sup>3</sup>* and shouldered at *a<sup>4</sup>* to engage the upper end of an oil well or cup *a<sup>5</sup>*, in which the separating contacts or electrodes are mounted.

As herein shown, the fixed electrode *b* is mounted in a cross-bar *b'*, carried by two opposite rods or conductors *b<sup>2</sup>* *b<sup>3</sup>*, and the movable electrode *b<sup>4</sup>* is carried by a rod *b<sup>5</sup>*, slidably mounted in a cross-bar *b<sup>6</sup>* and in the top plate *a'*, conductor-wires or copper ribbons *b<sup>7</sup>* *b<sup>8</sup>* being connected, respectively, with the electrodes *b* *b<sup>4</sup>* and to the rods *b<sup>2</sup>* *b<sup>3</sup>*. The rod *b<sup>5</sup>* has a shoulder or head *b<sup>9</sup>* at its upper end and is normally held in contact with electrode *b* by a spring *b<sup>10</sup>*, whose tension is regulated by a thumb-screw *b<sup>12</sup>*. Beneath the head *b<sup>9</sup>* is a striker *c*, shown as a light plate-metal arm pivoted, as at *c'*, and having its rear end *c<sup>2</sup>* engaged by a spring *c<sup>3</sup>*, whose tension is regulated by a thumb-screw *c<sup>4</sup>*. The striker *c* is



freely movable toward and from the head  $b^9$ , a piece of felt or other cushioning material  $b^{13}$  being interposed for lessening the noise, and the end of the said striker projects forward into the path of an actuator, herein shown as a shouldered cam  $c^5$ , mounted on the end of a shaft  $c^6$ , journaled in a block  $c^7$  and carrying at its opposite end a drive wheel or pulley  $c^8$ .

As the cam rotates in the direction of the arrow, Fig. 3, the parts first assume the position shown in Fig. 4, spring  $c^3$  being strongly compressed and striker  $c$  moved back away from the head  $b^9$  of the movable electrode or electrode-carrier, and thereupon further rotation of the cam permits the striker to escape from the shoulder  $c^9$  thereof, and instantly spring  $c^3$  causes said striker to deliver a sudden and severe blow against the head  $b^9$ , which instantly separates the electrodes; but as the force of the blow is spent the very moment it strikes the head  $b^9$ , there being no heavy swinging hammer or momentum device, the blow is given entirely by the suddenly-released spring, or, in other words, the mechanical actuator or cam that operates the striker does not deliver the blow, but the latter is brought about entirely separately from the cam by the suddenly-released spring. This will act to open a strongly spring closed pair of contacts, which could not be opened even by a heavy hammer, and yet it will do so with a quickness and to such a slight extent that the closing is almost instantaneous, and thereby accomplishes the short break and quick closing which is the principal object of the invention.

The chatter or noise of the contacts or electrodes  $b$   $b^4$  upon each other, due to the strong action of the spring  $b^{10}$ , is objectionable, and I have found that it can be almost entirely prevented by providing the supporting-rod  $b^{14}$  of the electrode  $b^7$  with a head  $b^{15}$ , resting against a cushion, shown as consisting of a series of felt disks  $b^{16}$ , retained by a removable cap  $b^{17}$  in a casing  $b^{18}$ , supported on the under side of the plate  $b'$ , so that as the blow of the movable electrode is delivered the noise is effectually prevented.

The operation of my invention will further be understood by reference to Fig. 6, where it will be seen that the interrupter I is contained in the circuit of a primary  $p$  of an induction-coil, the other end of the primary leading to an inductance-coil B and thence to a source of energy D, a condenser C being inserted across the circuit between the inductance-coils and the interrupter. With an old interrupter operating in the above system the action would necessarily be so sluggish as to obtain little efficiency, the discharge from the condenser surging back through the inductance-coils during the break or period of opening of the electrodes; but by reason of the extremely short and quick break made possible by my interrupter the discharge from

the condenser is received by the movable electrode just as it is moving back into closed position, and this operation is repeated, so as to consume all the condenser discharge as fast as it is delivered.

In the preferred form of my apparatus, which I have described above, the cam  $c^5$  releases the striker twice at each rotation, the force of the blow being determined by the adjustment of the striker-spring  $c^3$ , and the striker spends its force against the shoulder or head  $b^9$ , delivering the blow, however, against the felt buffer  $b^{13}$ , and instantly the spring  $b^{10}$  restores the contacts to closed position. In other words, the desired intense quickness of movement is due to the inertia of the contact and its spring and to the fact that when the thin lightstriker has delivered its quick-flying blow it instantly parts with its force, there being nothing to continue its impelling movement, as would be the case if it were weighted like a hammer, and therefore the result is that the instant the force of the striker is spent against the contact-head the high-tension spring of the latter closes the contacts again. The periodicity of movement thereof may be regulated by adjusting the tension of the spring so as to insure that the open interval corresponds to the time of the forward wave or impulse of the condenser.

As the electrode returns to closed position and strikes against the relatively fixed contact the noise is taken up or absorbed by the sound-deadening felt disks  $b^{16}$ , which are retained in the oil-tight casing  $b^{18}$ .

It will be understood that I have shown merely one of the many embodiments of which my invention is capable, the present embodiment being well adapted to continuous and hard usage; but I do not intend to limit myself to the constructional details herein set forth, excepting as otherwise required in the claims.

Having described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. An interrupter, comprising separable contacts, means tending to maintain them closed, a striker for momentarily separating them, impelling means for imparting the striking movement to said striker, and an independent actuator therefor.

2. An interrupter, comprising separable contacts, a striker for suddenly moving one of said contacts, and a mechanical actuator for operating said striker.

3. An interrupter, comprising separable contacts, yielding means for maintaining them closed, and spring-impelled means for momentarily separating said contacts.

4. An interrupter, comprising separable contacts, yielding means for maintaining them closed, a striker having its striking end thin and light for reducing momentum effects to a minimum, a spring adapted to be compressed



and released for causing said striker to separate said contacts by the force of its impact, and means for releasing said spring.

5 5. An interrupter, comprising separable contacts, a striker having a thin, light, striking end, means consisting of a released spring for imparting a sudden striking impulse to said striker for separating said contacts, and means for instantly counteracting the separating effect of said striker and closing the contacts.

10 6. An interrupter, comprising separable contacts, a striker, means consisting of a released spring for actuating said striker to separate said contacts, and an oppositely-acting spring for instantly closing the contacts thus separated.

20 7. An interrupter, comprising separable contacts, a striker for separating them, and a cam-actuator for operating said striker.

25 8. An interrupter, comprising separable contacts, carrying means for one of said contacts provided with a shoulder or head, a cushion on the inner side of said head and a spring-impelled striker for acting against said cushion to separate said contacts.

30 9. An interrupter, comprising separable contacts, carrying means for one of said contacts provided with a shoulder or head, a cushion on the inner side of said head and a spring-impelled striker for acting against said cushion to separate said contacts, and a cushion bearing against the outer end of the other of said contacts.

35 10. An interrupter, comprising separable contacts, a striker for moving one of them, a cushion-holder provided with sound-deadening yielding material, and means carried by

the other of said contacts for bearing against said materials and thereby deadening the sound of the closing of said contacts. 40

11. An interrupter, comprising separable contacts, quick separating means therefor, quick closing means, and sound-deadening means for receiving the closing impact of said contacts. 45

12. An interrupter, comprising separable contacts, quick separating means therefor, quick closing means, and sound-deadening means for receiving the closing impact of said contacts, consisting of a series of felt layers for receiving the closing impact of said contacts. 50

13. An interrupter, comprising separable contacts, quick separating means therefor, quick closing means, and sound-deadening means for receiving the closing impact of said contacts, an oil-well inclosing said contacts, and an oil-tight casing inclosing said sound-deadening means. 55 60

14. The combination with an induction-coil and condenser of an interrupter, comprising separable contacts, separating means and closing means therefor for giving a long closed period and an exceedingly short open period, and adjusting means cooperating therewith to give said contacts a periodicity of movement to receive and transmit the full condenser discharges. 65

In witness thereof I have signed my name to this specification in the presence of two subscribing witnesses. 70

THOMAS B. KINRAIDE.

Witnesses:

R. S. FORD,

JOHN E. PORTER.