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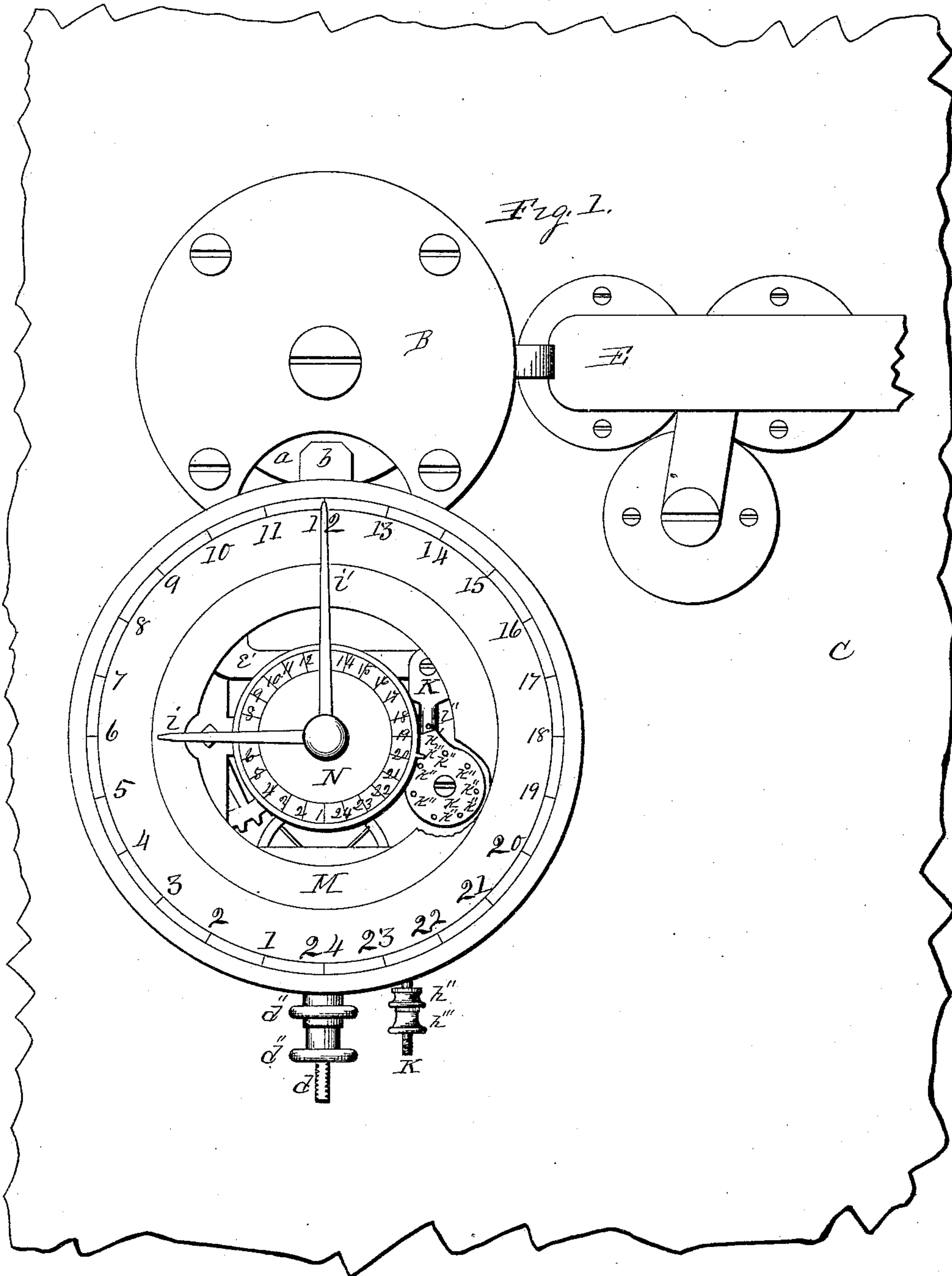
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C. H. SHAFFER.

TIME LOCK.

No. 333,682.

Patented Jan. 5, 1886.



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(Model.)

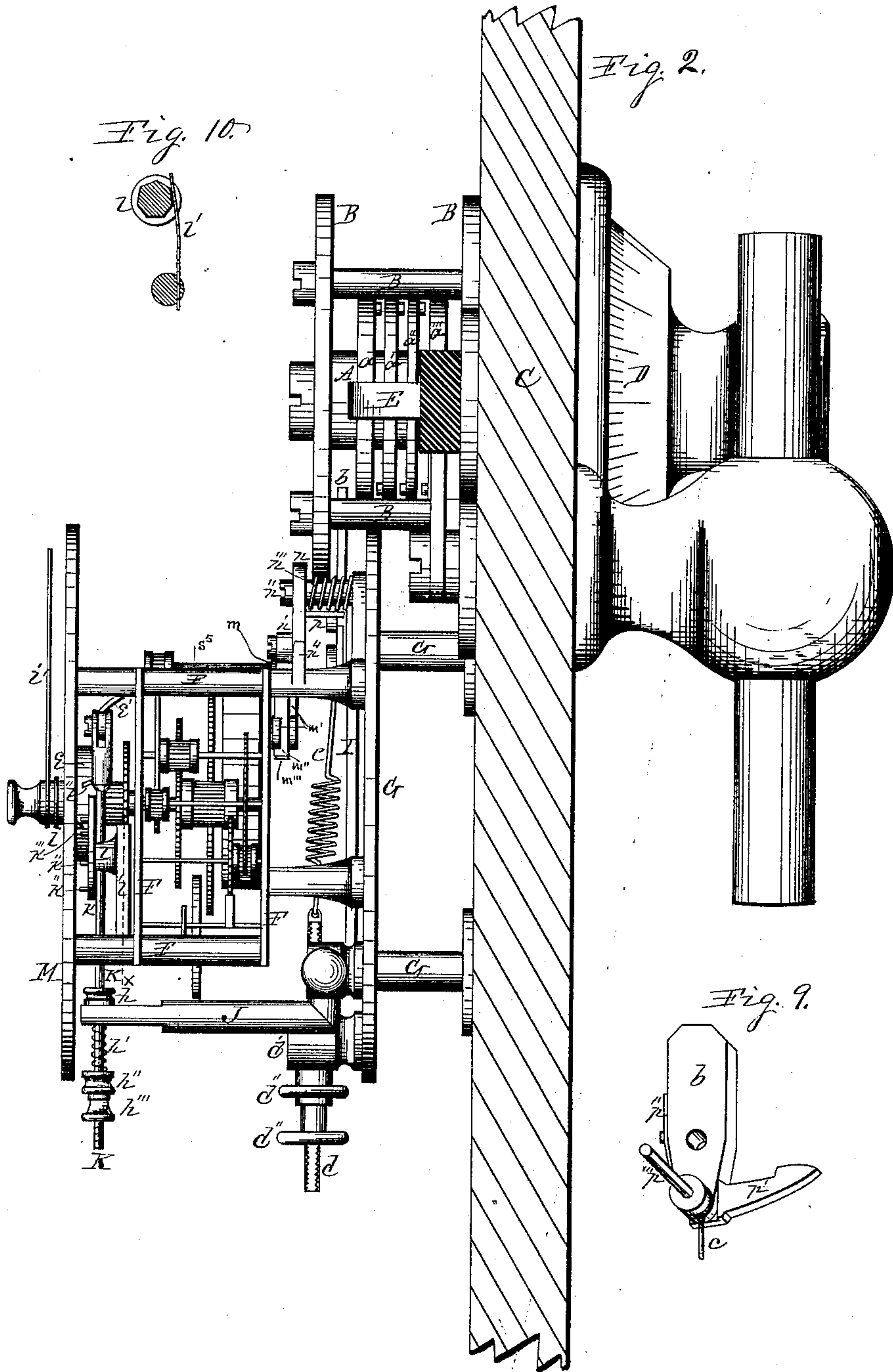
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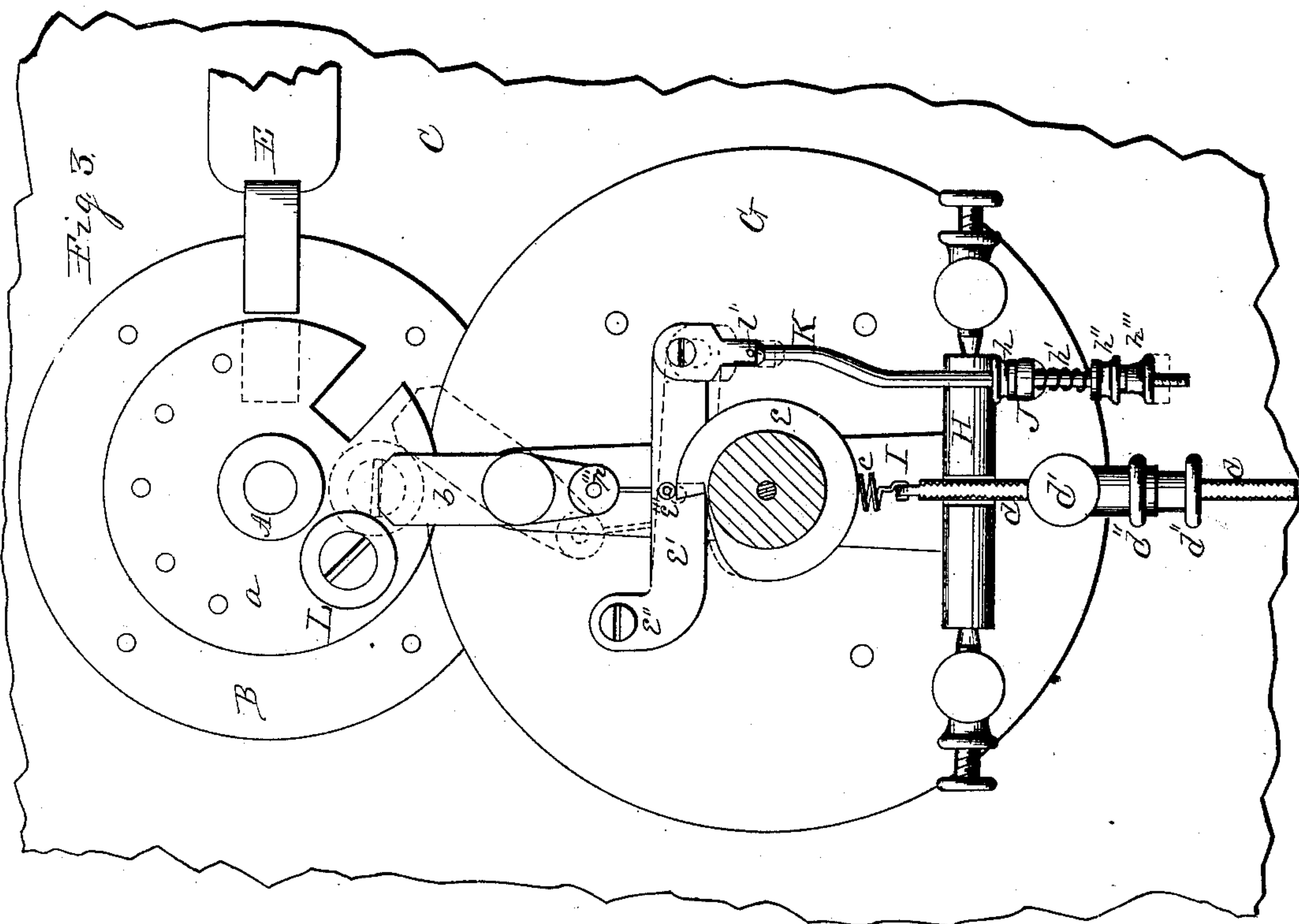
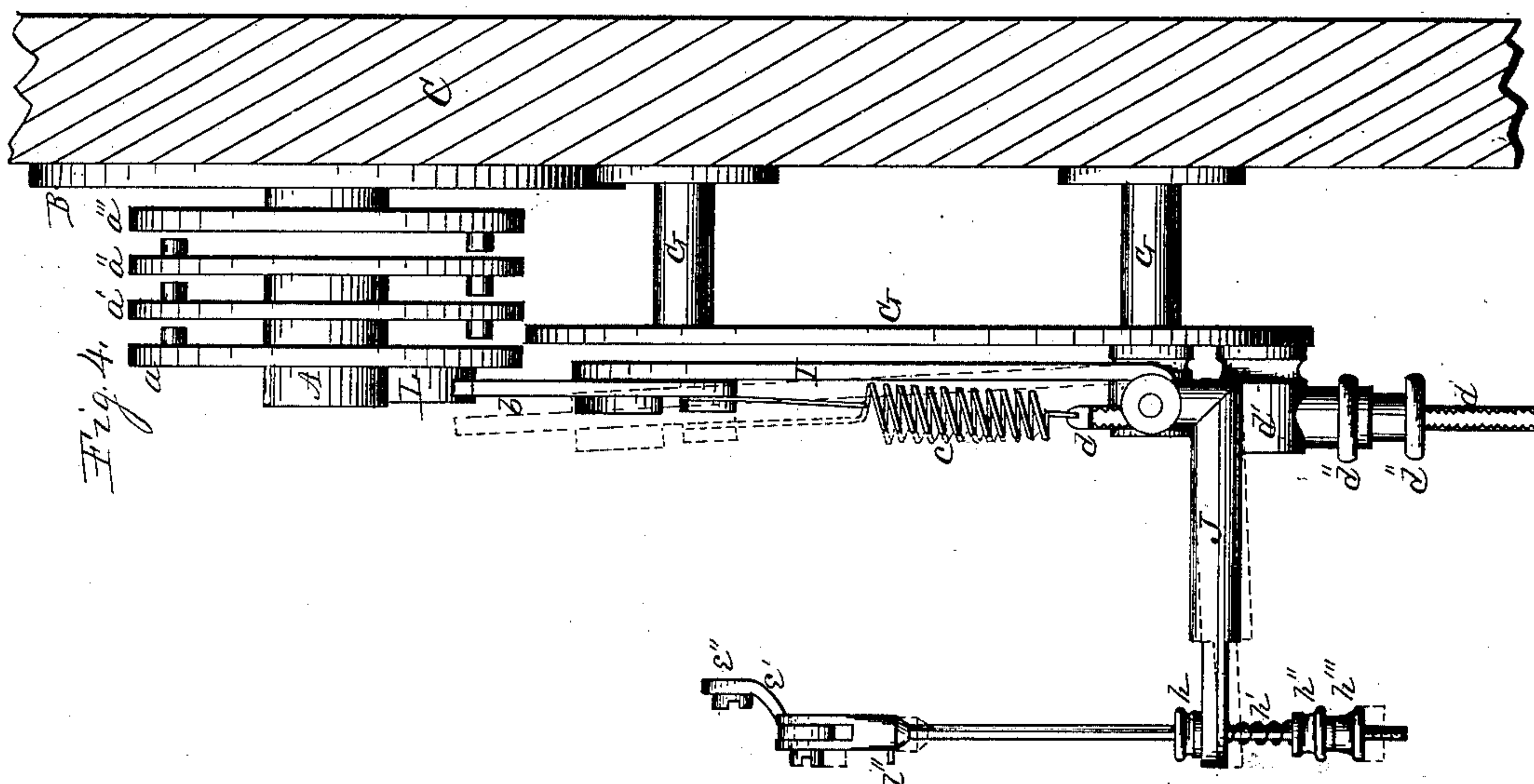
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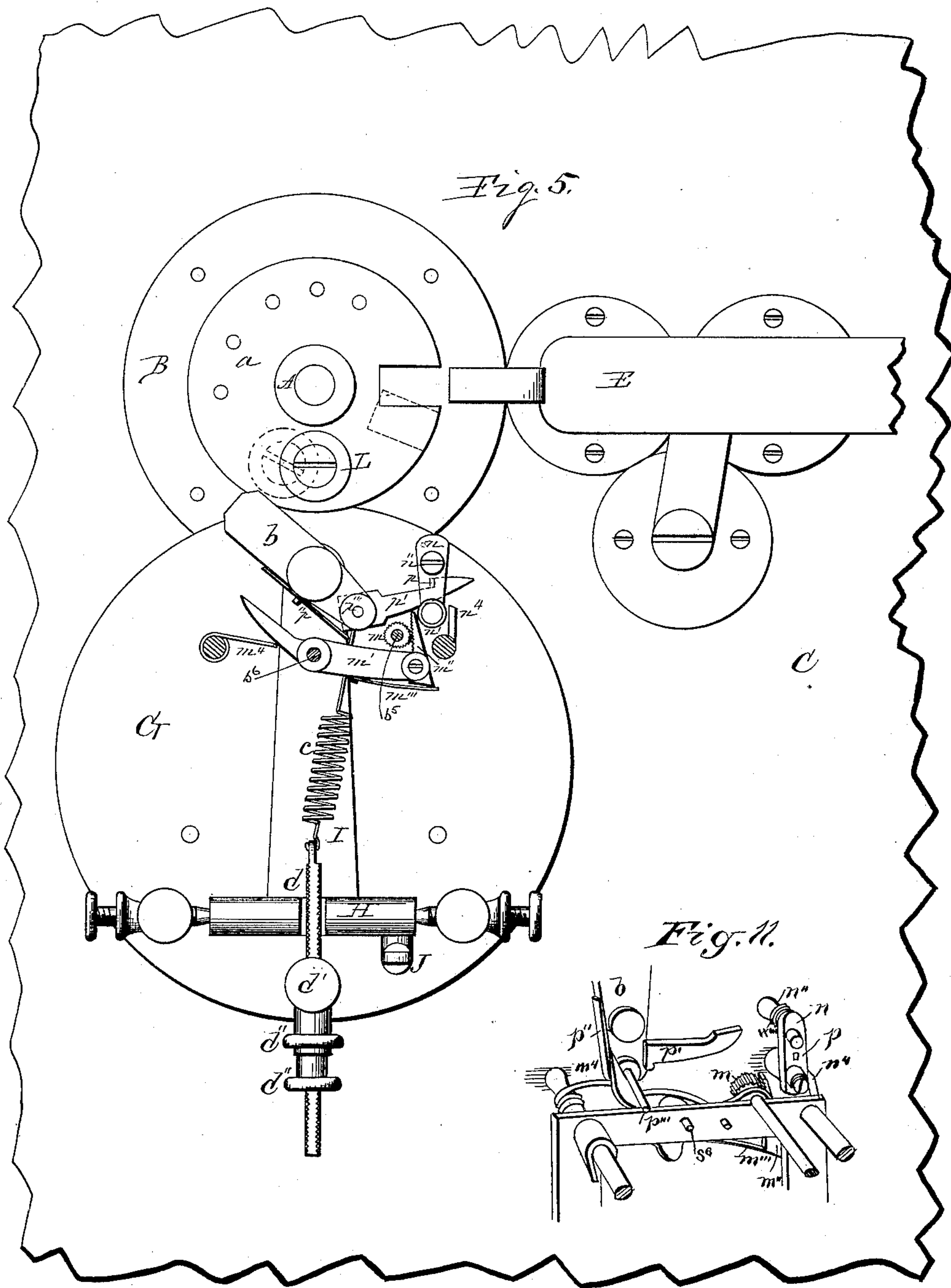
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Fig. 8.

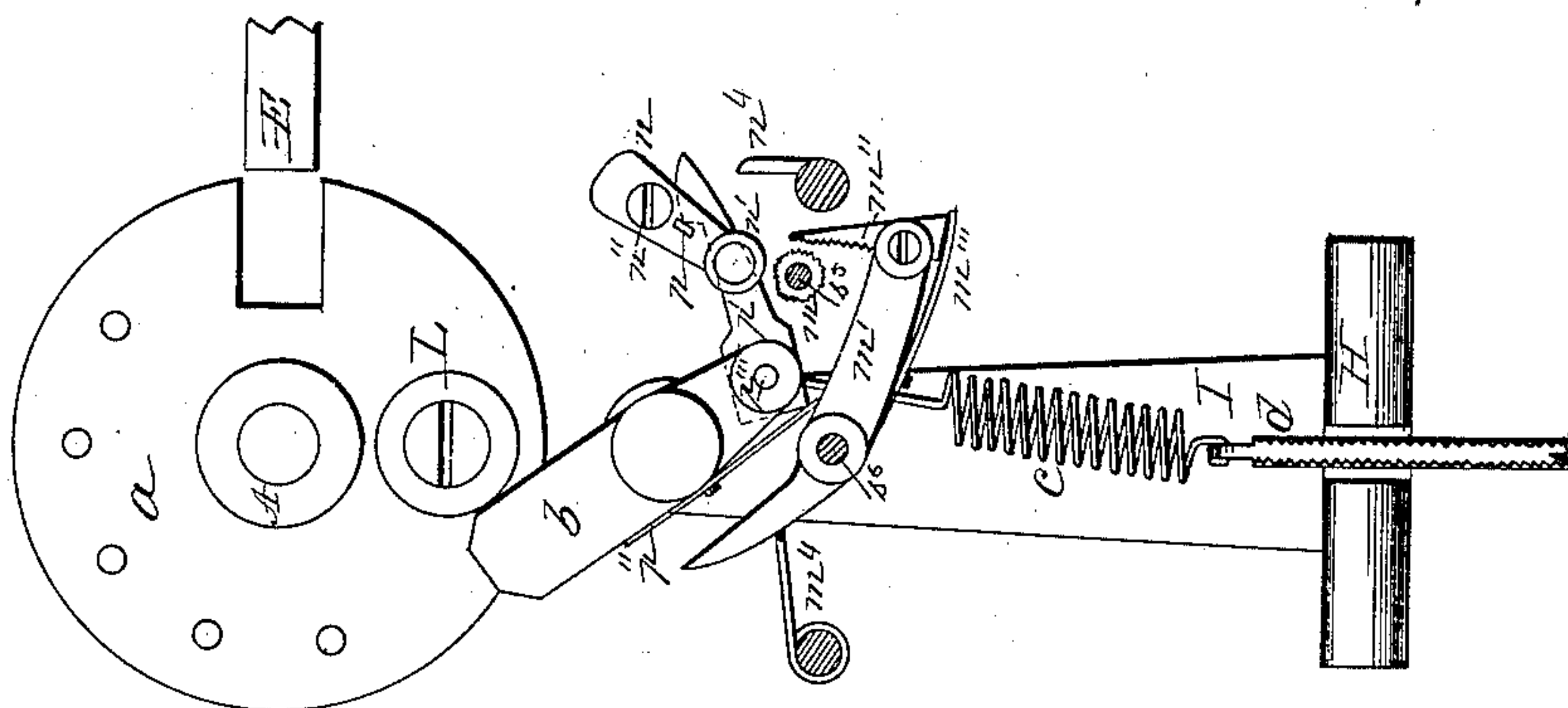


Fig. 7.

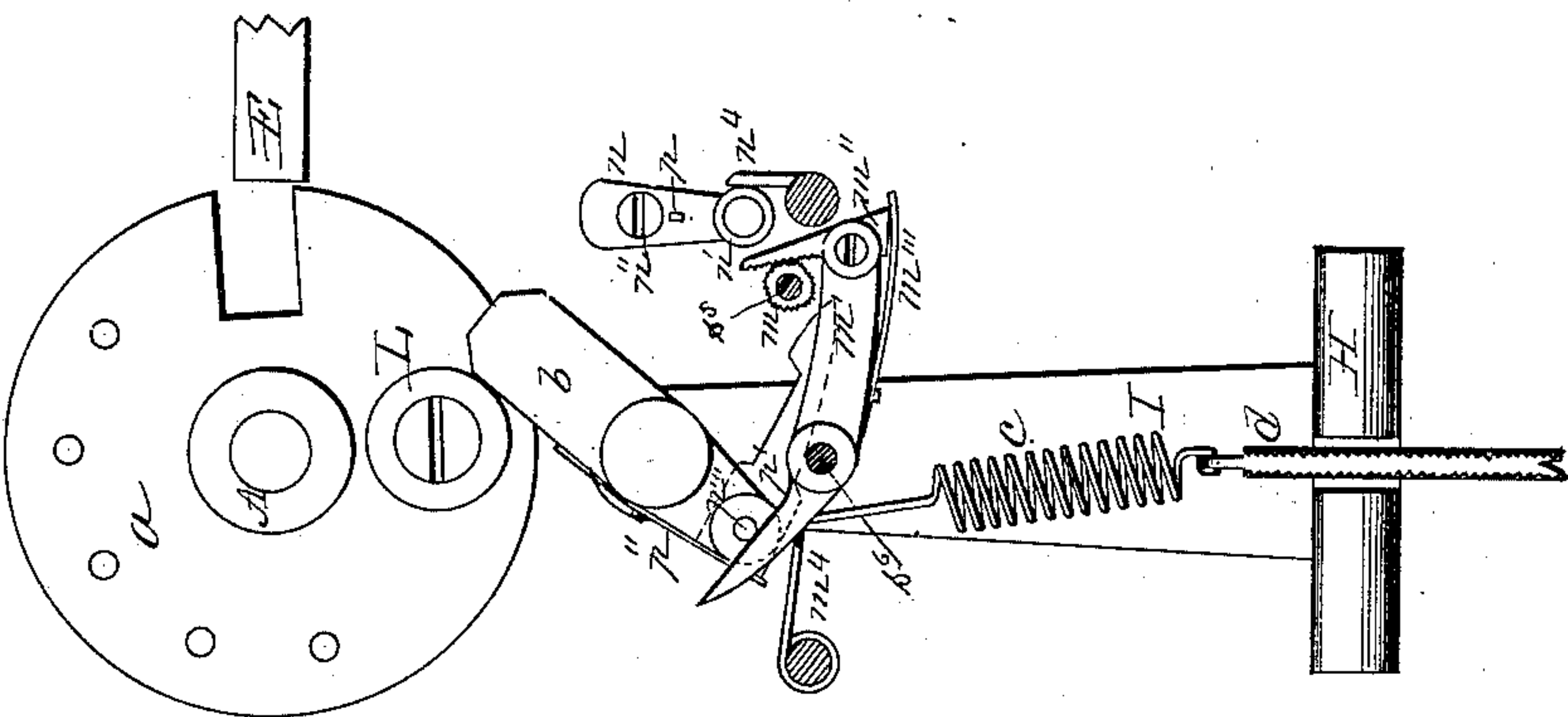
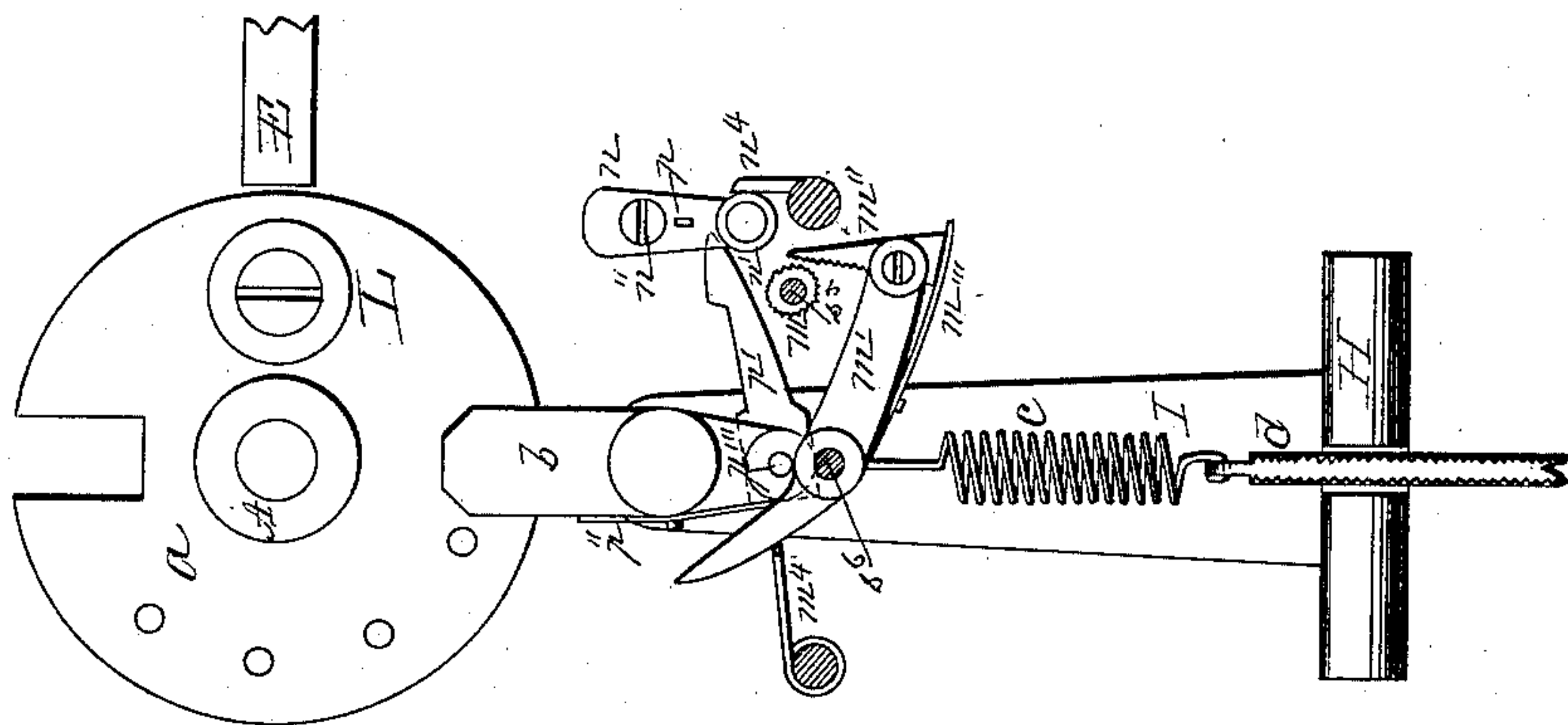


Fig. 6.



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UNITED STATES PATENT OFFICE.

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TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 333,682, dated January 5, 1886.

Application filed May 26, 1884. Serial No. 132,846. (Model.)

To all whom it may concern:

Be it known that I, CHARLES H. SHAFFER, a citizen of the United States, residing in the city of Rockford, county of Winnebago, and State of Illinois, have invented a new and useful Time-Lock, of which the following is a specification.

This invention relates to a locking mechanism in which a time-movement is employed to determine the time at which the lock may be opened.

The object of this invention is to provide a time-lock which while the time-movement is running can only be opened at a predetermined time by the combination to which the lock has been adjusted, and when the time-movement is not running additional movements of the locking mechanism, which can be designated by additional numbers to the combination, are required to open the lock.

This invention consists in a spring-actuated device to disarrange the adjusted locking mechanism to prevent opening the lock; in a spring-actuated device controlled by the time-movement to permit the lock to be opened at a predetermined time; in a spring-actuated device to permit the lock to be opened when the movement is stopped; in mechanism whereby the time-movement may be adjusted to permit the lock to be opened at any predetermined time; also, in automatic mechanism made adjustable to prevent opening the lock on Sunday, or any one day in seven, and capable of adjustment to permit the lock to be opened any day in the week at any predetermined time, all of which will be hereinafter more fully described.

In the accompanying drawings I have represented a time-lock embodying my invention, in which Figure 1 is a face view of a portion of the inner face of the safe-door having applied thereto a time-lock embodying my invention; Fig. 2, a side elevation of the same. Fig. 3 is a face view of the mechanism connecting the time-movement with the lock to disarrange the adjusted locking mechanism. Fig. 4 is an edge elevation of the devices shown in Fig. 3. Fig. 5 is a face view of the mechanism connecting the time-movement with the lock to disarrange the adjusted locking mechanism, with the mechanism employed to open

the lock when the time-movement is stopped added. Figs. 6, 7, and 8 show various portions of the parts in opening the lock when the time movement is stopped. Fig. 9 is an isometrical representation of the disengaging-lever and its attachments. Fig. 10 is a section of the heptagonal hub and spring to the pin-toothed wheel on dotted line *x* on Fig. 2. Fig. 11 is a perspective view of a portion of the movement-frame and certain attachments.

The locking mechanism represented in the figures, consisting of the single-gated tumblers *a a' a''* and driving-wheel *a'''*, of disk form, supported on a suitable spindle, *A*, within a supporting-frame, *B*, and mounted upon the door-wall *C*, including the graduated dial *D*, the bolt *E*, and its operating mechanism, is substantially such as is in common use in vaults and safes. The time-movement, consisting of the gear-train, balance-wheel, escapement and going springs, supported within the frame-work *F*, is of a well-known construction. This time-movement is mounted on a suitable supporting-frame, *G*, fixed to the door-wall in such relative position with the locking mechanism that suitable devices may be employed to connect the time-movement with the locking mechanism. The time-movement is connected with the locking mechanism by means of a right-angle lever consisting of a rock-shaft, *H*, a vertical lever-arm, *I*, and a horizontal lever-arm, *J*. This right-angled lever is supported by means of its rock-shaft on pivoted bearings on the frame *G* on which the time-movement is supported, and in such position thereon that the free end of the vertical arm *I* extends nearly to the lock-tumblers, and the free end of the horizontal arm *J* extends forward of the face side of the movement-frame.

At *b* is represented a lever having a free pivotal connection with the free end of the arm *I* of the angle-lever, in such position thereon that its free upper end will overlap the lock-tumbler *a*.

At *c* is represented a spring having a pivotal connection with the lower end of the lever *b*. This spring *c*, from its connection with the lever *b*, depends in a plane substantially parallel with the lever-arm *I*, and its depending end is connected to a screw-bar, *d*, made

adjustable lengthwise in a fixed support, d' , by means of suitable screw-nuts, d'' , to vary the force of its spring action, which tends to carry the lever b from its position in solid lines in Figs. 2 and 4 to its position shown in the dotted lines in Fig. 4.

The fixed support d' is secured upon a supporting-frame, G , near its lower edge, in any suitable manner.

At e is represented a cam-formed drop-wheel produced in disk-form, having a portion of its periphery cut away, as shown in Fig. 3. This drop-wheel is mounted to revolve on the axial center of the center shaft of the time-movement, preferably between the face-dial of the movement and the movement-supporting frame, and it is connected with the movement by a suitable gear-train in such a manner as to make one complete revolution in each twenty-four hours. It is also made adjustable independent of the time or face movement, to set the drop-notch in its periphery to any time within the twenty-four hours.

At e' is represented a drop-lever having one end pivoted at e'' to the movement-supporting frame, said lever adapted to vibrate in a vertical plane parallel with the plane of the drop-wheel. This drop-lever, from its pivotal support, extends laterally over the movement-supporting frame, contiguous to the rear face thereof, and to the upper peripheral edge of the drop-wheel. An anti-friction roller, e^3 , projects from the outer face of the drop-lever e' at a point to engage the drop-wheel centrally over its support.

At K is represented a connecting-rod having its upper end pivoted to the free end of the drop-lever, from which point it depends, passing in a free manner through the free end of the horizontal arm J of the angle-lever. The lower end portion of this connecting-rod is screw-threaded and provided with a screw-nut, h , made adjustable thereon, to regulate and limit the descent of the rod through the free end of the horizontal arm of the angle-lever.

At h' is represented a spiral spring placed on the depending end portion of the connecting-rod, below the horizontal arm J , and made adjustable to vary its spring force, and held in its adjusted position by means of the screw-nuts h^2 and h^3 . This spring h' is employed to hold the parts with which it is connected in their relative position in such manner that when the anti-friction roller e^3 is on the periphery of the drop-wheel the disarranging-lever b will be held in the track of the anti-friction wheel L on the tumbler; and when the anti-friction wheel is under the disarranging-lever the spring h will yield and permit the anti-friction roller e^3 to rise from the drop-notch in the drop-wheel to its periphery without materially interfering with the running of the time-movement.

At L is represented an anti-friction wheel fixed to the outer face of the tumbler a of the locking mechanism, in such position thereon that in the rotations of the tumbler it will

engage the free end of the disarranging-lever b when it is in the position shown in the solid lines in Figs. 2 and 4, and will pass under the lever b when in the position of the dotted lines in Fig. 4. By this construction and arrangement, and with the parts properly adjusted, it will be seen that when the anti-friction roller e^3 is supported on the periphery of the drop-wheel the disarranging-lever b will be in the position shown in the solid lines in Figs. 2 and 4, in the plane in which the anti-friction wheel L is carried in the rotations of the tumbler. When the graduated dial D is rotated to the right hand to adjust the tumblers in the ordinary manner, the anti-friction wheel L will carry the disarranging-lever b to the inclined position shown in the dotted lines in Fig. 3; and when the first tumbler, a , is released, by turning the graduated dial to the left hand to adjust the second tumbler, a' , the disarranging-lever, by means of its spring action, will return to its vertical position, as shown in the solid lines, and in this return movement will carry the tumbler a to its position in the solid lines, and place the gating therein at a point distant from the bolt. The reverse movement of the graduated dial D , for the purpose of adjusting the tumblers, will produce like reverse movements of the parts, and in both instances will prevent the adjustment of the locking mechanism, and consequently prevent opening the lock. When the drop-wheel e has been carried by the time-movement to the position to permit the anti-friction roller e^3 to drop into the drop-notch in the wheel, as shown in the dotted lines in Fig. 3, the drop-lever e' , connecting-rod K , horizontal arm J , vertical arm I , and disarranging-lever b will be carried by the action of the disarranging-spring c to their respective dotted-line positions, as shown in Fig. 4, and permit the adjustment of the locking mechanism to open the lock.

At M is represented a time-dial of annular disk-ring form, graduated into twenty-four, equal hour divisions, numbered consecutively from one to twenty-four. This dial M is mounted over the movement-supporting frame, concentric with the center shaft of the movement on suitable supports rising from the movement-frame.

At N is represented a rotary dial, made part of or fixed to the drop-wheel e , concentric therewith, and to rotate with the drop-wheel on the same axial center. This rotary dial is graduated into twenty-four equal hour-divisions, numbered consecutively from one to twenty-four, to correspond with the hour-divisions of the time-dial.

At i is represented an hour-hand, having a frictional connection with the hour gear-wheel of the face-movement, in such a manner as to revolve with the gear-wheel once in twenty-four hours, but capable of adjustment to any point on the dial independent of the wheel.

At i' is represented a minute-hand fixed to the center shaft of the movement to revolve

therewith, and to make a complete revolution once in each hour. The center shaft is frictionally connected with the time-movement to permit the minute-hand to be adjusted to any point upon the dial independent of the movement.

From the foregoing it will be seen that the construction and arrangement of these parts are such that the hands may be adjusted to the divisions of time, and that the drop-wheel may be adjusted to permit the lock to be opened at any predetermined time within the twenty-four hours. This adjustment of the drop-wheel is accomplished by turning the rotary dial to the right hand until the hour-hand is directly over the number on the dial indicating the hour or time fixed upon to open the lock.

At k is represented a pin-toothed wheel of disk form irregular in outline, having a peripheral enlargement, k' . This wheel is fitted with seven pin-teeth, k^2 , projecting from its side at equal intervals, and is mounted to revolve on a stud-journal, and in such relative position with the rotary dial N that a pin-tooth, k^3 , projecting from its periphery will engage one of the pin-teeth k^2 of disk-wheel k in each revolution, and carry the wheel one-seventh of a revolution, or will cause it to make one complete revolution in seven days. The hub l of the pin-toothed wheel is of heptagonal form. A spring, l' , is employed to engage the sides of the hub to limit the movement of the pin-toothed wheel to one-seventh of a complete revolution in each complete revolution of the rotary dial. The relative position of the pin-toothed wheel k with the connecting-rod K is such that on one day in seven the peripheral enlargement k' of the pin-toothed wheel will be automatically carried to the position shown in Fig. 1 to engage a pin-stud, l^2 , which projects from the connecting-rod, and operates to sustain the drop-lever and the parts connected therewith in their solid-line position, as shown in Figs. 3 and 4, to carry the anti-friction roller over the drop-notch in the drop-wheel e , and consequently prevent opening the lock on such day. The pin-toothed wheel k is made adjustable on its journal-support, to permit of an adjustment to bring its peripheral enlargement in position to engage the stud-pin l^2 of the connecting-rod on any one day of the week, and when adjusted will be automatic on such day in each week until changed or adjusted to some other day.

At m is represented a spur or saw-toothed pinion mounted upon the end of the time-movement pinion-shaft s^5 , to revolve therewith.

At m' is represented a trip-lever, pivoted upon a stud, s^6 , which is attached to the rear side of the upper back bar of the movement-frame, and having a serrated pawl, m^2 , pivoted to its end, and a spring, m^3 , fixed to the edge of said trip-lever in such position that its free end will engage the heel end of the serrated pawl to give it position relatively with the trip-lever m' in

a manner to permit a limited vibratory movement of the free end of the serrated pawl. This lever m' , with the serrated pawl connected therewith, is centrally pivoted to the movement-frame in such relative position with the spur-pinion m that when the lever is in the position shown in Figs. 5 and 7 the serrated surface of the spring-actuated pawl m^2 will engage the spur-toothed pinion m .

m^4 represents a spring employed to retain the lever in its position (shown in Figs. 6 and 8) disengaged from the spur-pinion.

At n is represented a lever of crank-arm form, having its free end fitted with an anti-friction roller, n' . This crank-arm lever n is pivotally mounted upon a support, n^2 , projecting from an arm attached to one of the posts of the frame-work F , to permit a swinging movement of its free end, and in such relative position with the spur-pinion m as to engage the free end of the serrated pawl when in its elevated position, as shown in Fig. 5.

At n^3 is represented a spring coiled on the support of the crank-arm lever n , and connected with the support and with the lever-arm in such a manner that its spring action tends to carry the arm against a stop, n^4 , employed to limit its outward movement. This stop n^4 is mounted upon one of the posts which connect the frame-work F with the supporting frame G , as shown in Fig. 2 of the drawings. This crank-arm lever n is provided with a latch-pin, p , extending from its inner face parallel with its support.

At p' is represented a hook-detent having a pivotal connection with the depending end of the disarranging-lever b , and a spring, p^2 , is fixed to the edge of the disarranging-lever in such position thereon that its free end will engage the heel end of the hook-detent to give it position relatively with the disarranging-lever b , in a manner to permit a vibratory movement of its free hook-detent end.

At p^3 is represented a pin-stud projecting from the outer face of the depending end of the disarranging-lever b , in position to engage the free arm of the trip-lever m' , as shown in Fig. 7, to cause the serrated pawl to engage the spur-gear, as shown in Figs. 5 and 7.

From the foregoing it will be seen that if the graduated dial D is rotated to the right hand, to adjust the tumblers of the locking mechanism in the usual manner, the trip-lever m' will, by means of the pin-stud p^3 , be carried to the position shown in Fig. 7, and the serrated pawl will have engaged the spur-toothed pinion, and when the trip-lever m' is released from the action of the pin-stud the action of the spur-toothed pinion upon the serrated pawl, if the time-movement is running, will immediately return the trip-lever to the position shown in Figs. 6 and 8, and the disarranging-lever will be free to prevent the adjustment of the locking mechanism, as hereinbefore described. If, however, the time-movement is stopped from any cause at any other time than the predeter-

mined time to which the mechanism has been adjusted for opening the lock, it may be opened by first turning the graduated dial D to the right a sufficient number of times to cause the serrated pawl m^2 to engage the spur-pinion m , at which time the parts will be in the position shown in Fig. 7, and the trip-lever will be held in its position by the contact of the serrated pawl with the spur-pinion. The graduated dial D is then turned to the left a sufficient number of times to carry the tumbler a to the position shown in the dotted lines at Fig. 5, which will engage the latch-pin p and hold the disarranging-lever, to permit the adjustment of the tumbler a by the first number of the combination to the position shown in the solid lines in Fig. 5, and the remaining tumblers in the order of the combination-numbers to receive the bolt F in the gatings of the tumblers to open the lock.

For the purpose of more readily opening the lock when the movement is not running, the additional portions of the graduated dial D may be designated by additional numbers preceding the numbers employed in the combination for opening the lock when the movement is running, and for greater security the additional prefixed numbers to the combination may be employed as a secret number or numbers known to a single party to be called upon when from any cause the time-movement has stopped at any time other than that predetermined at which to open the lock.

It will be noticed in the drawings that the corners at the upper end of the disarranging-lever are beveled. This is to obviate the danger of breaking by suddenly turning the tumbler back sharply after it has passed the lever, and the latter is momentarily held in position turned to one side. If the corners were perfectly straight and angular, it might be possible to catch the lever upon its end in such a way as to break or disarrange the parts, so as to destroy the utility of the disarranging mechanism. If the corners are rounded, it will of course have the same effect as the bevels. The anti-friction wheel on the tumbler also aids in this direction, as well as to relieve the friction and cause the parts to work more easily in the normal operation explained above.

I claim as my invention—

1. In a time-lock, a permutation-tumbler provided with a stop projection, in combination with an elastic or yielding stop adapted to engage therewith and throw the tumbler out of setting position by its elasticity, but without preventing its rotation, and an adjustable support on which said stop is mounted, whereby it may be moved bodily out of operative position, substantially as and for the purposes set forth.

2. In a time-lock, a permutation-tumbler provided with a stop projection, in combination with an elastic or yielding disarranging-lever mounted on a pivot, on which it is free to vibrate back and forth, and arranged to

stand normally in the path of the tumbler projection at a point where it will be turned somewhat to one side when the tumbler is brought into setting position, and which by its elasticity will throw the latter out of position when it is released by the setting-knob, substantially as and for the purposes set forth.

3. In a time-lock, a permutation-tumbler provided with a stop projection, in combination with an elastic or yielding disarranging-lever mounted on a pivot, on which it vibrates, a spring arranged to hold the lever in a normal position directly in the path of the permutation-stop, a dog or pawl, and a catch arranged to operate with the pawl to hold the lever out of operative position when turned to one side, substantially as and for the purposes set forth.

4. In a time-lock, a permutation-tumbler provided with a stop projection, and a disarranging-lever having the corners beveled or rounded at the free end thereof, substantially as and for the purposes set forth.

5. In a time-lock, a permutation-tumbler provided with a stop projection consisting of an anti-friction wheel or roller, in combination with an elastic or yielding disarranging-lever, substantially as and for the purposes set forth.

6. In a time-lock, a permutation-tumbler provided with a stop projection consisting of an anti-friction roller, in combination with an elastic or yielding disarranging-lever having beveled or rounded corners at its outer end, substantially as and for the purposes set forth.

7. The combination of a pivoted lever support, a disarranging-lever having a pivoted connection with the supporting-lever, and a disarranging-spring connected to the disarranging-lever, substantially as and for the purpose set forth.

8. In a time-lock, a permutation-tumbler, in combination with a pivoted disarranging-lever, a vibrating support on which said lever is mounted, and a double-acting spring arranged to actuate both the lever and its support, substantially as and for the purposes set forth.

9. In a time-lock, a time-movement, in combination with a permutation-tumbler, vibrating disarranging-lever, vibrating support for said lever, a double-acting spring arranged to actuate both the lever and its support, and a stop device connected to the lever-support and arranged to be operated by the time-movement to vibrate the said support in a direction against the force of the spring, substantially as and for the purposes set forth.

10. The combination, with a drop-wheel of a time-movement, and with a tumbler of a locking mechanism, of a double-action spring-actuated disarranging mechanism to prevent the adjustment of the lock-tumblers, substantially as and for the purpose set forth.

11. The combination, with the mechanism connecting the spring-actuated disarranging-lever with the drop-wheel connected with the time-movement, of a spring made adjustable

to hold the connecting parts in their relative position in a yielding manner, substantially as and for the purpose set forth.

12. The combination, with the connecting-rod and with the right-angled lever, of an adjustable screw-nut to limit the movement of the rod relatively with the arm of the angle-lever, a drop-lever connected to the said rod, and a drop-wheel operated by the time-movement, substantially as and for the purpose set forth.

13. The combination of a spur-toothed pinion having a connection with the time-movement, a spring-actuated trip-lever fitted with a spring-actuated serrated pawl to engage the spur-toothed gear-pinion, and the disarranging-lever fitted to engage the free arm of the trip-lever, substantially as and for the purpose set forth.

14. The combination of the spur-toothed pinion, the spring-actuated serrated pawl, the spring-actuated crank-lever arm, and the spring-actuated hook-lever detent to engage the latch-pin on the crank-lever arm, and having a pivotal connection with disarranging-lever, substantially as and for the purpose set forth.

15. In a time-lock, a permutation tumbler, in combination with a yielding vibrating disarranging-lever, a detent connected to the lever, and a stop arranged to engage with said detent, substantially as and for the purposes set forth.

16. In a time-lock, the disarranging-lever provided with a hook-detent, in combination with a pivoted yielding crank-arm provided with a latch-pin adapted to engage the said detent, substantially as and for the purpose set forth.

17. In a time-lock, permutation-tumblers, in combination with a disarranging device mounted on a movable support, a wheel controlled by the time-movement, and drop mechanism, substantially as and for the purposes set forth.

18. The combination, with the rotary dial and with the drop mechanism, of a pin-toothed wheel in irregular outline, operating automatically to engage the drop mechanism, substantially as and for the purpose set forth.

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