

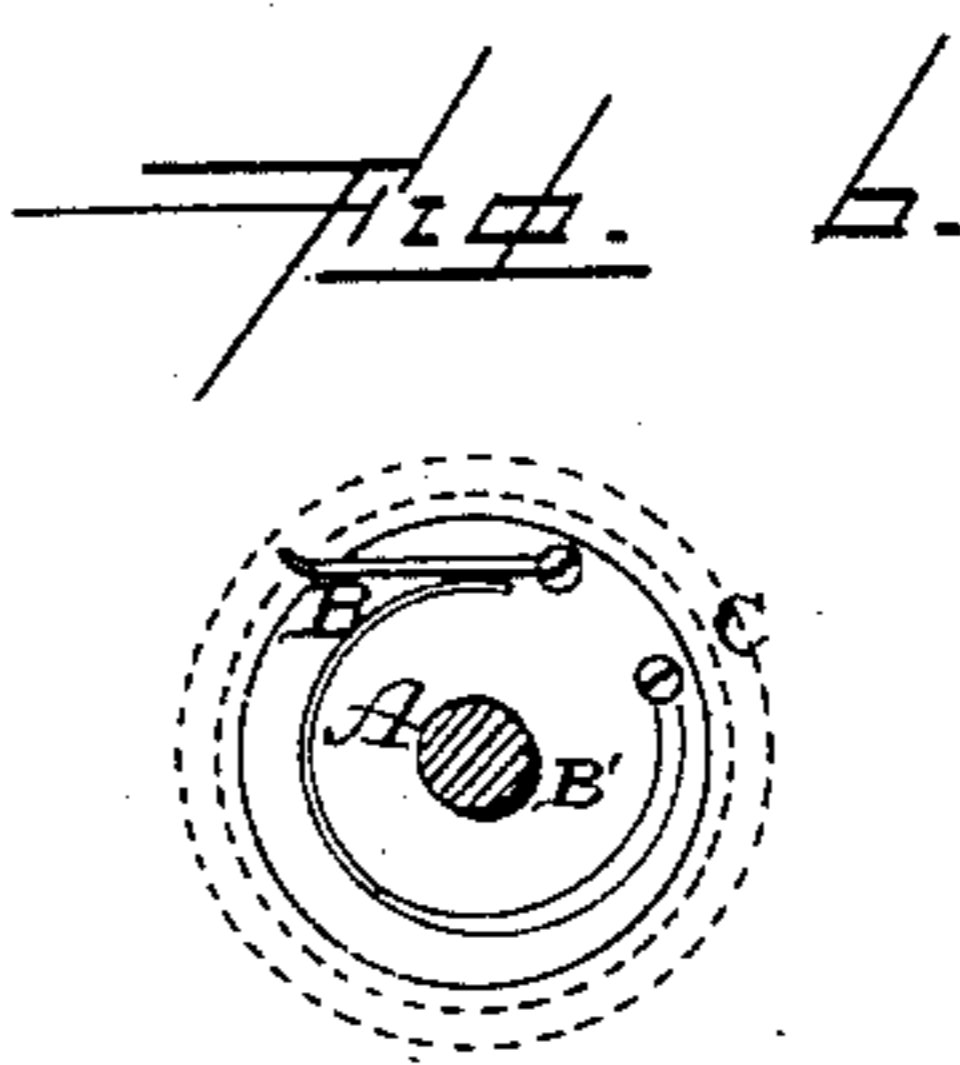
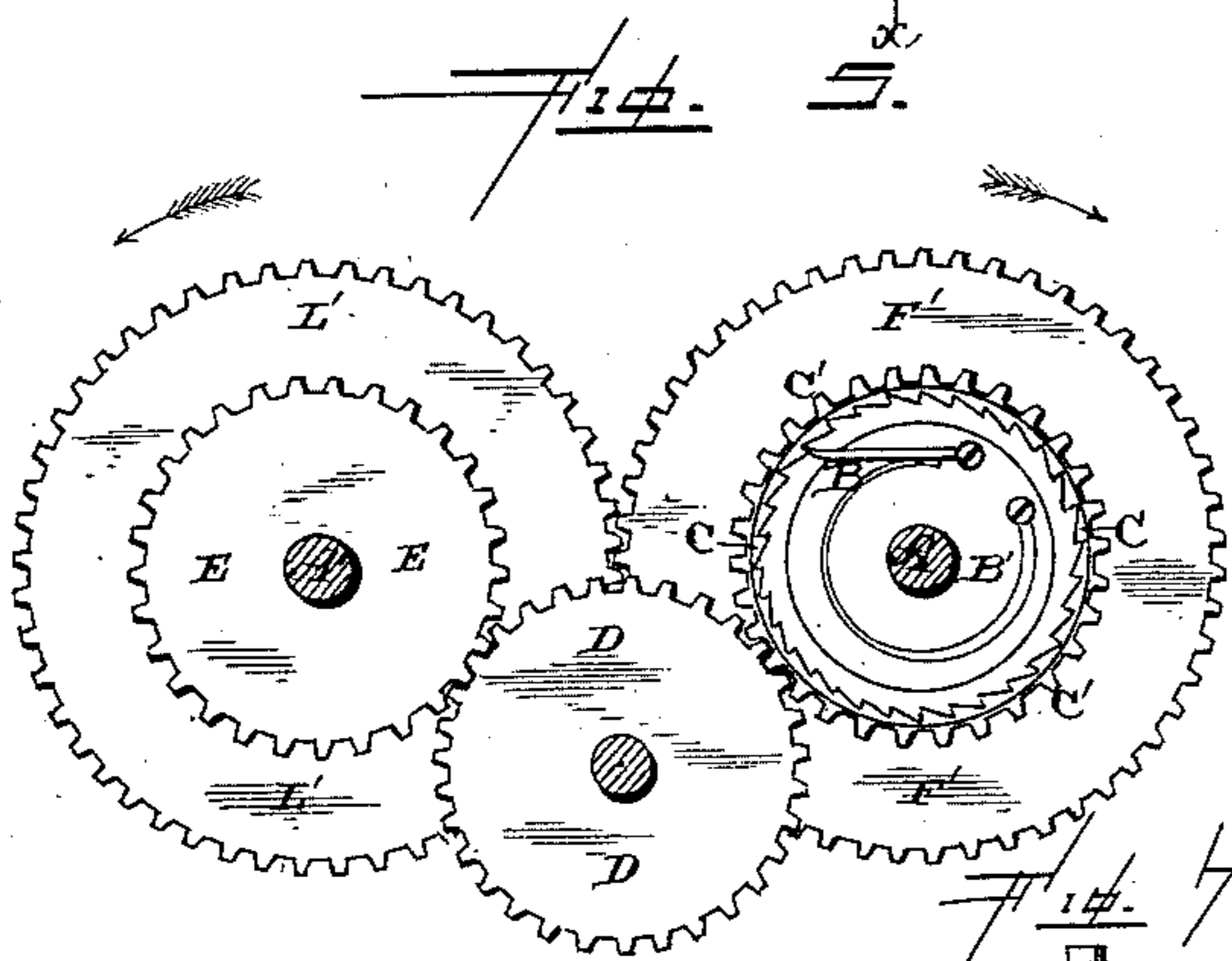
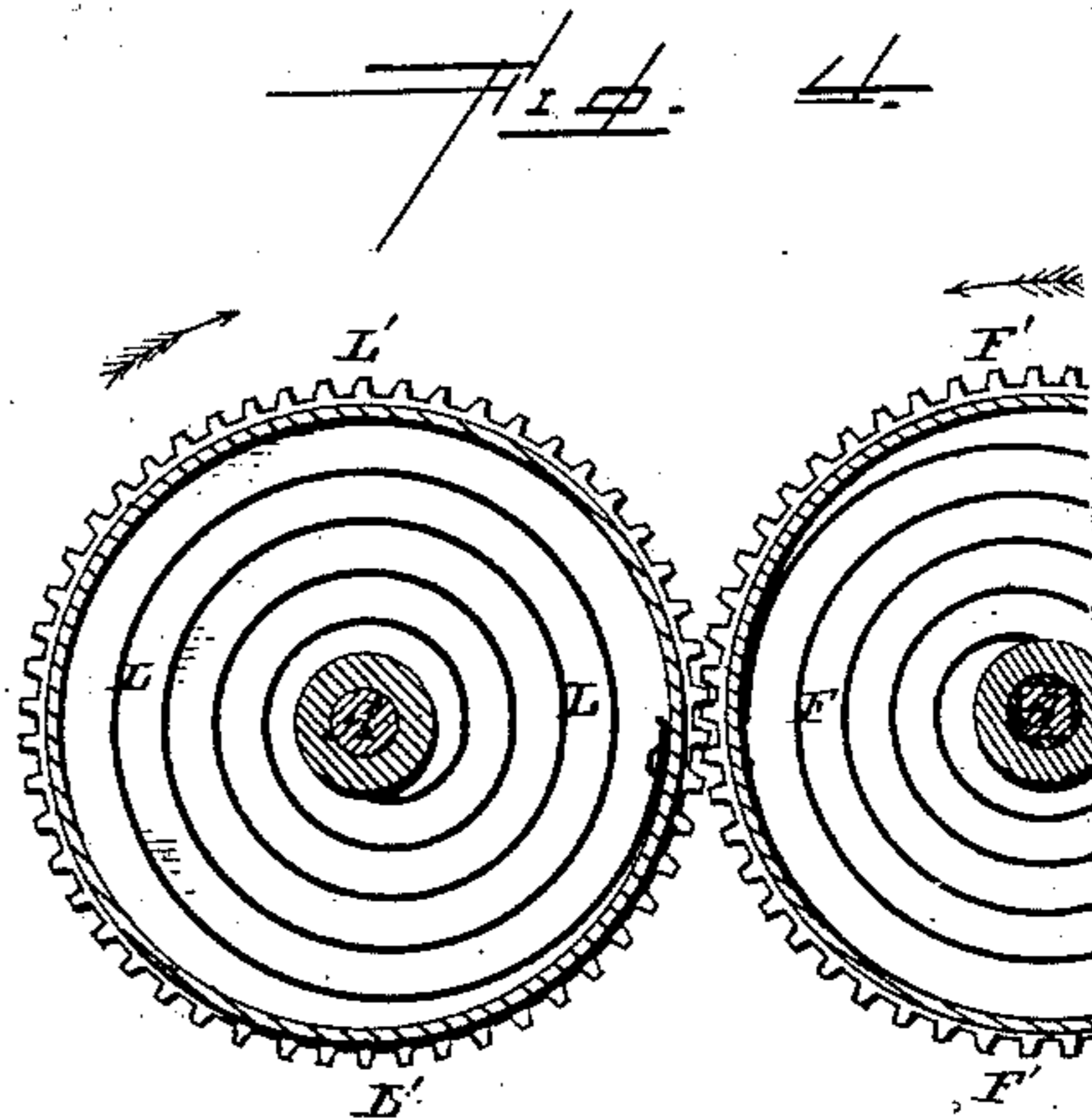
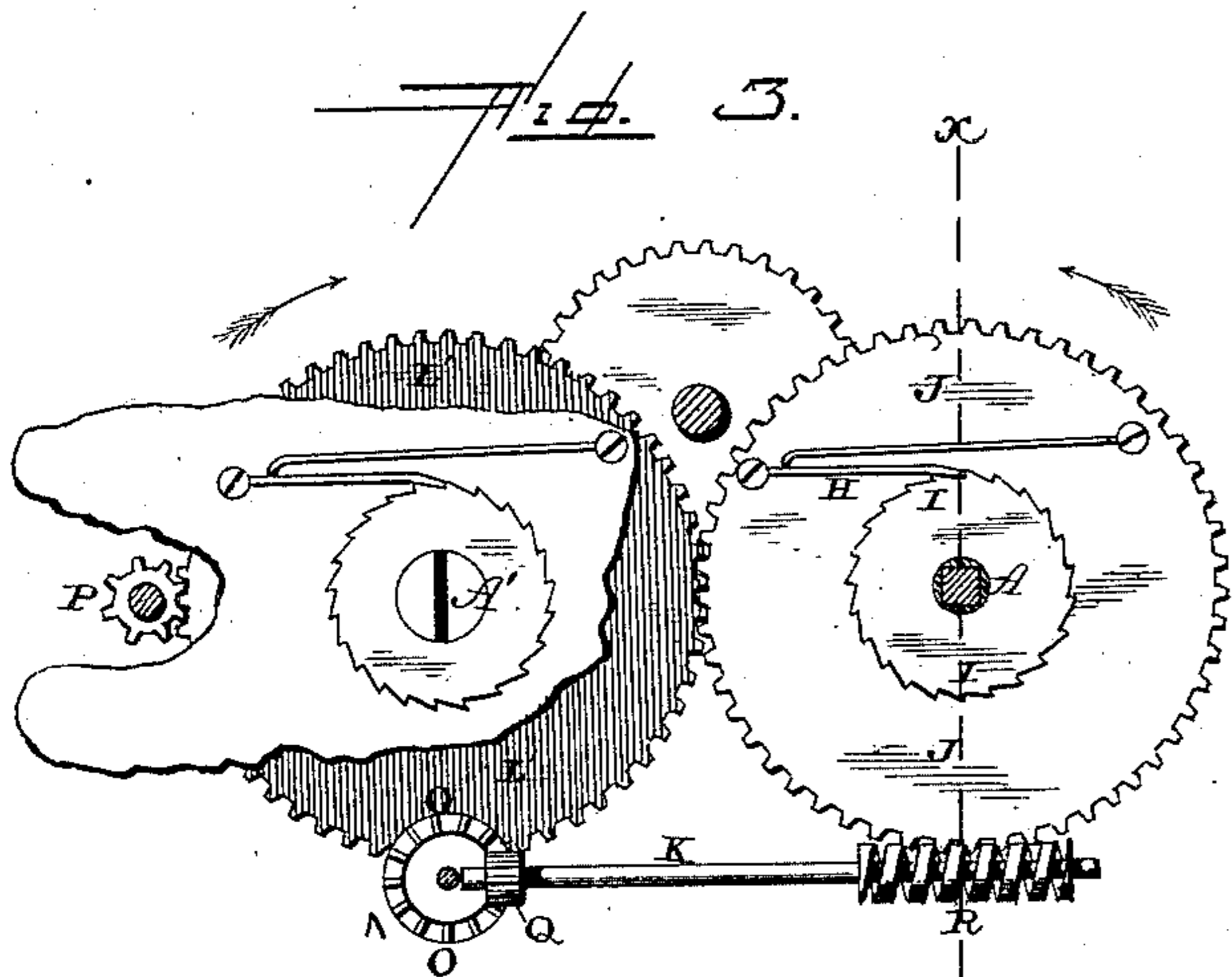
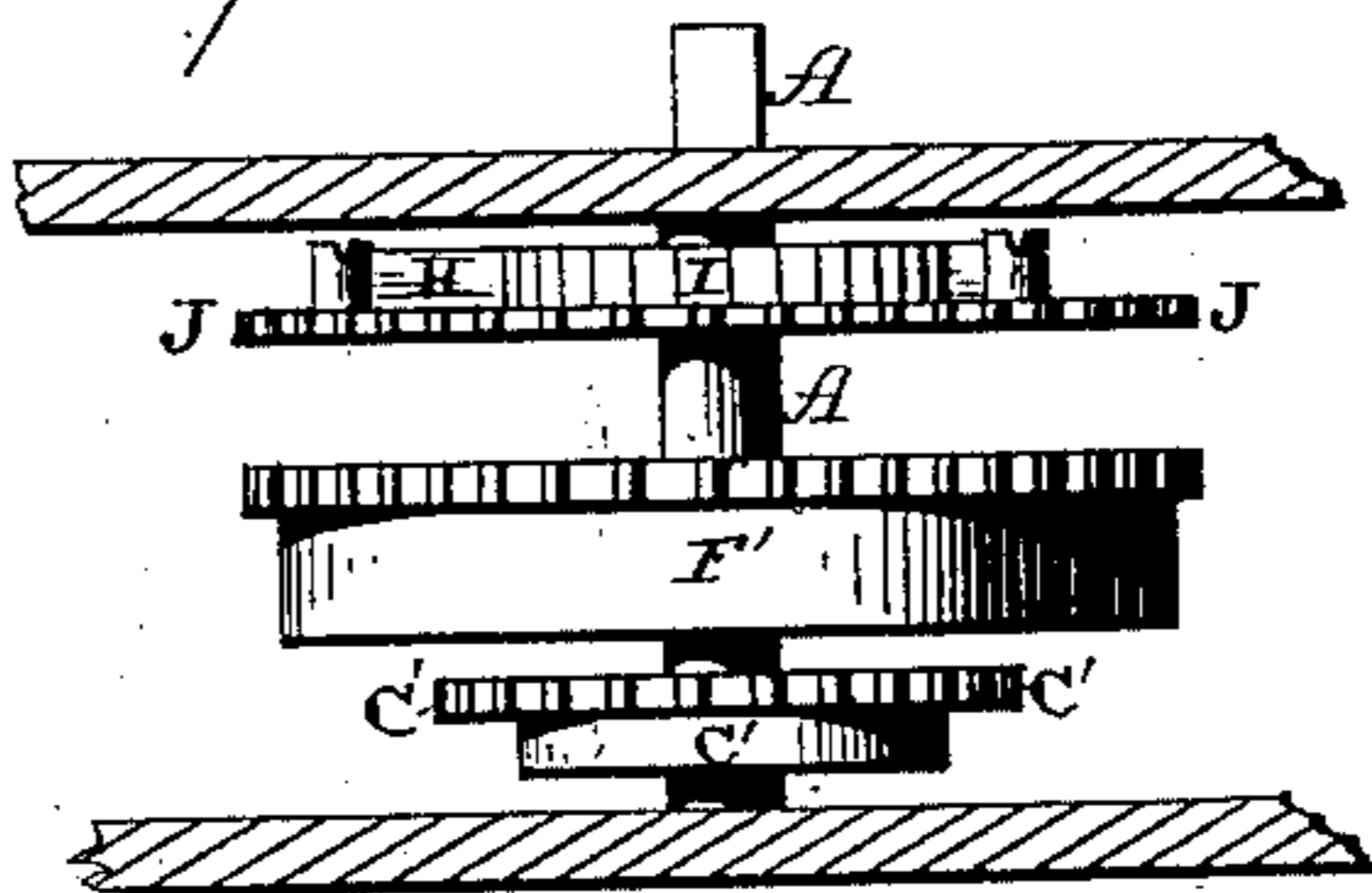
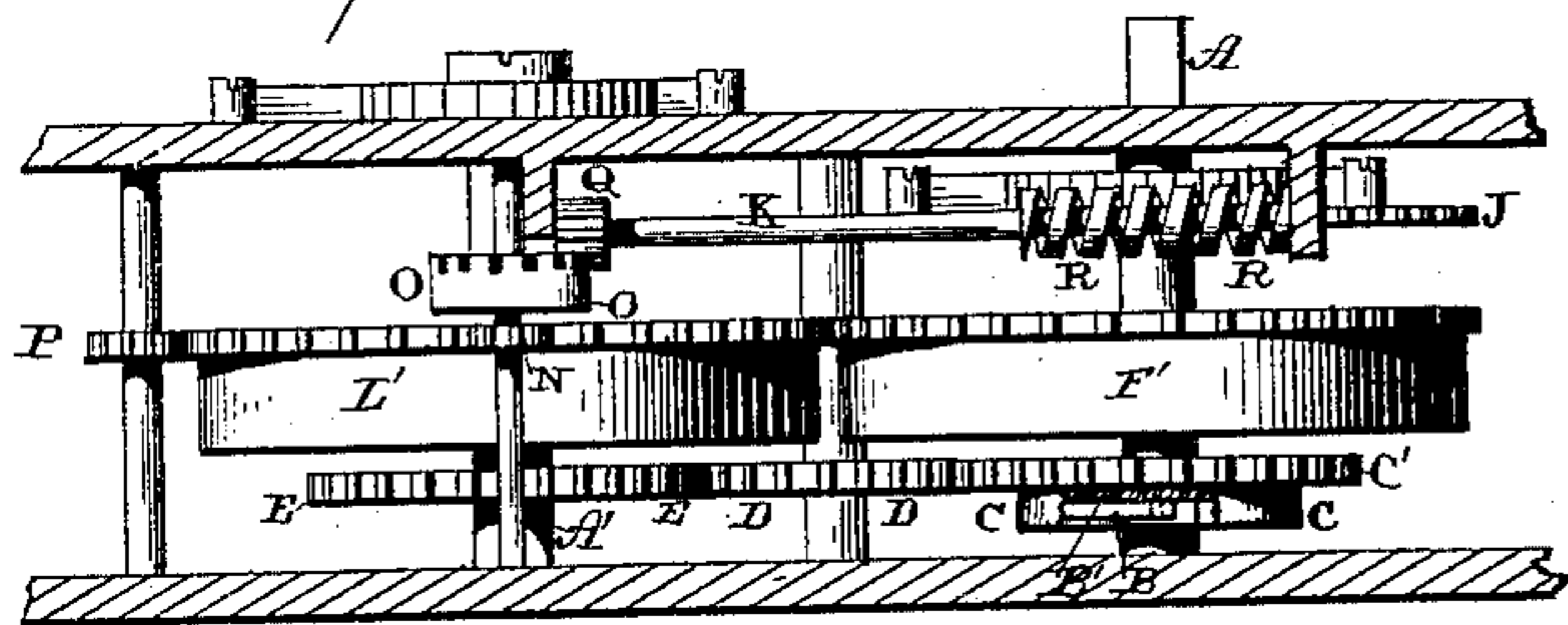
(No Model.)

M. WHEELER.

AUXILIARY GOVERNING SPRING FOR TIME PIECES.

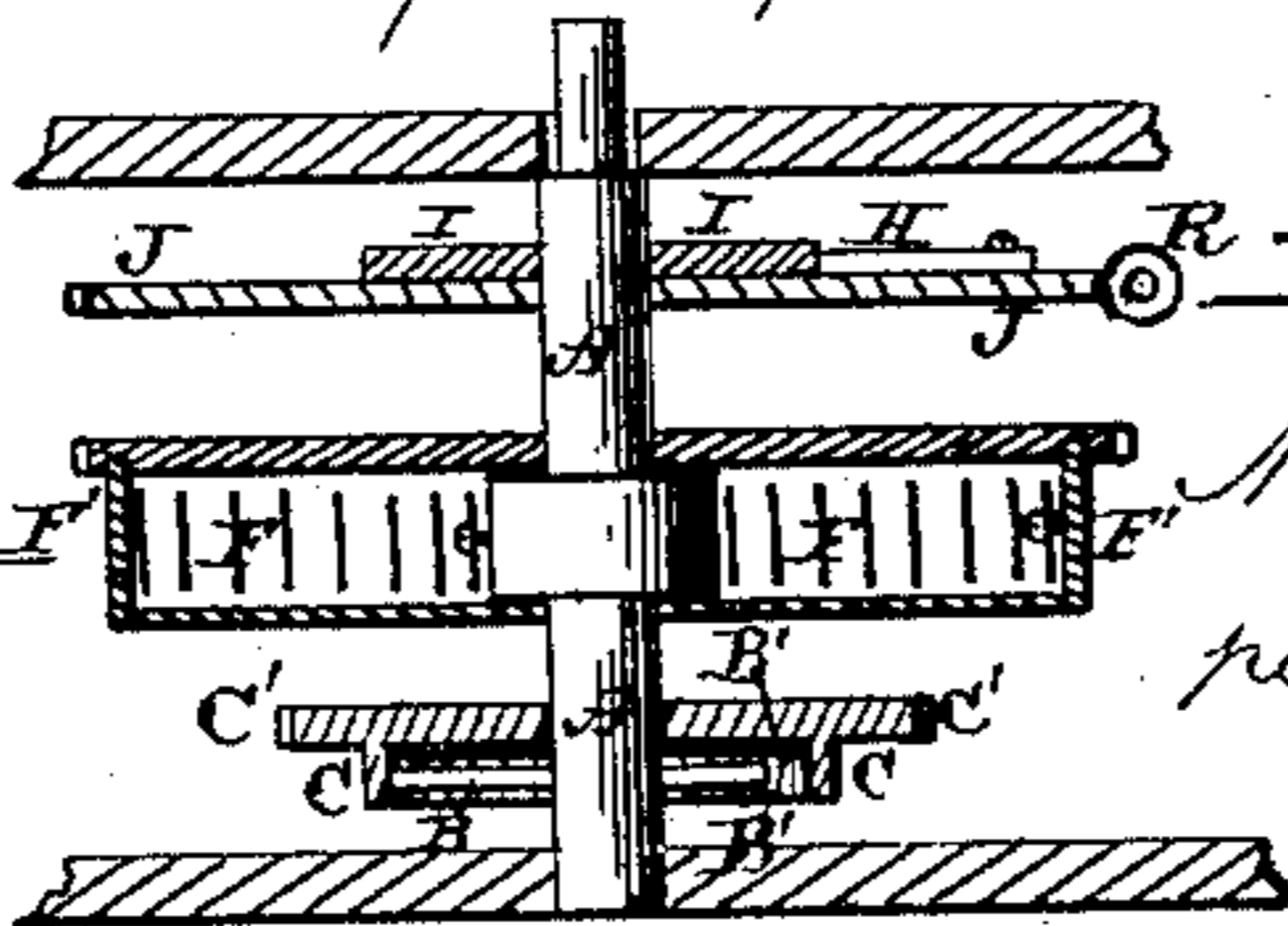
No. 336,460.

Patented Feb. 16, 1886.



WITNESSES.

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per
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att'y.

UNITED STATES PATENT OFFICE.

MARSHAL WHEELER, OF WASHINGTON, DISTRICT OF COLUMBIA.

AUXILIARY GOVERNING-SPRING FOR TIME-PIECES.

SPECIFICATION forming part of Letters Patent No. 336,460, dated February 16, 1886.

Application filed October 27, 1885. Serial No. 181,206. (No model.)

To all whom it may concern:

Be it known that I, MARSHAL WHEELER, of Washington, District of Columbia, have invented certain new and useful Improvements in Time-Pieces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in time-pieces; and it consists in, first, the combination of the mainspring, and an auxiliary spring which is connected thereto, and which is wound and unwound at the same rate of speed as the mainspring, and which auxiliary spring serves to counterbalance the power of the mainspring; second, the combination of the mainspring, the auxiliary spring, the two barrels in which the springs are placed, and which are made to gear together so as to revolve in opposite directions, the winding-post to which the inner ends of the two springs are connected, a mechanism for causing the motion of the principal winding-post to be transmitted to the other when the springs are being wound up, and a mechanism for transferring the unwinding motion of the mainspring to the winding-post of the auxiliary spring, all of which will be more fully described hereinafter.

The object of the invention is to govern or equalize the power of the mainspring by interposing a resistance which shall be greater when the spring is first wound and at its highest tension, and which shall be gradually reduced as the mainspring unwinds and its tension becomes less. The result accomplished by the fusee and chain in English watches is of the same character. I accomplish this result by the employment of a supplementary spring so connected for winding with the mainspring that both are wound simultaneously, but having such gearing between them that the supplementary spring is wound at one end by the unwinding of the mainspring while it unwinds at the other, the two motions being so proportioned that the resistance to the power of the mainspring shall be reduced in proportion to the reduction of its tension.

Figure 1 is a side elevation of a time-piece embodying my invention complete. Fig. 2 is an end view of the same. Fig. 3 is a plan view. Fig. 4 is a horizontal section taken through the barrels of the two springs. Fig. 5 is an inverted view. Fig. 6 is a detail view of the revolving winding-click attached to the main winding-post. Fig. 7 is a vertical section taken on the line *x x* of Fig. 3.

A A' represent the two winding-posts, to which the inner ends of the two springs L F are connected. The spring L is the mainspring of the watch, and the one, F, the auxiliary spring, which is used to counterbalance the pressure of the mainspring upon the works, and thus prevent any uneven pressure upon the works when the mainspring is fully wound or nearly unwound. The outer ends of these two springs L F are connected to the inner sides of the two barrels F' L', and the springs are coiled in the same direction, as shown in Fig. 4. These barrels F' L' are loosely connected to the winding-posts A A', so as to revolve independently of them. Each barrel is provided with teeth, as shown, and these teeth mesh together, so as to cause the barrels to always revolve in opposite directions.

Secured to the winding-post A by means of the plate B' is the revolving winding-click B, which operates in connection with the internal ratchet, C, formed on the under side of the wheel C'. This click B being fastened to the winding-post A by means of the plate B', to which it is pivoted, moves with the shaft in both directions, whether the shaft is being revolved in one direction to wind up the two springs F L or is unwinding. When the shaft A is revolved in one direction, for the purpose of winding the spring, this click engages with the ratchet C and forces the wheel C' around, for the purpose of transferring the winding movement, through the wheel C' and the idler D, to the wheel E, which is rigidly secured to the winding-post A'. By this construction all parts of the movement of one winding-post are transferred to the other, so that both springs are wound at the same rate of speed. While the mainspring L is unwinding the winding-post A' stands still, and hence no back motion is communicated from this shaft by the gear E and idler D to the wheel C' on

the main winding-post A. The winding-post A' is made to revolve in only one direction, and that while the two springs are being wound up; but the post A revolves in one direction while the springs are being wound up and in the opposite direction while the springs are unwinding.

Motion is communicated to the works of the time-piece through the pinion P, which meshes with the teeth of barrel L'. Also engaging with the teeth of the barrel L' is a pinion, N, which is secured to the same shaft as the crown-wheel O. The crown-wheel O in revolving communicates motion to the shaft K through the pinion Q on one end. Upon the opposite end of the shaft K from the pinion Q is the worm-gear R, which meshes with the wheel J, which is placed loosely upon the winding-post A. This wheel J in revolving carries with it the click H, which engages with the ratchet-wheel I, which is secured to the main winding-post A so as to revolve with it. This click H and ratchet-wheel I serve to prevent any backward movement on the part of the winding-post A when the springs are being wound up. As the wheel J is made to revolve by the worm and gear R, this click H remains in gear with the ratchet-wheel I, and the winding-post A, ratchet I, click H, and wheel J all revolve backward at the same time, so as to unwind the auxiliary spring from its inner end. While the mainspring L is unwinding the auxiliary spring F is being unwound from its inner end by means of the winding-post A at the same time that its outer end is being wound up through the motions of the barrels F' L'. The two barrels in revolving in opposite directions cause the spring F to be wound at its outer end at the same time that the main winding-post A is being made to revolve twice as fast as the barrel F', and thus the spring F is being unwound at the same rate of speed as the mainspring. By means of the worm-gear R, ratchet I, click H, and wheel J the winding-post A is made to move twice as fast, and unwind the spring F at its inner end while it is being wound up at its outer end by the motion of the two barrels F' L'. The spring F, it will be seen, is driven entirely by the mainspring L, and takes no part in driving the works of the time-piece, but simply acts as a counter-balance upon the movements of the mainspring L, and upon the movement of the time-piece when the spring is first wound up, and when there is an excess of power, or when the spring is nearly unwound and when there is a lack of power. The action of the mainspring upon the auxiliary spring is positive, and hence any movement of the barrel L', caused by the spring L, is instantly communicated to the auxiliary spring F, which spring F serves only as a counter-balance upon the spring L, so as to insure a constant unvarying motion upon the train of wheels, escapement, and balance-wheel. The two springs L F are of the same length and strength; but the mainspring L is keyed

upon a few turns, and the stop-works are set so as to prevent this spring from uncoiling the few extra turns which are given to it over the spring F. The consequence is that the spring L is wound to a greater degree than the spring F, and hence will exert a greater power than the one F, and it is just that amount of this extra power that is used in operating the time-piece.

The number of teeth in the barrels, the pinion N, crown-wheel O, pinion Q, and wheel J, and the obliquity of the thread of the worm-gear R may be varied at will; but they should be so proportioned to each other that the spring F is unwound at its inner end twice as fast as it is wound up at its outer end, and hence the relative strength of the two springs always remains the same. If the pinion N, which meshes with the barrel L', has seven teeth and the pinion Q has seven teeth, the crown-wheel O should have forty-nine teeth. Then the distance that the worm R shall at each revolution move the wheel J depends entirely upon the obliquity or pitch which is given to the thread of the worm. As the spring F is to be unwound twice as fast at its inner end as it is wound up at its outer end, the pitch of the worm is such that the wheel J is driven just fast enough to unwind the spring twice as fast as it is wound at its outer end.

The mechanism above described is here shown and described only in connection with a time-piece; but it is evident that it may be employed wherever a spring-motor is used for driving the mechanism of any kind and for any purpose. I do not therefore limit myself to a time-piece, for the same mechanism may be used in a music-box, a spring-motor, or in any place where the motive power is communicated through a spring, and a steady and even motion is desired.

I claim—

1. In a time-piece, the combination of the mainspring with an auxiliary spring, which serves to retard the motion of the main one, the two being geared together so as to be made to wind and unwind at the same time, substantially as shown.

2. The combination, in a time-piece, of the mainspring, the auxiliary spring coiled in the same direction, the two barrels which contain the springs and which are geared together so as to revolve in opposite directions, and a mechanism which is operated by the barrel of the mainspring, for unwinding the auxiliary spring as the main one unwinds, substantially as described.

3. In a time-piece, the combination of the mainspring, the auxiliary spring coiled in the same direction, and the barrels for the springs, geared together so as to revolve in opposite directions, with a mechanism which is connected to the winding-post, whereby both springs are wound up together, and a mechanism connected to the barrel of the main-

spring for unwinding the auxiliary spring, substantially as set forth.

4. The combination of the two winding-
5 posts and a mechanism for connecting them
together, the two springs which are connected
at their inner ends to the posts and coiled in
the same direction, the two barrels to which
the springs are connected at their outer ends,
and which barrels are placed loosely on the
10 posts, and geared together so as to revolve in
opposite directions, and a mechanism con-
nected to the auxiliary spring, for causing it
to unwind with the main one, substantially as
specified.

15 5. The combination of the two winding-
posts A A', the two springs L F, connected
thereto and coiled in the same direction, the
two barrels placed loosely on the posts and
geared together so as to revolve in opposite
20 directions, and a mechanism, substantially as

shown, connecting the two parts together so
that both springs are wound at the same time,
substantially as described.

6. The combination of the two winding-
posts, the springs connected thereto and coiled 25
in opposite directions, the barrels having the
outer ends of the springs connected thereto,
and placed loosely on the posts and geared
together so as to revolve in opposite direc-
tions, a winding mechanism connected to both 30
posts, and a mechanism for unwinding the aux-
iliary spring faster at its inner end than it is
wound up at its outer end by the barrel of
the mainspring, substantially as set forth.

In testimony whereof I affix my signature in 35
presence of two witnesses.

M. WHEELER.

Witnesses:

F. A. LEHMANN,
A. S. PATTISON.