

No. 649,589.

Patented May 15, 1900.

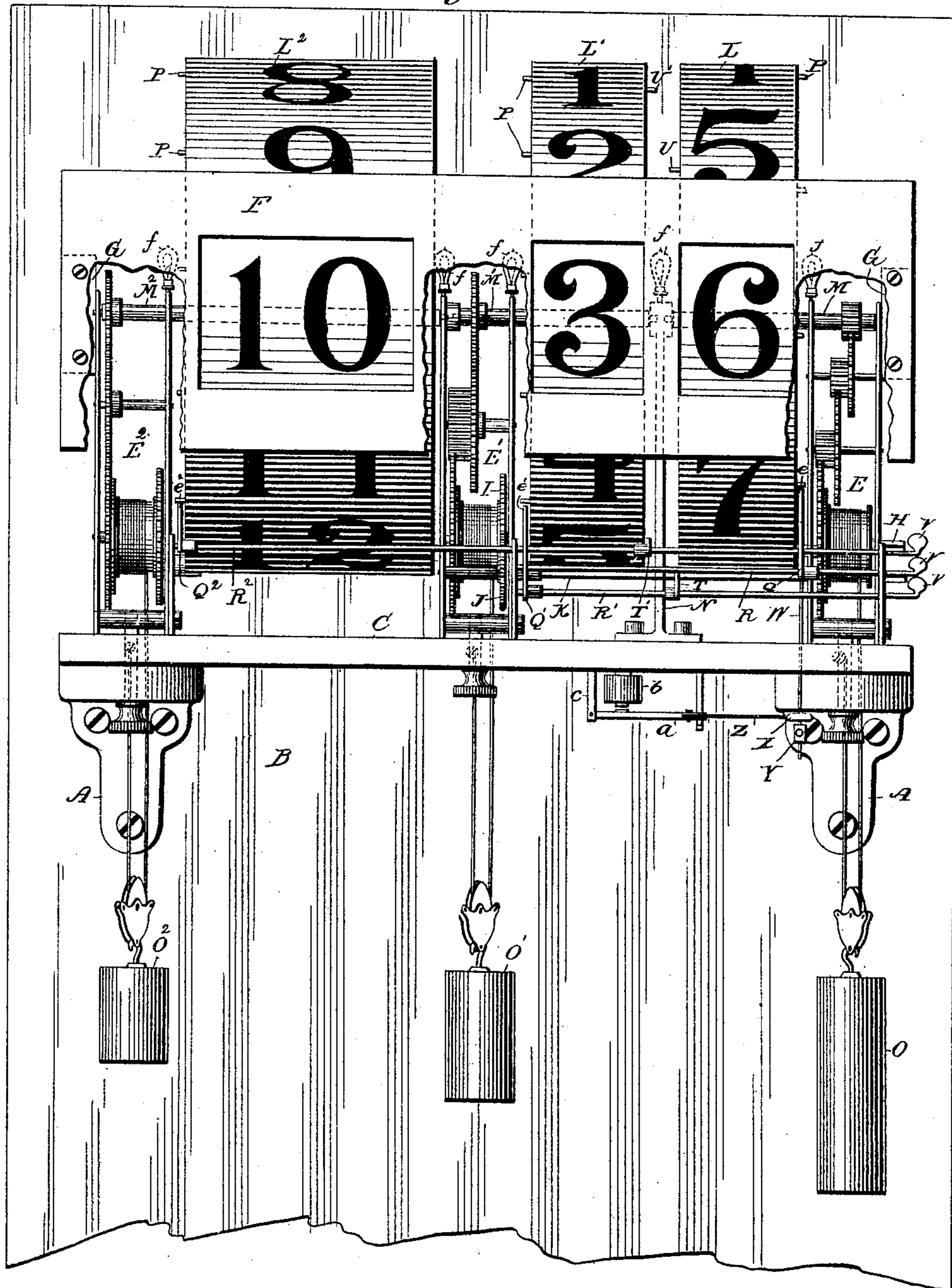
S. P. THRASHER.
SECONDARY ELECTRIC CLOCK.

(Application filed Mar. 15, 1897.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1



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3 Sheets—Sheet 2.

Fig. 2.

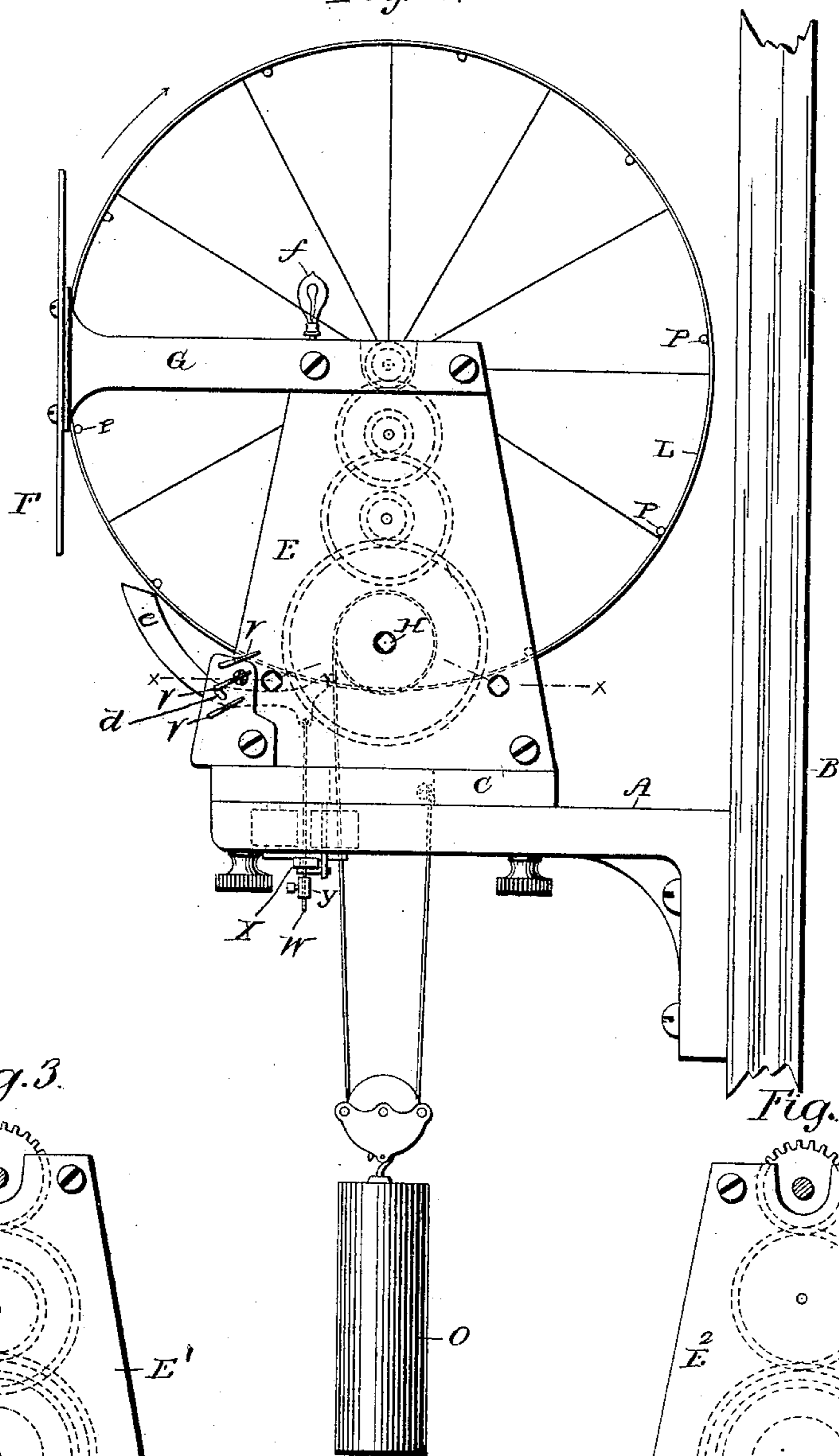


Fig. 3.

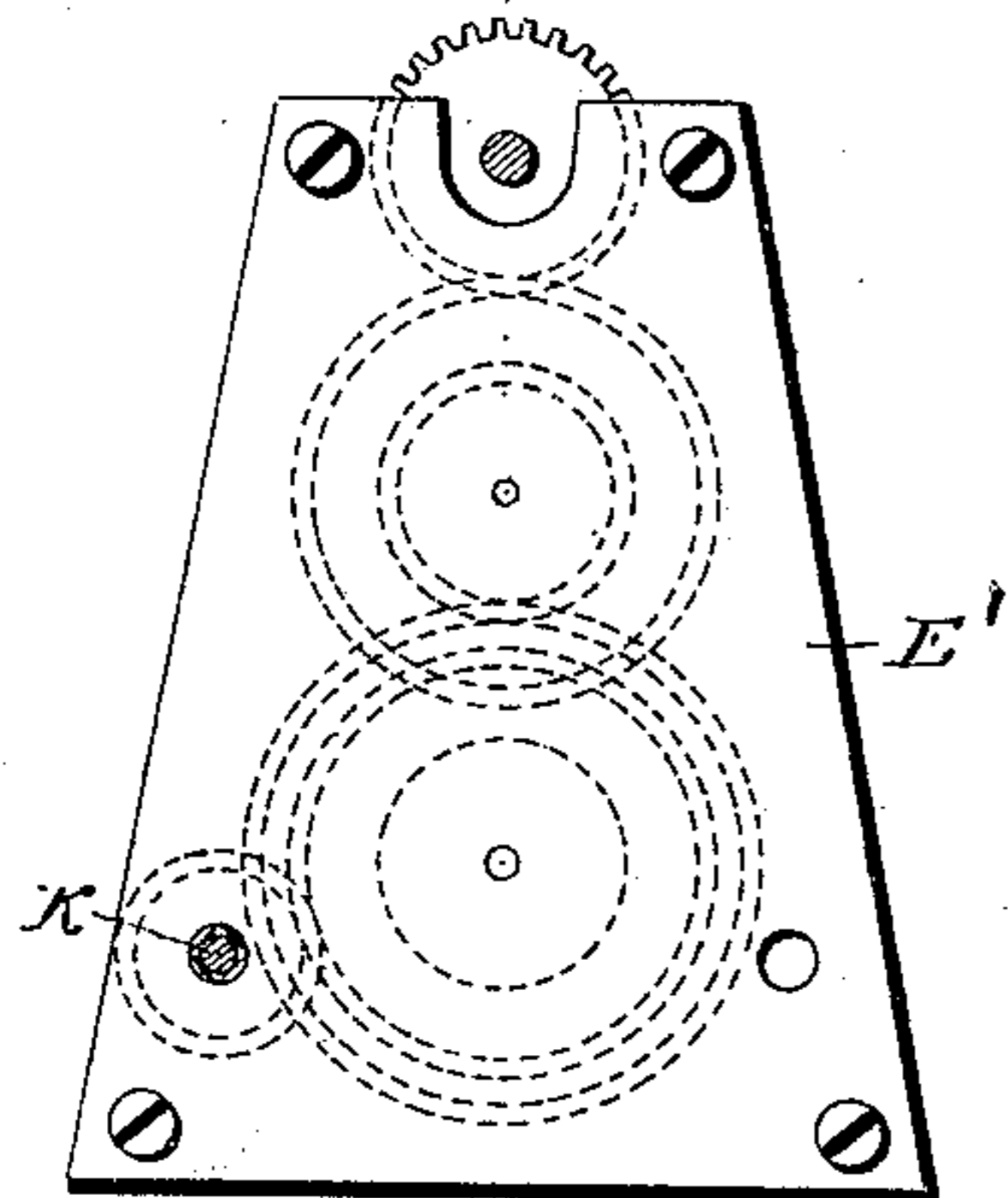
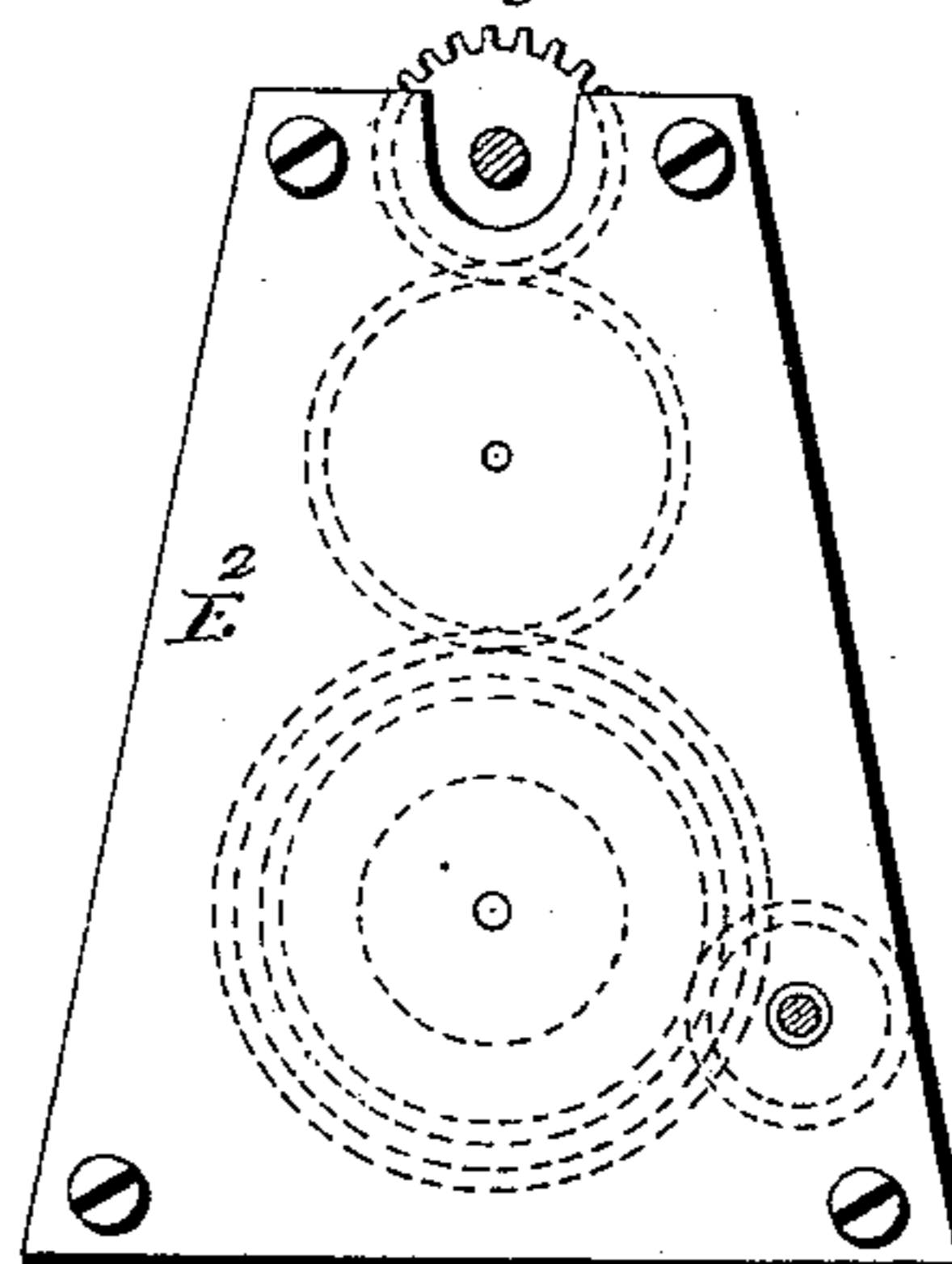


Fig. 4.



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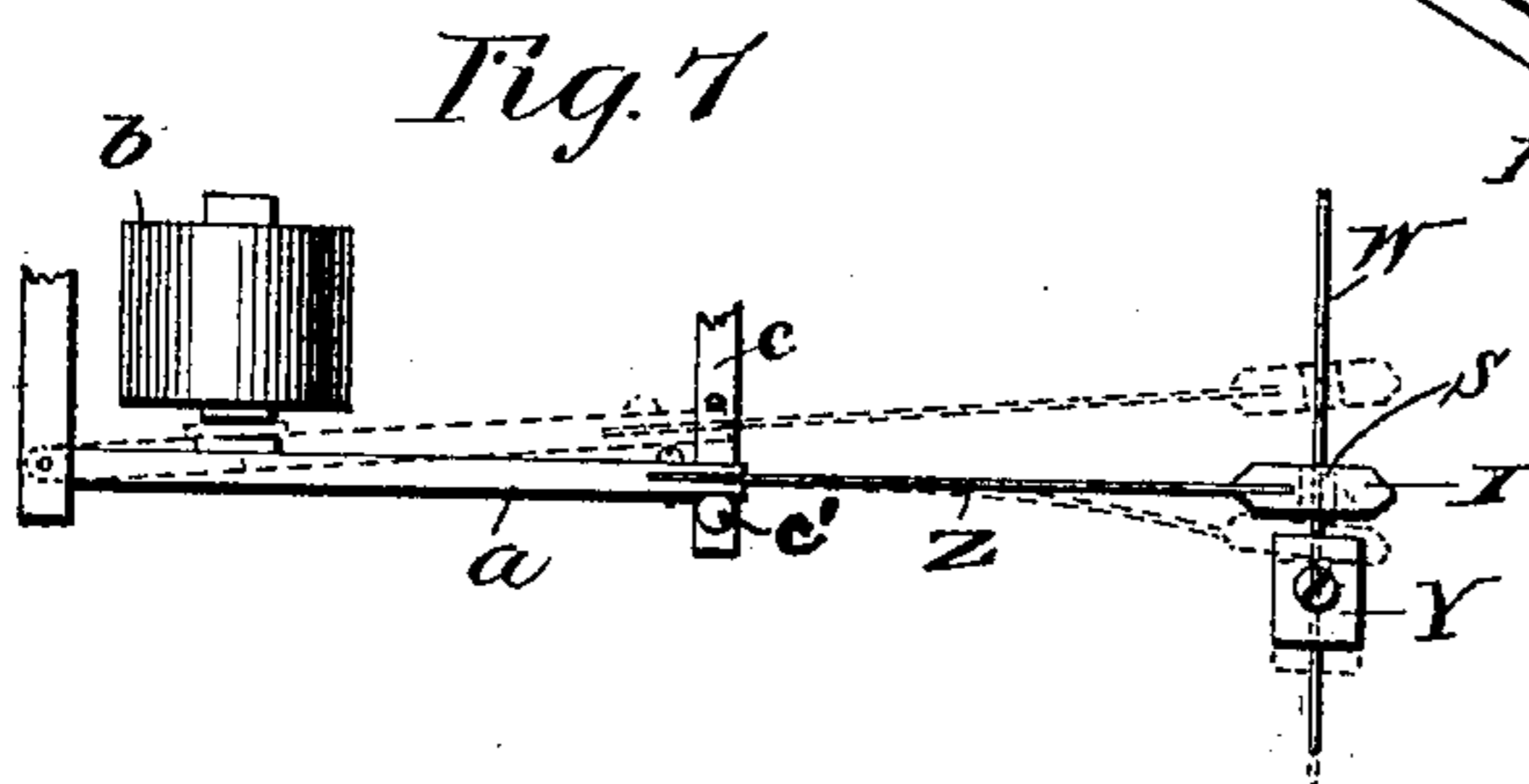
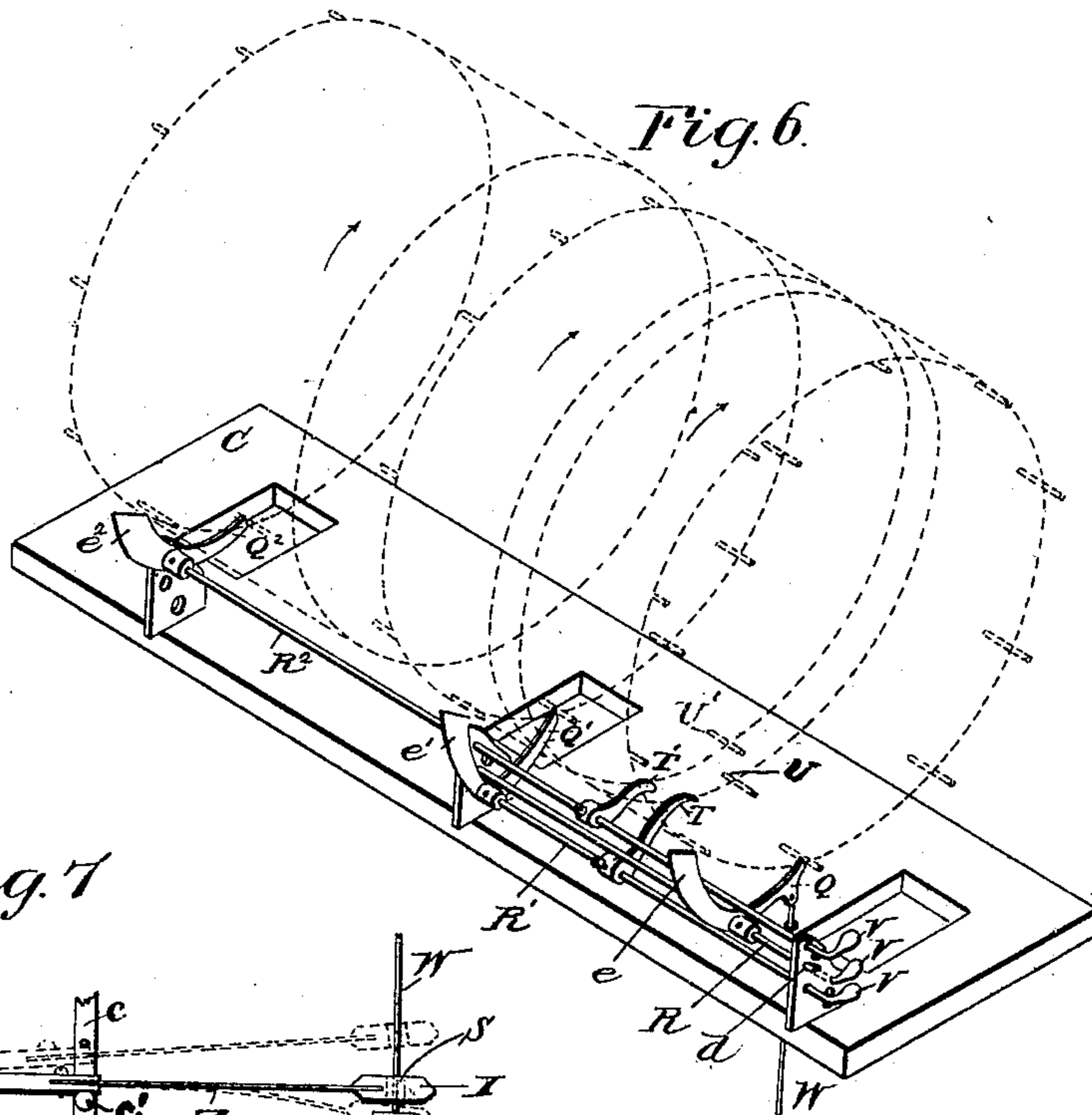
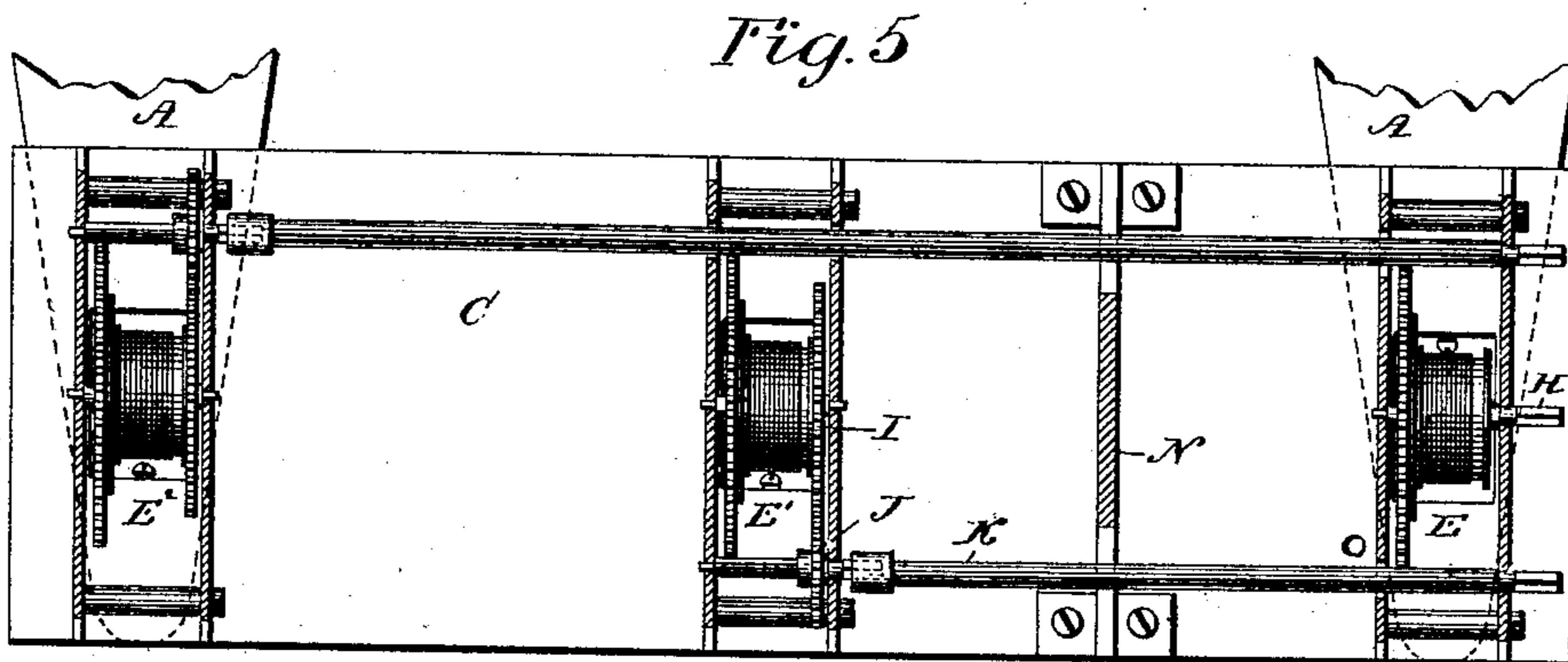
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

SAMUEL P. THRASHER, OF NEW HAVEN, CONNECTICUT.

SECONDARY ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 649,589, dated May 15, 1900.

Application filed March 15, 1897. Serial No. 627,472. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL P. THRASHER, a citizen of the United States, and a resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Time-Indicating Devices, of which the following is a specification.

My invention relates to time-indicating devices, especially to those in which rotating drums carry the time-numerals; and my object is to improve and simplify certain of the parts of the mechanism.

Figure 1 is a front elevation, partly broken away, showing the preferred embodiment of my device in operation. Fig. 2 is a side elevation showing but one of the pawls adapted to engage the drums. Fig. 3 is a view showing the train that operates the ten-minute drum. Fig. 4 is a side elevation of the train that operates the hour-drum. Fig. 5 is a sectional view on the line $x x$, Fig. 2, showing the arbors that wind the different movements. Fig. 6 is a perspective view showing the pawls, shafts, and supports in connection with the spools or drums, which are shown by dotted lines. Fig. 7 is a detailed view showing the construction and operation of the armature in connection with the electromagnet and tripping-rod.

In the above preferred construction, A A are brackets secured to a board or suitable standard B.

C is the base-plate of my mechanism and is held in proper position on the brackets by means of the screws passing through the same. Arranged on this plate are preferably independent movements $E E' E^2$, having their frames made, preferably, of plates and pillars similar to frames of ordinary clock-movements and fastened in their relative positions by means of screws which extend through the base-plate and enter the pillars at the lower end of the respective frames. These frames are made, preferably, alike, arranged in a straight line, and serve in part to support the drums carrying figures in a manner more particularly hereinafter described.

F is a perforated mat or plate arranged to expose the figures and supported by means of the forward-extending arms G G, secured to the frames at the upper ends of the move-

ments $E E^2$, respectively. Each movement is provided with an ordinary wheel or barrel and weight and train of gears connecting the main wheels with the pinions of the shafts of the drums, as shown.

The winding mechanism of my device I have arranged as follows, (see Fig. 5:) The barrel-arbor H of the movement E is adapted to have the key directly attached thereto. The arbor of the barrel of movement E' is provided with a winding-wheel I, made fast thereon, and is driven by a second winding-wheel J, mounted on its arbor, one end of which passes through one of the plates of the movement and is squared to receive the socket end of the shaft K, which extends lengthwise to the outside of my device, having its outer end journaled in the outer plate of the movement E, and is adapted at that point to receive the winding-key in the usual manner. In like manner I have provided the barrel-arbor of the movement E^2 with a similar winding-gearing and a similar winding shaft or arbor extending also lengthwise to the outside of the movement E, at which point the key is also applied when winding the movement E^2 . This arrangement allows all the movements to be wound on the side of the device, which will be especially desirable when the same is built on a large scale or when the nature of the front of the inclosure containing the mechanism is such as to prevent ready access to the suitable winding of the arbors directly, as in the case of being used in a limited space not provided with an incase-ment which opens in the front, as in the case of small towers. Besides, as in the present construction, it admits of arranging the several winding-barrels substantially above the bottom line of the drums and in close proximity thereto.

L L' L² are movable time-indicators, in the present embodiment pivoted drums having figures arranged thereon to show the time of day. The figures in the present embodiment are painted on or otherwise attached to the drums; but it is obvious that the drums will still carry the figures whether they are actually attached to the drums or not, the drum L having the ten numerals from "1" to "0," the drum L' having the figures "0" to "5," inclusive, and duplicated, and the drum L²

being provided with the numerals "1" to "12," inclusive; but as the arrangement and successive changes of the numerals on the respective drums are substantially the same as shown in my application under date of October 19, Serial No. 609,293, I need not explain the same further in this description.

I will now proceed to describe the novel mechanism and means which I employ in the present invention to rotate the drums.

M M M² are shafts of the respective drums L L' L², the two former shafts having one end journaled in the standard N, secured to the base-plate of the movements, and having their opposite ends supported by one of the plates of their respective movements, the opposite plates of the said movements being cut away around the said shaft, as shown by dotted lines in Fig. 2 and full lines in Fig. 3, and the latter shaft having its ends supported by the upper ends of one of the plates of the movements E E' E², the upper ends of the opposite plates being cut away about the shaft, as shown in Figs. 3 and 4, and each of the shafts of the said drums being provided with a pinion in mesh with the trains of their respective movements, by means of which the power of the weights O O O of the movements is communicated to the said shafts. The power of the weights thus applied to the drums is constant and adapted at all times to cause them to turn when free to do so. As the drum L makes twelve revolutions to one revolution of the drum L' and as the drum L' makes six revolutions to one revolution of the drum L², I have differentiated the gearing of their respective movements, and by providing the highest-gearred train for the drum L, a lower-gearred train for the drum L', and a still lower-gearred train for the drum L², I have also accordingly reduced the size of their respective weights, as shown in Fig. 1. I have shown also by dotted lines in Figs. 2, 3, and 4 the respective trains substantially as differentiated in this device.

Another novel feature in the present invention, in connection with the drums carrying figures to denote the time of day, I will now explain.

I have provided the drums with laterally-extending stop-fingers P P and trip-fingers U U, properly secured to the rims of the drums and adapted to engage the tripping and releasing pawls in the operation of stopping and releasing the drums and when not in engagement with the said tripping and releasing pawls the drums being left entirely free from contact with the said pawls in their rotation.

Referring to Fig. 6, in which I have shown the drums and fingers by dotted lines and the shafts with their pawls in full lines, Q is a stop pawl or dog mounted on a shaft R and weighted at its outer end and having its inner other end in engagement with a stop finger or pin of the drum L, as shown. When I say that the pawl "engages" the time-indicator (in this case the drum) to prevent the rotation thereof, I do not mean that the pawl must necessarily engage the time-indicator itself, because these stops which the pawl engages obviously need not be attached to the drum itself, and I therefore do not by that expression mean to limit myself to a construction in which the stops are necessarily on the time-indicator itself. T is a releasing-pawl on shaft R' of the stop-pawl Q', and T' a similar releasing-pawl on shaft R² of the stop-pawl Q². The said releasing-pawl T has its curved end disposed in the pathway of the releasing-finger U on the units-of-minutes drum and the releasing-pawl T' its curved end arranged in the pathway of the releasing-fingers U' U' on the tens-of-minutes drum.

When the device is in operation, it will be clearly seen that the stop-pawls referred to and operating as shown will only come in contact with the stop-pins, being arranged independently of the rims of the drums and in line with the stop-pins, and that likewise for the same reason the releasing-pawls will only come in contact with their releasing-pins. The limit of rotation of the pawls and their shafts may be effected by any well-known means. Aside from avoiding undue friction and expense of power by thus avoiding contact or bearing upon the rims of the drums, substantially the whole width of the rim may be utilized in space for the figures, and relatively, as compared with the size of the figures, much lighter rims can thus be employed.

As a means of setting my device from one side I have elongated the ends of the pawl-shafts and arranged thereon, outside of the movement E, short levers or keys V V V, which when slightly depressed by the operator free their respective drums and permit the rotation thereof step by step to any desired point or to the correct time. By this means not only the winding, as previously described, but also the setting, may be effected from the side of my time mechanism.

Another novel feature in this invention in connection with the operation of the drums is the means which I employ for tripping or releasing the drum L, carrying the units of minutes, and is as follows: The stop-pawl Q is normally in engagement with one of the ten stop-pins of the drum L and is provided with a pitman W, extending downward through a perforation in a hammer X, which when at rest is disposed slightly above an adjustable collar Y, preferably made fast upon its lower end. This "hammer," as I have termed it, is a weight secured or made fast to the outer end of, preferably, a flat spring Z, which forms an extension to an armature *a* of the electromagnet *b*, fastened to the under side of the base-plate C, and is provided with a hanger *c*, extending downward from the said plate to arrest and limit the said armature in its downward movement and upon which it is normally at rest, with the weight slightly

above the collar Y, as clearly shown in Fig. 7. When in operation, these parts operate to release the drum L each minute as follows: The armature is first drawn upward by the force of the magnet when put in circuit, preferably by a master-clock, to the position shown by dotted lines in Fig. 7, having glided freely along the pitman W, now in its normal position, with the stop-pawl Q, to which it is connected, resting against a stop-pin, and upon being released by the magnet the armature falls of its gravity and, suddenly coming to a stop at the point *c'* on the hanger, forthwith imparts a sudden and forcible blow upon the collar Y of the pitman W, caused by the momentum of its hammer and the elasticity of the flat spring Z. I have not indicated the electrical connections, nor any means to energize the magnet at proper intervals; but some such arrangement would not require invention, and one instance of a clock-movement to which electrical connection is made every minute is shown in my previous application filed March 5, 1897, Serial No. 626,012. This sudden blow dislodges the holding-pawl from behind its stop-pin; but the sudden reaction of the spring forthwith removes the weight of the hammer from the collar of the pitman, leaving said pawl free to return to its normal position. To prevent so sudden a release of the pawl from returning to its normal position behind the stop-pin just released in case the drum shall not have by this time moved sufficiently forward to prevent the same, I have provided the shaft-pivot of the said stop-pawl shaft with an inclined elongated bearing *d*, so that when the pawl is holding the drum from turning, as is the case in its normal position, the pivot will be forced to its upward and extreme backward position, as particularly shown in Fig. 2, the pawl having also receded in the direction the wheel when released is to turn. It will now be obvious that by the operation of drawing the engaging end of the pawl downward by the means shown both the force so exerted and the weight of the pawl and its shaft will invariably tend to settle the pivot in the lower and extreme opposite position in the elongated bearing, at the same time carrying the pawl also sufficiently in substantially the same direction to cause its engaging end in its sudden upward movement upon the recoil of the hammer to return to a point beyond or ahead of the engaging face of the stop-pin just released and forthwith in readiness and in proper position to arrest the drum in its rotation by contact with the next succeeding stop-pin. As a further means of insuring the return of the engaging end of the stop-pawl referred to to its normal position in successively engaging the stop-pins of the drum L I have arranged its weighted end *e* in such manner as to be at any time engaged by the stop-pins during the rotation of the drums and forced sufficiently outward thereby to positively return the said engaging end of

the pawl to its normal position should gravity fail to do so. This construction and arrangement which I have carried out in all the stop-pawls insures their respective drums against being released at any time, so as to be rotated, except by a step-by-step movement, thereby preventing undue velocity in turning.

Having shown the method of releasing one of the drums by an electromagnet or other suitable power, I will now explain how the rotation of the said drum so released operates to release the other drums.

As has been previously stated, the several drums are provided with power constantly applied thereto respectively, so that to effect the rotation of any of them at any time it is only necessary that they be released from the holding-pawls, as in the case of the operation of the drum L, which I have just explained.

Referring to Fig. 6, it will be seen that the drum L' is shown as held from turning by means of the pawl Q' in engagement with one of its stop-pins. It will be further seen that the releasing or count pawl T on the shaft R' of the stop-pawl Q' is about to be engaged by the releasing-pin U on the drum L at its next forward movement, and that also when engaged the outer end of the releasing-pawl T will be borne downward and cause its shaft to be turned sufficiently to depress the engaging end of the pawl Q', mounted on the same shaft, thereby releasing the drum L' and allowing it to turn until the next stop-pin thereon engages the pawl in a manner similar to the operation of the drum L, in connection with the pawl Q, as above described, and that in like manner the releasing or count pawl T' is adapted at the proper time to be engaged by one of the releasing-pins of the drum L' during its rotations and cause the release of the drum L² in like manner. The rims of the drums L L' L², I preferably construct of thin sheets of celluloid or other suitable transparent material, and I arrange, preferably, the electric lights *ff* in any suitable manner and in the position substantially as shown to plainly show by transparency of the rims the figures at night, which I regard as one of the important features of my invention.

It is evident that various changes in the construction and relative arrangement of the parts herein shown and described might be made and yet be within the spirit and scope of my invention, and I do not wish to be understood as in any way limiting myself to the construction and arrangement of the several parts hereinbefore described and set forth; but,

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a time-indicating device provided with time-drums having stops thereon, a series of shafts suitably provided with holding and releasing pawls for said stops for effecting the proper changes of time when the device is in operation, and said shafts each ex-

tending to the side of the device and having their ends provided with the finger-pieces by which the said setting is effected, substantially as and for the purposes described.

5 2. In a time-indicating device, in combination with drum L, pawl Q, engaging therewith, said pawl having a pivot located in an elongated bearing *d*, rod W, connected with said pawl Q and having a stop Y, weight or hammer X and spring Z, substantially as and for the purposes described.

10 3. In a time-indicating device, in the tripping mechanism in combination with magnet *b* and armature *a*, the spring end Z and weight X, substantially as and for the purposes described.

15 4. In a time-indicating device in combination, a movable time-indicator, means to move the same, a stop on the same, a pivoted pawl adapted to rock on its pivot and engage said stop to hold said time-indicator, means to automatically rock said pawl, thereby releasing it from said stop and move the same together with its pivot bodily from its stop-engaging position to allow said time-indicator to move and pass said stop beyond said detent.

20 5. In a time-indicating device in combination, a movable time-indicator, means to move the same, a stop on the same, a pivoted pawl-detent adapted to rock on its pivot and engage said stop to hold said time-indicator, said pivot being held in an elongated bearing, means to automatically release said pawl-detent from said stop and move the same bodily from its stop-engaging position to allow said time-indicator to move and pass said stop beyond said pawl-detent.

25 6. In a time-indicating device in combination, a numeral-carrying drum, means to rotate the same, a pin-stop on said drum, a pivoted pawl-detent adapted to rock on its pivot and engage said pin-stop to hold said drum, said pivot being held in an elongated bearing, means to automatically release said pawl-detent from said pin-stop and move the same bodily from its stop-engaging position to allow said drum to move and pass said pin-stop beyond said pawl-detent.

30 7. In a time-indicating device in combination, a pivoted numeral-carrying drum, means to rotate said drum, a stop on said drum, a pivoted pawl-detent engaging said stop to hold said drum, a support having a slot in which the pivot of said pawl is carried, means to automatically release said pawl-detent from said stop and move the same bodily in said slot from its stop-engaging position to allow said drum to move and pass said stop beyond said pawl-detent.

35 8. In a time-indicating device in combination, a pivoted numeral-carrying drum, means to rotate said drum, a stop on said drum, a pivoted pawl-detent engaging said stop to hold said drum from rotation, a support having an inclined slot in which the pivot of said pawl is carried, means to automatically release said pawl-detent from said stop and

move the same bodily from its stop-engaging position, the pivot of said detent moving in said inclined slot, to allow said drum to rotate and pass said stop beyond said detent.

9. In a time-indicating device in combination, a pivoted numeral-carrying drum, means to rotate said drum, a stop on the same, a pivoted pawl-detent engaging said stop to hold said drum from rotation, a support having a slot in which the pivot of said pawl is carried, and means, embracing a spring-arm fixed at one end and carrying a weight toward the other end thereof and automatic means to bend said arm and release the same, said weight adapted to impart a quick hammer-stroke to said pawl, to automatically release said pawl-detent from said stop and move the same bodily from its stop-engaging position to allow said drum to rotate and pass said stop beyond said pawl-detent.

10. In a time-indicating device in combination, a rotatable time-indicator, a pivoted pawl engaging the same to prevent the rotation thereof, and means for simultaneously rocking said pawl to release said time-indicator and moving said pawl bodily laterally of its pivot.

11. In a time-indicating device in combination, a plurality of independently-rotatable drums carrying time-indicating numerals on their faces, said drums located side by side the pivots of the same lying parallel, an independent movement for each drum, a winding-shaft for each movement, said winding-shafts lying parallel and extending through to the outside of said time-indicating device on the same side thereof and close together.

12. In a time-indicating device in combination, a rotatable drum carrying time-numerals on its face, a pivoted pawl engaging said drum to prevent rotation of said drum, and means for simultaneously rocking said pawl to release said drum and moving the same bodily laterally of its pivot.

13. In a time-indicating device in combination, a movable part provided with a series of stops, a pivoted pawl engaging the same, a spring-hammer adapted to move said pawl, a stop for said hammer to hold said hammer normally out of operative relation with said pawl, means to move said hammer from said stop and allow the same to return and strike said stop, a portion of said hammer at one side of said stop being adapted to pass beyond its normal position and exert a quick hammer-stroke on said pawl to move the same.

14. In a time-indicating device in combination, a rotatable drum, a series of stops thereon, a pivoted pawl engaging said series of stops, a magnet, a hammer embracing a spring and a hammer-head thereon, a stop for said hammer and a connection between said hammer and pawl, said hammer being normally held out of engagement therewith by said stop, said magnet being adapted to move said hammer away from said stop and

allow it to fall back upon the same to allow said head to pass beyond its normal position and strike the connection between it and said pawl to move said pawl.

5 15. In a time-indicating device in combination, a movable time-indicator, means to move the same, a stop on the same, a detent engaging said stop to hold said time-indicator, means to automatically release said detent
10 from said stop and move the same bodily from its stop-engaging position embracing a spring-hammer adapted to give a quick hammer-stroke to said detent.

15 16. In a time-indicating device in combination, a pivoted drum carrying time-numerals, means to rotate the same in one direction, a plurality of pins projecting in a circle from said drum, a pivoted pawl adapted to engage
20 said pins to prevent the rotation of said drum in said direction, a second pivoted drum, means to move said second drum in the same direction, a ratchet connected with said drum, a second pivoted pawl in engagement with said ratchet, means to automatically release
25 said first pawl from its ratchet and allow said means to rotate said first drum until said first pawl comes in contact with the next pin, and a projection from said first drum adapted to engage and move a part connected with said
30 second pawl to release the same from the ratchet connected with said second drum and allow said second drum to rotate.

35 17. In a time-indicating device in combination, a clock-face, a pair of pivoted drums carrying time-numerals adapted to show through

said clock-face, means to apply a continuous impulse to said drums to rotate both in the same direction, a ratchet for each drum consisting of laterally-projecting pins arranged in a circle on the periphery of said drums, a
40 pivoted pawl for each ratchet adapted to engage the pins on said ratchets and prevent said drums from rotation in said direction, means to automatically release the pawl from one of said drums and allow the same to rotate until
45 engaged by said pawl, a releasing-pawl connected with the pawl on the other drum and a pin carried by said first drum adapted to engage and move the same and thereby said
50 other pawl to release said other drum and allow the same to rotate until stopped by its pawl.

18. In a time-indicating device in combination, a pivoted rotating part having a series of stops thereon, a pivoted pawl one arm of
55 the same engaging said stops to check the rotation of said part in one direction, the other arm of said pawl having an inclined face adapted to be struck by said stops on the rotation of said part in the other direction so as
60 to allow the rotatable part to rotate in either direction.

Signed at New Haven, in the county of New Haven and State of Connecticut, this 13th day of March, A. D. 1897.

SAMUEL P. THRASHER.

Witnesses:

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WILLIAM W. MONSON.