

N. A. RANSOM.
Fare Register and Recorder.
No. 226,626. Patented April 20, 1880.

Fig. 1.

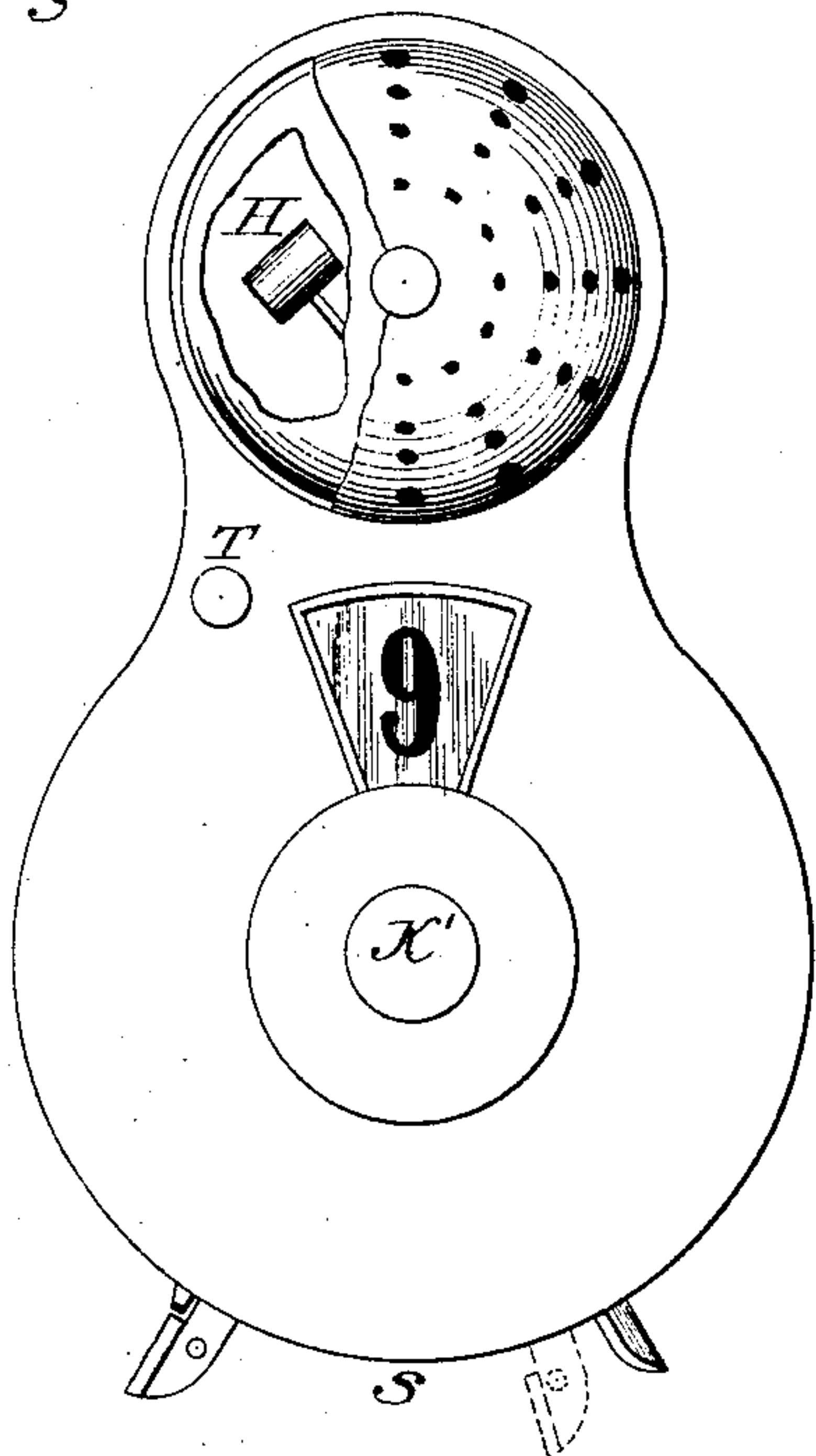


Fig. 2.

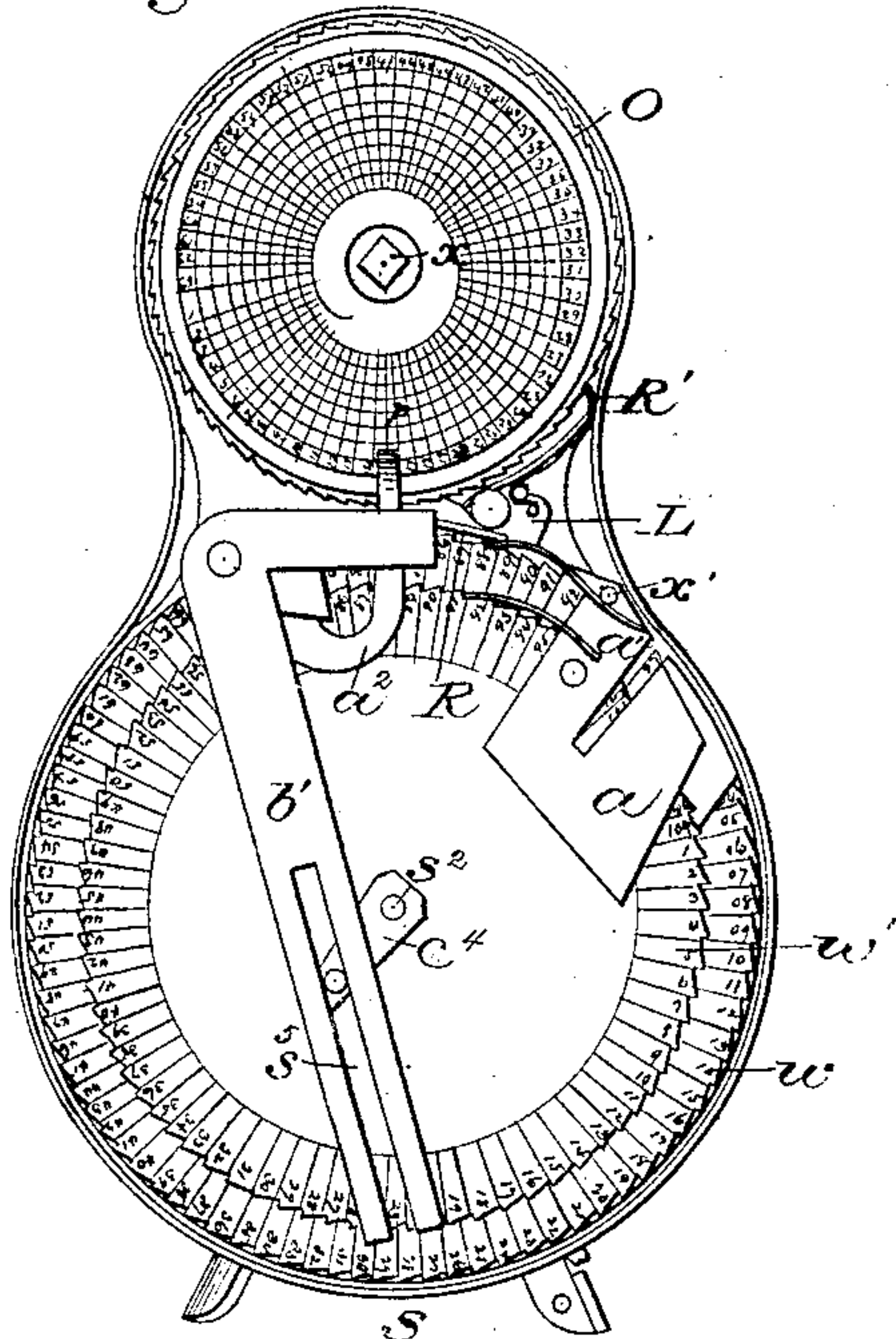


Fig. 3.

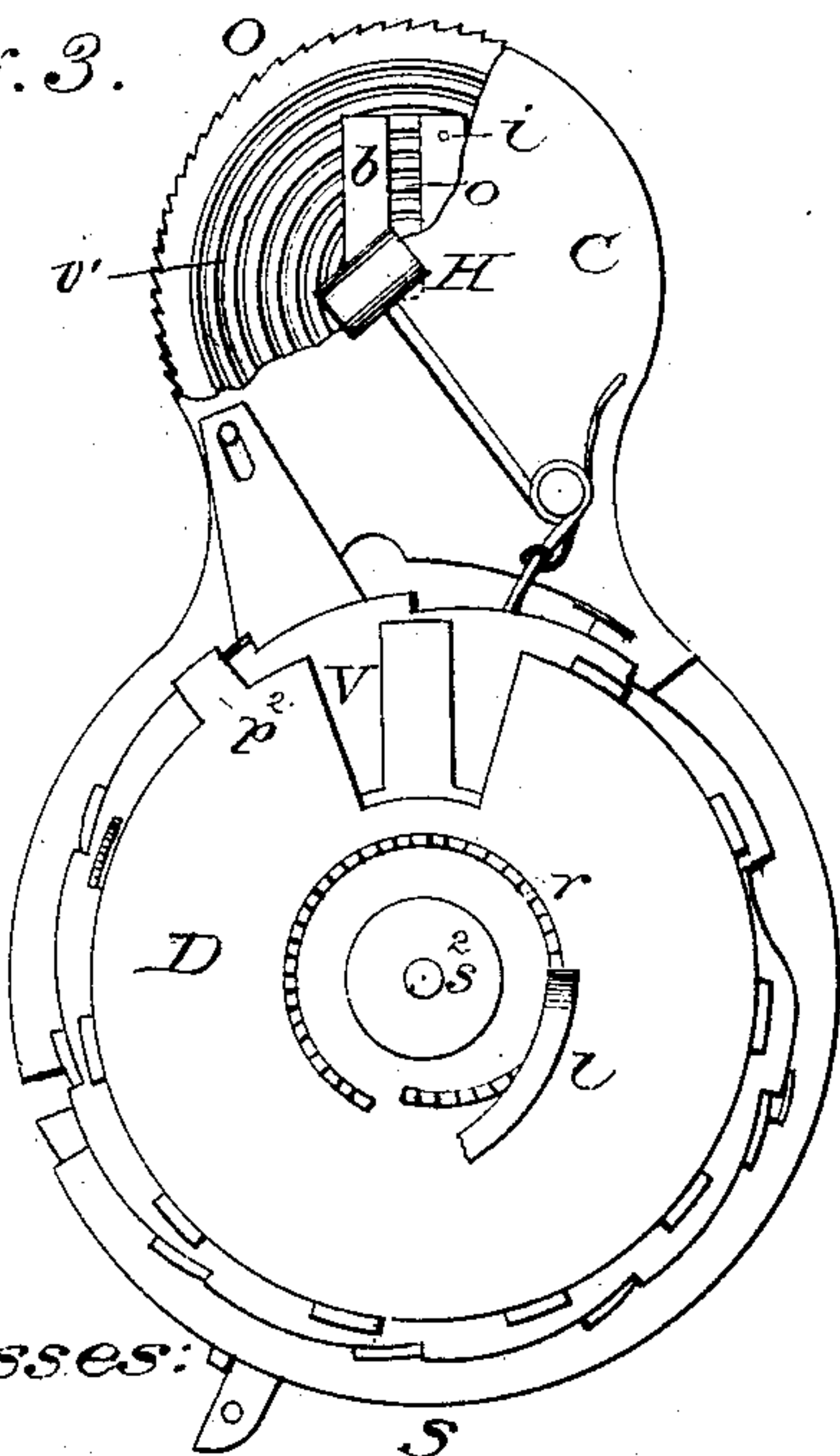
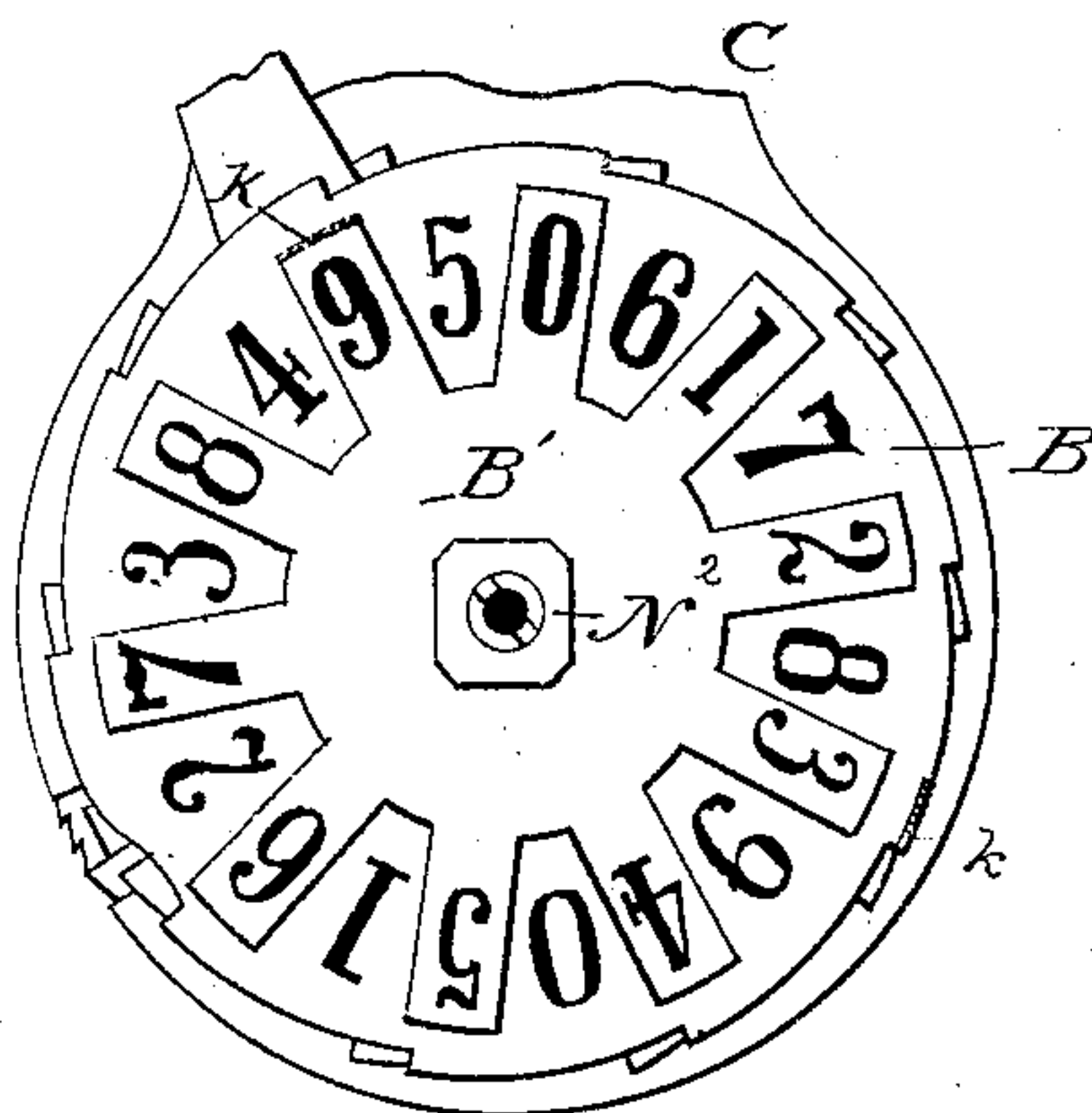


Fig. 4.



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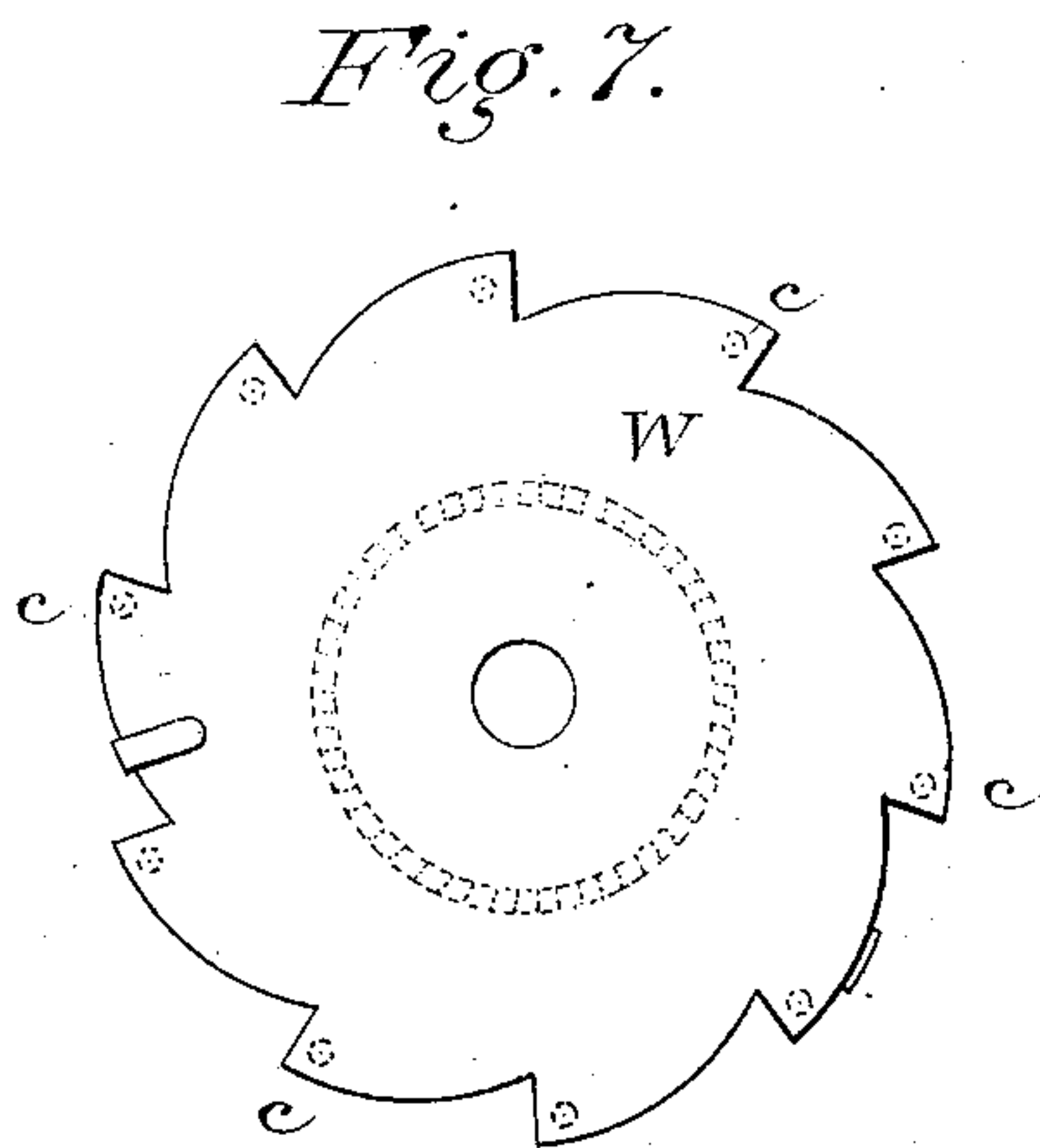
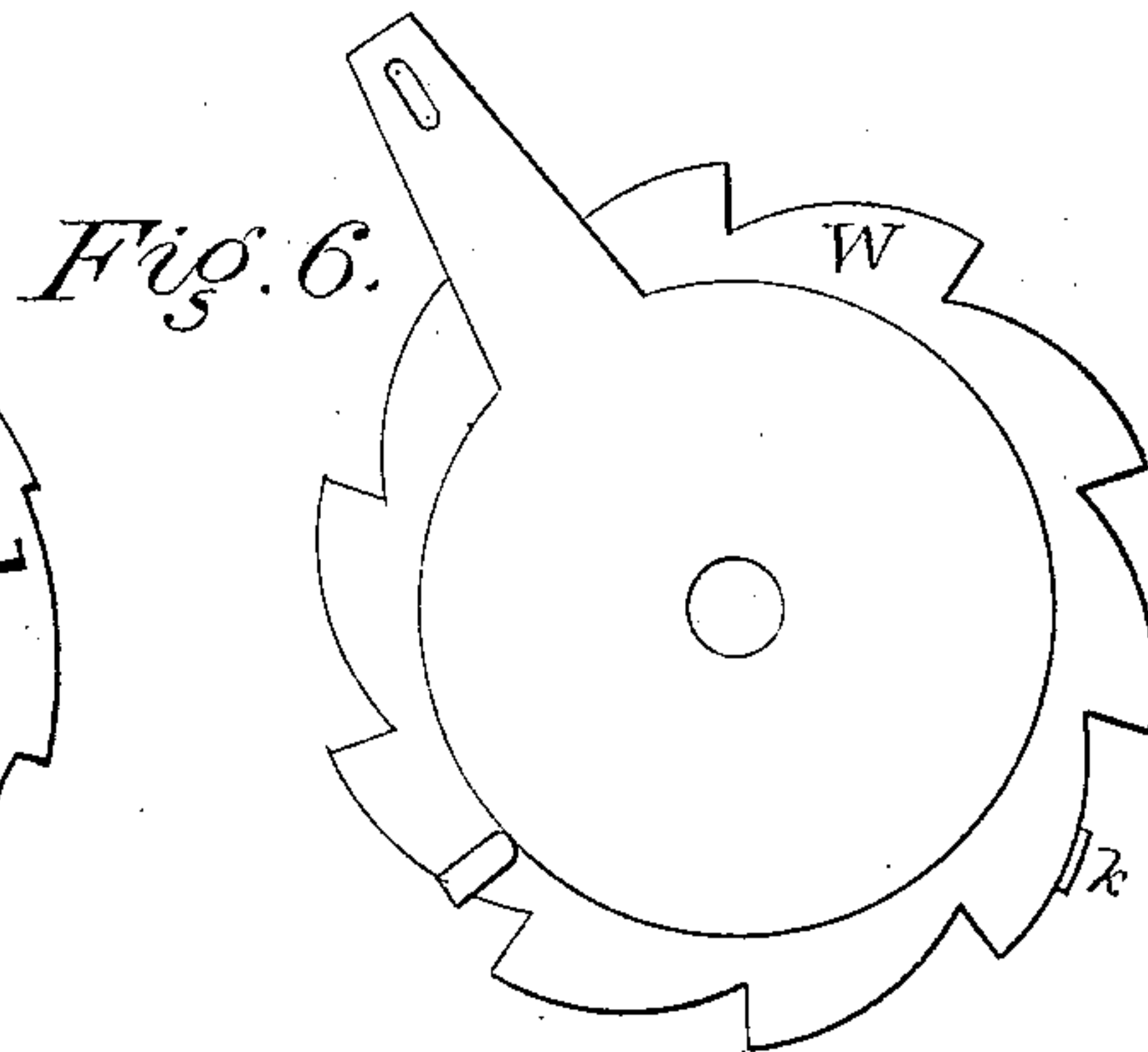
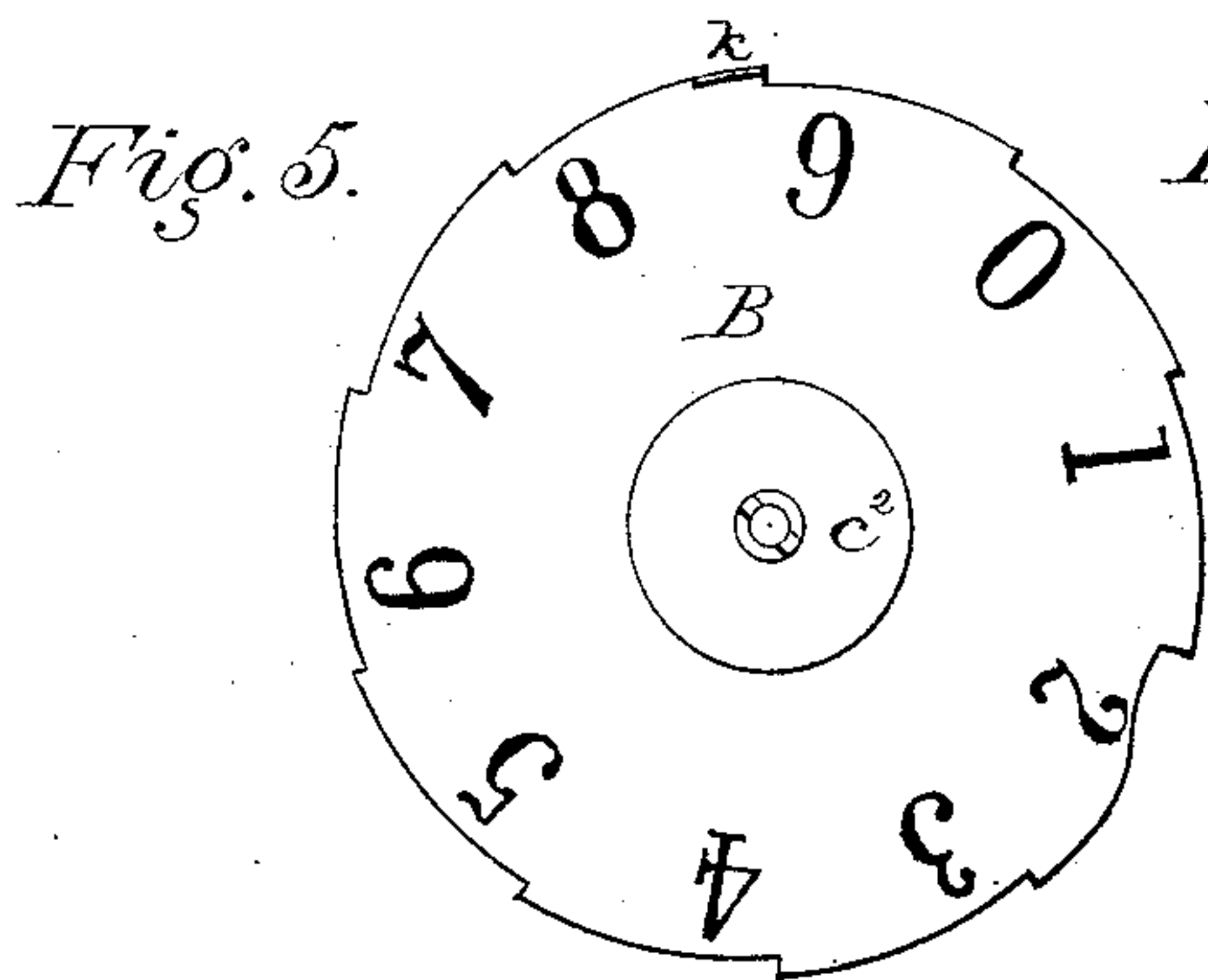


Fig. 8.

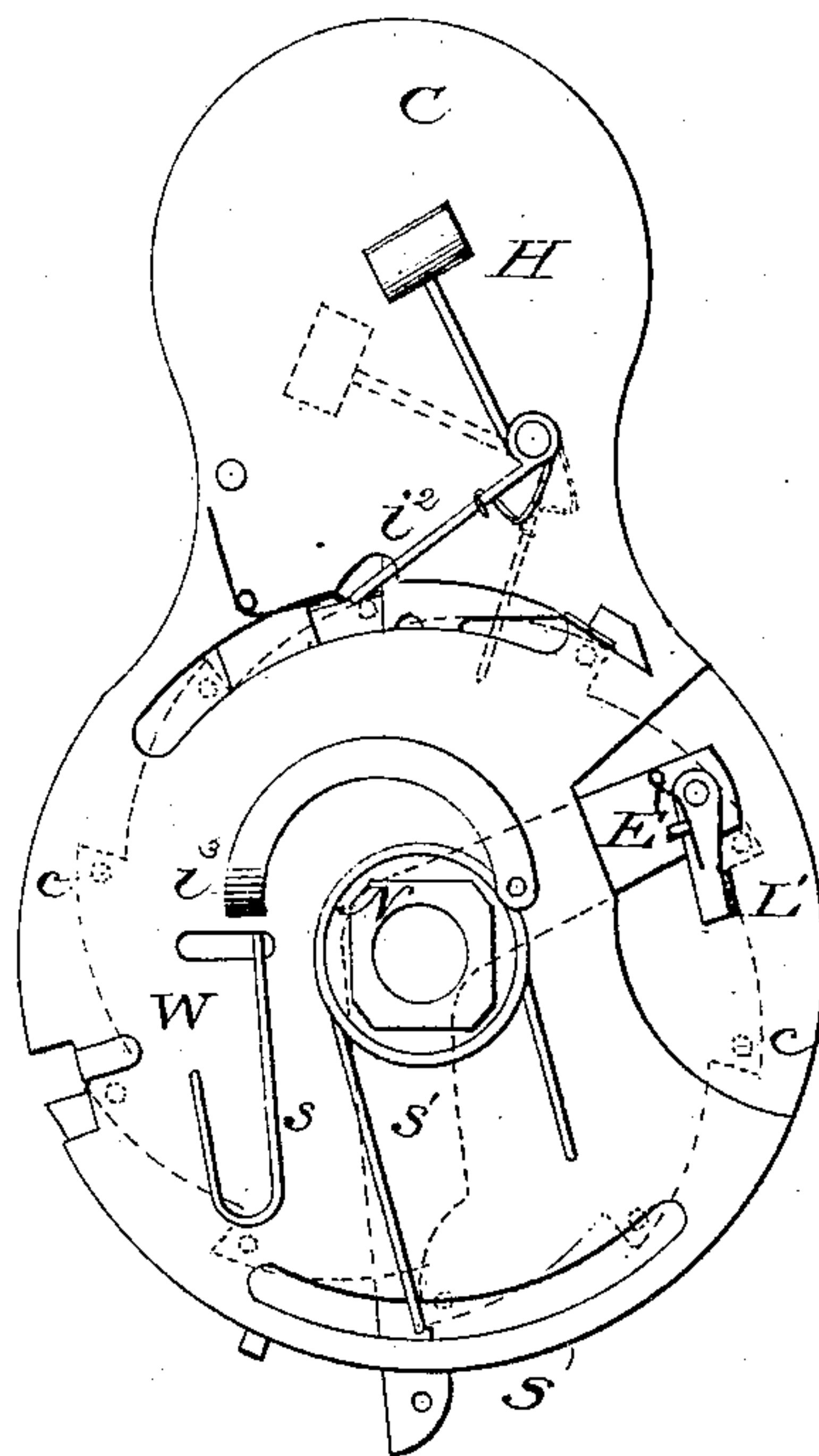
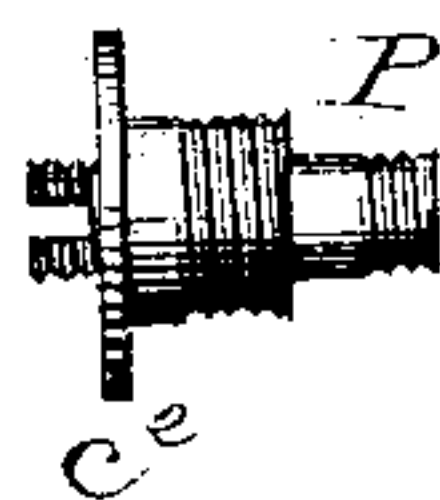


Fig. 9.



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Fig. 10.

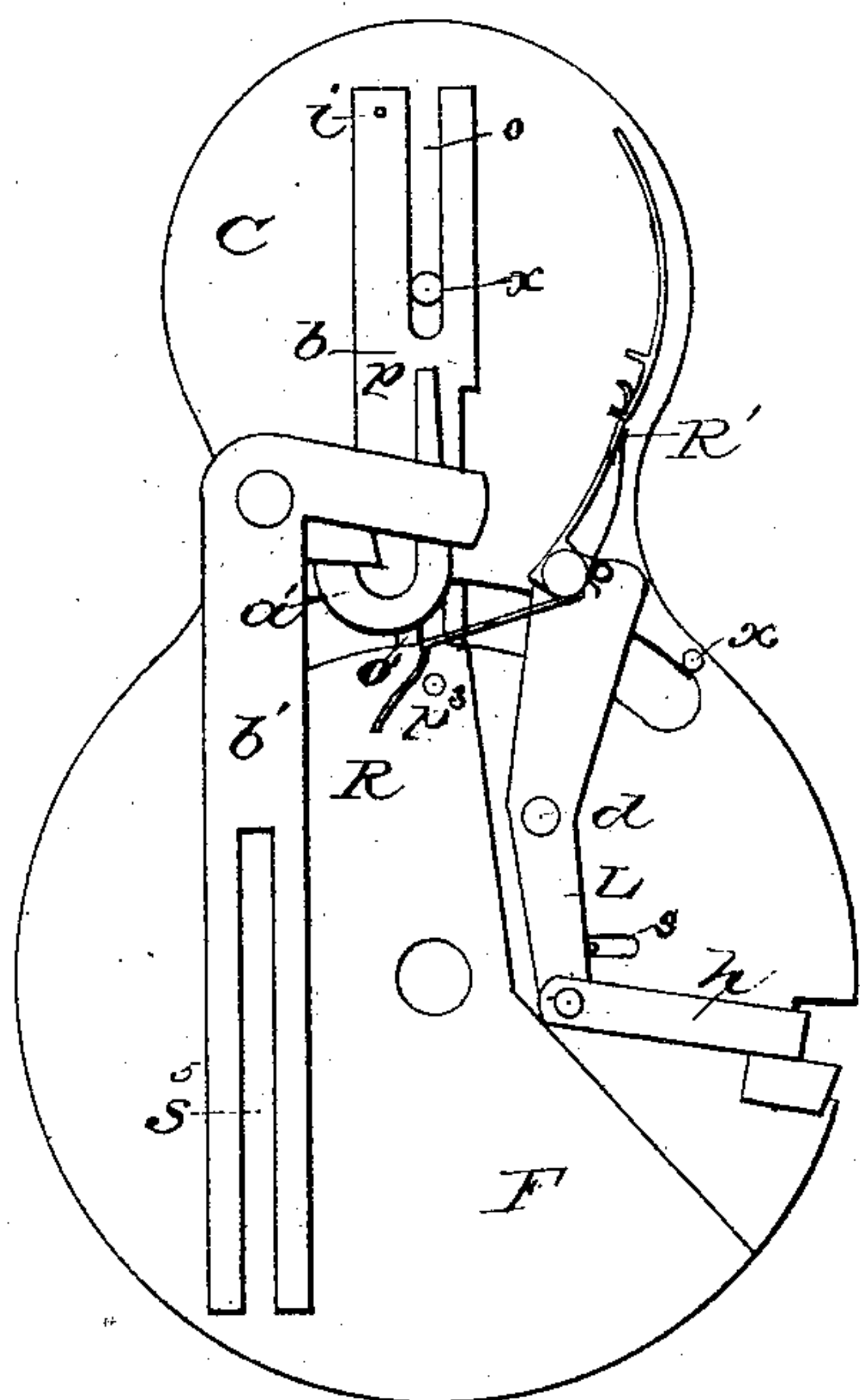


Fig. 11.

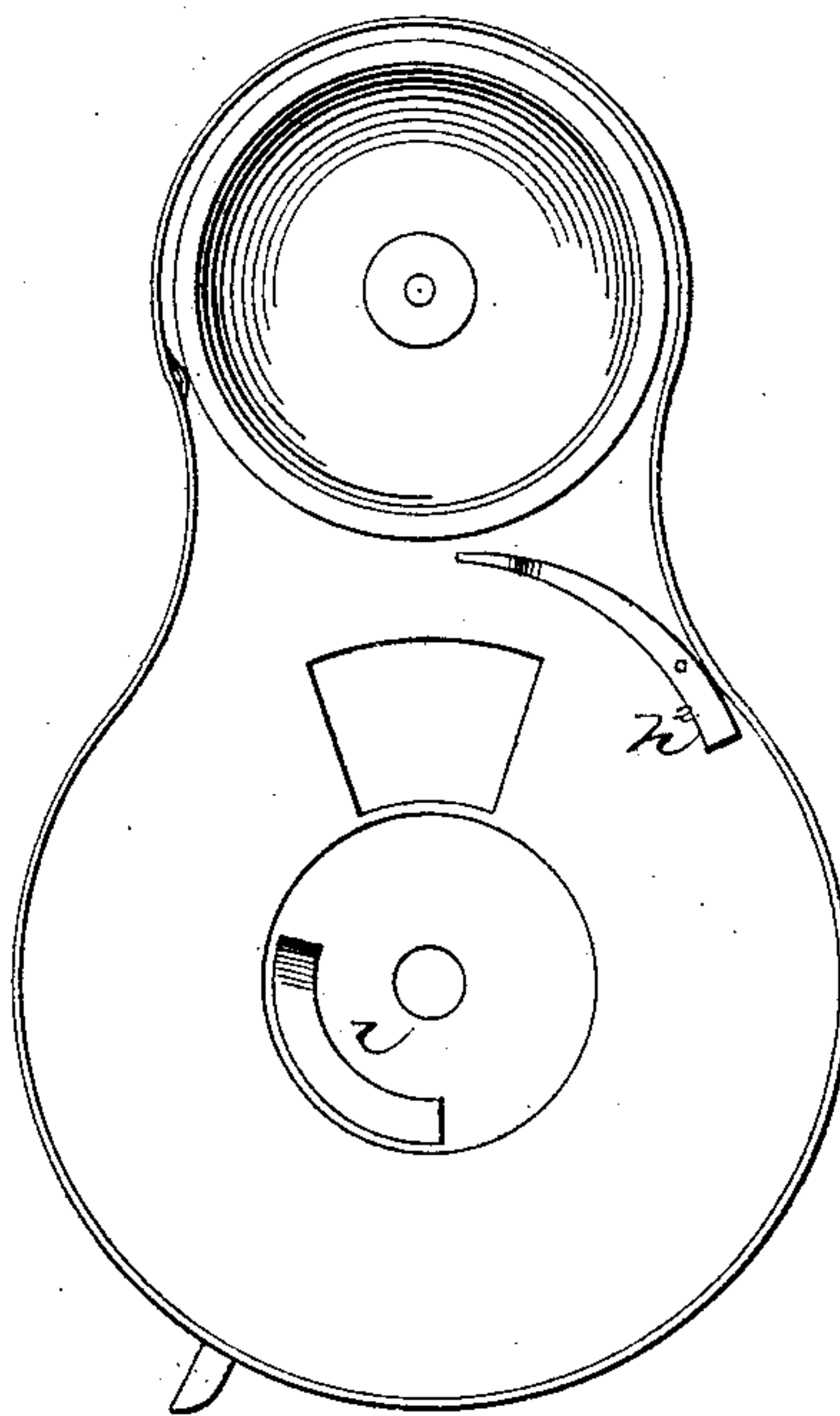


Fig. 12.

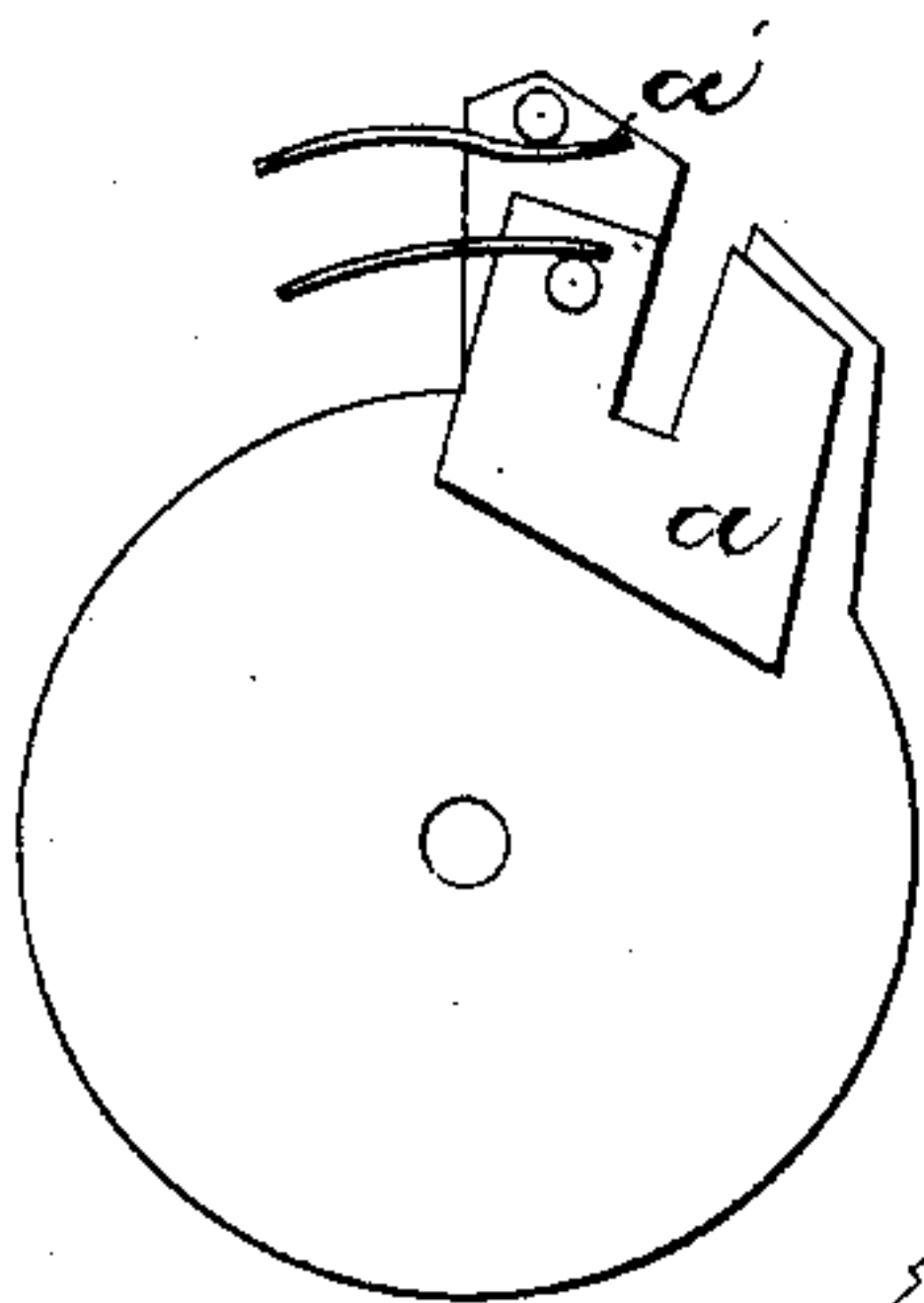
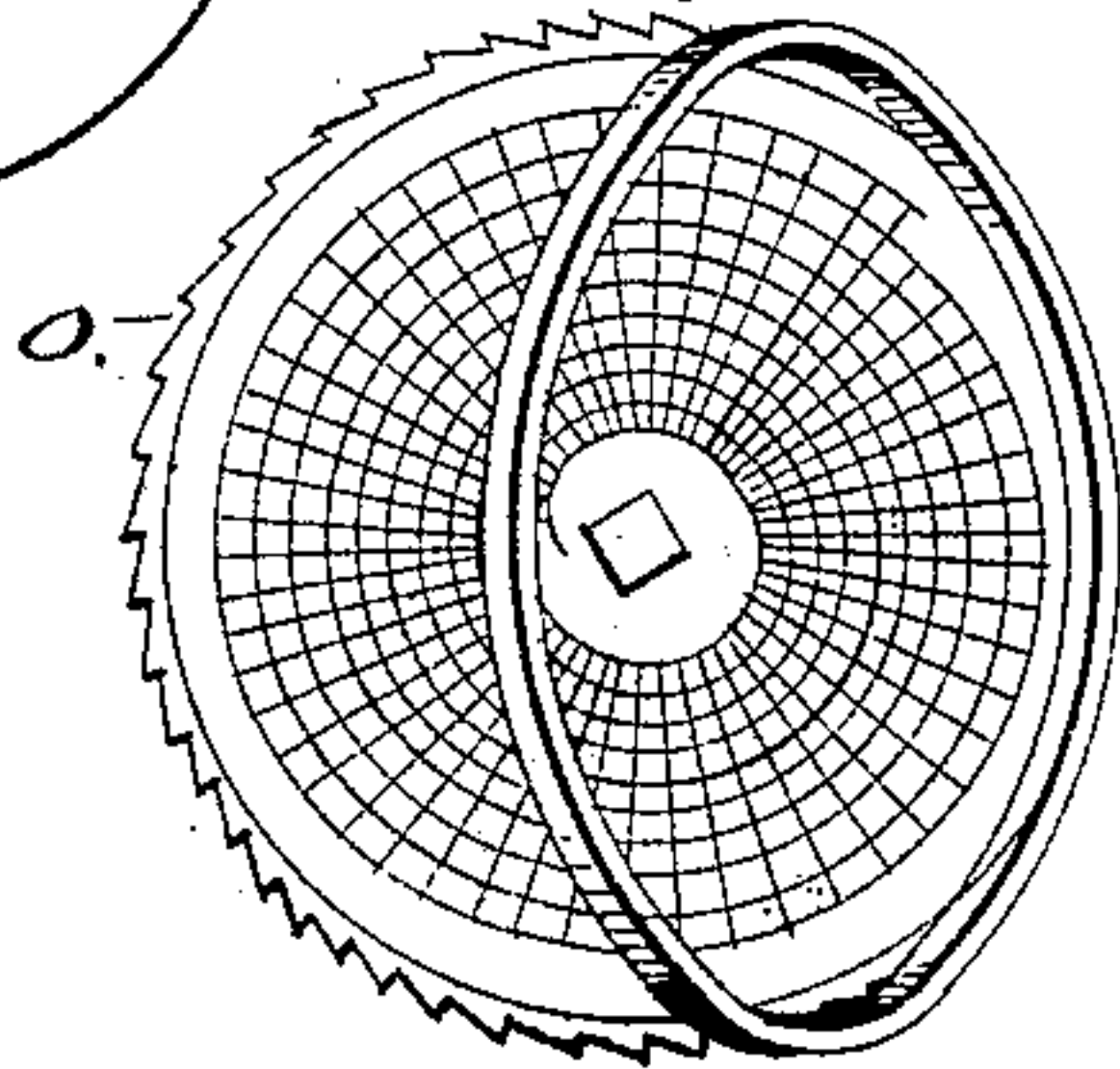


Fig. 13.



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Fig. 14.

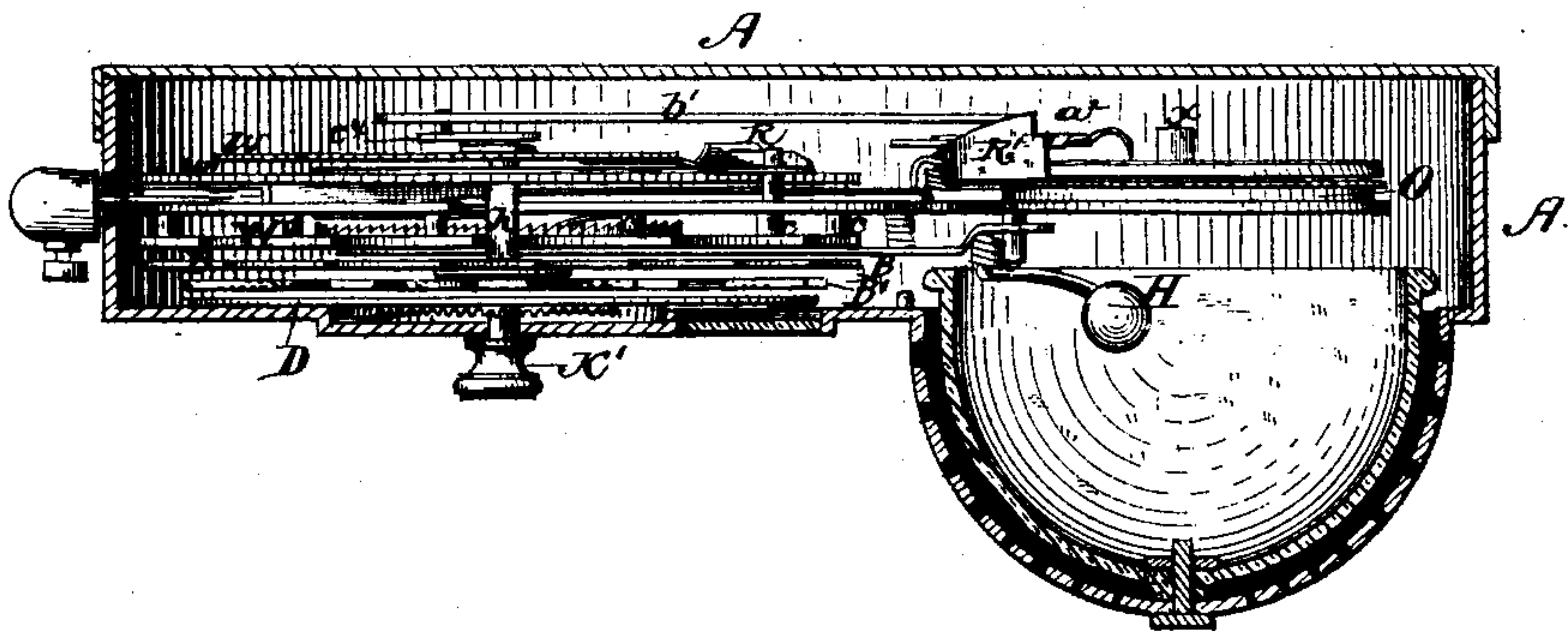
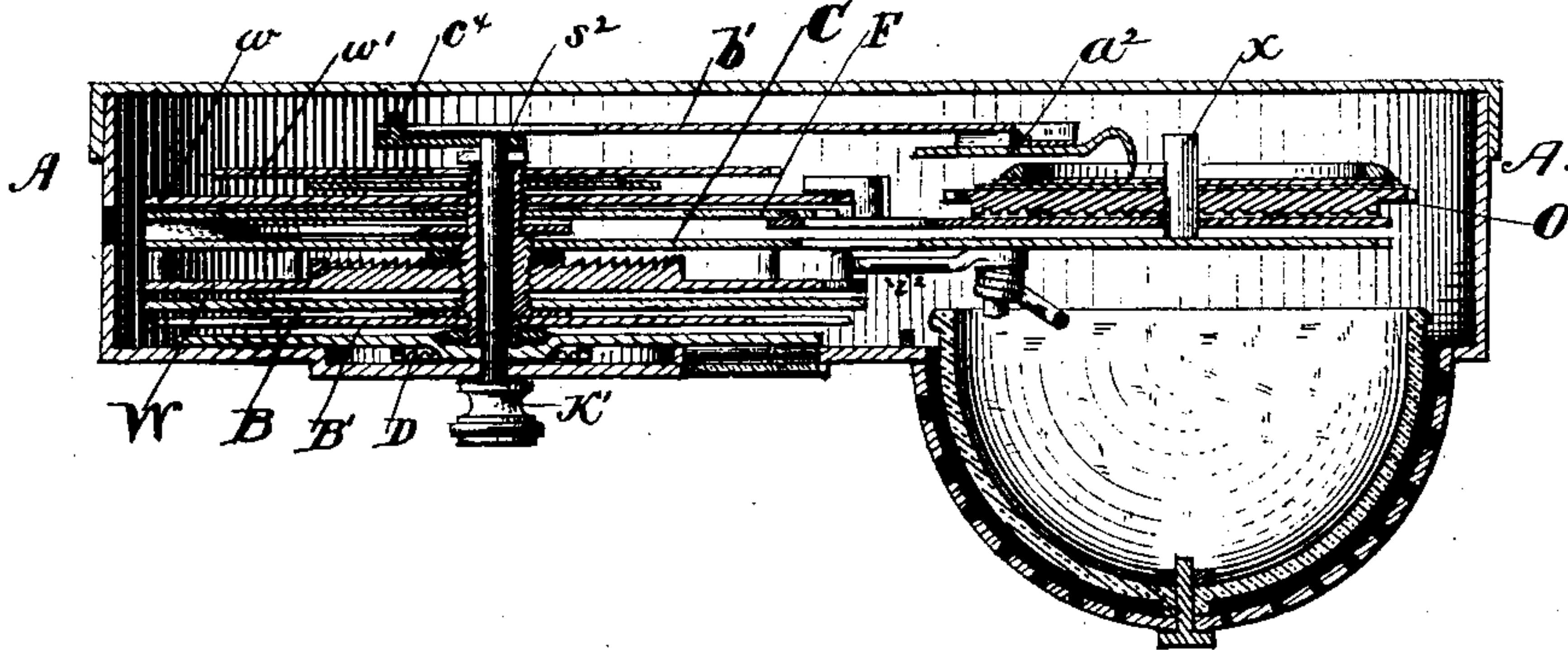


Fig. 15.



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UNITED STATES PATENT OFFICE.

NEWMAN A. RANSOM, OF CHICAGO, ILLINOIS.

FARE REGISTER AND RECORDER.

SPECIFICATION forming part of Letters Patent No. 226,626, dated April 20, 1880.

Application filed July 12, 1879.

To all whom it may concern:

Be it known that I, NEWMAN A. RANSOM, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fare-Registers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

10 Figure 1 is a front or face view of my improved registering-machine. Fig. 2 is a rear view of the same with the back of the casing removed, showing the total-register and the recording mechanism. Fig. 3 is a front view
15 of the operative mechanism withdrawn from the casing, and showing more particularly the partial or trip register. Fig. 4 is a detail view of the wheels of the partial or trip register. Fig. 5 is a face view of the units-wheel of the
20 partial or trip register. Fig. 6 represents the main actuating-wheel and the isolating-plate which separates it from the units-wheel of the partial or trip register. Fig. 7 represents a front view of said main actuating-wheel detached. Fig. 8 is a front view of the mechanism with the partial or trip register and main
25 actuating-wheel removed. Fig. 9 is a view of the post upon which are mounted the prime actuating-lever, the main actuating-wheel, the partial or trip register wheels, and the total-register wheels. Fig. 10 is a view showing the construction and arrangement of the levers by which motion is imparted to the total-reg-
30 ister and to the recording mechanism, and also showing a part of the recording mechanism. Fig. 11 is an interior view of the casing, showing the location of the bell, the detent or holder for the zero-gathering plate, the pawl for preventing the backward rotation of said
40 gathering-plate, and the window through which the numbers on the partial or trip register are observed. Fig. 12 is a detached view of the non-rotating isolating-plate, which, when in position, is located between the wheels of the
45 total-register, and carries pawls for preventing the backward movement of said wheels. Fig. 13 is a view of the wheel of the recording mechanism, carrying on its face a prepared record sheet or disk. Fig. 14 represents
50 a longitudinal section taken through the casing, and showing the contained mechanism in

elevation. Fig. 15 is a longitudinal vertical section through the casing and its mechanism.

Similar letters of reference in the several figures denote the same parts. 55

My invention is designed as an improvement upon that class of portable fare-registers which embody, first, a partial or trip register for indicating the number of fares collected and registered on each trip, and which is capable
60 of being turned back to zero, and zero only, upon the completion of the trip; secondly, an irreversible total-register for indicating the total number of fares collected and registered on the several trips; and, thirdly, mechanism
65 for indicating the number of times the partial or trip register has been set back to zero, and consequently the number of trips made.

Registers heretofore constructed on this principle are fatally defective in that they fail
70 to show the number of registrations made for fares collected between the times the partial or trip register is set back, or, in other words, the number of fares collected on each trip, thus opening the door for fraud on the part of
75 the conductor or other person entrusted with the taking of the fares, who may neglect to reset the partial or trip register at the end of any one or more trips, and yet escape detection by resetting said register again and again
80 until the appropriate number of trips is indicated before turning in his machine at his employer's office for inspection at the completion of his day's work.

To illustrate more clearly this mode of de-
85 frauding, let it be supposed that the partial or trip register has been set at zero, the condition of the total-register taken, the condition of the trip-indicating mechanism also taken, and the machine delivered to the conductor. 90

It is the duty of the conductor, upon the receipt of each fare, to make a registration on his machine, and each registration is evidenced by the sounding of a bell, produced by the operation of the prime mover, and the advance
95 of the partial or trip register one number, as indicated at the window or opening on the face of the machine. It is the further duty of the conductor to set his partial or trip register back to zero upon the completion of each trip
100 or half-trip, as the case may be.

Now, supposing that on any given trip there

should have been but eight fares collected, and that, say, sixteen passengers are ready to start back on the return trip, the conductor, taking advantage of this opportunity, would fail
 5 to turn back his register to zero, and when he came to take up fares on the return trip would make but eight registrations, which would be but for half the number of fares actually collected, although his partial or trip register would
 10 indicate plainly that the full number (sixteen) had been taken up. This operation might be repeated several times a day without detection, especially by a skillful conductor; but as it would not answer to turn in his machine at
 15 night with a smaller number of trips indicated than had been actually made, he, before so turning it in, sets the partial or trip register at zero, makes one registration, turns it back again to zero, makes another registration, and so on,
 20 repeating the operation until the number of times he turns it back shall equal the number of times he has failed to turn it back at the end of the regular trips during the day. Thus manipulated the machine will pass examination
 25 at the inspector's office, the company will congratulate themselves on the efficiency of their registers and the thorough manner in which the conductors have been outwitted, while the latter will laugh in their sleeves and
 30 grow rich on the fares they have so neatly appropriated without detection.

To obviate these defects in the old machines and prevent the aforesaid frauds, my invention consists, primarily, in the combination of a
 35 partial or trip-register capable of being reset at zero, a total-register moving forward concurrently with the partial or trip register, and mechanism, independent of the total-register, for indicating the number of times the partial
 40 or trip register is reset and the number of fares registered between the times of resetting.

It further consists in the peculiar construction and arrangement of the devices for actuating the several registering mechanisms.

45 It further consists in the means for making the indentations or punctures in the prepared disks of the recording mechanism; and it consists, lastly, in the details of construction and combinations of the several parts, which I will
 50 now proceed to describe.

In the drawings, A represents the casing of the register, constructed preferably of metal, and of the general form shown in Fig. 1.

55 C is a metal plate, which carries all the essential operating parts of the mechanism, and is adapted to fit snugly the interior of the casing A, and capable of being applied to or removed therefrom when desired. On the front side of this plate C is rigidly secured a nut, N,
 60 into which is screwed a non-rotating post, P, that forms the support and axis of a prime actuating-lever, E, a main actuating-wheel, W, the indicating-wheels B B' of the partial or trip register, and the zero-gathering and win-
 65 dow-covering plate D on one side of the said

plate C, and the support and axis of the indicating-wheels $w w'$ of the total-register on the other side of said plate.

The main actuating-wheel W has ten (more or less) equidistant cam-notches in its periphery and a similar number of laterally-projecting short pins or studs, c , near said notches. The cam-notches serve a double purpose—first, to enable the wheel to be rotated by means of a spring-pawl articulated to the prime actuating-lever, and, secondly, for operating a lever, L, by which the total-register and the zero-recording mechanism are actuated.

The pins or studs c are adapted to strike the shank h^2 of a bell-hammer, H, which lies in the path of their rotation, and thus cause said hammer to sound a bell arranged in the top of the machine at each full movement of the prime actuating-lever.

The indicating-wheels of the partial or trip register are two in number—one of them, B, which I term the “units-wheel,” consisting of a disk or plate marked on its face near its periphery with the digits from 0 to 9, and provided with peripheral cam-notches corresponding in number and length with those on the main actuating-wheel, though not so deep, with which notches the pawl on the prime actuating-lever engages, and advances said wheel B simultaneously with the main actuating-wheel. The other wheel, B', which I term the “tens-wheel,” consists of a central portion or hub and ten radial arms or spokes, which latter are numbered from 0 to 9, and project between the numbers on the wheel B. An isolating washer is placed between said wheels B B', to prevent the rotation of the one by the other. The tenth or last peripheral notch in the wheel B is made deeper than the other notches, in order that when the said wheel has nearly completed a revolution, or, in other words, has tallied “nine,” the operating-pawl will fall into said deep notch and engage with one of the arms of the tens-wheel and rotate the latter forward one number, as will be readily understood.

The means which I employ for setting back the wheels of the partial or trip register, but which I do not claim in this application, consists, mainly, of a plate, D, which I term the zero-gathering and window-covering plate. This plate is secured to a spindle or stem, s^2 , which passes through the hollow post P, and is adapted to turn freely therein. The spindle or stem s^2 projects outside the case on the face of the register, and is there provided with a milled knob, K', by which it can be conveniently rotated. The gathering-plate is provided with a radial arm or point, p^2 , which projects slightly beyond the periphery of the units-wheel B, and is adapted to engage with inclined lateral setting-projections $k k'$, located on the wheels B B', near the periphery thereof, the setting-projection on wheel B being, in the construction shown, placed a little to the

left of the figure 9, and the setting-projection on the wheel B' on the end of the arm or spoke marked with the figure 9.

The plate D is further provided with a view-slot, V, corresponding in shape to the window in the casing, through which the figures on the partial or trip registering wheels are observed. At each complete movement of the prime actuating-lever the pawl L' will cause the units-wheel to advance one number, and when nine registrations have been made, the pawl, having reached the deep notch in said units-wheel, will drop down and come into engagement with one of the arms of the tens-wheel B', and carry said tens-wheel forward until the number on the next arm is exhibited at the window. During the forward movements of these wheels the setting-projections k , especially the one on the units-wheel, must frequently pass the projecting arm p^2 of the gathering-plate. To enable them to easily so pass said stops are inclined upwardly in the direction of the rotation of the wheels B B', and as they come in contact with the projecting arm or point p^2 of the gathering-plate said arm or point is very slightly raised by the inclines, and it springs back again after they, or either of them, have passed, the elasticity of the metal readily permitting such movement.

The gathering-plate D is prevented from rotation to the right, or in the direction opposite to that in which the wheels B B' are rotated, by means of a circular ratchet, r , secured to its outer side, as shown in Fig. 3, and a spring-pawl, l , fixed to the interior of the casing and adapted to engage with said ratchet. The plate D is prevented from being rotated by the forward movement of the wheels B B' by means of a spring catch or holder, h^2 , secured to the casing, as shown in Fig. 11, and located in the path of the end of the radially-projecting arm or point p^2 . A short pin or shank is fixed to the back of the catch h^2 , and, projecting through the casing, terminates in a little knob or button, T, as seen in Fig. 1.

When the end of the trip is reached, and the conductor desires to set the partial or trip register back to zero, he presses upon the button T, and thus releases the catch or detent h^2 from the point of the arm p^2 ; then, by rotating the plate D to the left by means of the external knob, K', the radially-projecting arm p^2 is made to engage with the vertical sides of the setting-projections k , one after the other, or both together, according to their position in the circle in which they move, and carry said wheels around until the arm or point p^2 comes again in contact with the holder or detent. When this point is reached the parts of the mechanism are so arranged that the view-slot of the plate D is exactly opposite the window in the casing and the zero of the units-wheel only is visible. The unbroken part of the plate D entirely covers the window-opening and screens the indicating-wheels from view while the latter are being turned back to

zero. The plate D can never be backwardly rotated by reason of the pawl and ratchet on its side, and it is impossible for said plate to be rotated forward less than a full revolution and show any number whatever at the window, or to rotate a full revolution and display any other figure than zero.

The prime actuating-lever E, that has before been incidentally referred to, is located at the back of the plate C, between said plate and another plate, F, and swings freely on the post P. Its inner end carries the pawl by which the main actuating-wheel and the wheels of the partial or trip register are operated. The outer end projects through the bottom of the casing sufficiently far to be conveniently operated. A suitable spring, s' , restores the lever to its normal position after each registration. To the back of the plate C is pivoted an intermediate lever, L. To the lower arm of said lever is articulated a bar, h , the free end of which is bent down at right angles to form a hook, which plays back and forth in a slot in the side of the plate C and engages with the cam-notches in the periphery of the main actuating-wheel. The upper arm of said lever L carries two spring-pawls, R R', the former of which is adapted to operate the wheels $w w'$ of the total-register, and the latter the wheel O of the mechanism for recording the number of times the partial or trip register has been set back to zero. A spring, s , presses against the lower end of the lever L and operates to keep the hooked end of the bar h at all times in engagement with the cam-notches of the main actuating-wheel W.

It will be observed that the pawl on the prime actuating-lever imparts directly a forward rotation to the wheels of the partial or trip register, and also to the main actuating-wheel W, such wheels being independent of each other, while the bell-hammer is operated from the main actuating-wheel alone by means of the pins on the side of the latter. This construction enables the partial or trip registering wheels to be turned back to zero without altering the position of the main actuating-wheel, and consequently without sounding the bell.

The total-register is of simple construction, and consists of two graduated wheels, $w w'$, mounted upon the outer end of the post P, with an isolating-plate, a , between them, to prevent the motion of one from being communicated to the other. The wheel w' is of slightly smaller diameter than the wheel w , and each of said wheels is provided with notches or ratchet-teeth upon its periphery numbered consecutively from zero to one hundred. The pawl R, which operates these wheels, moves the first wheel, w ; the distance of one tooth at each complete movement of the prime actuating-lever, so that said wheel keeps an even tally with the registrations on the partial or trip register. When the first wheel, w , has completed a revolution the pawl

R reaches a tooth that is deeper than the others, and, dropping down therein, engages with the second wheel, w' , and advances that one tooth, thus indicating that a hundred registrations have been made, and so on. The backward rotation of the wheels of the total-register is prevented by means of spring-pawls a' . The state of the total-register can be ascertained by observing the numbers which appear in a slot in a plate, a .

I have thus far described the partial or trip register, which indicates the number of fares registered in the current trip, and also the total-register, which keeps account of all the fares registered on the several trips.

I will now proceed to describe a mechanism by which the number of times the trip-register is turned back to or reset at zero is indicated, together with the number of registrations that are made between the times of resetting.

I do not desire to be limited to the particular construction shown for accomplishing this result, as other forms of mechanism might be employed which would, perhaps, be equally effective.

Referring again to the drawings, O represents a wheel mounted upon a stud, x , affixed to the plate C, as shown in Fig. 2. The periphery of the said wheel is provided with ratchet-teeth, with which the operating-pawl R' on the intermediate actuating-lever, L, is adapted to engage.

The under surface of the wheel O is provided with a spiral or volute groove, v' , in which works a pin or stud, i , projecting upward from a metal bar, b , which rests upon the plate C. This bar b is guided and prevented from lateral movement by means of slots o o' in its upper and lower ends, the upper slot, o , accommodating the stud x , and the lower slot a guiding-pin, p^2 , located between plates C and F. Said bar b is further provided with a laterally-projecting arm, which is bent upward and backward, so as to project slightly beyond the plane of the upper surface of the wheel O and form a support for a spring indicating and marking arm, a^2 , and a pivotal point for a swinging arm or lever, b' .

The upper surface of the wheel O is covered with some porous or yielding substance, which is evenly pressed or indented by a pointed instrument, and upon this surface so prepared is placed a disk of paper or other suitable material, and there held in position by a hinged metal ring, as shown, or by any other proper means. The paper disk is marked upon its face with a scroll or volute line corresponding with the scroll or volute groove in the under side of wheel O, and is divided off by radial lines, which are consecutively marked in numbers in the spaces formed by the crossings of the volute line, increasing from zero upward in the direction opposite to that in which the wheel O is rotated and from the outer extremity of said radial lines inward.

From the foregoing description it is evident

that as the wheel O is rotated the volute groove v' , acting upon the pin or stud i , will cause a longitudinal movement of the bar b and a consequent movement of the indicating-arm a^2 over the face of the paper disk and along the volute line thereon. Now the radial lines on the paper disk are so distanced and the various operating parts of the mechanism so proportioned and timed in their operation that the advance of the wheel O one tooth by the action of the pawl R' will be indicated on the paper disk by the next succeeding numbered radial line coming under the point of the arm a^2 , and, inasmuch as the pawl R' is itself only operated when the prime actuating-lever has performed a complete movement, it follows that the exact number of fares registered will be indicated on the paper dial, as well as on the partial or trip register and on the total-register. It is also now evident that to attain the main object of my invention—namely, to produce a record of the exact number of registrations made between the times of resetting the partial or trip register back to zero, or, in other words, the number of fares collected and registered on each trip—it is only necessary to provide means for pressing down the point of the indicating or marking arm a^2 every time said partial or trip register is turned back, so as to puncture or indent the paper dial at the number on the radial line beneath said point, and thus indicate, by a comparison of the number so punctured or indented with the number last punctured or indented, or zero, as the case may be, the exact number of registrations made since the last turning back of the partial or trip register.

The means which I have shown for effecting the depression of the point of the marking-arm to produce the punctures or indentations in the paper dial consist of the pivoted lever b' , before briefly alluded to, and a crank, c^4 , made fast to the inner end of the spindle s^2 , to which the gathering-plate D is fastened. The wrist of the crank c^4 is adapted to play back and forth in a longitudinal slot, s^5 , in the lower arm of lever b' , and, when the crank is rotated, impart to said lever a vibratory movement. The upper arm of the lever normally bears lightly upon the back of the indicating or marking arm a^2 , near the inner end thereof; but when the lever b' is vibrated by the action of the crank said arm moves outward, and, overcoming the elasticity of the marking-arm, presses it down, causing its point to come in contact with the paper dial and puncture or indent the same at the number marked on the radial line immediately under said point.

As was before observed, a complete movement of the prime actuating-lever causes the partial or trip register, the total-register, and the wheel O to all move concurrently and indicate the receipt of a fare. Now, when the conductor turns back his partial or trip register to zero the rotation of the gathering-plate, necessitated by such operation, will also rotate

the crank and cause the lever b' to depress the point of the marking-arm a^2 and make a puncture or indentation in the paper disk, as aforesaid. By this arrangement the conductor is
 5 unable, as heretofore, to appropriate fares, and by manipulating his machine escape detection, inasmuch as not only is the number of trips indicated, but also the number of fares collected on each trip. He cannot, therefore, as
 10 with the old machine, neglect to reset his partial or trip register at the end of a trip or trips, and then, before turning in his machine, advance and set back said trip-register so as to indicate simply the full number of trips made
 15 by him during the day, because such proceeding will at once be detected by inspection of the record on the paper dial. A great saving is consequently effected to the company. The back of the casing of the register is intended
 20 to be hinged and fastened by a lock, keys to which are held by the officers of the company.

The paper disks have the capacity of recording the greatest number of fares liable to be registered on the machine in one day, and each
 25 night the inspector removes the old and applies a fresh one for the ensuing day's work.

The total-register is preferably covered by a tight glass plate, so as to be inaccessible to anybody for the purpose of turning it back or
 30 altering its position, and yet enable its condition to be observed when the door of the casing is opened. It therefore always indicates the true state of the machine, and operates as a check upon both conductor and inspector by
 35 preventing any frauds with the paper record-dials, which they otherwise might be disposed to perpetrate.

I do not claim herein the means described for setting the partial or trip registering wheels
 40 back to zero, nor the detent or holder for locking the zero-gathering and window-covering plate from forward rotation, nor the combination, with a partial or trip register, of a turning-plate for setting it to zero, a total-register, and mechanism for indicating the number of
 45 times the partial or trip register is set to zero, as such subjects-matter are described and claimed in another pending application, filed by me August 30, 1879, and designated as
 50 "Division B."

Having thus described my invention, I claim as new—

1. In a fare-register, the combination of a partial or trip register capable of being reset at zero, a total-register moving forward concurrently with the partial or trip register, and
 55 mechanism, independent of the total-register, for indicating the number of times the partial or trip register is reset and the number of fares registered between the times of resetting. 60

2. The combination, with the main actuating-wheel W , of the lever L , having the articulated hooked operating-bar h , and carrying the
 65 pawls R R' , whereby the total-register and the wheel O of the recording mechanism are simultaneously advanced, substantially as described.

3. The wheel O , intermittently rotated, as described, and having a scroll or volute groove in its under surface, in combination with the
 70 longitudinally-moving bar p , having a stud, i , which works in the groove of the said wheel, and carrying the indicating-arm a^2 , and with the paper disk supported on said wheel, having a volute line and numbered radial lines marked
 75 thereon, whereby the registration of each fare is indicated on said paper disk simultaneously with its registration on the partial or trip register, substantially as described.

4. The combination, with the intermittently-
 80 rotated wheel O and the longitudinally-moving bar p , which carries the indicating and marking arm a^2 , of the vibratory lever b' and the crank c^1 , secured to the spindle of the zero-gathering plate, whereby the point of the mark-
 85 ing-arm is caused to puncture or indent the paper record-disk every time the zero-gathering plate moves the partial or trip register back to zero, substantially as described.

5. The partial or trip registering wheels and
 90 the main actuating-wheel, rotated forward directly by the pawl on the prime actuating-lever, and independently of each other, in combination with the bell-hammer operated from the main actuating-wheel alone, whereby
 95 the said partial or trip registering wheels can be turned back to zero without disturbing the main actuating-wheel or sounding the bell, substantially as described.

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Witnesses:

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