

4 Sheets—Sheet 1.

TICKET CUTTER, REGISTER, AND ALARM.

Patented Nov. 24, 1885.

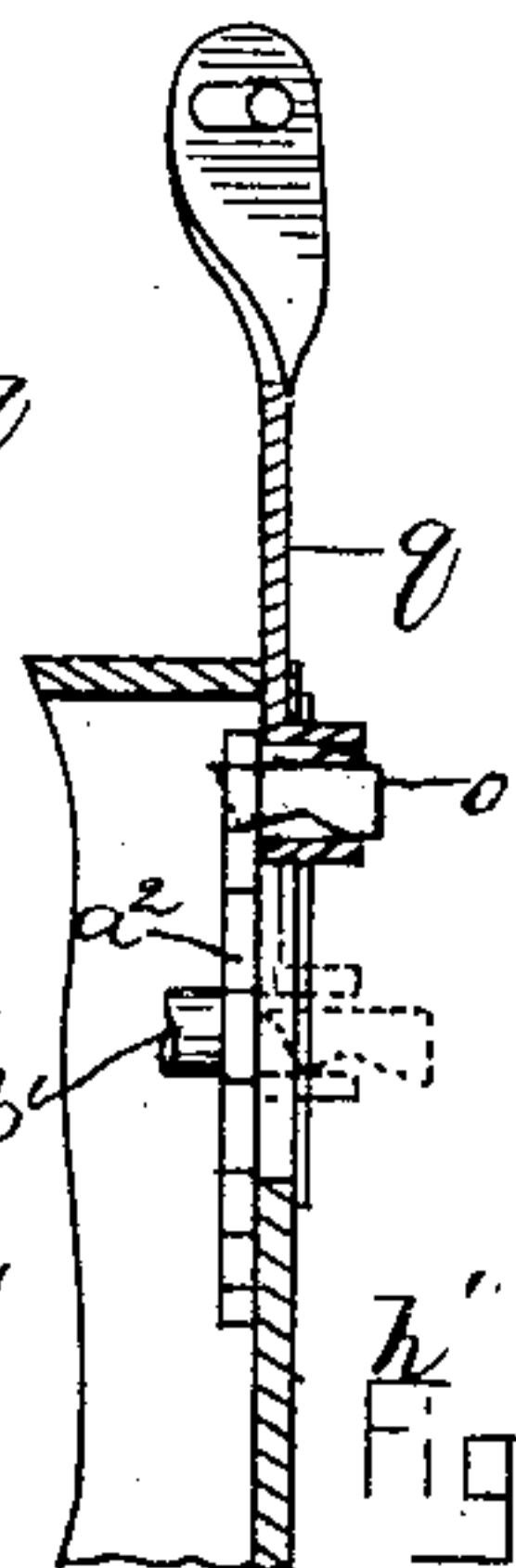
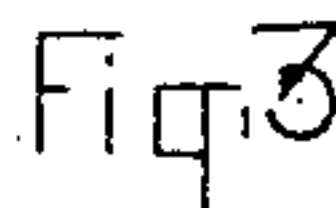
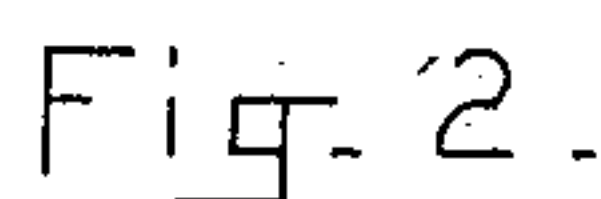
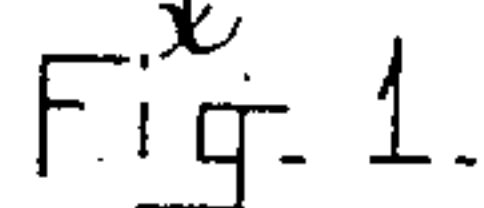


Fig. 4. by Night & Dawn
Atty.

(No Model.)

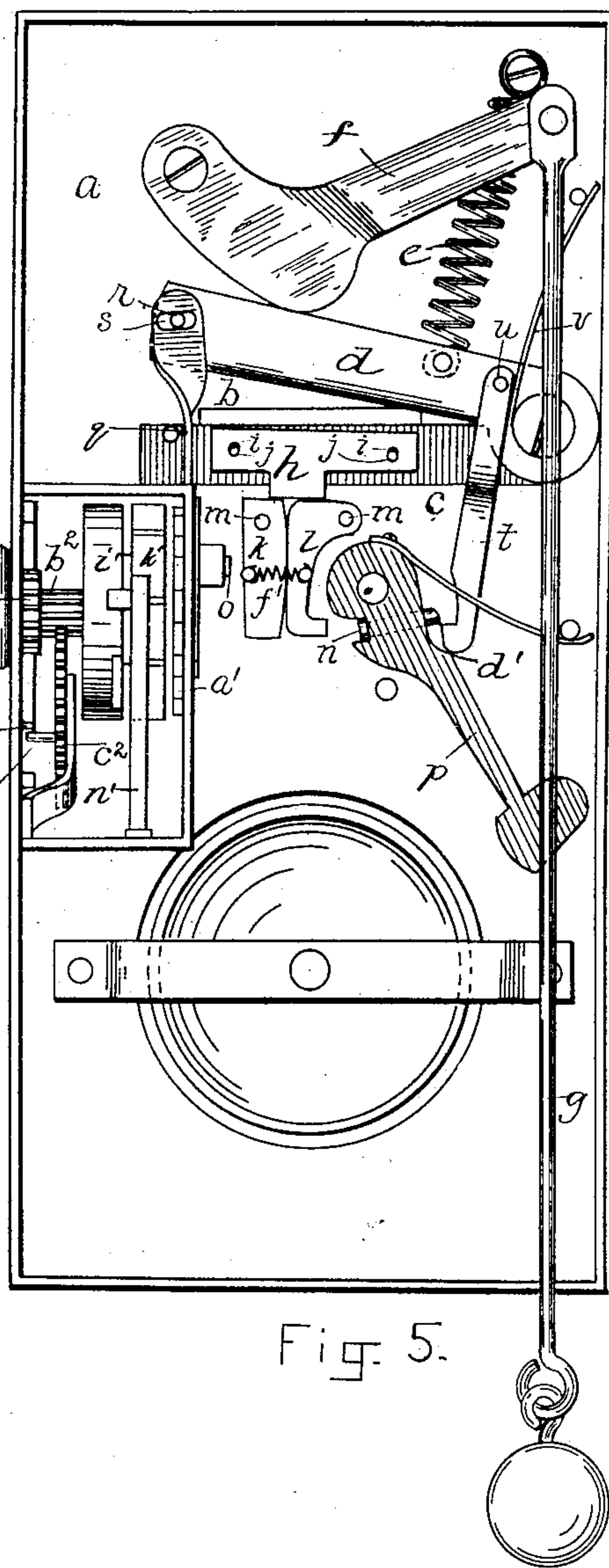
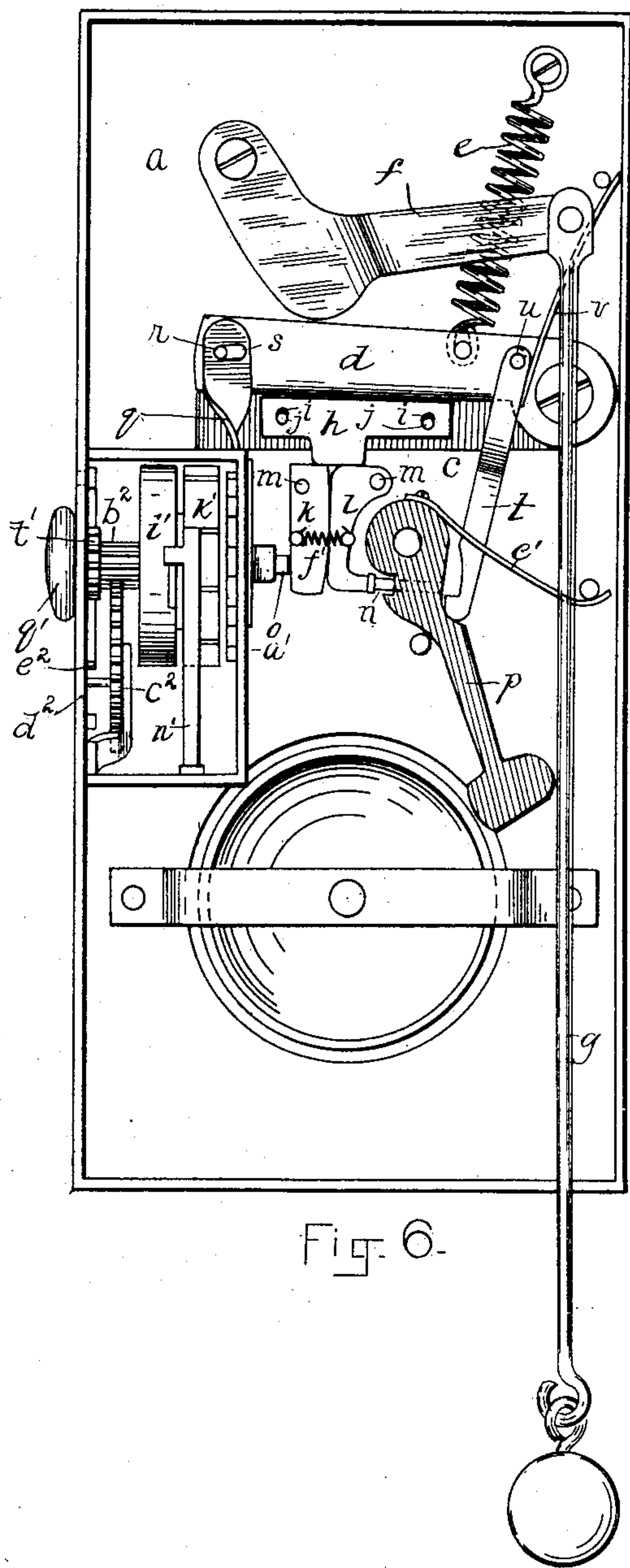
4 Sheets—Sheet 2.

E. F. POLAND & J. G. CRAWFORD.

TICKET CUTTER, REGISTER, AND ALARM.

No. 331,213.

Patented Nov. 24, 1885.



WITNESSES:
Chas. S. Gooding.
H. Brown.

INVENTORS
E. F. Polans
J. G. Crawford
by Wright & Brown
Attys.

(No Model.)

4 Sheets—Sheet 3.

E. F. POLAND & J. G. CRAWFORD.

TICKET CUTTER, REGISTER, AND ALARM.

No. 331,213.

Patented Nov. 24, 1885.

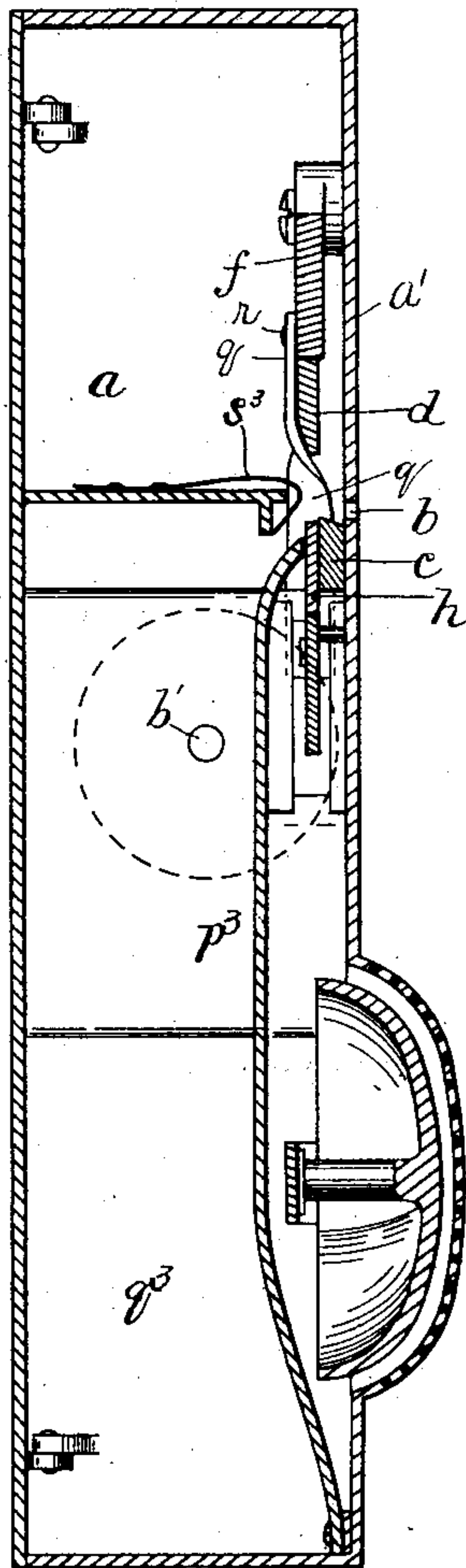


Fig. 7.

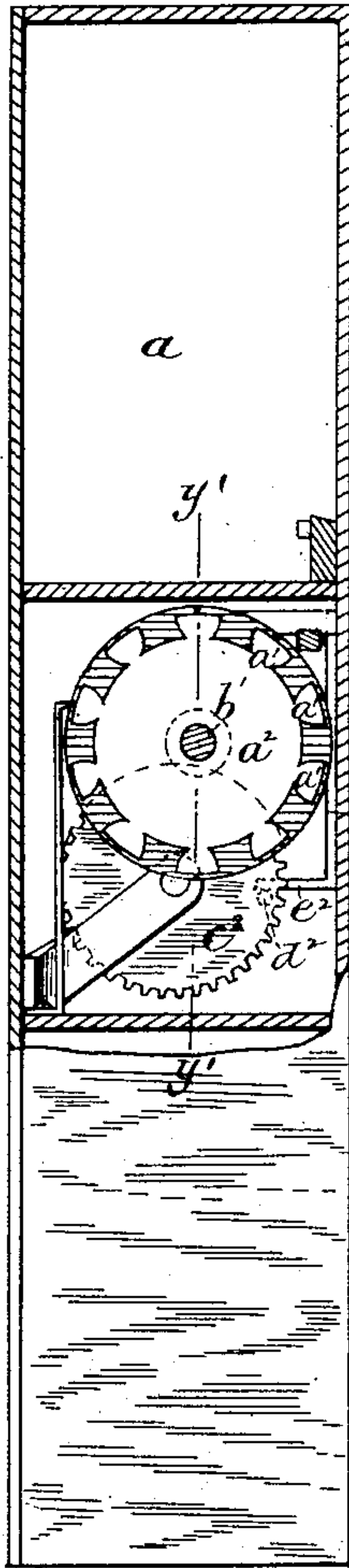


Fig. 8.

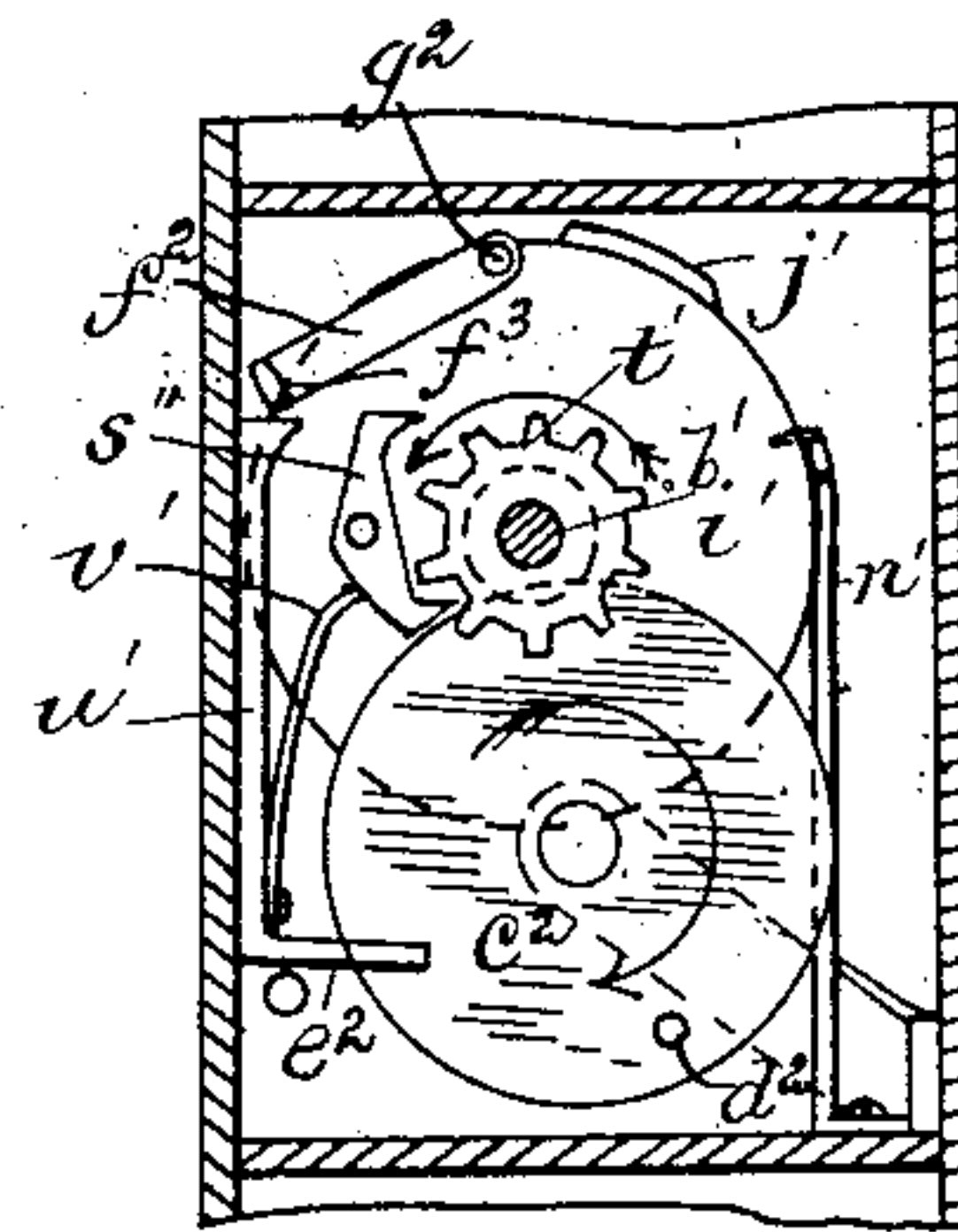


Fig. 9.

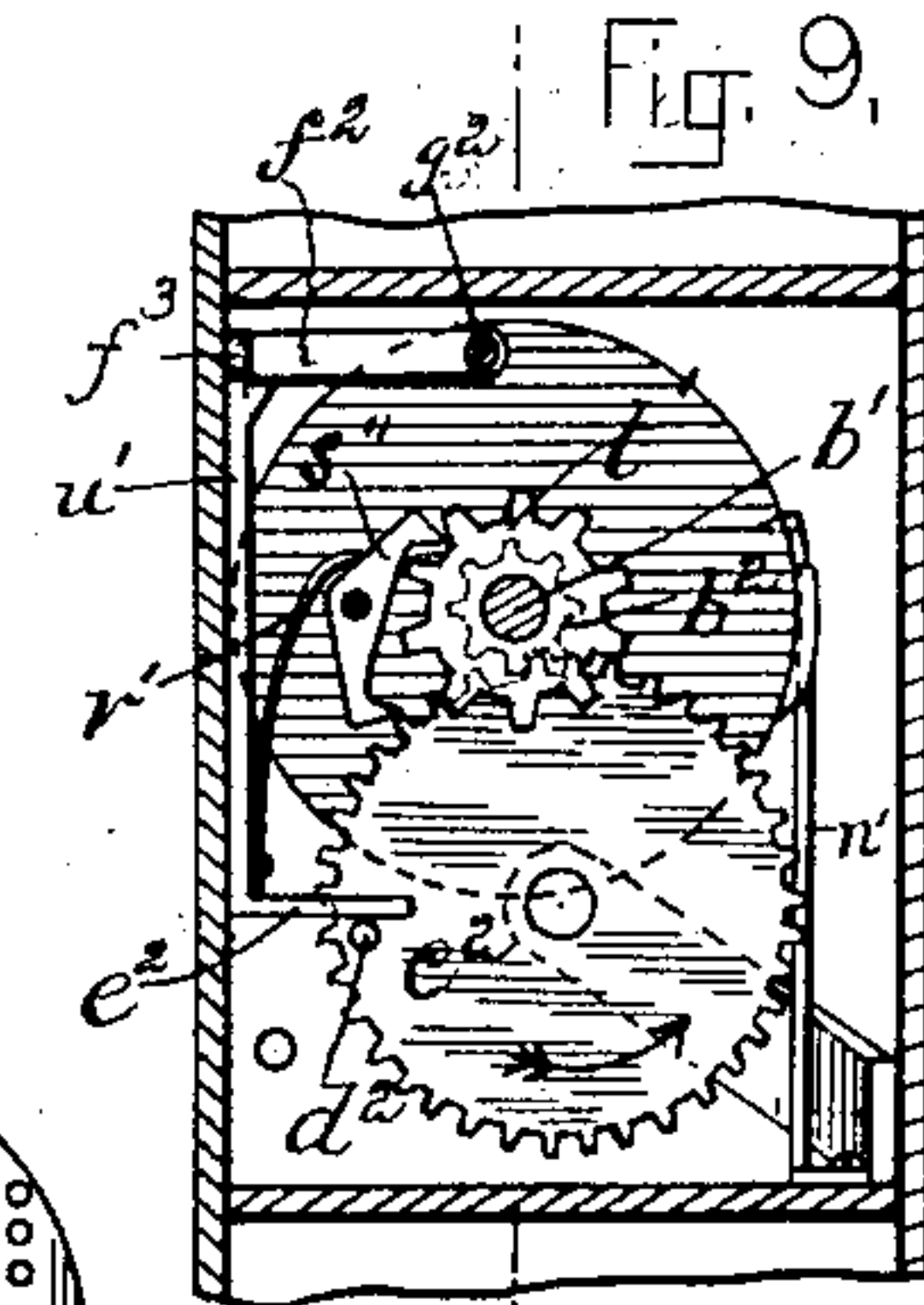


Fig. 10.

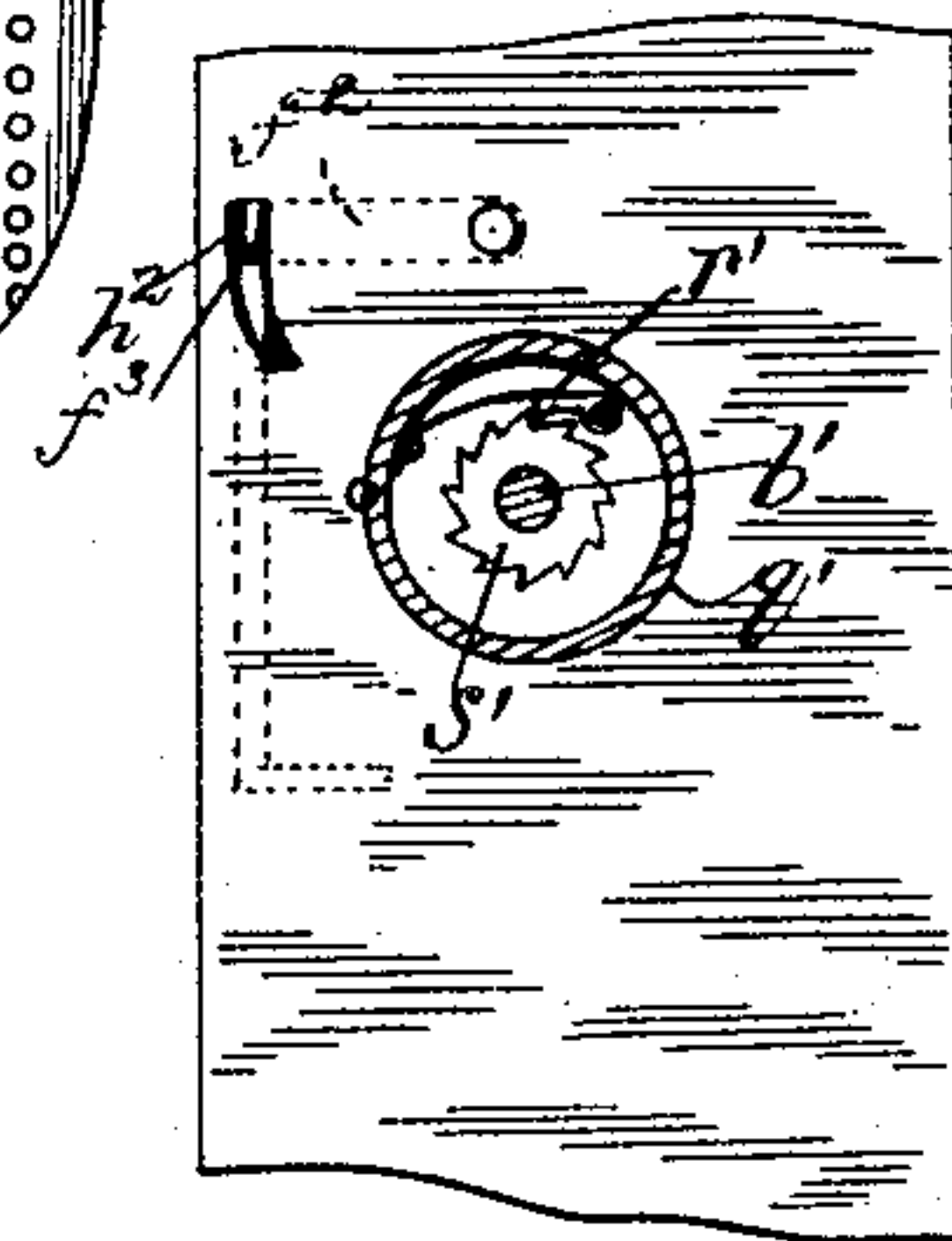


Fig. 11.

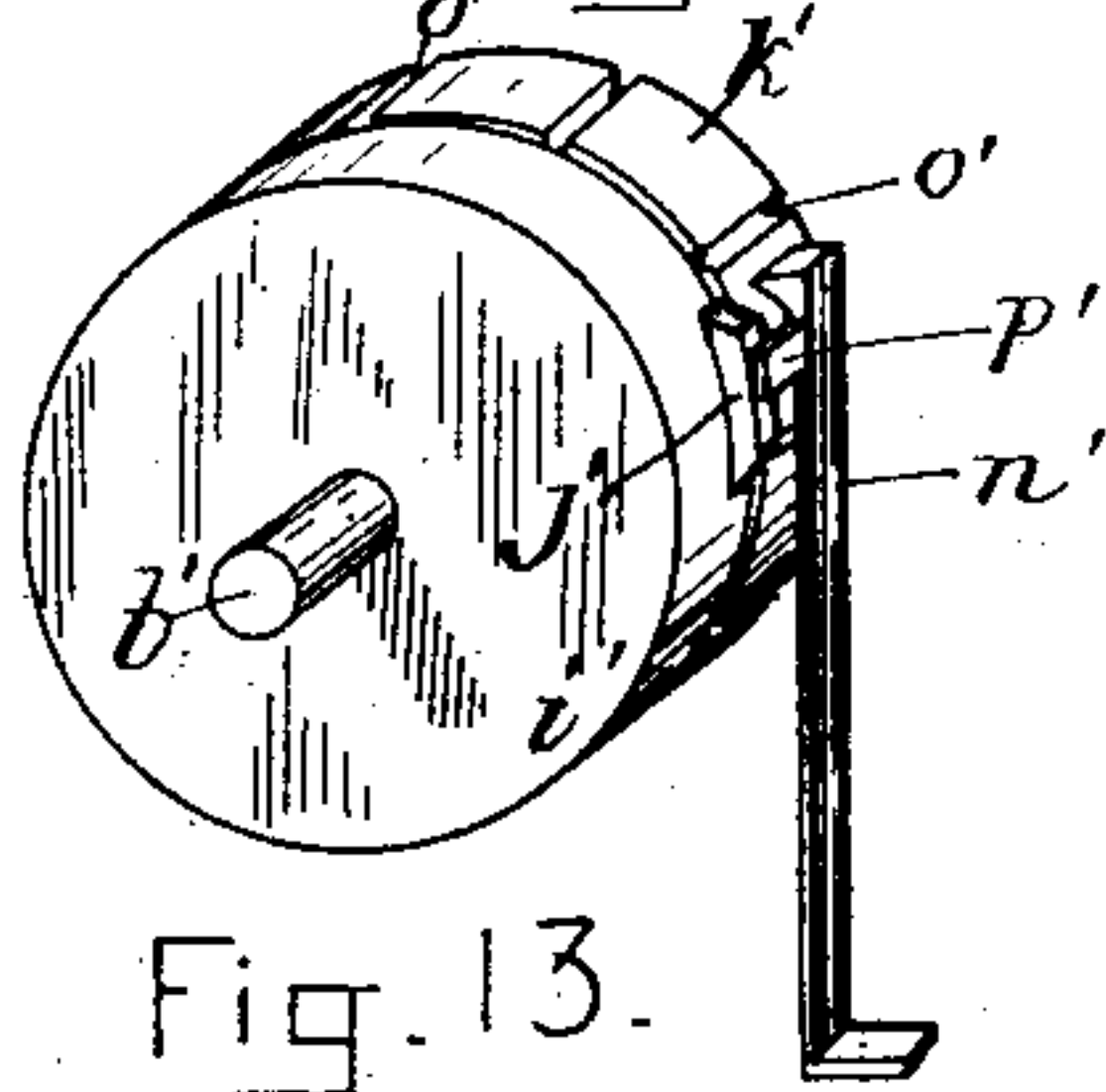


Fig. 13.

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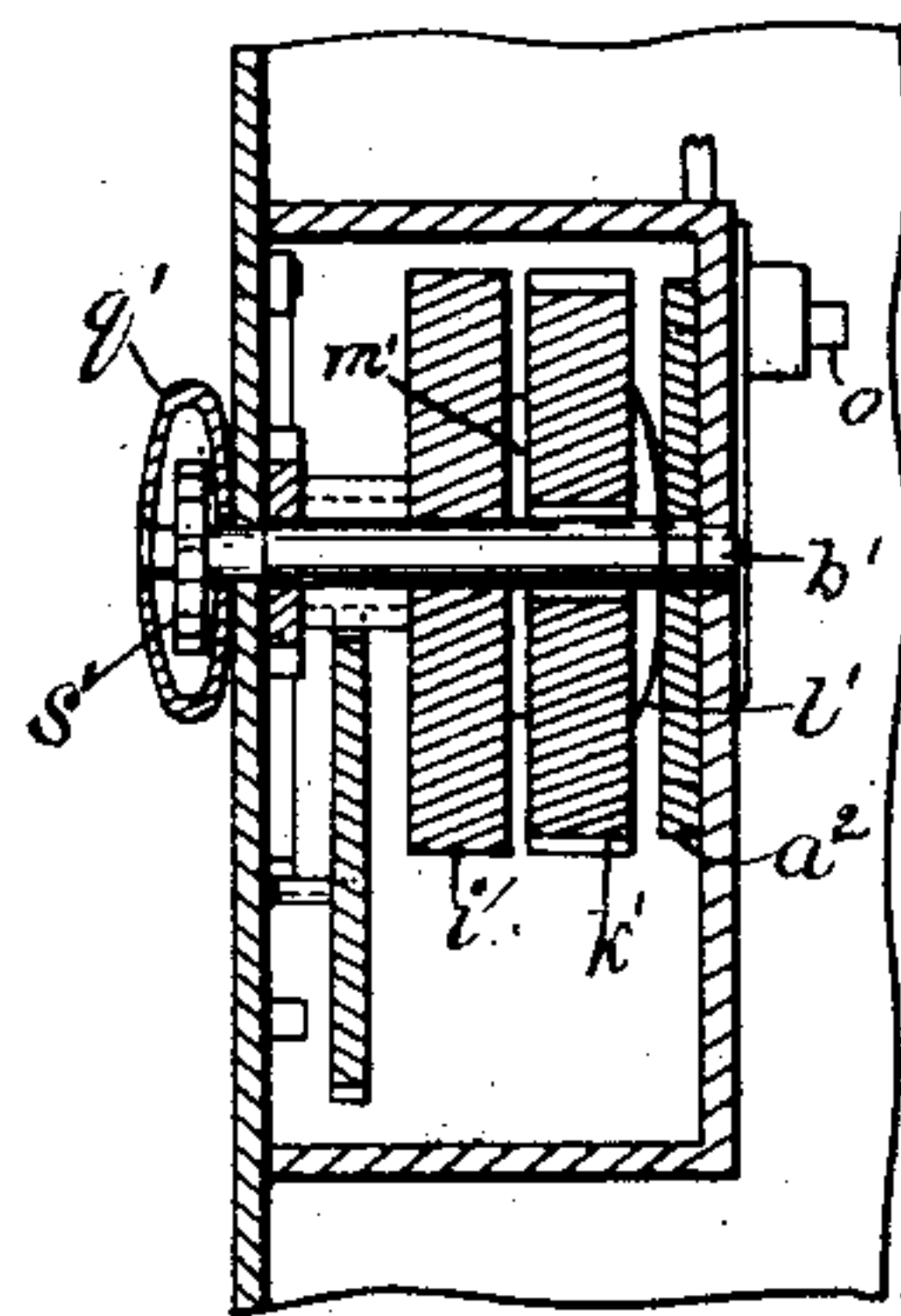


Fig. 12.

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(No Model.)

4 Sheets—Sheet 4.

E. F. POLAND & J. G. CRAWFORD.

TICKET CUTTER, REGISTER, AND ALARM.

No. 331,213.

Patented Nov. 24, 1885.

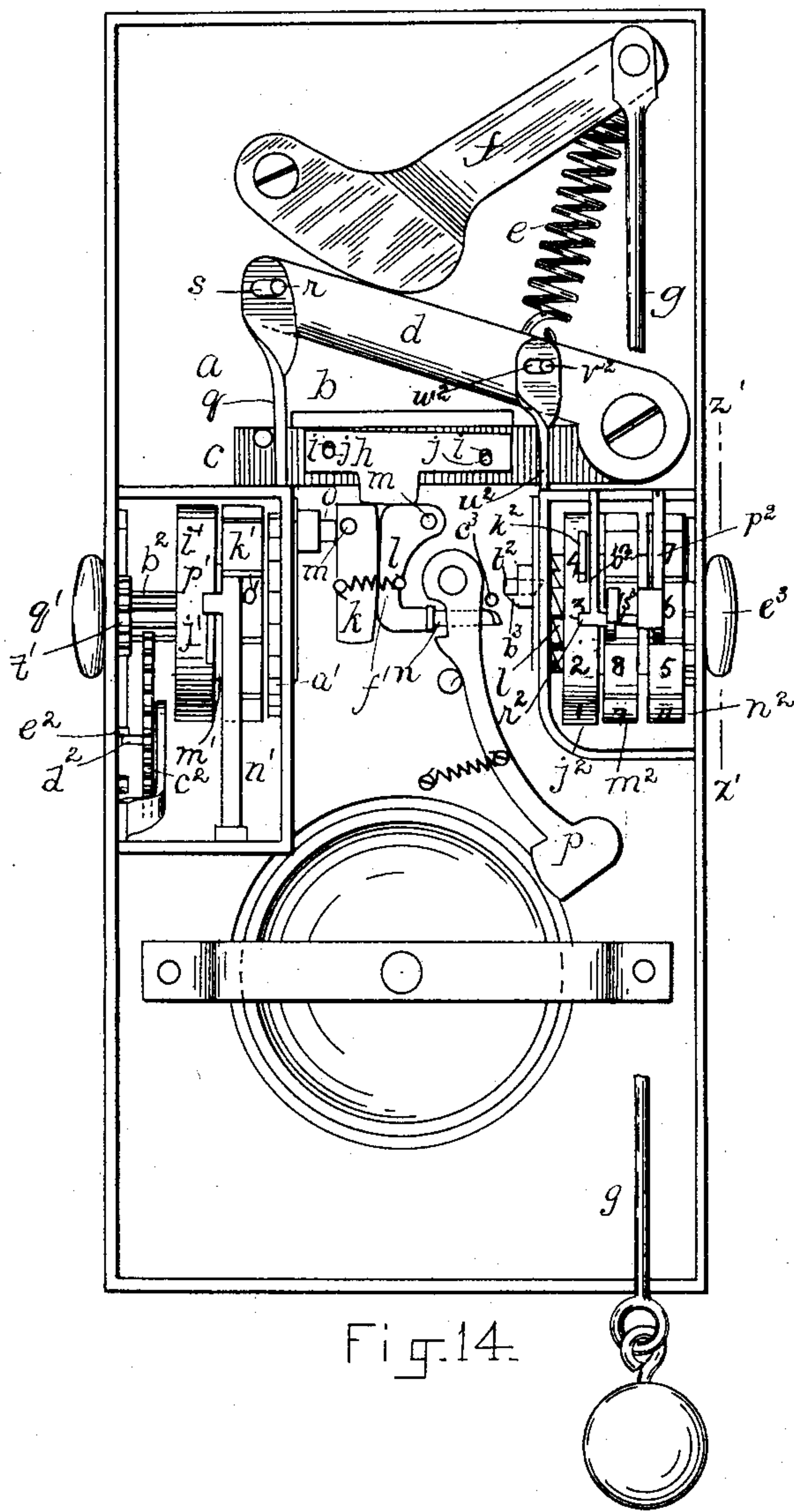


Fig. 14.

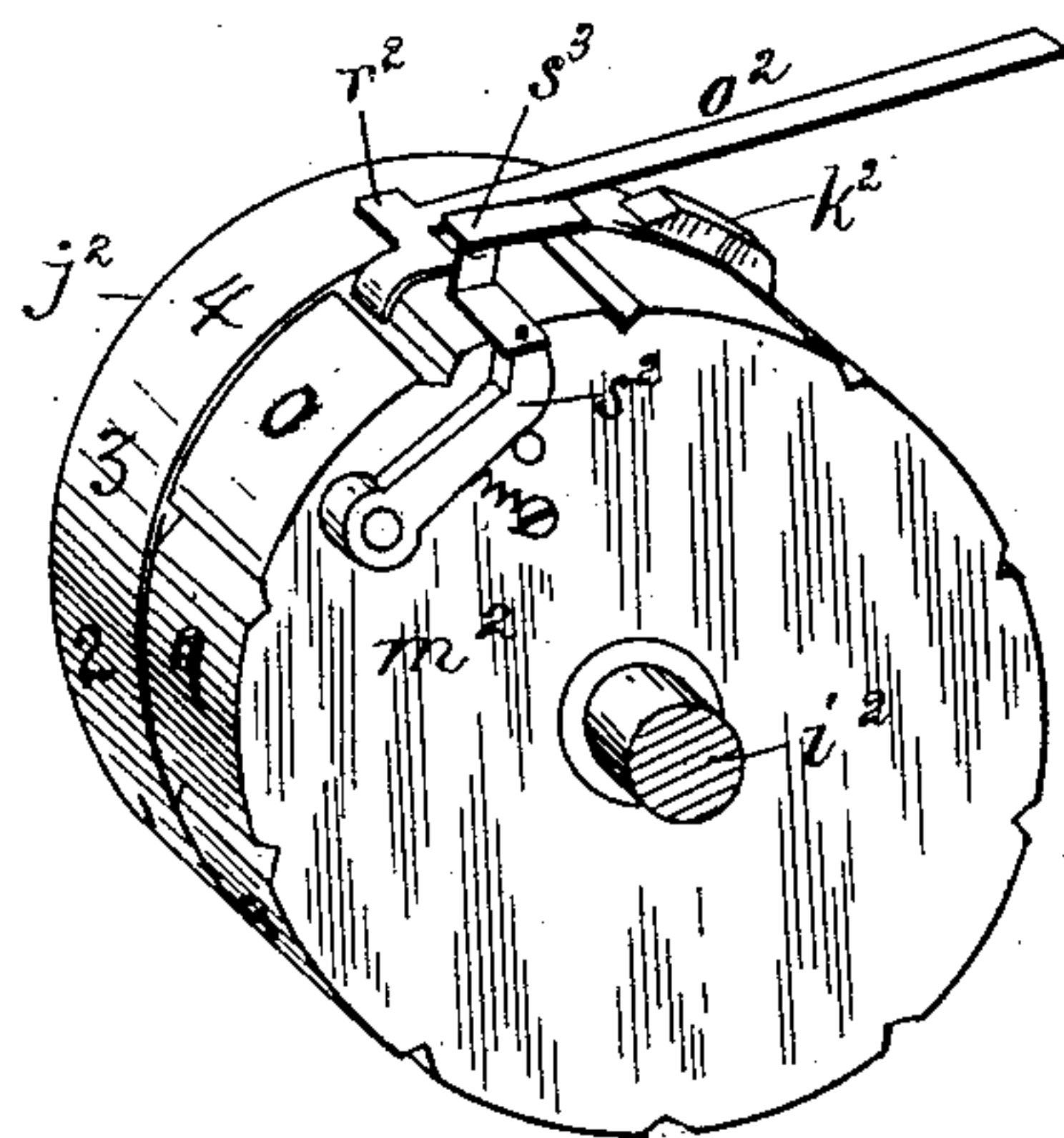


Fig. 15.

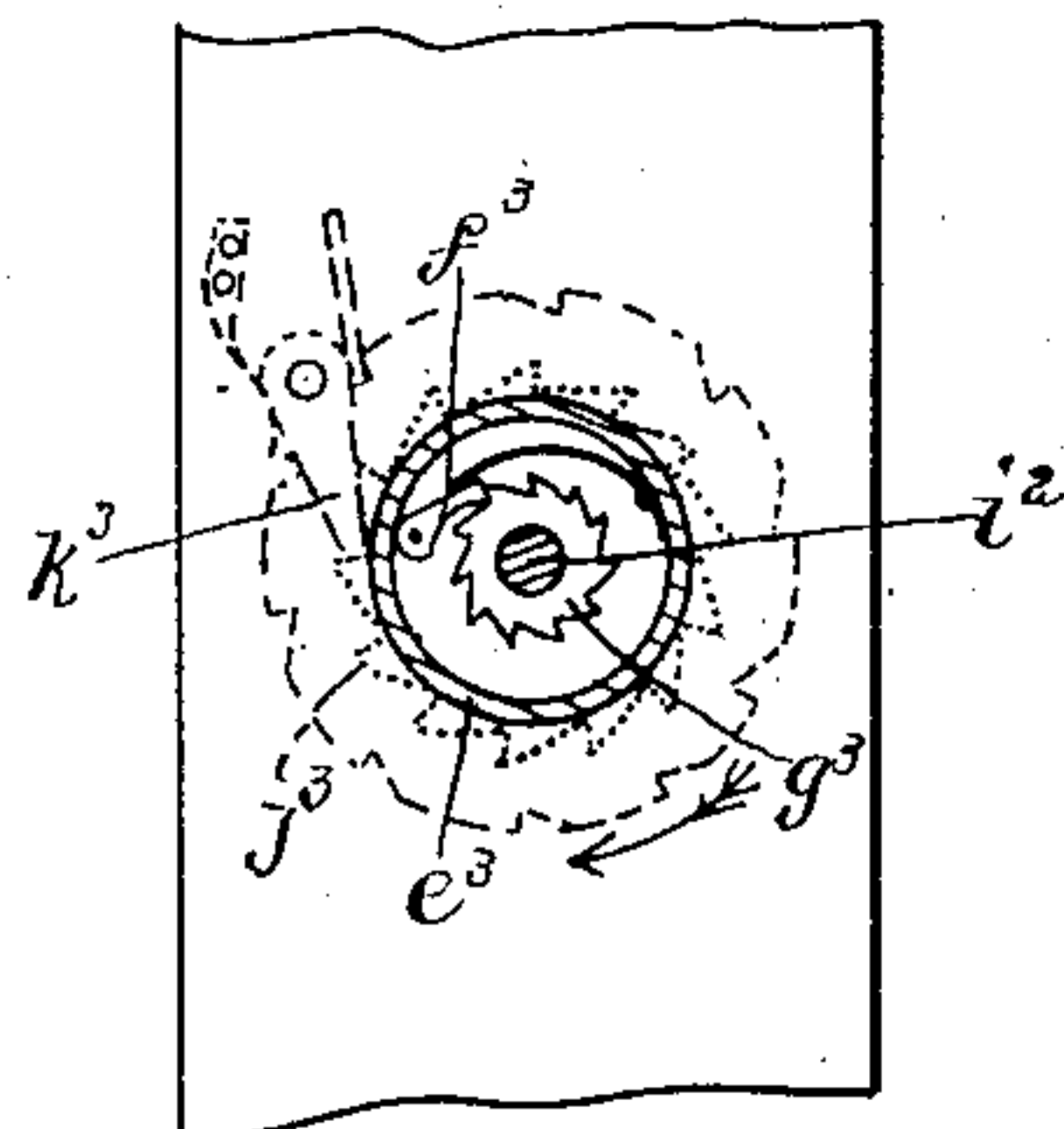


Fig. 16.

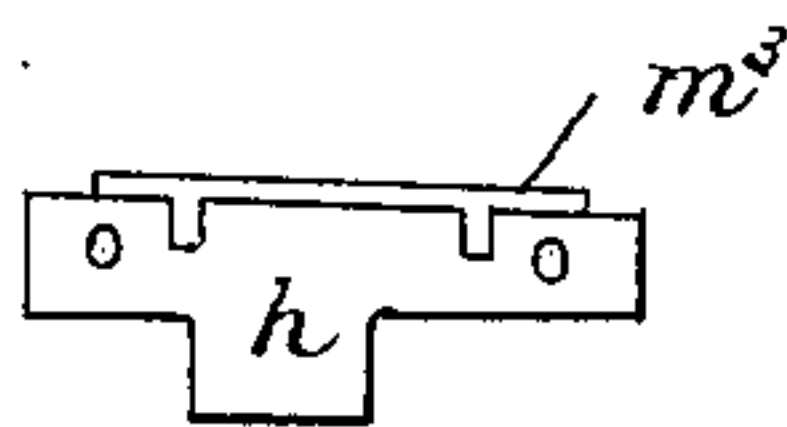


Fig. 17.

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UNITED STATES PATENT OFFICE.

EDWARD F. POLAND AND JAMES G. CRAWFORD, OF BOSTON, MASS.

TICKET CUTTER, REGISTER, AND ALARM.

SPECIFICATION forming part of Letters Patent No. 331,213, dated November 24, 1885.

Application filed February 2, 1885. Serial No. 151,672. (No model.)

To all whom it may concern:

Be it known that we, EDWARD F. POLAND and JAMES G. CRAWFORD, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Ticket Cutters, Registers, and Alarms, of which the following is a specification.

This invention has for its object to provide a ticket cutter, register, and alarm, adapted to sever a ticket or coupon from a strip, preserve the same in a closed receptacle, and ring and register whenever a ticket is severed, the arrangement being such that fraud on the part of the conductor by ringing the alarm without properly depositing the ticket is prevented.

The invention also has for its object to provide an improved trip-register of such construction that the conductor cannot tamper with it for fraudulent purposes.

The invention also has for its object to provide a total-register, a trip-register, and an alarm, all adapted for simultaneous operation.

To these ends our invention consists in the improvements hereinafter described and claimed.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a rear view of our improved cutter, register, and alarm, showing the movable cutting-blade raised, the back of the inclosing-case being removed. Fig. 2 represents a similar view, showing the movable blade depressed. Fig. 3 represents a section on line *w w*, Fig. 1. Fig. 4 represents a section on line *v v*, Fig. 3. Figs. 5 and 6 represent rear views respectively showing the movable blade raised and depressed, the depressed blade having no ticket under it. Fig. 7 represents a section on line *x x*, Fig. 1. Fig. 8 represents a section on line *y y*, Fig. 1. Figs. 9 and 10 represent a section on line *z z*, Fig. 1, looking toward the right and showing certain of the devices in different positions. Fig. 11 represents a section on line *x' x'*, Fig. 1. Fig. 12 represents a section on line *y' y'*, Fig. 8. Fig. 13 represents a perspective view of a part of the trip-register shown in section in Fig. 12. Fig. 14 represents a rear elevation of the apparatus, showing a total-register added thereto. Fig. 15 represents a perspective view of a part of the total-register. Fig. 16 represents

a section on line *z' z'*, Fig. 14. Fig. 17 represents a view of a modification.

The same letters of reference indicate the same parts in all the figures.

In the drawings, *a* represents the inclosing-case, which may be provided with means for suspending it from the conductor's neck, and has a hinged back provided with a suitable lock, whereby access can be had to the interior of the case. In the front *a'* of the case is a narrow slot, *b*, for the introduction of the ticket-strip, from which a ticket or coupon is to be severed. Inside of the case are ticket-severing devices composed of a fixed blade, *c*, and the pivoted blade *d*, which is normally held by a spring, *e*, above the fixed blade, the slot *b* being between said blades, so that when the blade *d* is depressed by means of a cam-lever, *f*, and an operating rod or handle, *g*, passing through the bottom of the case, it will co-operate with the fixed blade in severing a ticket or coupon from a strip inserted in the slot.

h represents a plate or a strip located at the inner side of the fixed blade *c*, and slightly below the cutting-edge thereof. Said plate is capable of a limited vertical edgewise movement by means of slots *i i* in it, through which pass pins *j j*, affixed to the blade, (see Fig. 1,) said pins keeping the plate *h* in position against the blade. The lower edge of the plate *h* (or an offset thereon) bears on the inner portions of the upper ends of two levers, *k l*, which are pivoted to the case at *m m*, the pivots being at opposite sides of the portions of the levers on which the plate *h* bears, so that when said plate is moved downwardly it will turn said levers in opposite directions on their pivots, as shown in Fig. 2, and thus cause the lower ends of said levers to push outwardly a sliding pin, *n*, and a sliding dog, *o*, the former being mounted in the shank of the alarm-hammer *p*, and the latter in a sliding arm, *q*, which is connected to the movable blade *d*, by a stud, *r*, passing through a slot, *s*, in its upper end. When the pin *n* is thus projected or pushed outwardly, it is in position to engage with a hooked arm, *t*, as shown in Fig. 2, said arm being pivoted at *u* to the movable blade *d*, and pressed toward the hammer-shank by a spring, *v*, so that when the blade *d* is depressed and the pin *n* pro-

jected the hook will automatically engage with said pin. The dog *o* is projected or pushed outwardly only when the slide *q* is depressed by the downward movement of the blade *d*, as hereinafter described, so that the dog is caused to enter a space between two of the teeth *a'* *a'* of a wheel, *a*², affixed to an arbor, *b'*, of the trip-register, hereinafter described, and is caused to partly rotate said wheel and arbor when the slide *q* is moved upwardly by the upward movement of the blade *d*. The plate *h* is arranged with its upper edge slightly below the upper edge of the fixed blade *c*, so that when the movable blade is depressed it will not depress the plate *h* unless the ticket *c'*, severed by the depression of said blade, is interposed between it and the plate *h*, as shown in Fig. 2, in which case the ticket acts as a connecting medium and enables the movable blade to depress the plate *h*, and thus cause it to move the levers *k* *l*, the pin *n*, and the dog *o*, as above described. When the movable blade is released, it is raised or retracted by its spring *e*, and is thereby caused to raise the slide *q* and hooked arm *t*, which respectively rotate the wheel *a*² of the trip-register and raise the hammer *p*. A shoulder, *d'*, on the hammer-arm bears against the lower end of the arm *t*, and gradually moves the hook of the latter off from the pin *n* as the hammer rises, until, when the hammer is sufficiently raised, the hook is entirely disengaged from the pin, as shown in Fig. 5, the hammer being thus released and caused by a spring, *e'*, to strike the bell. It will be seen, therefore, that when the movable blade is depressed without severing a ticket there will be no movement of the plate *h* and no engagement of the slide *q* and hooked bar *t*, secured to the movable blade, with the bell-hammer and register; hence the register and alarm will not be operated. Conductors are therefore unable to operate the alarm unless they insert a ticket-strip into the case before depressing the blade. They are thus prevented from appropriating the tickets and ringing the alarm as if they had deposited the tickets in the case. When the movable blade rises after depressing the plate *h*, a spring, *f'*, connecting the levers *k* *l*, restores said levers to their normal position, (shown in Fig. 1,) thus raising the plate *h* sufficiently to enable the next ticket to act on it. During the succeeding depression of the movable blade the hooked arm *t* strikes the pin *n* and pushes it back against the lever *l*, thus preparing it for the next operation. During the same movement the projected dog *o* is pushed back to its former position by contact of its beveled outer end with the wheel *a*², said contact causing the dog to move from the position shown in full lines in Fig. 4 to that shown in dotted lines in the same figure. The slide *q*, which carries the dog *o*, moves in guides *g'* *g'*, Fig. 3, on a plate, *h'*, within the case, said plate also supporting one end of the trip-register arbor *b'*.

The trip-register is composed of the arbor

b' and its toothed wheel *a*², already described, a wheel, *i'*, affixed to said arbor and provided with a single projection, *j'*, and a second wheel, *k'*, mounted loosely on the arbor *b'* and held by a spring, *l'*, Fig. 1, in frictional contact with a washer, *m'*, of any suitable yielding material interposed between the two wheels, so that when the arbor *b'* and wheel *i'* are rotated the wheel *k'* will rotate with them by friction unless prevented by a locking device hereinafter described. Said device is composed of a spring-detent, *n'*, secured to the casing and normally bearing against the periphery of the wheel *k'*, which has a series of notches, *o'*, ten in number. When the detent coincides with either of said notches, it locks the wheel *k'*. The detent has an arm or offset, *p'*, which projects into the path in which the projection *j'* of the wheel *i'* moves. When said projection reaches the arm of the detent, it presses the same away from the wheel *k'*, thus permitting the latter to rotate with the wheel *i'* until the next notch *o'* reaches the detent, when the wheel *k'* is again locked, the projection *j'* having left the detent and permitted it to bear against the wheel *k'* before the next notch reached the detent. It will be seen, therefore, that each partial rotation of the arbor *b'*, caused by the engagement of the dog *o* with the toothed wheel *a*², causes the wheel *i'* to make one-tenth of a complete rotation, while each complete rotation of the wheel *i'* causes the wheel *k'* to make one-tenth of a complete rotation. Said wheels have numerals on their peripheries, which are displayed through an opening in front of the case, those on the wheel *i'* indicating units, while those on the wheel *k'* indicate tens, the two wheels being adapted to register up to 99. At the end of every trip the register is set back to zero by means of a knob, *q'*, on the arbor *b'*, outside of the case. Said knob is mounted loosely on the arbor, and is provided with an internal spring-pawl, *r'*, which engages with a ratchet, *s'*, Fig. 11, affixed to the arbor *b'*, so that the knob can only rotate the arbor backwardly.

To prevent the conductor from fraudulently moving the register, we provide a reversible or double pawl, *s''*, Figs. 9 and 10, engaging with a pinion-shaped ratchet, *t'*, on the arbor *b'*, and capable of engaging with said ratchet in either of two positions, as shown in Figs. 9 and 10. When the pawl is in the elevated position shown in Fig. 10, it prevents the ratchet *t'* and the arbor *b'* from being rotated in the only direction in which the knob *q'* is capable of rotating it, and when in the depressed position shown in Fig. 9 it enables said arbor to be rotated. The position of the pawl *s''* is determined by a slide or bar, *u'*, having a spring, *v'*, bearing on the back of the pawl, said slide being adapted to move so as to cause its spring to bear on the pawl at either side of the pivot thereof, and thus press either end of the pawl against the ratchet *t'*. When the arbor *b'* is being rotated to set the register back to zero, a pinion, *c*², (shown in Figs. 9 and 10,) meshing

with a pinion, b^2 , on the arbor b' , is rotated thereby in the direction indicated by the arrow in Fig. 9, and when the setting of the register is nearly completed a pin, d^2 , on the pinion c^2 comes in contact with an arm, e^2 , on the bar u' , and raises said bar until the spring v' thereon passes above the pivot of the pawl s'' and throws the latter over to the position shown in Fig. 10, thus preventing further rotation of the arbor b' , this change in the position of the pawl taking place when the register-wheels are in position to indicate zero. The step-by-step rotation of the arbor by the upward movement of the blade d , whereby the wheels are moved forward to register the number of tickets severed, is in the opposite direction to that in which the arbor is moved by the knob q' ; hence when the pawl s' is in position to permit the arbor to be rotated by the knob it prevents rotation of the arbor by the movement of the blade d , and vice versa. The rotation of the arbor b' by the movement of the blade d therefore causes the pinion c^2 to rotate in the direction indicated by the arrow in Fig. 10, thus moving the pin d^2 away from the arm of the bar u' . The pinions $c^2 b^2$ are so proportioned that the movements of the arbor b' required to cause the registering-wheels to indicate from zero to 99 will give the pinion c^2 one complete rotation. During said rotation the pin d^2 is revolved until it bears upon the upper side of the arm e^2 of the bar u' , and depresses said bar and causes the spring v' to change the pawl s'' back to the position shown in Fig. 9, when the register-wheels indicate 99, thus preventing further forward rotation of the arbor, and permitting it to be rotated backwardly by the knob q' until the register is again set at zero. In practice the register is seldom, if ever, required to indicate 99 during a single trip, so that usually the end of the trip will be reached before the pin d^2 can reach and depress the bar, as above described. To enable the conductor to depress said bar and adapt the register-arbor to be turned backwardly, we provide a lever, f^2 , pivoted to the interior of the case at g^2 , and bearing loosely on the upper end of the bar u' , so that when pressed against said bar it can depress the latter, but cannot raise or move it in the opposite direction. The lever f^2 has a short stud, f^3 , at its outer end, projecting through a slot, h^2 , in the casing, so that the operator can move it to depress the bar u' . After the bar u' is depressed by the lever it can only be raised by the pin d^2 during the backward rotation of the pinion c^2 when the register is being set back to zero. It will be seen, therefore, that the conductor cannot tamper with the register to commit fraud by setting the register partially back, and then continuing to operate it in the regular way, because he cannot raise the bar u' after depressing it, to enable the register to be set back; hence the register cannot be again operated by the upward movements of the blade until the pin d^2 has raised the bar u' , and this is accomplished,

as before stated, only when the register has been set entirely back to zero.

In Figs. 14, 15, 16 we have shown a total-register which is adapted to indicate the number of actuations during an entire day. Said register is composed of an arbor, i^2 , journaled in the case at the opposite side from the trip-register above described, a wheel, j^2 , affixed to said arbor and having a projection, k^2 , on its periphery and a ratchet, t^2 , on one of its sides, and two wheels, $m^2 n^2$, each loose upon the arbor i^2 , and adapted to rotate therewith by friction, like the wheel k' of the trip-register. The wheels $m^2 n^2$ have notches in their peripheries, like the wheel k , said notches being engaged by spring-detents $o^2 p^2$, which prevent said wheels from turning with the wheels j^2 , excepting when said detents are temporarily displaced to permit the wheel m^2 to be rotated one-tenth of its diameter by each complete rotation of the wheel j^2 , and to permit the wheel n^2 to be similarly rotated by each complete rotation of the wheel m^2 . The detent o^2 has an offset, r^2 , with which the projection k^2 comes in contact to raise said detent and permit the partial rotation of the wheel m^2 . An arm, s^2 , (see Fig. 15,) is pivoted to one side of the wheel m^2 , and has an offset, s^3 , projecting sufficiently across the periphery of said wheel to be raised by the detent o^2 when the wheel m^2 is in the position shown in Figs. 14 and 15, this being the case once during each complete rotation of the wheel m^2 . The detent p^2 has an offset which projects over the arm s^2 when the latter coincides with the detent o^2 , and is raised by said arm when the latter is raised by the detent o^2 , the wheel n^2 being thus released and allowed to make a tenth of a rotation during each complete rotation of the wheel m^2 , and after every tenth rotation of the wheel j^2 . The wheels $j^2 m^2 n^2$ have numerals on their peripheries, which are displayed through an orifice in the case. The wheel j^2 is rotated one step by each upward movement of the blade d , by means of a dog, t^2 , in a slide or plate, u^2 , which is connected to the blade d by a pin, v^2 , passing through a slot, w^2 . When the slide is depressed by the downward movement of the blade d , the dog t^2 coincides with the pin n in the hammer-shank, and if said pin is projected by the action of a ticket under the blade d on the intermediate mechanism above described it moves the dog t^2 into engagement with a tooth of the ratchet t^2 , and at the same time engages with a hook or projection, b^3 , on the slide u^2 under the dog t^2 , so that the upward movement of the blade d and slide u^2 causes the dog t^2 to partially rotate the wheel j^2 of the total-register, and also causes the hook b^3 to raise the hammer p until the pin n strikes a stud, c^3 , and is pushed backwardly thereby to disengage the pin from the hook b^3 and allow the hammer-spring to force the hammer against the bell. The arbor i^2 of the total-register has a loosely-mounted hollow knob, e^3 , on the outside of the case, having an internal pawl, f^3 , engaged with a

ratchet, g^3 , affixed to the arbor i^2 within the knob, so that the arbor can be turned by the knob only in the direction indicated by the arrow in Fig. 16. A ratchet, j^3 , having its teeth cut oppositely to those of the ratchet g^3 , is affixed to the arbor i^2 within the case, and said ratchet is engaged by a pawl, k^3 . The total-register cannot therefore be set back to zero until the case is opened and the pawl k^3 disengaged from the ratchet, when the arbor i^2 may be rotated backwardly until each wheel shows only zero, the wheels m^2 n^2 rotating by friction with the arbor until arrested by their detents.

We do not limit ourselves in all cases to the above-described relative arrangement of the plate h and movable blade d , whereby the former is operated only when a ticket is interposed between the two.

When the apparatus is used for a registering and ringing for cash-fares, no tickets being used, the arrangement may be such that each depression of the movable blade will depress the plate. To this end said plate may be provided with a detachable re-enforcing strip, m^3 , on its upper edge, as shown in Fig. 17, said strip being the equivalent of a ticket in causing the movable blade to depress the plate h . The ends of the re-enforcing strip may be inserted in slots cut in the plate h .

Fig. 7 represents a partition or apron, p^3 , separating the registering and alarm mechanism from the receptacle q^3 for the severed tickets. s^3 represents a spring which bears up on and is raised by the end of the ticket-strip inserted in the slot b , and forces the severed ticket downwardly into the receptacle q^3 when the blade d rises.

We do not confine ourselves to the joint use of the register or registers and the alarm in one apparatus, as the alarm may be used without one or both of the registers.

By having the construction of the device such that there is absolutely no engagement between the registering mechanism and other parts of the improvement until the movable blade has completed its movement in the direction of the fixed blade and the hammer of the alarm sufficiently elevated to insure the sounding of the alarm, the registering mechanism cannot be actuated by either a partial movement of the upper pivoted blade or of the bell-hammer. Another important advantage of such arrangement, and perhaps the most important consideration of all, is that only a certain amount of power is requisite to operate the cutting and alarm mechanism, the power for actuating the registering mechanism being automatically supplied by the retracting movement of the pivoted blade.

We claim—

1. In a ticket cutter and register, the combination of a movable blade, a register normally disconnected from the said blade, the movable plate h , and mechanism for connecting the blade with the register to operate the latter, and mechanism, substantially as de-

scribed, to operate the movable blade, whereby the movements of the blade to sever a ticket will operate the connecting mechanism to form a connection between the blade and register and actuate the latter, all as set forth.

2. In a ticket cutter and alarm, the combination for a movable blade, a bell, a hammer therefor suitably pivoted and normally disconnected from the said blade, the movable plate h , and mechanism for connecting the blade with the hammer to operate the latter, and means, substantially as described, to operate the movable blade, whereby the movement of the blade to sever a ticket will operate the connecting mechanism to form a connection between the blade and hammer and lift the latter, all as set forth.

3. In a ticket cutter, register, and alarm, the combination of a movable blade, a bell, a register, and pivoted bell-hammer normally disconnected from the said blade, the movable plate h , and mechanism for connecting the blade with the register and hammer to operate the said register and hammer, and a device, substantially as described, to operate the movable blade, whereby the movement of the blade to sever a ticket will operate the connecting mechanism to form a connection between the blade and the register and hammer to operate them both, all as set forth.

4. The combination of the spring-retracted pivoted blade and means for depressing it, a trip-register, an alarm, and a hammer therefor, a plate or slide, and a hooked arm connected to said blade, the pivoted blade having a sliding dog, a sliding pin in the hammer of the alarm, and devices, substantially as described, operated by the depression of the blade to engage the sliding dog with the register and the sliding pin with the hooked arm, whereby when the blade is retracted the register and alarm are simultaneously operated, as set forth.

5. The combination of the spring-retracted pivoted blade and means for depressing it, the plate or slide, and the hooked arm secured to said blade, the pivoted blade having the sliding dog, the trip-register, the alarm, and a hammer therefor, the sliding pin in the alarm-hammer, the plate arranged to be depressed by the pivoted blade, and the levers on which the plate acts when depressed to project said sliding dog and pin and cause them to engage, respectively, with the register and with the hooked arm of the blade, as set forth.

6. The combination of the arbor b' , a series of disks mounted thereon and rotating said arbor forward, as described, an operating-handle located on said arbor to revolve the same in a backward direction, a pinion mounted on said arbor, a double pawl pivoted relatively thereto to normally permit the forward rotation of said pinion, devices for moving said pawl to permit the backward rotation, a wheel, c^2 , rotated and operated by said pinion to actuate said device when the register

has been turned backward to zero, and again permit the forward rotation of the arbor, as specified.

7. In a ticket cutter and register, the combination of a movable blade and intermediate devices, a register operated by said blade, but normally disconnected therefrom, and composed of an arbor having a toothed actuating-wheel and a registering-wheel fast upon it, the latter having a single projection on its periphery, and a notched registering-wheel loose upon the arbor and connected by friction therewith, an automatic detent which normally locks the loose wheel, and is periodically displaced by the projection of the fast registering-wheel to allow the loose wheel to rotate, and mechanism, substantially as described, for rotating the arbor forward step by step.

8. In a ticket cutter, register, and alarm, the combination of a movable blade, a bell, trip-register, a total-register, and pivoted bell-hammer normally disconnected from the said blade, mechanism for connecting the blade with the said registers, and a bell-hammer, and a device for operating the blade, whereby the movement of the said blade to sever a

ticket will operate the connecting mechanism to form a connection between the blade, registers, and bell-hammer to operate them, all as set forth.

9. In a ticket cutter and register, the combination of a movable blade and intermediate devices, a register operated by said blade, but normally disconnected therefrom, and composed of the wheel j^2 , rotated directly by the retraction of the movable blade, and the notched normally-locked wheels $m^2 n^2$, the said wheel j^2 having a projection unlocking and rotating the wheel m^2 , and a locking-detent on the wheel m^2 , and an arm, s^2 , pivoted to said wheel and operating conjointly with the first-mentioned projection to unlock and rotate the wheel n^2 , as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 30th day of January, 1885.

EDWARD F. POLAND.
JAMES G. CRAWFORD.

Witnesses:

C. F. BROWN,
H. BROWN.