

J. ERICKSON.

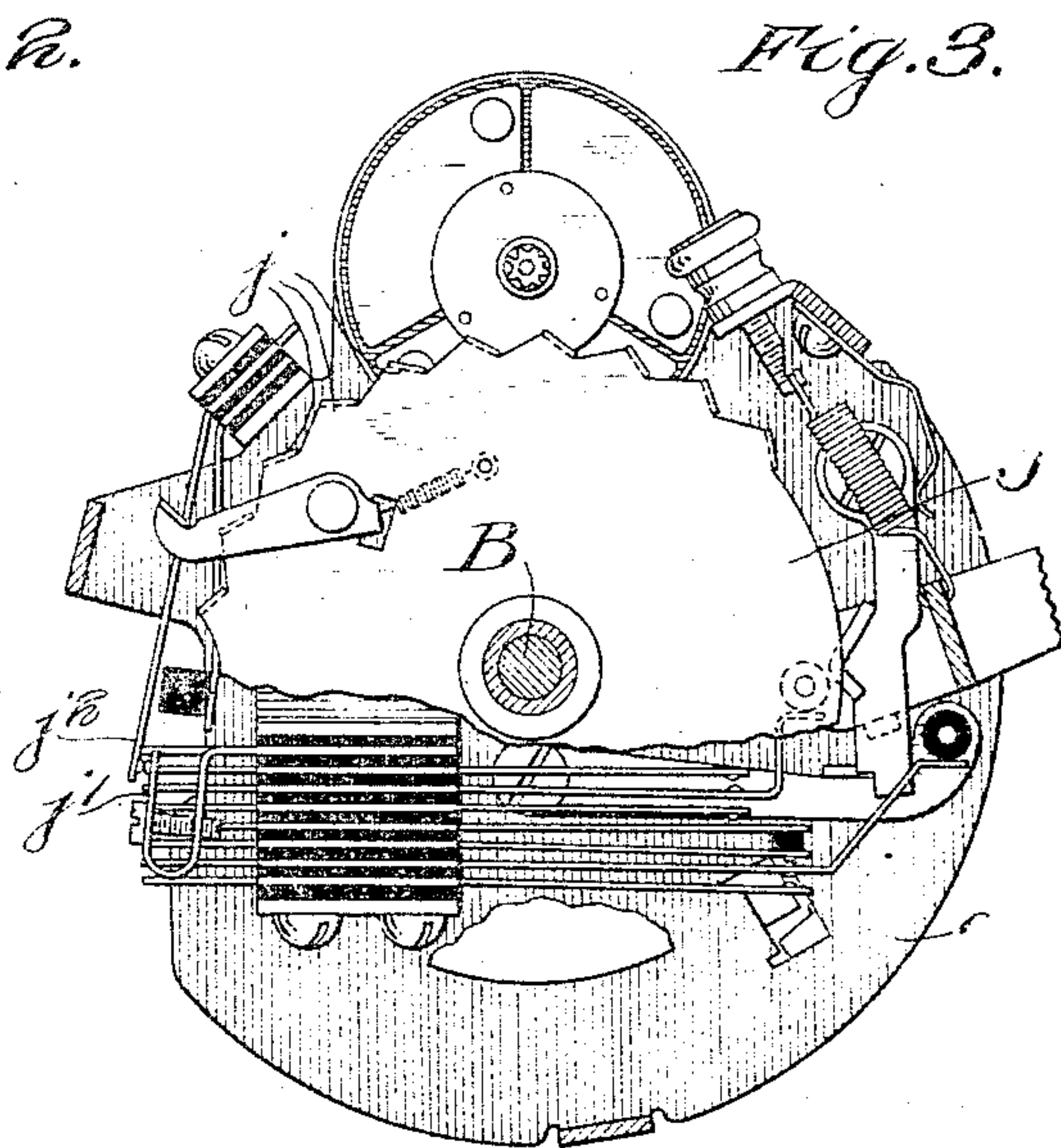
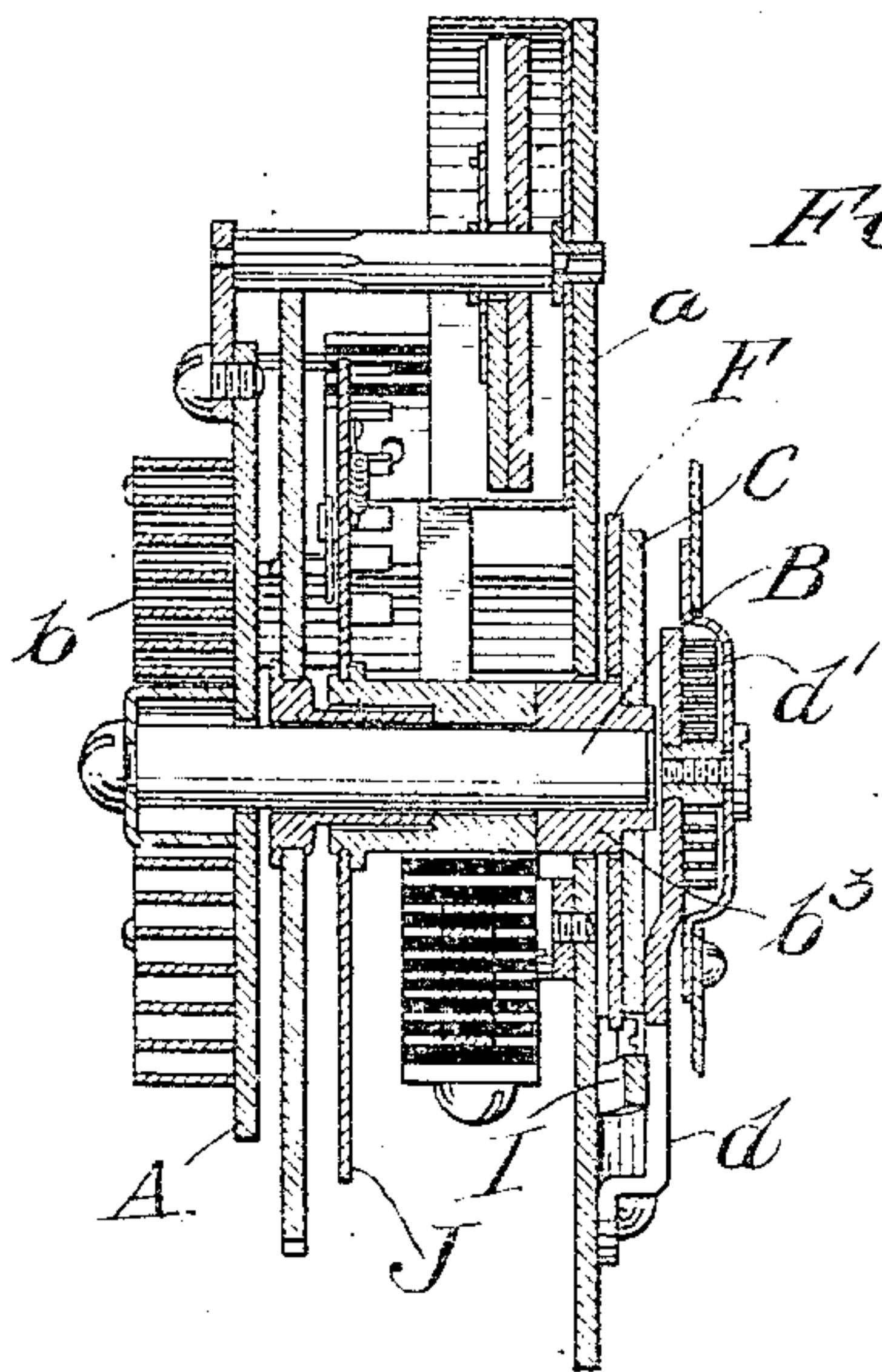
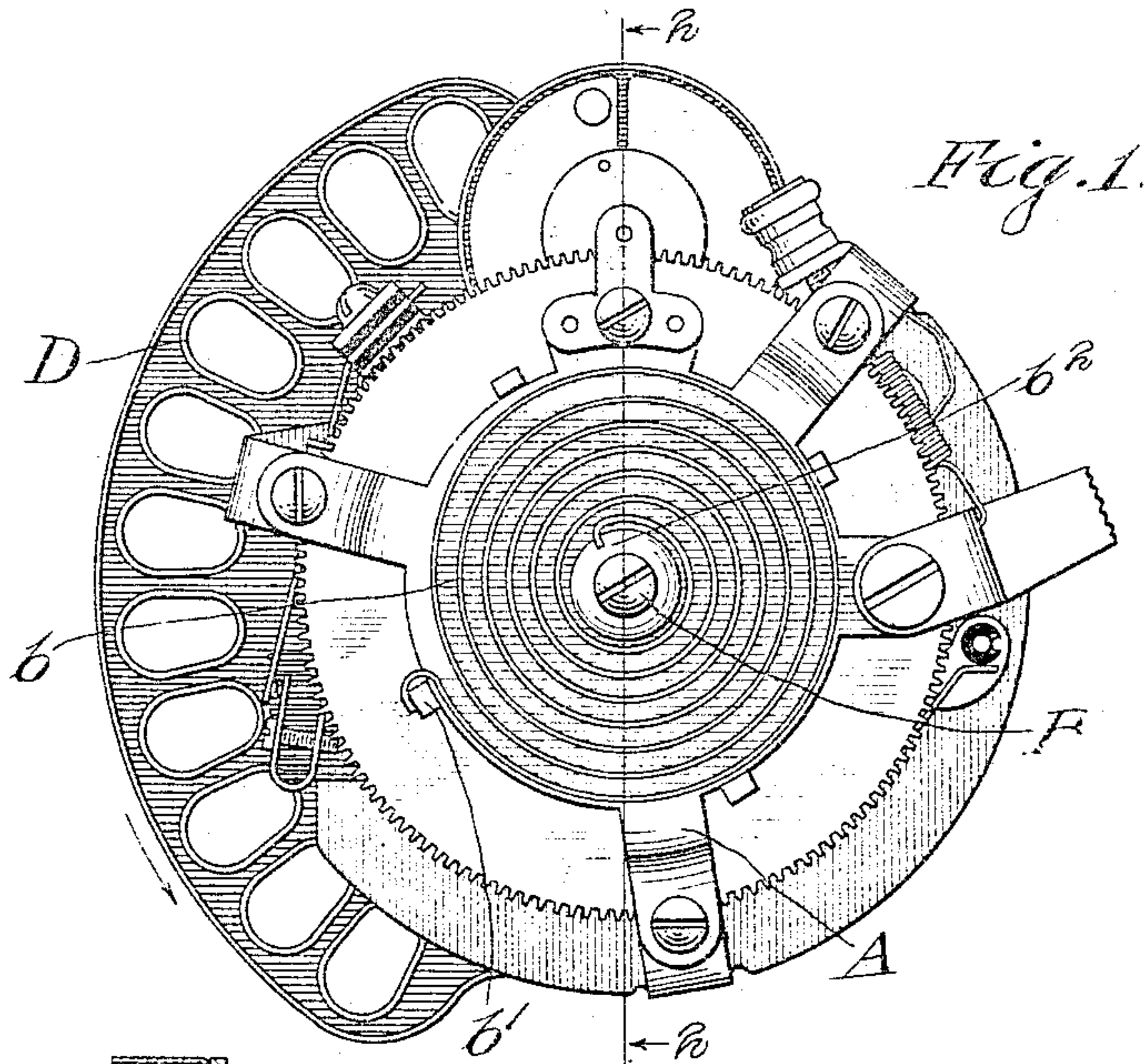
TELEPHONE EXCHANGE SYSTEM IMPULSE TRANSMITTER.

APPLICATION FILED JUNE 14, 1909. RENEWED MAY 13, 1912.

1,133,796.

Patented Mar. 30, 1915.

2 SHEETS—SHEET 1.



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2 SHEETS-SHEET 2.

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UNITED STATES PATENT OFFICE.

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TELEPHONE-EXCHANGE-SYSTEM IMPULSE-TRANSMITTER.

1,133,796.

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To all whom it may concern:

Be it known that I, JOHN ERICKSON, a citizen of the United States of America, and resident of Chicago, Cook county, Illinois, have invented a certain new and useful Improvement in Telephone-Exchange-System Impulse-Transmitters, of which the following is a specification.

My invention contemplates an electrical impulse transmitter, such as those used in automatic telephone exchange systems, comprising a back and forth rotary dial for operating the make-and-break mechanism, and means for holding the dial locked in any position to which it is advanced, together with means for releasing the make-and-break mechanism by a slight backward movement of the dial, whereby the impulse wheel of the make-and-break mechanism rotates back to normal position while the dial remains locked in its advanced position, after which the dial returns to normal position. By thus holding the dial locked while the impulses are being transmitted the operation cannot be interfered with, as by undue acceleration of the dial, and thus the proper transmission of the impulses is insured, together with the desired operation of the switches at the central station.

An impulse mechanism characterized by my invention is applicable to a three-wire system, and is also applicable to a two-wire system, being especially advantageous in the latter, because of the importance in a two-wire system of precluding interference with the transmission of the impulses by the calling subscriber.

In the accompanying drawings Figure 1 is a rear elevation of an impulse-transmitting mechanism embodying the principles of my invention. Fig. 2 is a vertical section on line 2—2 in Fig. 1. Fig. 3 is a view similar to Fig. 1, but showing certain portions of the structure broken away to bring other elements into view. Fig. 4 is a front elevation of the said mechanism, with the dial removed and with certain other portions broken away, showing the mechanism in normal position—that is to say, normal except for the removal of the receiver from the switch hook, which serves to unlock the dial. Fig. 5 is a view similar to Fig. 4, showing the positions of certain elements when the dial is rotated or advanced from its normal position. Fig. 6 is a detail frag-

mentary perspective view of the make-and-break device. Figs. 7 and 8 are in the nature of diagrams illustrating the operation of the said make-and-break device.

As thus illustrated my invention comprises a frame A of the usual or any suitable shape, which is rigidly connected with the front plate *a*. The shaft B extends centrally through the said frame and front plate, and is controlled at its rear end by a spring *b*, which latter has its outer end secured to the frame at *b'*, and its inner end suitably secured to the said shaft at *b²*, in the manner shown more clearly in Fig. 1. At its forward end said shaft is provided with a hub *b³* that turns or rotates in the plate *a*, and which serves to rigidly connect the said shaft with the plate or wheel C. The dial D, which is of the usual pattern or design, is pivoted upon a frame *d* secured to the front of the plate *a*, so that it rotates about an axis coincident with the axis of the said shaft. A spring *d'* is applied to the central portion of the said dial to return the same to normal position. The said dial is provided on its under surface with a pivoted dog E, which latter has one portion *e* adapted to engage a notch or tooth *c* on the wheel C, and another portion *e'* adapted to engage between two portions *e²* carried on an arm *e³*. This arm *e³* is rigid with and projects from one side of the ratchet wheel F, which latter is mounted to turn loosely upon the hub *b³*. The said ratchet wheel also has a lug *f* adapted to be engaged by a shoulder *f'* on the back of the arm *e³* of the dog, when the dial is permitted to return to normal position, as will hereinafter more fully appear. The wheel C is provided with a cam portion *c'* for restoring the portion *e* to engagement with the notch or tooth *c* upon the restoration of the mechanism to normal position. The said wheel C is also provided with a projecting portion *c²* adapted to be engaged by the dog G operated by the switch hook H. This dog G engages the portion *c²*, when the receiver is on the hook, to lock the dial against rotation. A dog I pivoted on the frame *d* is provided with a tooth *i* adapted to engage the teeth of the ratchet wheel F, and with a projecting end portion *i'* adapted to engage the cam portion *c³* of the wheel C when the latter returns to normal position, whereby the said dog is disengaged

from the ratchet wheel to allow the latter and the impulse wheel J to return in unison to normal position. This impulse wheel is provided with teeth j , and is rigidly connected with the hub b^3 and with the wheel C, whereby they all move in unison. These teeth are adapted to engage the spring K when the dial is rotated forward, in the manner shown in Fig. 7, the said teeth riding over the said spring, whereby the two normally closed springs j' and j'' of the line circuit are not opened. When the said wheel is allowed to rotate back to its normal position, then these teeth slide over the spring K and thus open the two springs j' and j'' in the manner shown in Fig. 8. It is the opening and closing of these springs j' and j'' that causes the transmission of the impulses in the line of the calling subscriber, whereby the automatic switches are operated at the central station. It will be understood that this make-and-break device is suitable for a two-wire system—that is to say, a system in which there are no operating grounds at the subscribers' stations.

When the receiver is removed from the switch hook H the dog G disengages the portion c^2 , thereby unlocking the dial and placing the same in readiness to be rotated. When the dial is rotated in the direction indicated by the arrow in Fig. 1, the wheel C is rotated by the hook-shaped portion e , and the ratchet wheel F is rotated by the portion e' , inasmuch as the latter engages the outer end of the arm e^3 , in the manner explained. The dial is rotated forward in accordance with the particular digit of the called number, and the dog i then locks the ratchet wheel F in such position, holding the dial in the same position. The pivotal motion of the dog E, however, permits the dial to rotate backward slightly, and this is sufficient to throw the portion e out of engagement with the tooth or notch c , by reason of the relative movement between the dial and the ratchet wheel F. In other words, this slight backward movement of the dial causes the portion e' to lift the portion e out of engagement with the wheel C, the spring b' supplying the requisite propelling power for this purpose. As soon as the wheel C is released, then the shaft B and the impulse wheel J rotate back to normal position, operating the impulse springs and transmitting the impulses during the backward rotation. When the cam c^3 engages the portion i' of the dog I, then the ratchet wheel F is disengaged, and in this way the said ratchet wheel and dial D are automatically released and allowed to return to normal position. Obviously, though, the dial is locked against motion during the backward rotation of the impulse wheel J and during the transmission of the impulses. When the portion e engages the

cam-like inner edge of the portion c' , then the said portion e is restored to position for engagement with the notch or tooth c , thus placing the dial in condition to again operate the impulse wheel. During the return of the dial and ratchet wheel F to normal position the lug f engages the shoulder f' on the back of the dog E, thus insuring a locking action which causes the dial and ratchet wheel to return together to normal position.

The switch hook H is provided with a lug h that engages the dog G when the receiver is removed, as shown in Figs. 4 and 5. This disengages the dog G from the portion c^2 , and thereby unlocks the dial in the manner explained. When the receiver is replaced upon the hook, then the lug h is disengaged from the dog G, and the latter is returned to normal position by the spring g , whereby the dial is normally locked against rotation.

Thus it will be seen that I provide an improved impulse-transmitting mechanism of such character that the dial, although of that type in which backward rotation thereof is incidental to the use of the same for calling, cannot be forced or operated in such manner as to interfere with the proper transmission of the impulses. The dial is absolutely locked against motion while the impulses are being transmitted, which is important in systems of this character, and especially advantageous in a two-wire system—that is to say, a system in which the switches at the central station are controlled over the two sides of the line circuit in series. I have found that in a system of this kind it is particularly important that the impulses be transmitted properly and without any improper acceleration of the impulse wheel during its return to normal position. Furthermore, as explained, the dial is locked against motion while the receiver is on the hook.

What I claim as my invention is:—

1. A telephone exchange system impulse transmitter comprising a dial, an impulse wheel, means for returning the wheel to normal position, means for holding the dial locked in its advanced position, means for releasing the dial when the wheel reaches its normal position, and means for returning the dial to normal.

2. A telephone exchange system impulse transmitter comprising a dial, an impulse wheel, spring means for returning said dial and wheel to normal position, and means whereby the wheel returns first and the dial afterward.

3. A telephone exchange system impulse transmitter comprising a dial, an impulse device, spring means for operating said device and returning said dial to normal position, means for releasing the device by slight backward movement of the dial, means for

holding the dial against movement while the device is sending the impulses, and means for releasing the dial when the device is through sending the impulses.

5 4. In a telephone system, a subscriber's calling dial, an impulse wheel, means for returning the wheel to normal position, means for holding the dial locked in its ad-
10 vanced position, means for releasing the dial when the wheel reaches its normal position, means for returning the dial to normal, and means for normally locking the dial against rotation.

5 5. In a telephone system, a subscriber's calling dial, an impulse wheel, spring means for returning said dial and wheel to normal position, means whereby the wheel returns first and the dial afterward, and means for normally locking the dial against rotation.

20 6. In a telephone system, a subscriber's calling dial, an impulse device, spring means for operating the impulse device and returning the dial to normal position, means for holding the dial against movement while the
25 device is sending the impulses, and means for normally locking the dial against rotation.

7. In a telephone system, a subscriber's calling dial, an impulse device, spring means
30 for operating said device and returning said dial to normal position, means for releasing the device by slight backward movement of the dial, means for holding the dial against movement while the device is sending the
35 impulses, means for releasing the dial when the device is through sending the impulses, and means for normally locking the dial against rotation.

8. In a telephone system, a subscriber's
40 calling dial, spring means for returning the dial to normal position, a ratchet device for holding the dial against movement while the impulses are being transmitted, and means for normally locking the dial against
45 rotation.

9. In a two-wire telephone exchange system, a calling dial therefor, an impulse wheel, means for returning the wheel to normal position, means for holding the dial
50 locked in its advanced position, means for releasing the dial when the wheel reaches its normal position, means for returning the dial to normal, and normally closed line springs adapted to be opened and closed to
55 transmit the impulses.

10. In a two-wire telephone exchange system, a calling dial therefor, an impulse wheel, spring means for returning said dial and wheel to normal position, means whereby the wheel returns first and the dial after- 60
ward, and normally closed line springs adapted to be opened and closed to transmit the impulses.

11. In a two-wire telephone exchange system, a calling dial therefor, an impulse de- 65
vice, spring means for operating the impulse device and returning the dial to normal position, means for holding the dial against movement while the device is sending the impulses, and normally closed line springs 70
adapted to be opened and closed to transmit the impulses.

12. In a two-wire telephone exchange system, a calling dial therefor, an impulse de- 75
vice, spring means for operating said device and returning said dial to normal position, means for releasing the device by slight backward movement of the dial, means for holding the dial against movement while the
80 device is sending the impulses, means for releasing the dial when the device is through sending the impulses, and normally closed line springs adapted to be opened and closed to transmit the impulses.

13. In a two-wire telephone exchange sys- 85
tem, a calling dial therefor, spring means for returning the dial to normal position, a ratchet device for holding the dial against movement while the impulses are being transmitted, and normally closed line 90
springs adapted to be opened and closed to transmit the impulses.

14. In a telephone system, a calling device having a reciprocating operating dial, a reciprocating impulse wheel, and means 95
whereby said dial and wheel operate independently and simultaneously.

15. In a telephone system, a calling device comprising a reciprocating dial, a reciprocating impulse wheel, means for operating 100
said dial and wheel independently and simultaneously, and means for holding said dial against movement while said impulse wheel is sending the impulses.

Signed by me at Chicago, Cook county, 105
Illinois, this 10 day of June, 1909.

JOHN ERICKSON.

Witnesses:

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