

(Model.)

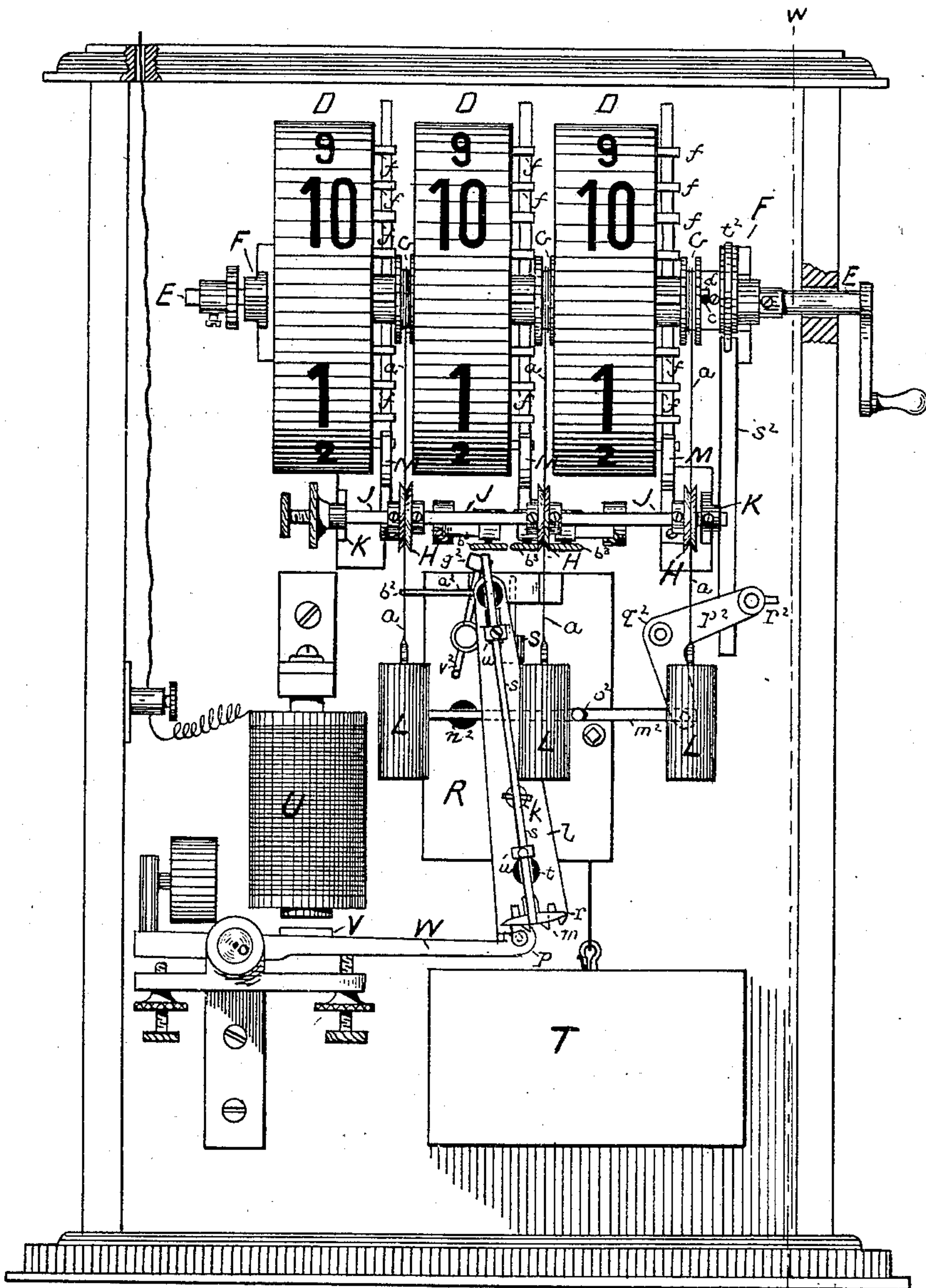
3 Sheets—Sheet 1.

C. E. RANDALL & E. M. BYINGTON.  
FIRE ALARM REGISTERING APPARATUS.

No. 257,067.

Patented Apr. 25, 1882.

*Fig. 1.*



Witnesses.  
Wm. S. Bellows  
H. F. M. Keever.

C. E. Randall and  
E. M. Byington  
Inventors  
Per Brown Bros. Atty.

(Model.)

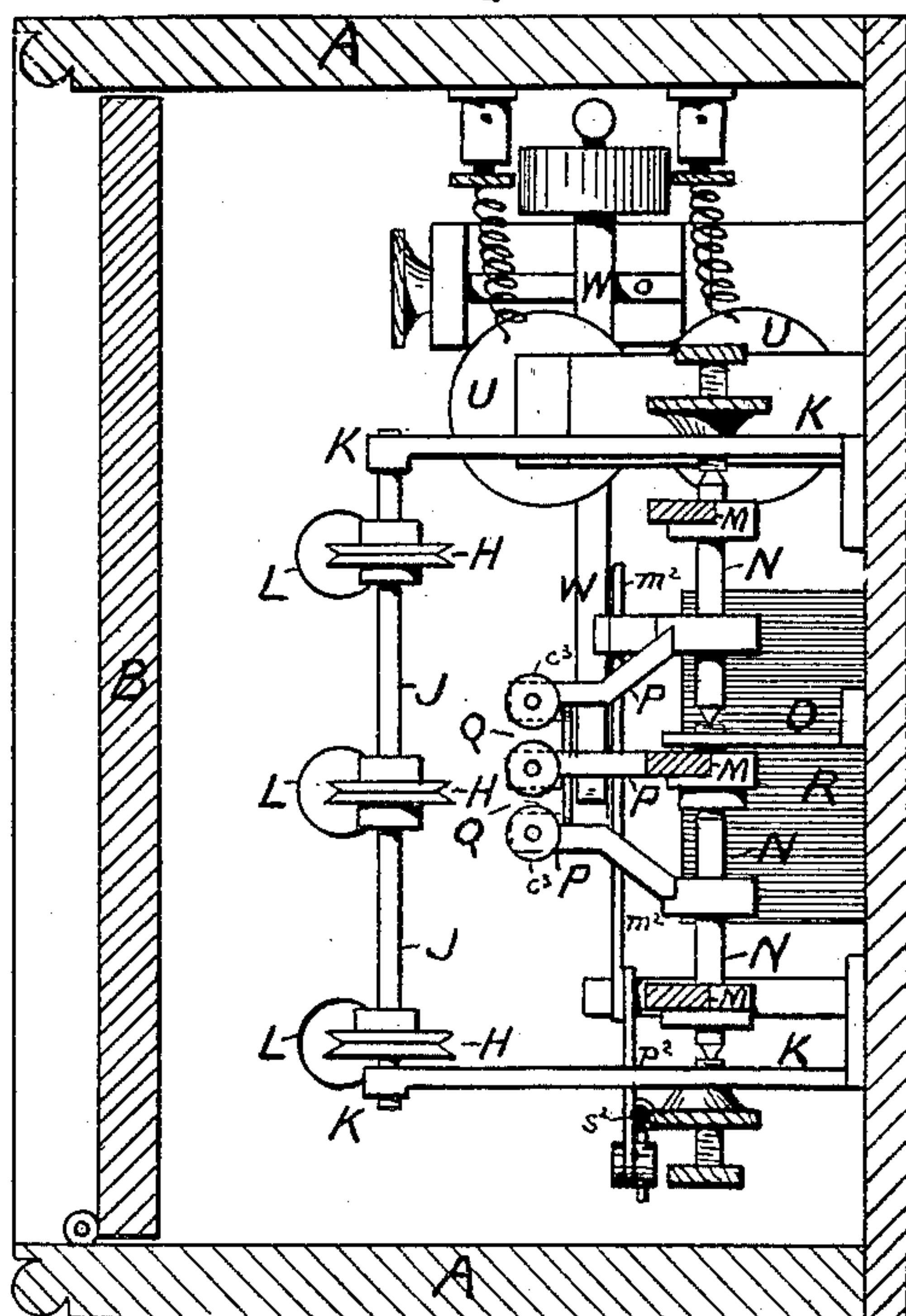
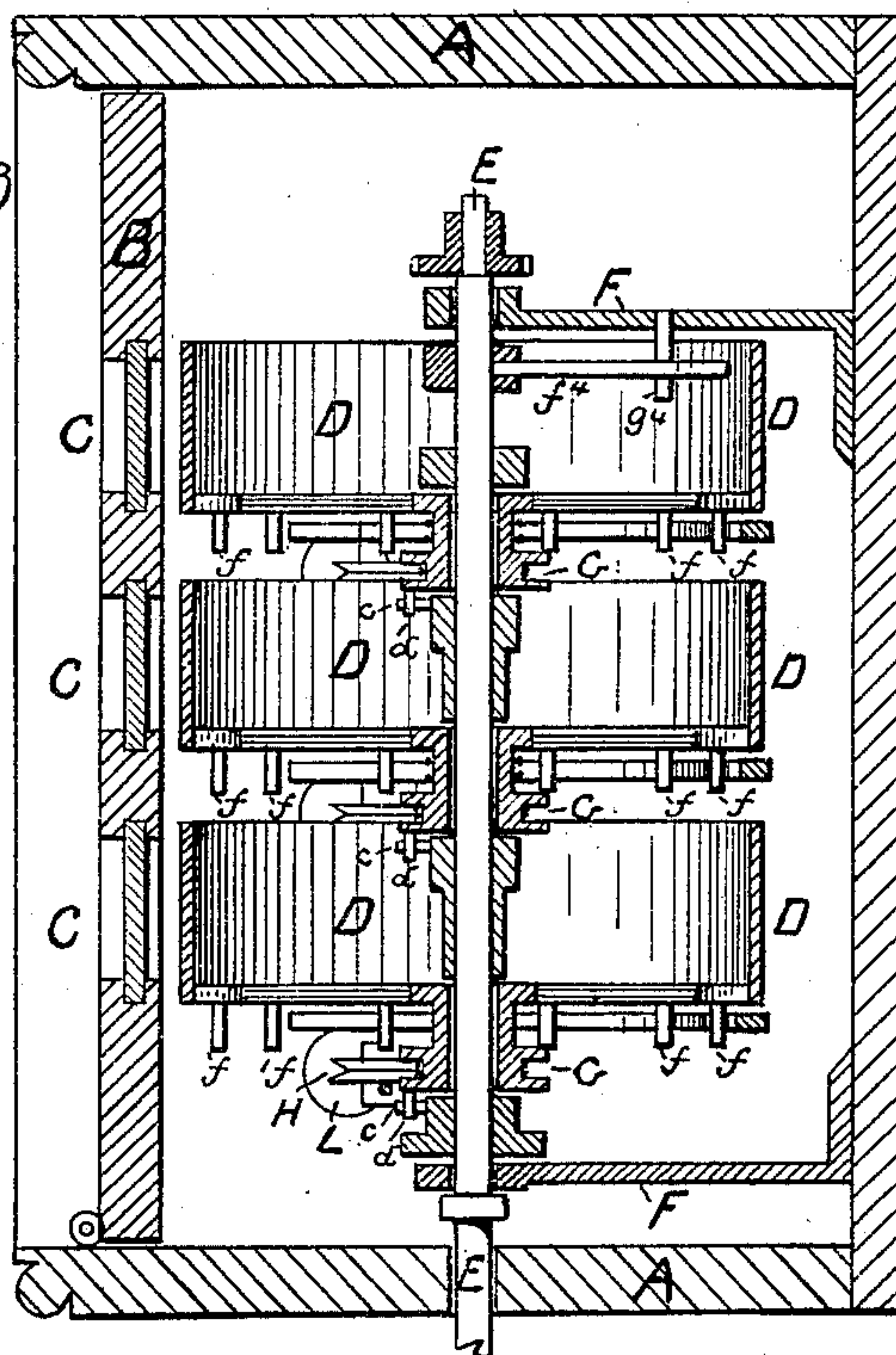
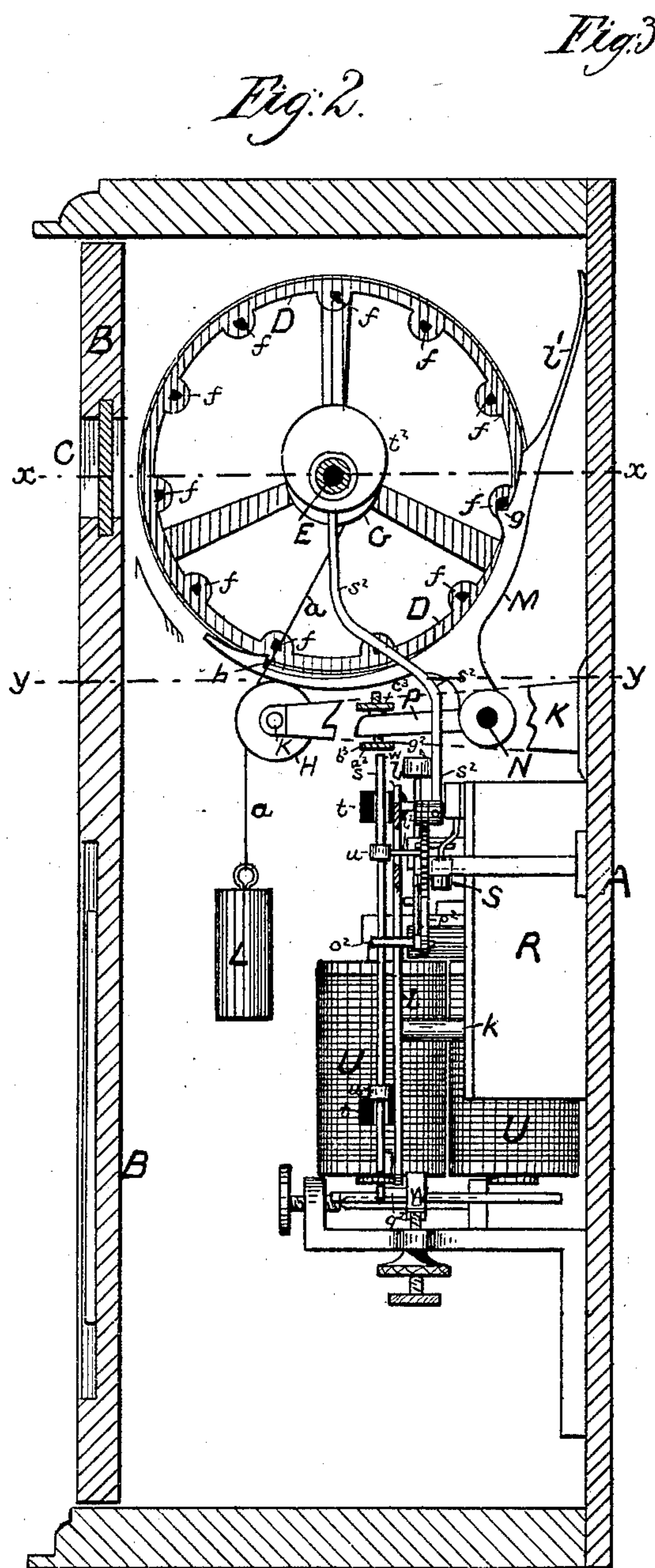
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*Witnesses:*  
*Wm. S. Bellows*  
*H. F. M. Keever.*

*Fig. 4.*

*C. E. Randall & E. M. Byington*  
*Inventors*  
*Per Brown Bros, attys.*



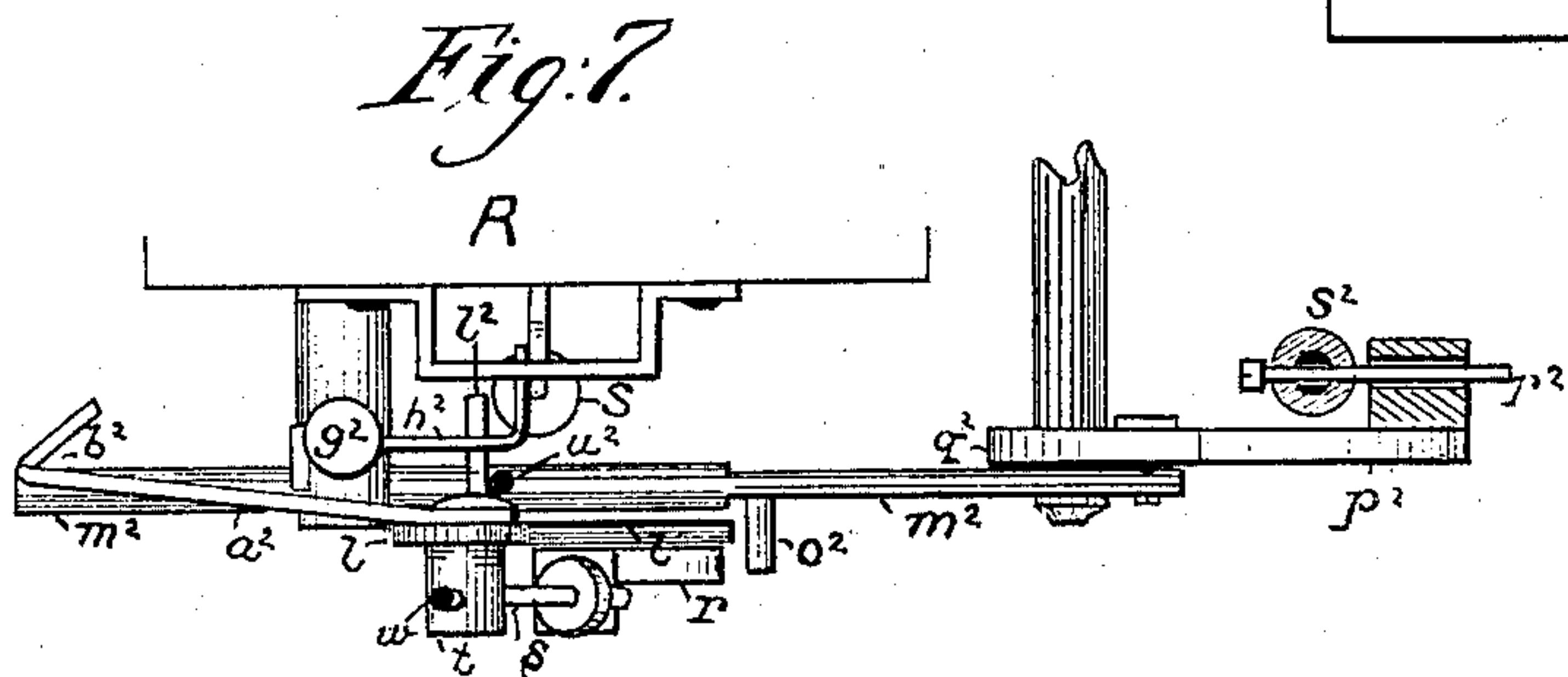
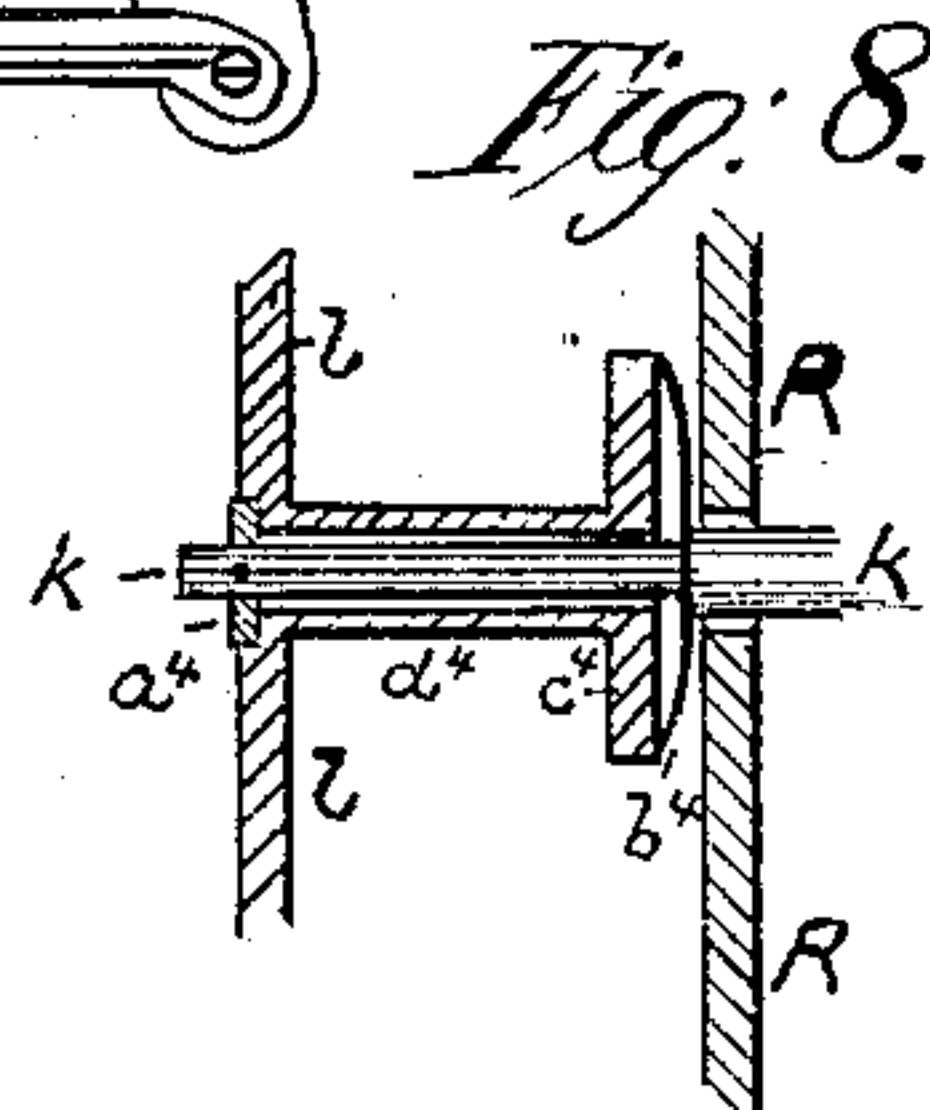
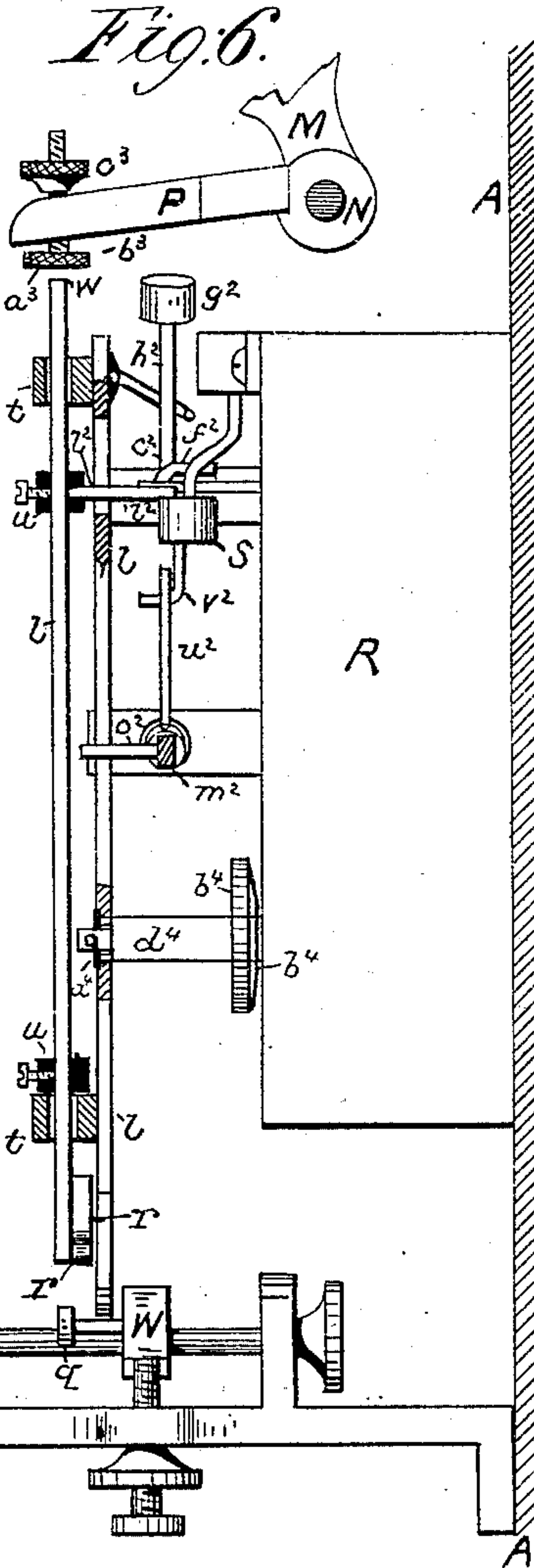
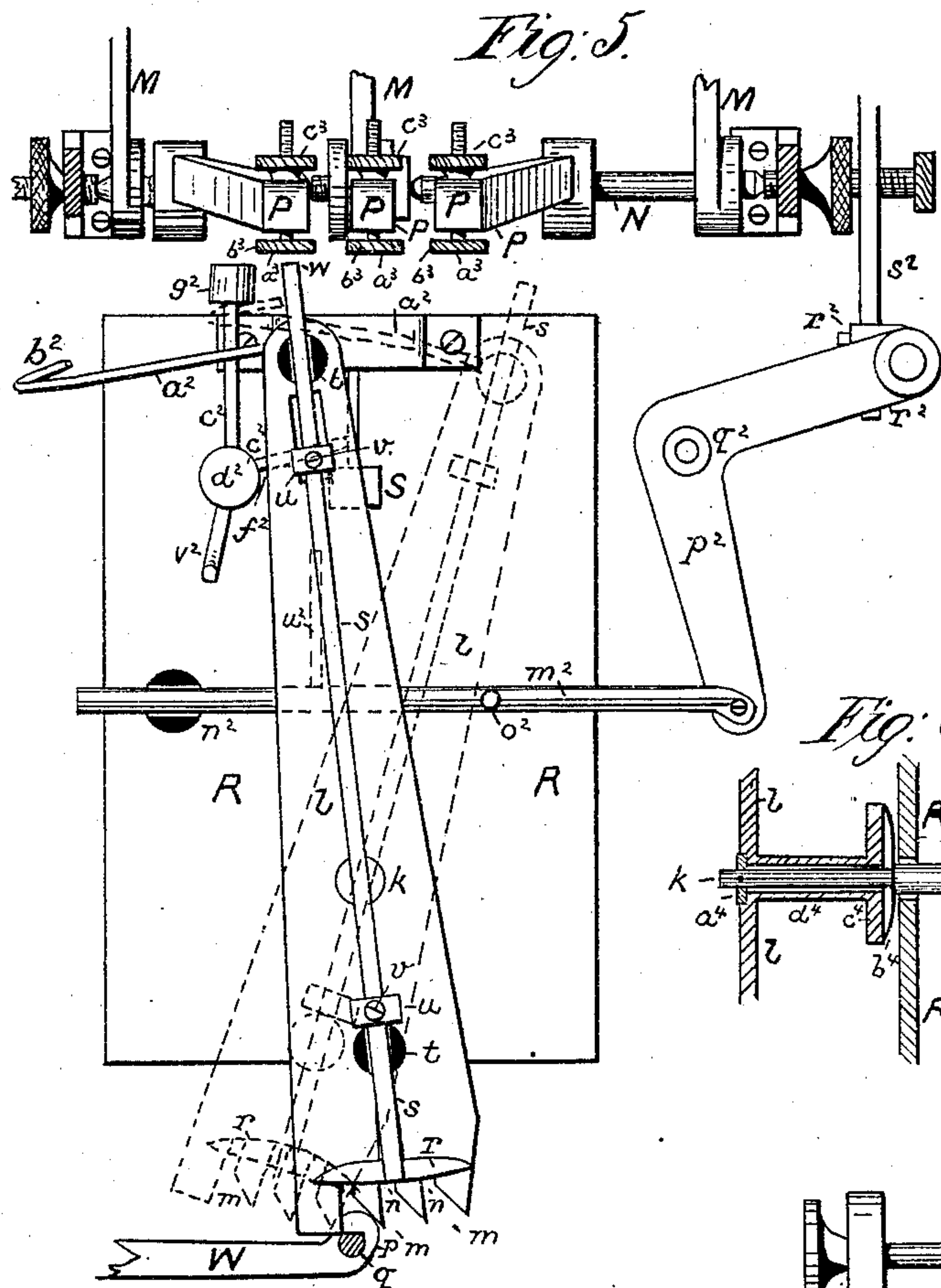
(Model.)

3 Sheets—Sheet 3.

C. E. RANDALL & E. M. BYINGTON.  
FIRE ALARM REGISTERING APPARATUS.

No. 257,067.

Patented Apr. 25, 1882.



Witnesses.

Wm. E. Bellows  
H. F. M. Reeves.

C. E. Randall and  
E. M. Byington  
Inventors.

Per Brown Bros.  
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# UNITED STATES PATENT OFFICE.

CHARLES E. RANDALL AND EUGENE M. BYINGTON, OF BOSTON, MASS.

## FIRE-ALARM-REGISTERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 257,067, dated April 25, 1882.

Application filed February 1, 1881. (Model.)

*To all whom it may concern:*

Be it known that we, CHARLES E. RANDALL and EUGENE M. BYINGTON, both of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Fire-Alarm-Registering Apparatus, of which the following is a full, clear, and exact description.

In cities and other communities employing the electric or telegraphic system for sounding an alarm of fire by numbered strokes of bells or gongs it is desirable that the operatives of the fire department on duty where the fire-engines, hose, and hook-and-ladder carriages and other fire-extinguishing apparatuses are housed, and at other places, shall be enabled to ascertain the alarm given or sounded at the earliest possible moment, and with the least possible hinderance or annoyance or diversion to them in their labors to get the fire apparatus in their control under way to the locality corresponding to the number of the alarm given. To this end, as well known, apparatus to be located at such places have been heretofore invented and patented for registering or recording the number of the alarm as it is sounded in such a manner as to place the number of the alarm in plain view and sight of the operatives there on duty without other thought or care on their part, thus, while the alarm is sounded, enabling them to give their whole attention and exertions to their work of getting their fire apparatus in readiness to depart for the locality corresponding to the number of such alarm.

This invention pertains to such recording or registering apparatuses, and particularly to that class of the same having wheels which are spaced and numbered around their peripheries and are arranged side by side, all in a manner, through a suitable connection with the electric fire-alarm system, to secure a step-by-step rotation of each wheel and of one wheel after the other, according to the number of separate figures marking the alarm.

This invention consists in substance, first, of a series of peripheral spaced and numbered wheels, which are arranged side by side and so as to turn separately and independently upon or about a common shaft or axis under the action of weights separately applied thereto, or otherwise, and which are each provided

with a series of concentrically-arranged and equidistant pins, in combination with a pawl for each wheel, which in its length has two shoulders or abutments for said pins, and is provided with an actuating-lever severally arranged as to each wheel for a separate and distinct action thereon, all substantially as hereinafter described; secondly, of a series of peripheral spaced and numbered wheels, which are arranged side by side and so as to turn separately and independently upon or about a common shaft, in combination with projecting pins applied to both said wheels and said shaft in a manner to secure through the abutment of the one set of said pins against the other set thereof a return of the series of wheels to a common and corresponding position as to the numbered spaces, all substantially as hereinafter described; thirdly, of a series of peripheral spaced and numbered wheels, which are arranged side by side and so as to turn separately and independently upon a common shaft or axis under the action of weights separately applied thereto, or otherwise, and which are each provided with a series of concentrically-arranged and equidistant pins, and with a pawl which in its length has two shoulders or abutments for said pins, and in its turn is provided with an actuating-lever severally arranged as to each wheel for a separate action, in combination with a pusher arranged to travel in relation to and across the plane of said actuating-levers, and as it so travels to be made to abut against and lift the same, all substantially as hereinafter described.

This invention also consists of other improvements, all of which will hereinafter fully appear.

In the accompanying plates of drawings this invention is illustrated.

In Plate 1, Figure 1 is a front elevation with the door to the casing removed. In Plate 2, Fig. 2 is an elevation at one side along a vertical plane represented by line *ww*; Figs. 3 and 4, horizontal sections on lines *xx* and *yy*, Fig. 2. In Plate 3, Fig. 5, in substance, is an enlarged front view of certain portions of this apparatus; and Figs. 6 and 7 are enlarged side and plan views of the same, all as will hereinafter fully appear. Fig. 8 is a detail view, as will hereinafter appear.



In the drawings, A represents a box or casing, made of suitable shape to inclose the present fire-alarm-registering mechanism. This box has a door, B, provided with three similar vertical openings, C, in the same horizontal line, and at each of these openings, within the box A, is a wheel, D, which several wheels are arranged in parallel vertical planes to turn loosely and independently of and separately from each other upon a common horizontal shaft, E, arranged to turn in stationary brackets F, and at one end to project to the outside of the box A, where it is provided with a crank-handle for convenience in operating it. In the present instance the periphery of each wheel D is divided into eleven spaces of equal length, one of which is left blank and the others numbered from 1 to 10, inclusive, and the arrangement of the wheels above described, together with the size and outline of the openings C in box A, is such as to expose the numbering of the wheels at the openings C, and, when a blank or any given numbered spaces of a wheel is placed at the opening C for such wheel, to have the remaining numbered and blank spaces of the same wheel covered against view. Each numbered wheel D carries a comparatively small grooved pulley, G, and each of these pulleys has one end of a separate cord or line, *a*, attached to it. These several cords *a* pass from their respective pulleys G to and over grooved pulleys H, (one for each cord,) which are suitably located therefor and arranged to turn loosely upon a common stationary shaft, J, which is below the horizontal plane and in front of the axis of the numbered wheels, and is there supported upon fixed horizontal bracket-arms K. Each cord rests against the front of its lower grooved and loose pulley, and below such pulley it carries a weight, L. These pulleys, cords, and weights cause the turning of the wheels in the direction of the arrow, Fig. 2, and this direction, with the arrangement of the numbers upon the wheels, is such as to bring the numbered and blank spaces of each wheel, from its blank space to and including number 10, in regular order and succession to its box-openings C.

The shaft E at one side of each grooved pulley G to the numbered wheels D has a fixed radial projecting pin, *c*, all of which move with the shaft when it is turned, and from the side of each grooved pulley G a fixed horizontal pin, *d*, projects into the plane of revolution of the shaft-pin *c*, that is located at the side of such grooved pulley, as described. These several shaft-pins *c* are in the same horizontal plane, or, in other words, are in a corresponding longitudinal line of the shaft; but the several wheel-pins *d* are in one and the same horizontal plane only when the several blank or unnumbered spaces of the wheels are at and opposite to the box-openings C, and this plane is one coincident with the horizontal plane of the axis of the numbered wheels.

For the proper working of this apparatus,

as will hereinafter appear, when the wheel-pins *d* are in the horizontal plane relative to the axis of the wheels and the box-openings above described the several shaft-pins *c* are under and against the several wheel-pins *d*, as plainly shown in Figs. 1 and 3 in the drawings. Each numbered wheel D on a corresponding side is provided with a series of concentrically-arranged horizontal projecting pins, *f*, equal in number (eleven) to the divisions of the periphery of each wheel, and arranged at equal distances apart and each in a line coincident with a radial line of the wheel running midway of the length of each numbered or blank space of the wheel. Each set of concentric wheel-pins *f* has an arc-shaped arm or pawl, M, which in each case is arranged to partially encircle them at and along their rear and bottom sides relative to their carrying-wheel, and below the wheel each pawl is attached to a separate horizontal shaft, N, which severally are arranged in the same line and horizontal plane, but so as to turn independently and separately on their respective supports. These supports consist of the brackets K, before referred to, and an intervening fixed bracket, O. This intervening bracket makes, with an outside bracket, the support for one end of two of the shafts N, one of which shafts, at its other end, is supported on an outside bracket, K, and the other on one end of the third shaft, which at its other end is supported on an outside bracket. Each pawl M has two shoulders, *g h*, for an abutment of the concentric pins of the numbered wheels D, and these shoulders, in each instance, are situated in such relation to the rotation of the numbered wheels under the action of the pulleys G H, cords *a*, and weights L, as herein described, that if either shoulder of the pawl be in the plane of rotation of the said concentric pins *f* one of such pins will abut against it, and thus the further rotation of the wheel in that direction be stopped; and, furthermore, that with either shoulder of a pawl in the plane of rotation of the said concentric pins *f* the other shoulder of such pawl will be outside of such plane. This latter position of the shoulders *g h* to each pawl M relative to the concentric wheel-pins *f* is maintained by the pressure of bent springs *V*, suitably arranged and applied therefor to such pawl, and when the pressure of such spring is overcome, as will hereinafter appear, the shoulders of the pawl are brought into their other position of their two positions relative to said concentric wheel-pins.

Each horizontal shaft carrying a pawl, M, as above described, has a fixed horizontal radial arm or lever, P, and these several levers project from the front side of the shafts N, and at their outer ends they severally terminate in common vertical and horizontal planes below the numbered wheels D, and are there disposed alongside of but equally separated from each other by an open space, Q. A lift of the forward end of either of the levers P swings its



pawl against its spring in a direction to place the upper shoulder, *g*, of such pawl out of and the lower shoulder, *h*, into the plane of revolution of the concentric wheel-pins *f*, whereby such wheel *D* is released to the action of its pulleys, cord, and weight, which revolves it until its revolution is arrested by abutment between one of its concentric pins *f* and the lower shoulder, *h*, of the pawl *M*, then, as described, in the plane of revolution of the concentric pins, said revolution being of the length of one division of said wheel.

Under the construction and arrangement of parts above described each numbered wheel, with an intermittent release of its pawl by a lift of the lever to such pawl, is given a step-by-step movement, and in the direction of its numbering—to wit, from the blank space to one, (1,) and thence to ten, (10,) inclusive. Again, this step-by-step movement of each numbered wheel is independent of the same movement in either one or both of the other numbered wheels. Again, in each step-by-step movement, on each throw of their levers the pawls hold the wheels from running a distance greater than the length of any of their respective divisions. Again, the pawls, when their levers are released, resume, by the then reaction of their springs, their position of abutment at their upper shoulders, *g*, with the concentric wheel-pins, and, furthermore, in each movement of the pawls through a lift of their levers the numbered wheels rotate to the extent of one division of their peripheries, which rotation is secured by and through the pulleys, cord, and weight-connections above described. With the several wheels placed with their blank spaces opposite to the box-openings *C* it is plain that they can then be operated from time to time to show and exhibit at such openings *C* any given combination of their numbers—as, for instance, 3, 4, 5—or a given combination of a number or numbers and a blank space or spaces. After this manipulation of the numbered wheels their blank spaces are again brought to the box-openings by a suitable turn of the horizontal shaft *E*, upon which they rotate. This turn of the shaft acts through its radial pins *c* upon the pins *d* of the numbered wheel-pulleys *G*, and thus the several wheels are put into position, when by a turn of the shaft in the reverse direction its pins are brought under the wheel-pulley pins *d*, which places them out of interference with the rotation of the numbered wheels through their weights and connecting parts should the pawls *M* be again released by a lift of their levers *P*, as has been described.

The lift of the levers *P* to the pawls *M* above described, under this invention, is obtained from the striking of the alarm by the electric-alarm apparatus in and through mechanism as follows:

*R* is a case which contains an ordinary clock mechanism, having a pendulum, *S*, which is outside and at the front of said case, and as

it is otherwise the same as any ordinary clock mechanism it is not deemed necessary to herein more particularly describe it. This clock mechanism is below the mechanism which has been described, and, as shown, it is adapted to be actuated by a weight, *T*; but obviously a coiled spring may be used as well. *k* is a horizontal shaft arranged to be rotated by the clock mechanism. This shaft *k* has a radial arm, *l*, projecting in opposite directions from its axis and in a vertical plane coincident with the vertical plane of the outer ends of the lifting-levers for the pawls. This radial arm *l* moves around with the said shaft, which has a continuous rotation from the clock mechanism, and this movement of said arm is from the left toward the right, and it is attached to said shaft *k*, as will hereinafter be described, so that it can be swung back thereon—that is, in the contrary direction to its movement—by the clock mechanism without injury or other effect upon such clock mechanism or its continuance of rotation of the shaft. The operating position of this arm is vertical, and its then lower end has a series of vertical notches, *m*, extending across its width. Each notch, at its inner end, has straight parallel sides *n*, and at the left hand of each notch such side is so continued to the outer end of the notch, and at the right hand of each notch such side so continues for only a portion of its length, when its further continuation is at an obtuse angle to its straight portion, and in such direction at an acute angle to the left-hand side of the next notch at the right, which is straight for its whole length.

*U* is an electro-magnet placed in a vertical position at the left of the notched radial arm above described, and *V* the armature thereto. The electro-magnet is connected by wires with the electro-magnetic fire-alarm system, so that on each stroke of an alarm in such system it will attract its armature *V* and cease such attraction when such stroke is completed. The armature *V* is attached to a horizontal lever, *W*, which is hung upon a fulcrum, *o*, and at one end has a weight, which is arranged to be moved on said lever, so as to adjust it in relation to the other and outer end, *p*, of said lever in such manner that the end *p* will fall and carry the armature back to its normal position of rest after the cessation of each attraction of the electro-magnet, its end *p* being in a position, as the armature and itself move toward the electro-magnet, because of the electro-attraction of the magnet for its side, stud, or pin *q*, to enter into a notch, *m*, of the series of notches in radial arm *l*, before referred to, and to pass along the length thereof toward and into its straight portion, provided, of course, such series of notches are in position therefor, and when the armature and its lever are at rest to be entirely free and clear of all of such notches.

*r* is a foot-piece lying across and covering the front of the inner straight portions, *n*, of



the notches  $m$  in radial arm  $l$  of clock mechanism. This foot-piece is secured to the lower end of a stem or rod,  $s$ , arranged to play along the length of the radial arm  $l$  and through two guide-blocks,  $tt$ , thereof, and in a radial direction with the axis of revolution of the carrying-shaft  $k$  for said radial arm. This foot-piece stem  $s$  has adjustable collars  $u u$ , secured by set-screws  $v v$  and arranged between its two guide-blocks  $t t$ , for limiting the throw of the foot-piece stem in both directions along the length of the radial arm, and thus the throw of the upper end,  $w$ , of the stem, which end  $w$  is in a vertical plane corresponding to the vertical plane of and below the several outer ends of the actuating-levers  $P$  for the pawls of the numbered wheels. On each throw of the armature  $V$  and its lever  $W$ , because of the attraction of the electro-magnet, the lever  $W$ , through its stud or pin  $q$ , provided such stud enters a notch,  $m$ , of the radial arm  $l$ , works against the foot-piece  $r$ , and through it lifts the stem attached to it a sufficient distance to bring the upper end,  $w$ , of such stem  $s$  against the under side of an actuating-lever,  $P$ , for the pawls  $M$ , according as one or the other of such levers is in line with it, and thus lifts such lever sufficiently for it, working through its carrying-shaft  $N$ , to place the shoulders  $g h$  of its pawl  $M$  in a position for a rotation of the numbered wheel belonging thereto, because of the pulleys, weight, and cord-connection described, a distance equal in length to one of the peripheral divisions of said wheel, as has been hereinbefore fully described. On each return of the armature and of its carrying-lever to their normal position the said foot-piece and its stem drop of their own weight into position to be lifted, as before, on the next movement of the armature and its lever under the attraction of the electro-magnet, as aforesaid.

The radial arm  $l$ , with its pusher, composed of the foot-piece  $r$  and stem  $s$ , as described, under the action of the clock mechanism, travels from left to right across the horizontal plane of the actuating-levers  $P$  for the pawls of the numbered wheels, and as it so travels on each and every attraction by the electro-magnet of the armature and its lever  $W$  a lift of either one or the other of the said levers  $P$  will occur, according to the then position of the upper end of the pusher  $r s$  in relation thereto, and thus as a consequence the numbered wheel  $D$  belonging to such lever so lifted will be set free for a rotation, as aforesaid, correspondingly changing the number of its peripheral space exposed at its box-opening from blank to 1, and from thence upward to and including 10, as the case may be. To secure or produce through this travel of the pusher  $r s$  across and operation of the actuating-levers  $P$  to the numbered wheel-pawls  $M$  from the action of the clock mechanism and electro-magnet and its armature-lever  $W$ , as above described, and from the pulley cord, and weight connection above described of the numbered wheels, a step-by-

step rotation of each of the several numbered wheels  $D$ , the one wheel after the other, and thereby secure a presentation at the box-openings of the separate figures of an alarm of fire, the one figure after another, each actuating-lever and the space between each actuating-lever have such widths, respectively, in the direction of the travel of the pusher  $r s$  from the running of the clock mechanism, and the aforesaid shaped notches  $m$  of the carrier or radial arm  $l$  to said pusher are so situated relative to each other and to the said travel of the pusher and to the movement of the pin or stud  $q$  on the armature-lever  $W$  that during the several separate strokes of an alarm which go to make up the first and each succeeding figure or digit of such alarm—as, for instance, 3, 4, and 5—the pusher for each stroke of each figure of such alarm will always act against the appropriate lever of the numbered wheels  $D$ —as, for instance, for the first figure, 3, the left-hand lever, for the second figure, 4, the middle lever, and for the third or last figure, 5, the right-hand lever—and during the intermission between the cessation of the strokes for one figure of an alarm and the commencement of the strokes for next figure of such alarm, because, under the well-known electric system of sounding of fire-alarms, of the then additional time allowed between the separate figures of an alarm over the time allowed between the separate strokes making up one figure, the pusher will always then pass across the space intervening between the lever which has been operated upon and the lever to be next operated upon by the pusher, and thus be put into position for its operation against such following lever should the alarm cover another figure, and so on for each succeeding figure of the alarm. This swing from left to right of the pusher during the sounding of an alarm, as above described, as it is produced from the running of the clock mechanism, obviously will continue so long as the clock mechanism runs, if not otherwise prevented, and it is in every respect, except as described, independent of and separate from the operation of the electro-magnet  $U$  and its armature-lever  $V$ . To secure an automatic arrest of this swing of the pusher when it has sufficiently passed beyond the last lever to place it beyond any possibility of being further acted on by the armature-lever of the electro-magnet, mechanism as follows is provided:

$a^2$  is an arm projecting to the left from the pusher, and at its outer end having a hook,  $b^2$ .  $c^2$  is a vertical angular lever, hung at its angle upon a fulcrum-pin,  $d^2$ , of the clock-casing  $R$ , and adapted, when swung in the one direction, to abut by its arm  $f^2$  against the pendulum-rod  $S$ , and thus to hold it from swinging, and to be so retained until released by the leverage exerted upon it from the weighted end  $g^2$  of the other arm,  $h^2$ , and when swung in the other direction to free its said abutting arm from the pendulum-rod, and thus set the pend-



ulum free to vibrate from the running of the clock mechanism. The situation of this angular lever  $c^2$  upon the clock-casing and of the hook-projection  $b^2$  from the pusher-carrier  $l$  are such relatively to each other that the said pusher-carrier  $l$ , through its said hook-projection  $b^2$ , will pull and thus put the angular lever  $c^2$  into such a contact with the pendulum-rod  $S$ , when the pusher has reached the limit of its swing to the right, as to stop the swing of the pendulum, and so hold the same until released, which arrests the further running of the clock, and as a consequence the further swing of the pusher.

To place the pusher, after the registration of an alarm, for the registration of another alarm, in so far as the pusher and its carrier are concerned, it is only necessary to swing the pusher carrier back to its original position of starting at the left, when obviously the same operations and a similar registration as have been described will occur, provided, of course, the wheels have been put back to their original position by the turn of the shaft, as has been described, and the pendulum has been released by placing the angular lever out of contact therewith. The release of this hold upon the pendulum is secured from the first upward movement of the pusher  $r$   $s$  in the sounding of the next alarm through a horizontal pin,  $l^2$ , attached to it, and which is properly situated to then lift the arm of the angular lever  $c^2$ , which is against the pendulum-rod  $S$ , sufficiently for the other and weighted arm of the angular lever to then throw the angular lever out of its position of detention to the swing of the pendulum.

The replacement of the pusher and its carrier herein described is secured by mechanism as follows:

$m^2$  is a slide or rod arranged to travel horizontally through a guide-block,  $n^2$ , across the swing of the pusher, and  $o^2$  a pin projecting therefrom, and in a suitable position or otherwise arranged to abut against the right-hand edge of the pusher-carrier  $l$ , and when moved forward to the left, by sliding the rod  $m^2$  in that direction, to swing the pusher-carrier upon its center in a similar direction, thus restoring it to its starting position. This slide of this rod  $m^2$ , as also its return to its original position, is secured from the turn of the horizontal shaft  $E$ , carrying the numbered wheels, as before described, by means of a connection consisting of a bell-crank lever,  $p^2$ , hung at its angle  $q^2$  upon a fulcrum of the casing  $R$ , and at one end connected to the said slide-rod  $m^2$ , and at its other end, through a sliding link-piece,  $r^2$ , and vertical rod  $s^2$ , to an encircling-strap,  $t^2$ , of an eccentric on said horizontal shaft. The arrangement of this connection is such in relation to the arrangement of the shaft-pins  $c$  and wheel-pins  $d$ , and to the replacement of the wheels and their pins  $d$  and the shaft-pins  $c$  above described, as, in the turn of the shaft  $E$  for such purposes, to secure the replacement

of the pusher through the slide of the rod  $m^2$ , as above stated, and at the same time the return of the said rod  $m^2$  to its original position, so as to place its abutting pin for the pusher-carrier out of the line of movement of the pusher-carrier in its next swing to the right, under the next action of the clock mechanism in the sounding of an alarm. This slide-rod  $m^2$  has a vertical pin,  $u^2$ , so situated thereon that by sliding it (the rod) in the proper direction to place the pusher-carrier back to its starting position the said pin will strike against a downward-projecting arm,  $v^2$ , of the stop-lever  $c^2$ , and thus swing such stop-lever into contact with the pendulum, if not already in such position, and arrest the further run of the clock mechanism. By this means the running of the registering apparatus may be arrested in its action at any time desired.

Although this invention has been herein particularly described as operated in certain respects from the action of an electro-magnet and its armature-lever, it is obvious that an operation in the same respects can be as well secured from the swing of a gong-hammer, to be used in lieu of the armature-lever, which is actuated by the electric fire-alarm system or otherwise in many ways in connection with such system; and while the use of an electro-magnet and its armature-lever, in substance, in the manner described constitutes a part of this invention, yet it is not intended that the same shall be limited thereto as to its other mechanisms, which of themselves are capable of the actions described, provided, so far as the electro-magnet and its armature-lever are concerned, some suitable and proper contrivances—as, for instance, a gong-hammer, as before stated—are employed.

The face  $a^3$  of each actuating-lever against which the pusher  $r$   $s$  acts is formed of a plate,  $b^3$ , rendered adjustable as to its height or horizontal position by a screw-threaded nut and bolt,  $c^3$ , through which it is attached to its lever. This construction enables the face  $a^3$  of each actuating-lever  $P$  for the abutment of the pusher to be adjusted as may be found necessary to secure the proper and best action of the pusher, the advantages of which are obvious.

It will be here observed that the herein-described formation of the notches  $m$  of radial arm  $l$ , in which notches the armature-lever works against the pusher  $r$   $s$ , gives a wide opening to the entrance of the stud  $q$  to the armature-lever  $W$ , and the angular direction of one side guides the said stud in such entrance to the inner straight portion of the notch, and thus the pusher is brought back—or, in other words, swung back—in an opposite direction to its swing by the running of the clock mechanism, and thus kept in line with the appropriate lever during the time of the several strokes, making up such digit of the number of the alarm, all of which is obvious in view of the preceding description of the construc-



tion, arrangement, and operation of the several parts composing this registering apparatus for fire-alarms. For the pusher *r s* and its carrier *l* to be swung backward upon the shaft *k* while such shaft continues its turn—or, in other words, in a reverse direction to the turn of the shaft—under the action of the clock mechanism, and without interfering with or arresting the continuation of such turn of the shaft *k* or the clock mechanism, the said carrier is confined to its carrying-shaft between two bearings, the one a cross-pin, *a*<sup>4</sup>, through the shaft, and the other a bent spring, *b*<sup>4</sup>, which surrounds the shaft and bears against the front face of the clock-casing and a disk, *c*<sup>4</sup>, which is a part of a tubular casing, *d*<sup>4</sup>, of the carrier. This attachment of the carrier *l* secures its swing with the shaft, while it allows it to be turned of itself freely on the shaft in either direction.

*f*<sup>4</sup> is an arm projecting radially from shaft *E*, and *g*<sup>4</sup> a stationary pin in position for the abutment of said radial arm when swung around. This arm and pin are relatively situated to act as a stop to the rotation of the shaft *E* in the setting of the numbered wheels, as has been herein described.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A series of peripheral spaced and numbered wheels, *D*, arranged to turn separately and independently under the action of weights or their equivalents, and each provided with a series of concentrically-arranged and equidistant lateral pins, *f*, in combination with pawls *M*, arranged between the wheels, and each provided with two abutments for said pins, and with an actuating-lever, *P*, which lever is rigidly connected to and forms a part of said pawl, all combined and arranged together substantially as and for the purpose described.

2. A series of peripheral spaced and numbered wheels, *D*, arranged to turn separately and independently under the action of weights or their equivalents, and each provided with a series of concentrically-arranged and equidistant lateral pins, *f*, in combination with pawls *M*, arranged between the wheels, and each provided with two abutments for said pins, and with an actuating-lever, *P*, which lever is rigidly connected to and forms a part of said pawl, and with a pusher, *r s*, arranged to travel in relation to and to operate upon and against each and all of said levers, all substantially as and for the purpose described.

3. A pusher, *r s*, and its carrier *l*, having notches *m*, and arranged to swing about an axis or center, in combination with a lever, *W*, arranged to vibrate, and in such vibration to enter into a notch of said carrier and therein work against said pusher, all substantially as and for the purpose described.

4. A pusher, *r s*, and its carrier *l*, having notches *m*, and together arranged to swing about an axis or center, in combination with

an electro-magnet, and a lever, *W*, which is arranged to vibrate, and in such vibration to enter into a notch of said carrier and therein work against said pusher, and is operated upon through the said electro-magnet, all substantially as and for the purpose described.

5. The combination, with the pendulum of a clock or other suitable movement, and with the carrier *l* for a pusher, *r s*, which is moved by such clock mechanism, substantially as and for the purpose described, of the arm *b*<sup>2</sup> to said pusher-carrier *l*, and of the angular lever *c*<sup>2</sup>, arranged to turn on a stationary support in relation to said pendulum, and the movement of said arm in conjunction with said pusher-carrier for said arm to place said angular lever at a bearing against the pendulum, and thereby arrest its movement, all substantially as and for the purpose described.

6. The pin *l*<sup>2</sup> of pusher *r s* and the stop-lever *c*<sup>2</sup> for the pendulum *S* of a clock or other movement, combined and arranged together for said pusher-pin, when moved in the proper direction to release said stop-lever from the pendulum, all substantially as and for the purpose described.

7. The carrier *l*, arranged to swing on or about a center, and carrying a pusher, *r s*, in combination with a slide-rod, *m*<sup>2</sup>, for operation substantially as described, for the purpose specified.

8. The vertical pin *u*<sup>2</sup> to slide-rod *m*<sup>2</sup>, in combination with the arm *v*<sup>2</sup> of stop-lever *c*<sup>2</sup> to the pendulum *S* of a clock or other movement, substantially as and for the purpose described.

9. The peripheral spaced and numbered wheels *D*, each provided with concentrically-arranged pins *f*, the pawls *M*, each having two shoulders, *g h*, and an actuating-lever, *P*, in combination with a clock or other suitable movement, a carrier, *l*, carried by such movement, and having a pusher, *r s*, and notches *m*, and with the lever *W*, adapted to be vibrated, when severally constructed and arranged and operating together substantially as and for the purpose described.

10. The carrier *l*, carrying the pusher *r s*, in combination with the shaft of a clock or other movement, an electro-magnet, an armature, and an attached lever arranged directly beneath the pusher and acting to elevate the same, substantially in the manner described and shown.

11. The pusher-carrier *l*, provided with the notches *m*, each constructed at its inner end and along its sides substantially as shown and described, for the purposes set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

CHARLES E. RANDALL.  
EUGENE M. BYINGTON.

Witnesses:

ALBERT W. BROWN,  
W. S. BELLOWS.