

(No Model.)

3 Sheets—Sheet 1.

L. A. OSBORNE.  
AUTOMATIC SWITCH.

No. 557,339

Patented Mar. 31, 1896.

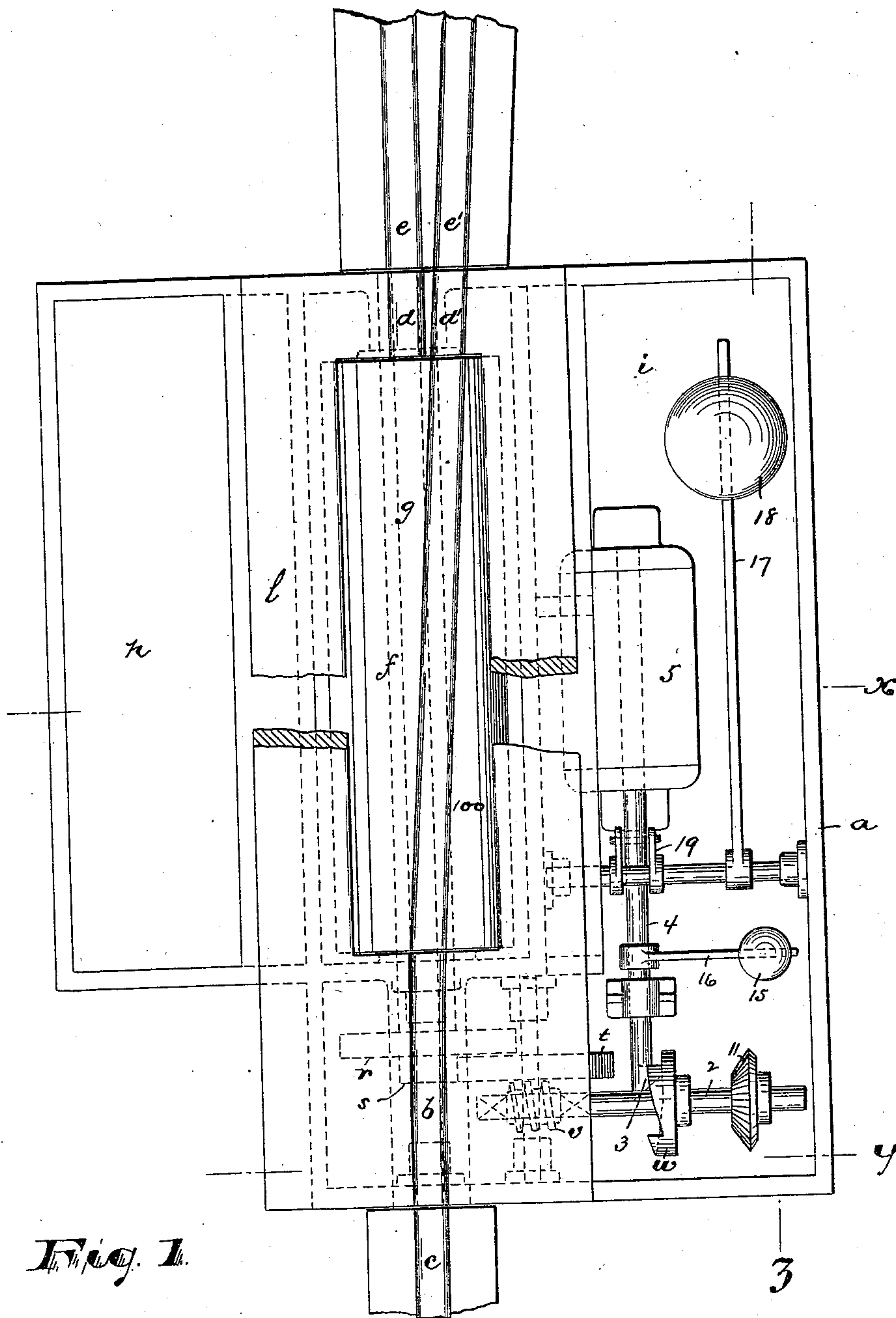


Fig. 1.

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*Louisa Browne.*

*Loyal W. Osborne,*

BY *Drake & Co.* ATTY'S.

INVENTOR:

(No Model.)

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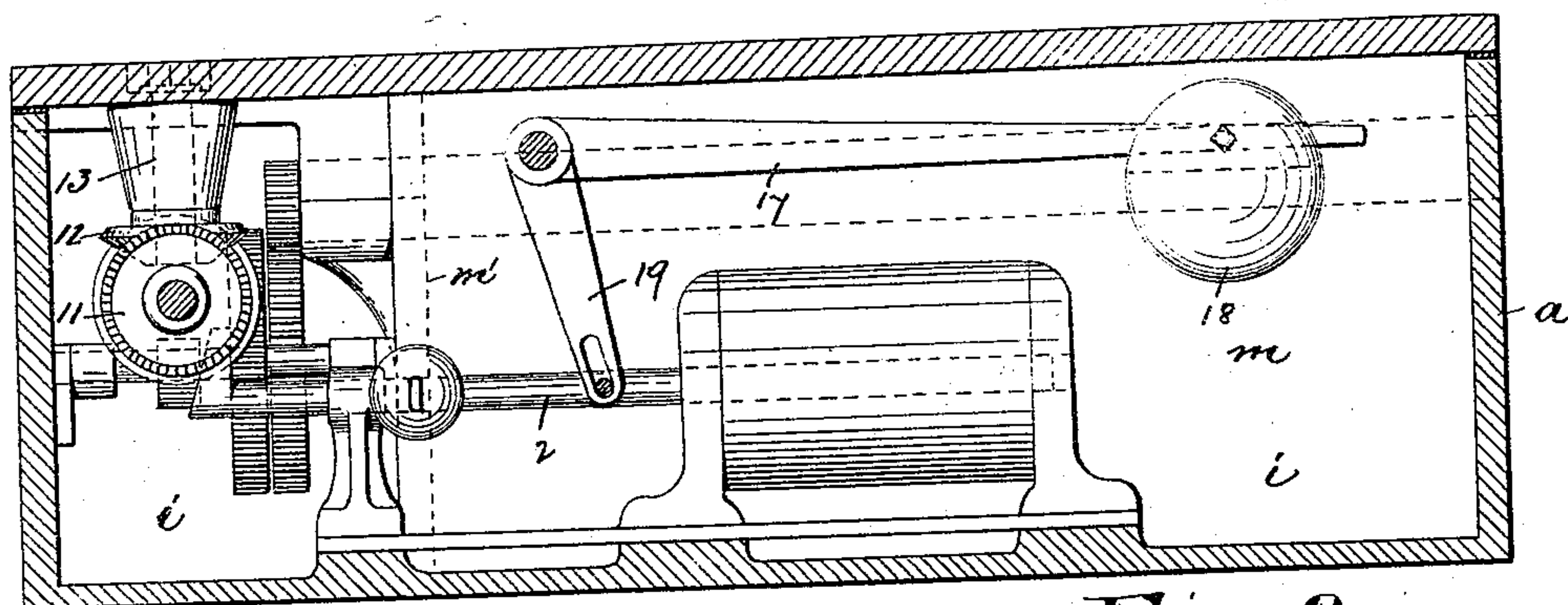


Fig. 2.

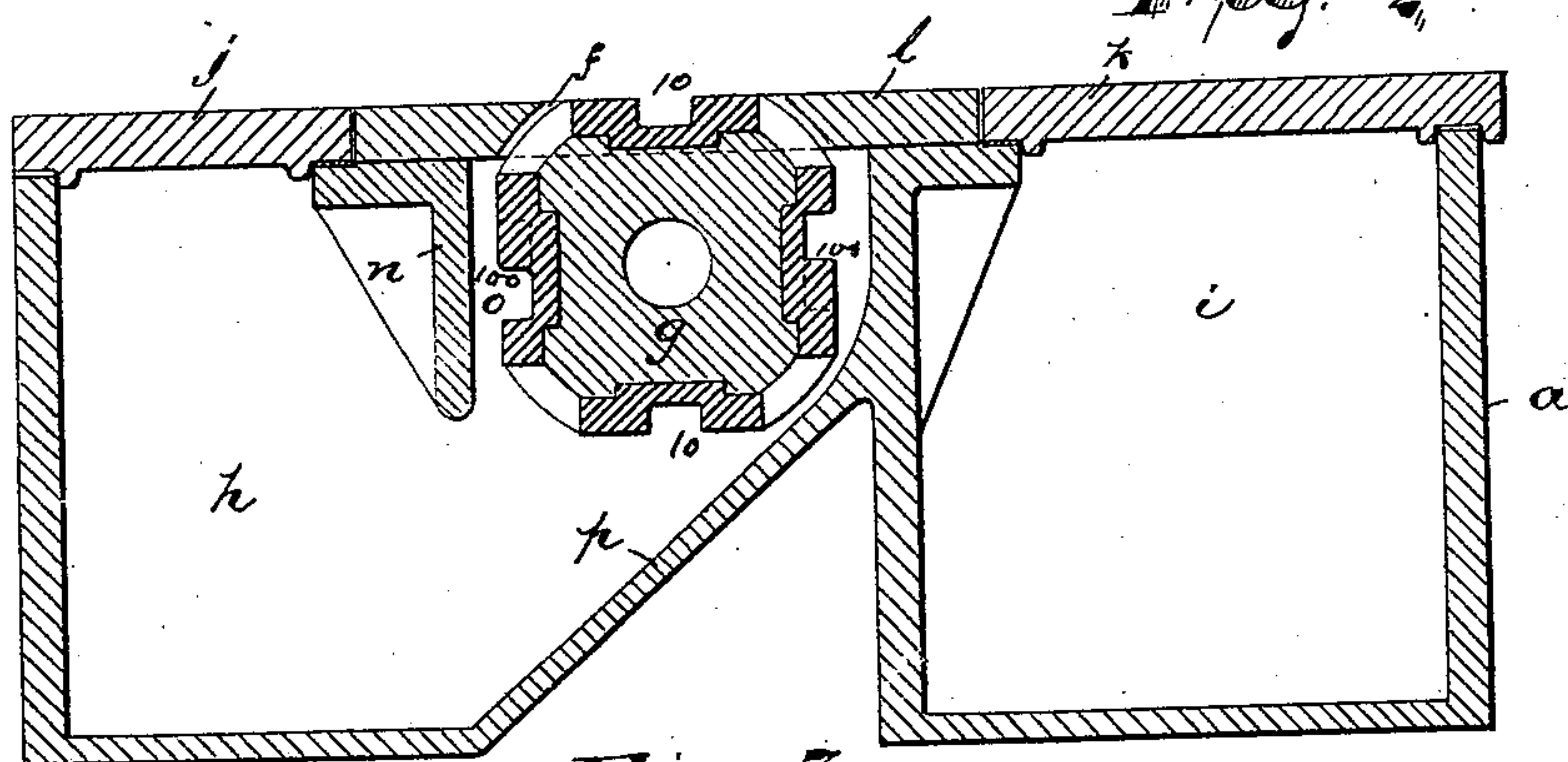


Fig. 3.

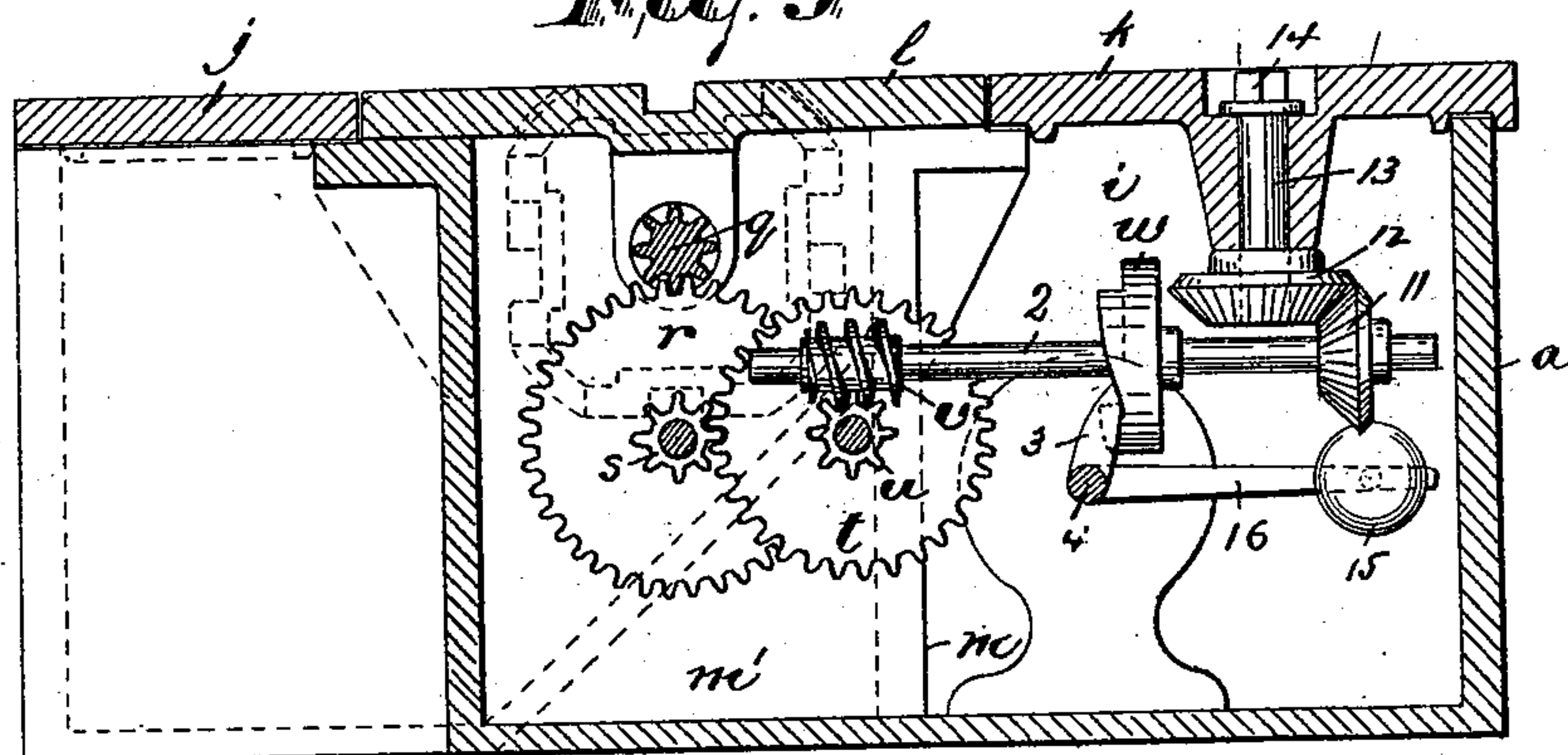


Fig. 4.

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INVENTOR:

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(No Model.)

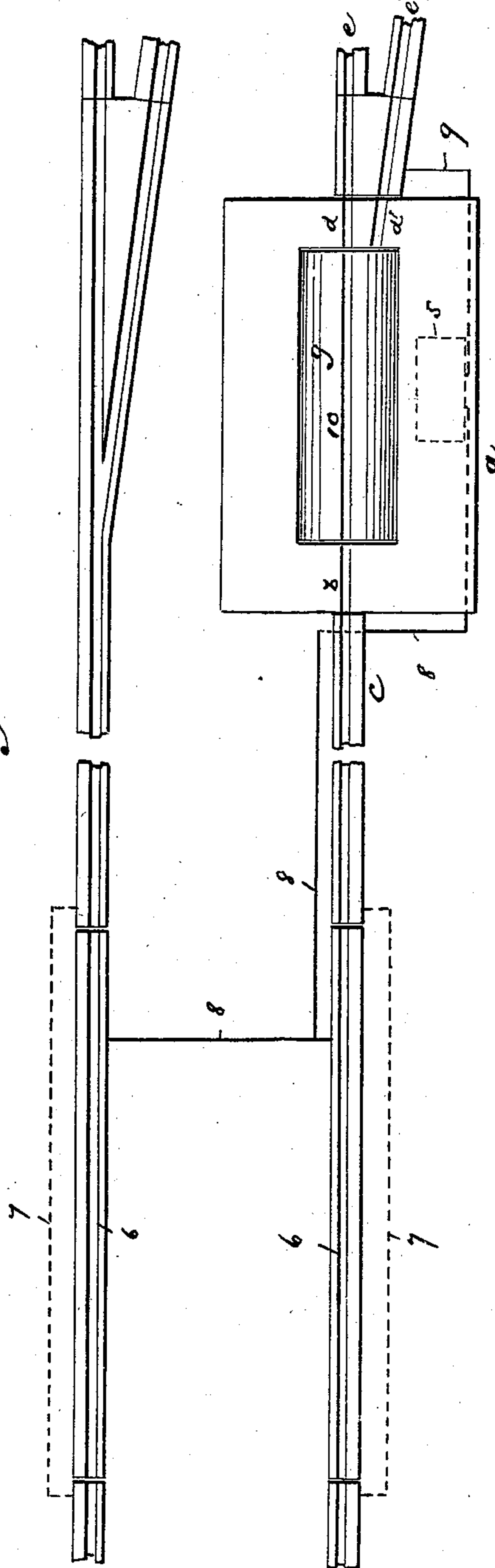
3 Sheets—Sheet 3.

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*Fig. 5.*



WITNESSES:

INVENTOR:

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# UNITED STATES PATENT OFFICE.

LOYALL A. OSBORNE, OF NEWARK, NEW JERSEY.

## AUTOMATIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 557,339, dated March 31, 1896.

Application filed March 5, 1894. Serial No. 502,330. (No model.)

*To all whom it may concern:*

Be it known that I, LOYALL A. OSBORNE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Automatic Switches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters and numerals of reference marked thereon, which form a part of this specification.

This invention relates more particularly to that class of switches employed in connection with electric railways for automatically changing the position of the switch prior to the passage of the car thereover. It may be applied to any existing railway.

The objects of this invention are to render the automatic switch more certain in operation, of greater durability, and less susceptible to the influence of the weather; to enable the device to be more readily cleaned; to so separate the working mechanisms from the frog-carrier as that the latter may be covered with water and yet the said mechanisms be perfectly dry, and to secure other advantages and results, some of which will be referred to in connection with the description of the working parts.

The invention consists in the improved switch and in the arrangements and combinations of parts, substantially as will be hereinafter referred to, and finally embraced in the clauses of the claim.

Referring to the accompanying drawings, in which like letters and numerals indicate corresponding parts in each of the several views, Figure 1 is a plan of the improved switch, certain top plates thereof being removed. Fig. 2 is a section of the same on line *z*; Fig. 3, a section of the box and frog-carrier at line *x*, and Fig. 4 is a section at line *y*. Fig. 5 is a diagram showing the method of electrically wiring the parts.

In said drawings, *a* indicates a metallic box adapted to be sunken in the road-bed at the point of intersection or divergence of the tracks, so that its upper surface is flush or approximately flush with the road-bed. At

one end the said upper surface of the box is provided with a rail extension or section *b*, integral therewith, or otherwise, which lies in alinement with one of the portions *c* of the main track, and at the opposite end said upper surface is provided with diverging extensions or sections *d d'*, which are in alinement with the main and branch rails *e e'*, respectively. Between said extensions *b* and *d d'* the top of the box is open, as at *f*, to receive the upper side of a frog-carrier *g*, and at the sides of said opening are openings to the chambers *h* and *i*, hereinafter referred to, the latter openings being provided with suitable covers *j* and *k*. The central top plate *l*, having the frog-carrier opening, may be integral with the box or a separate piece, the latter being the preferred construction.

The interior of the box is divided by partitions *m m n* into what we may call the "mechanism-chamber" *i*, the "frog-carrier chamber" *o*, and the "dirt-chamber" *h*, the last being connected at its lower end to the frog-carrier chamber *o* to receive the dirt therefrom automatically. The bottom *p* of the frog-carrier chamber is formed on an incline, as indicated in Fig. 3, so that the dirt entering the chamber *o* on the turning of the frog-carrier will gravitate through the opening below the partition *n* and be easily removable without disturbing the said carrier or opening the chamber containing the carrier-operating mechanism or otherwise interfering with the working of the device.

The chamber *i* is L-shaped in plan and extends laterally, as shown in Fig. 1, across the line of the axis of the frog-carrier, the partition *m'* being provided with bearings for the axis of said cylinder and means, such as an ordinary stuffing-box, for preventing an inflow of water from the more or less open chamber *o* into the chamber *i*.

In the existing forms of automatic switches the greatest cause which has tended to prevent successful operation has been the clogging of the mechanism by dirt and the rapid deterioration of the wearing-surfaces due to the same. By the improved construction these objections are avoided.

On the horizontal axis or shaft on which the frog-carrier *g* works is arranged, within the chamber *i*, which is inaccessible to dirt



and water, a pinion *q*, which receives power through a train of gear-wheels *r s t u* and a worm-wheel *v* from a ratchet-wheel *w* on the shaft 2 with said worm-wheel. Said ratchet-wheel *w* is operated by a pawl 3, connected with or forming part of the solenoid core-shaft 4. The spirally-wound portion or body 5 of the solenoid is in electrical connection with the track, so as to become electrified prior to the passage of the car over the switch. When thus electrified, the said core-shaft is drawn into the solenoid, the pawl engages one of the teeth, and the ratchet-wheel is drawn or caused to turn a degree or step sufficient to cause a partial rotation of the frog-carrier *g*, the movement bringing a next longitudinal tread thereon into service.

In Fig. 5 is shown a preferred method of arranging the electrical connections, whereby a current of electricity is caused to pass at the proper time through the solenoid to effect the desired action. At a suitable point in advance of the switch are arranged insulated rails 6 6, which are cut out from the ground or rail current by the shunts 7 7. These insulated rails are in metallic connection through wires 8 with the coils of the solenoid, at one end of said solenoid, and the latter is at its other end in connection with the ground-rail through wire 9. The solenoid is thus normally cut out from the main circuit; but when the car passes upon the insulated section of the track the current passes from the overhead wire, when such is used, through the trolley, car, and rail-sections and through the wire 8 to the solenoid, causing a longitudinal action of its core. From thence it passes to the ground-rail through wire 9, all under the control and at the will of the motorman of the car, as will be understood.

The frog-carrier consists of a polyhedron having on its peripheral sides recesses or seats for the frogs. Said polyhedral carrier rotates intermittently in one direction only on a horizontal axis within the box, and thus any dirt or dust within the grooves of the frogs will be positively dumped into the box as the carrier rotates and said carrier will be kept automatically free and clear without constant attention. The upper faces of the frogs 10 10 10 are grooved or provided with longitudinal wheel-treads. The frogs 10 are grooved or provided with wheel-treads parallel with the axis of the carrier to connect the rails *c e* of the main line, and the treads of frogs 10 are inclined to said axis or to a plane of said axis to connect the main with the branch rail. Said frogs are removable and are thus capable of easy and convenient renewals. They are arranged alternately around and upon the peripheral surfaces of the carrier to alternately connect the main and branch extensions *d d'* with the extension *b* at the opposite end.

It may be here noted that in the train of operating mechanisms by which the power is transmitted to the carrier from its source is

a worm-wheel *v*, and this serves as a lock by means of which back movement, or movement induced by power exerted at the carrier, is prevented.

I may and prefer to employ mechanical means whereby the carrier may be turned by a key by an attendant. Said means consist of a vertical shaft having bearings in the box and an angle gear-wheel 11 on the shaft 2, which meshes with a corresponding wheel 12, Figs. 2 and 4, on the key-shaft. The key-shaft 13 preferably has suitable bearings on the top plate of the box and is provided with an angular head 14, adapted to receive the key, which last may be an ordinary crank.

To enable the pawl on the core-shaft to move over the teeth preparatory to engaging the same and turning the ratchet-wheel, said pawl is given an eccentric projection, as shown in Fig. 4, and in connection with the longitudinal movement with the core-shaft has an oscillating movement therewith caused by engagement with the inclined sides of the teeth.

A weight 15 on an arm 16, fastened to the core-shaft 2, tends to turn the same so that the pawl enters into effective relation to the ratchet-wheel. A bell-crank 17, having a weight 18 on its longer arm and having its slotted shorter arm 19 connected to the shaft 2, serves to withdraw said shaft from the solenoid when the same is deenergized and bring the pawl into position to give an impulse to the train of mechanisms when the coils are again electrified. Other means than weights may be employed to give return movements.

The operation of the switch has, it is thought, been sufficiently explained in connection with the description of the working parts, and further description in that line is therefore deemed to be unnecessary. I may state, however, that by the use of non-crossing treads a greater smoothness of movement is given to the car-wheels in crossing the frog-carrier and that by extending the treads longitudinally a longer and more easy curve is secured.

Having thus illustrated and described my invention as embodied in one practical form, it will be obvious that the same may be more or less modified without departing from the spirit of my invention. For instance, the several chambers formed in the metallic box *a* may be formed by masonry or otherwise and the arrangement of the gearing forming the connection between the core-shaft 4 and the axle or shaft of the frog-carrier be more or less changed to retain an operative connection between said parts.

Having thus described the invention, what I claim as new is—

1. An automatic switch, in which is combined a polyhedral body having longitudinal rail-treads thereon and arranged to rotate on its longitudinal axis, mechanism for operating said polyhedral body with an intermittent rotary movement in one direction, and elec-



tromagnetic devices operating and governing said mechanism, in a manner substantially as described and for the purpose set forth.

2. An improved switch, in which is combined a frog-carrier having an intermittently-rotating movement in one direction, and a receptacle or chamber located with relation to said frog-carrier whereby the dirt or other similar material taken by the latter will be received into said chamber and from the path of the frog-carrier, substantially as described and for the purpose set forth.

3. An improved switch, in which is combined a box or chamber having an inclined bottom or lower portion, and a frog-carrier having frogs or treads thereon adapted to rotate in horizontal bearings above said inclined portion, whereby the dirt carried into the chamber by the rotary carrier will gravitate to a point of easy access, substantially as described and for the purpose set forth.

4. An improved switch, in which is combined with a box divided interiorly by partitions into a frog-carrier and operating-mechanism chambers, the latter being imperviously apart from the former, a frog-carrier arranged on a horizontal axle journal or shaft which extends into the operating-mechanism chamber, and means for operating said axle journal or shaft with the connected frog-carrier, substantially as set forth.

5. An improved switch, in which is combined with the frog-carrier, a solenoid and electrical connections, a core-piece longitudinally movable in said solenoid and having a pawl, a ratchet-wheel operated by said pawl and a train of gearing transmitting power from said ratchet-wheel to the frog-carrier.

6. An improved switch, in which is combined, a frog-carrier longitudinally arranged on its bearings, a solenoid and electrical connections for energizing the same, a core-piece operating a pawl, a ratchet-wheel and a train of mechanisms including a worm-wheel transmitting power from said ratchet-wheel to said carrier, substantially as set forth.

7. An improved switch, in which is combined a frog-carrier having on its peripheral surfaces longitudinal wheel-treads alternately parallel and inclined to planes of the axis of said carrier and a train of mechanisms controlled by a solenoid arranged in a chamber apart from the carrier, and said solenoid and electrical connections adapted to be controlled by the car.

8. An improved switch, in which is combined with the rails, a polyhedral body with longitudinal rail-treads thereon, said body being arranged on a horizontal axis, and mechanisms for operating the same arranged in a separate compartment from the said carrier and electrical devices governing said mechanisms, and connecting electrical terminals in advance of said switch, substantially as set forth.

9. The improved railway-switch, in which

is combined with the main and branch rails, a box interiorly partitioned to form chambers *o*, *i*, the chambers, *o*, having therein a polyhedral body with longitudinal treads coinciding alternately with the main and branch rails, and the chamber, *i*, having a solenoid and pawl-carrying core-shaft, and a ratchet-wheel engaged by said pawl and in train with the polyhedral body, and electrical connections with said solenoid, substantially as set forth.

10. An improved railway-switch, in which is combined with the rails, a polyhedral body with longitudinal rail-treads thereon, said body being arranged on a horizontal axis, and mechanisms for operating the same, and electrical devices, governing said mechanisms, connecting electrical terminals in advance of said switch, substantially as set forth.

11. In an automatic railway-switch, a box or chamber having an inclined bottom, a horizontal body with longitudinal treads journaled in said chamber, and means for operating the same, substantially as set forth.

12. In combination with the box having chambers, *o* and *i*, the latter being L-shaped, a horizontally-rotating body having longitudinal wheel-treads, the axial shaft of which extends through the partition *m*, and is provided with a cog-wheel or pinion, *q*, gear-wheels, *r*, *s*, *t*, *u*, worm-wheel, *v*, shaft 2, ratchet-wheel *w*, pawl 3, on core-shaft 4, the solenoid and means for electrifying the same, and means for securing a return movement of the core-shaft, all substantially as set forth.

13. In an automatic switch, the combination with the box, rotating body having wheel-treads and electrical means for intermitting and rotating the same, of a key-shaft arranged in connection with said box for operating said rotating body locally, substantially as set forth.

14. In an automatic switch, the combination with the box, horizontally-journaled frog-carrier, a solenoid and its core-shaft and pawl, a ratchet-wheel and means for transmitting movement to the frog-carrier, electrical connections and local means for turning said ratchet-wheel and frog-carrier, substantially as set forth.

15. In an automatic switch, the combination with the box, frog-carrier, solenoid and its core-shaft, pawl, and means for electrifying the coils, of a ratchet-wheel in mechanical connection with the frog-carrier, a gear-wheel, 11, on a shaft with said ratchet-wheel, an angle gear-wheel, 12, and a key-shaft 13, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 24th day of February, 1894.

LOYALL A. OSBORNE.

Witnesses:

CHARLES H. PELL,  
LOUISA BROWNE.