W. HAMILTON.

COIN FREED PREPAYMENT MECHANISM.

APPLICATION FILED JUNE 21, 1909.

965,891.

Patented Aug. 2, 1910.

4 SHEETS—SHEET 1.

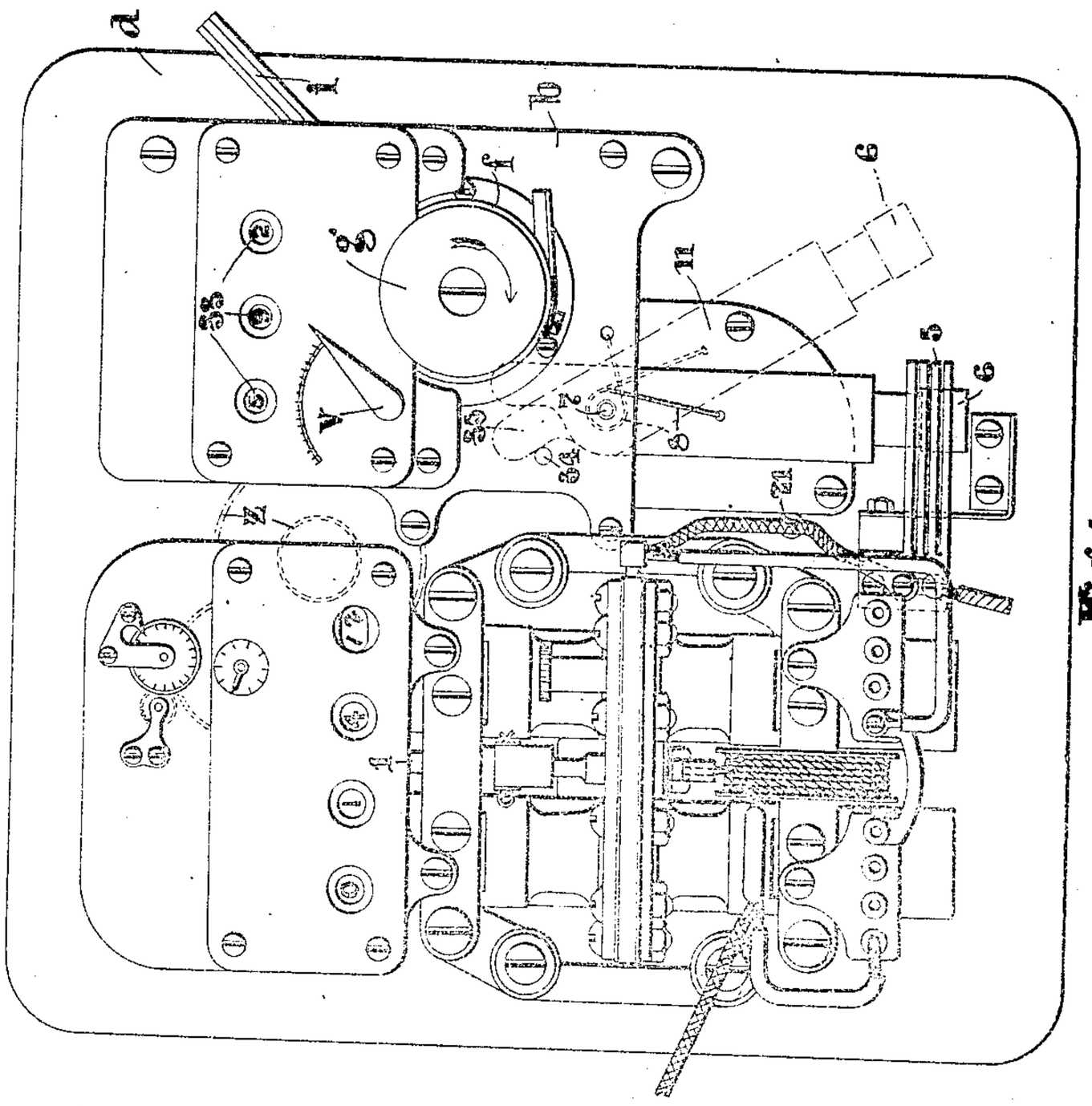

Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

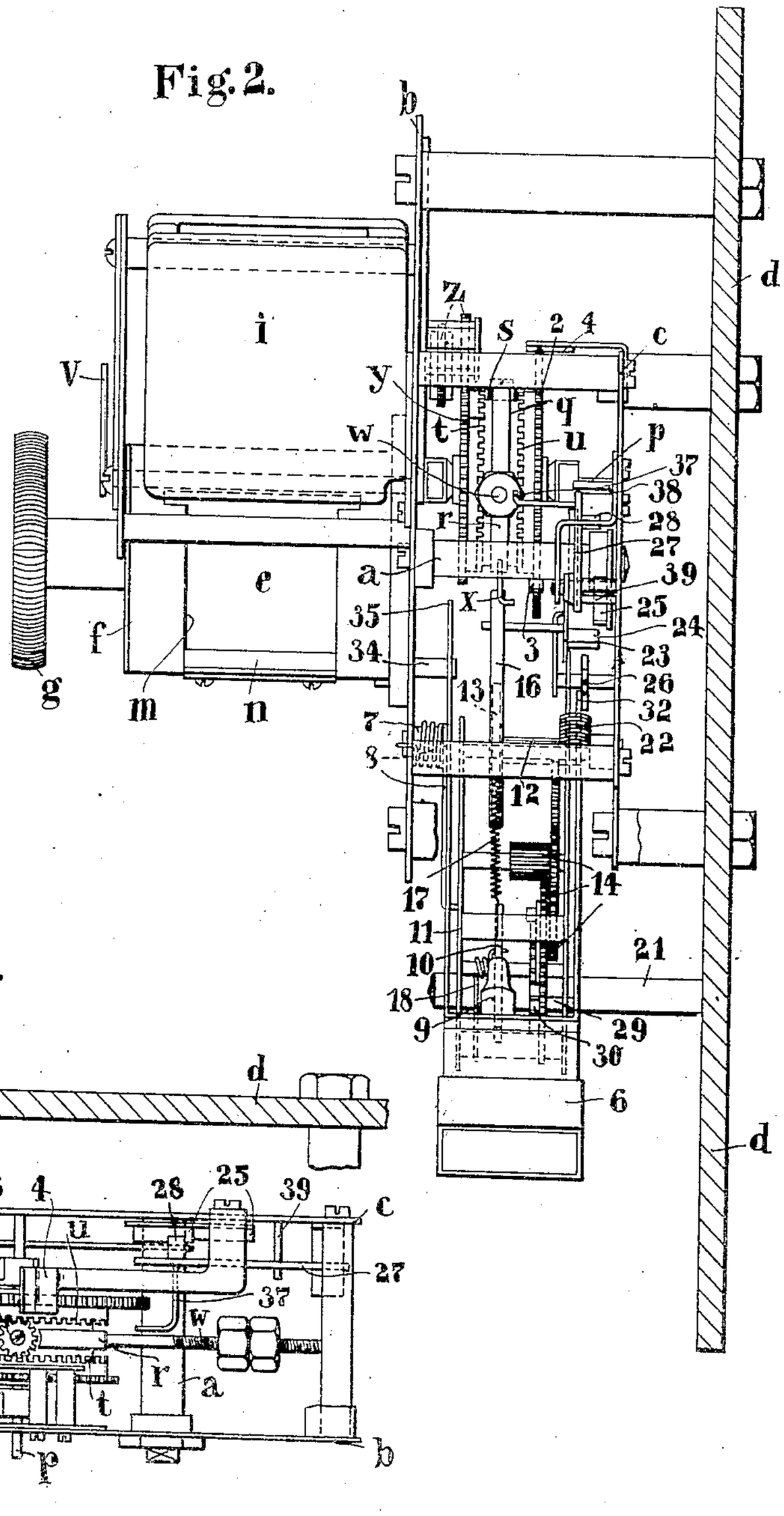

Fig. 6.

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4 SHEETS—SHEET 3.

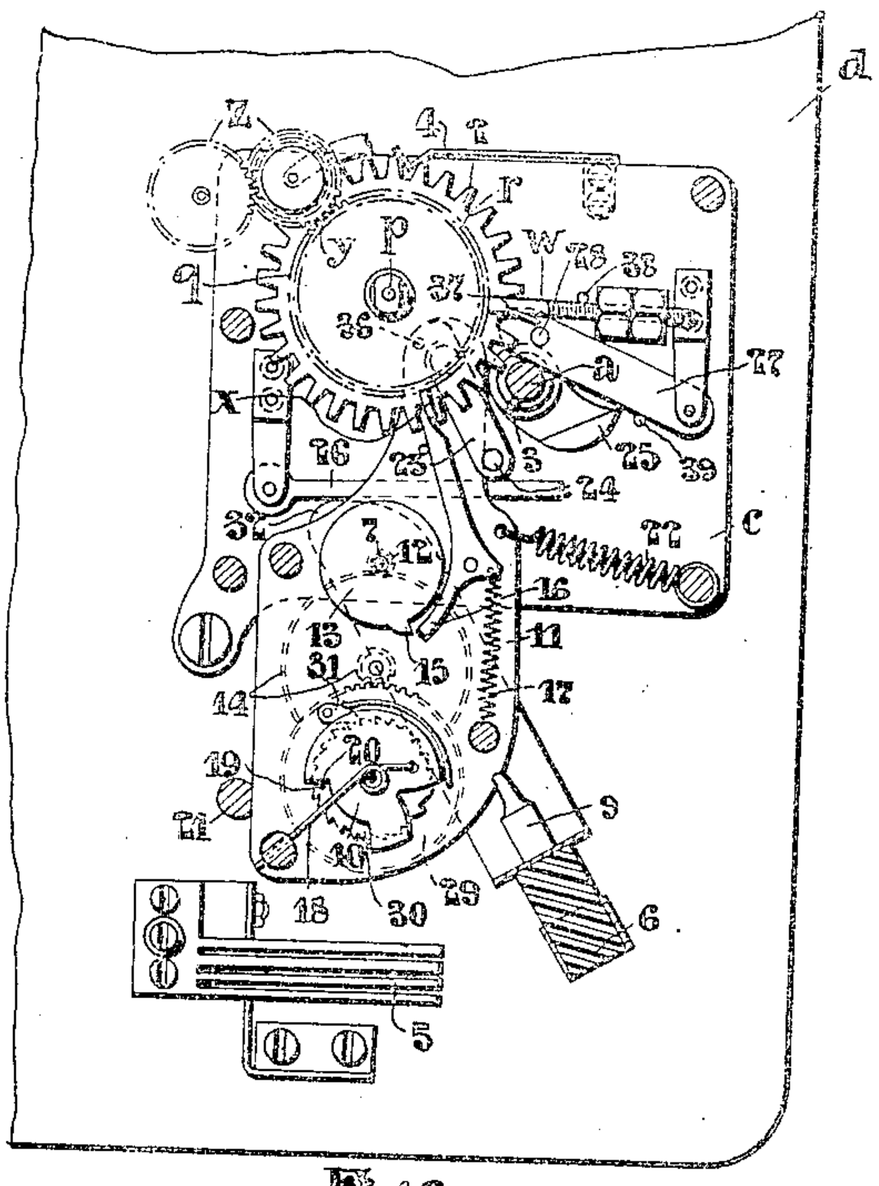

Fig. 5.

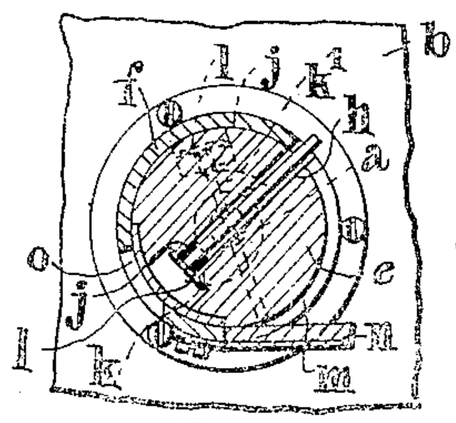

Fig. 7.

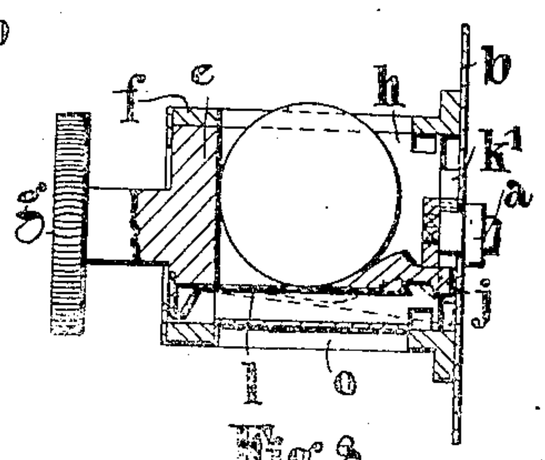

Fig. 8.

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4 SHEETS—SHEET 4.

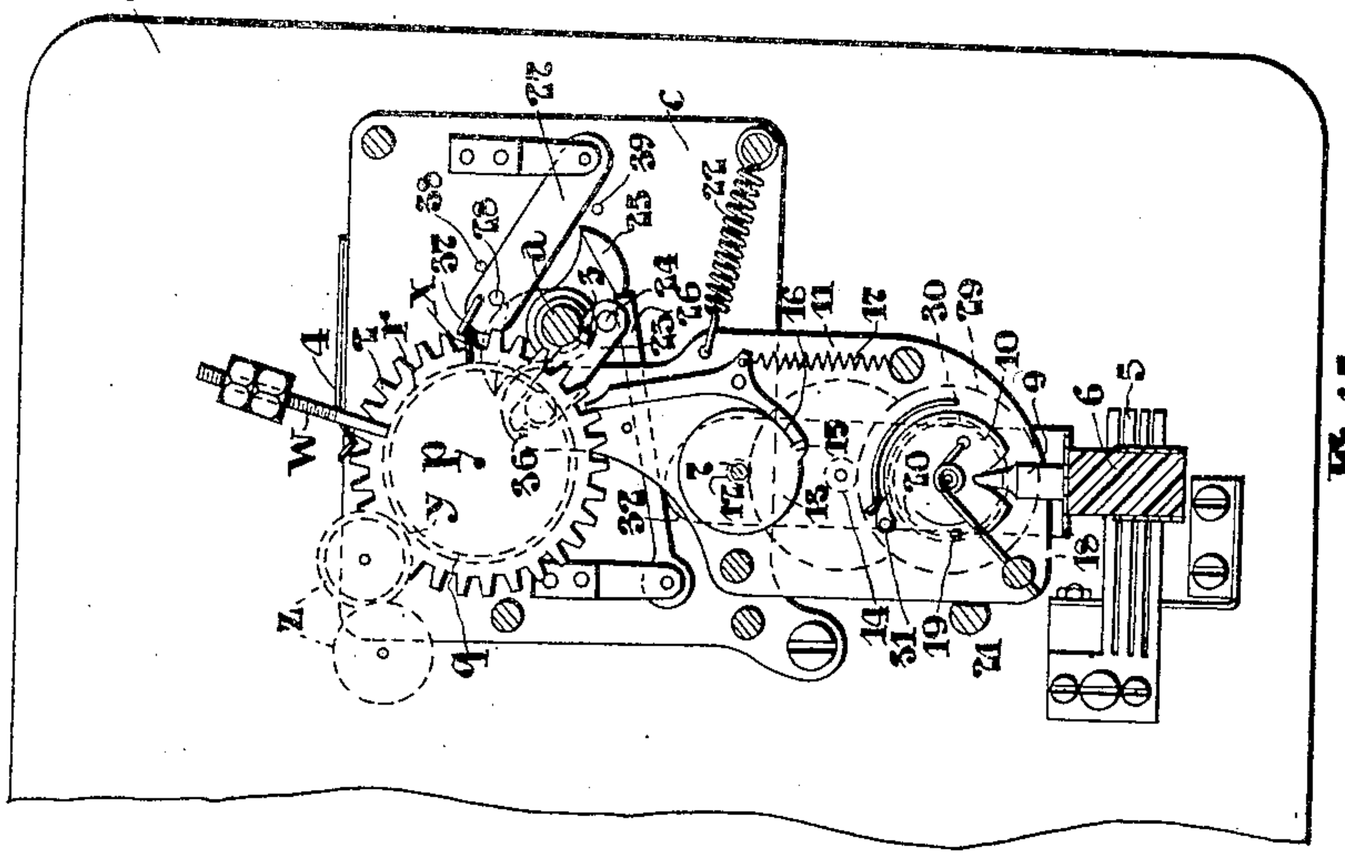

Fig. 3.

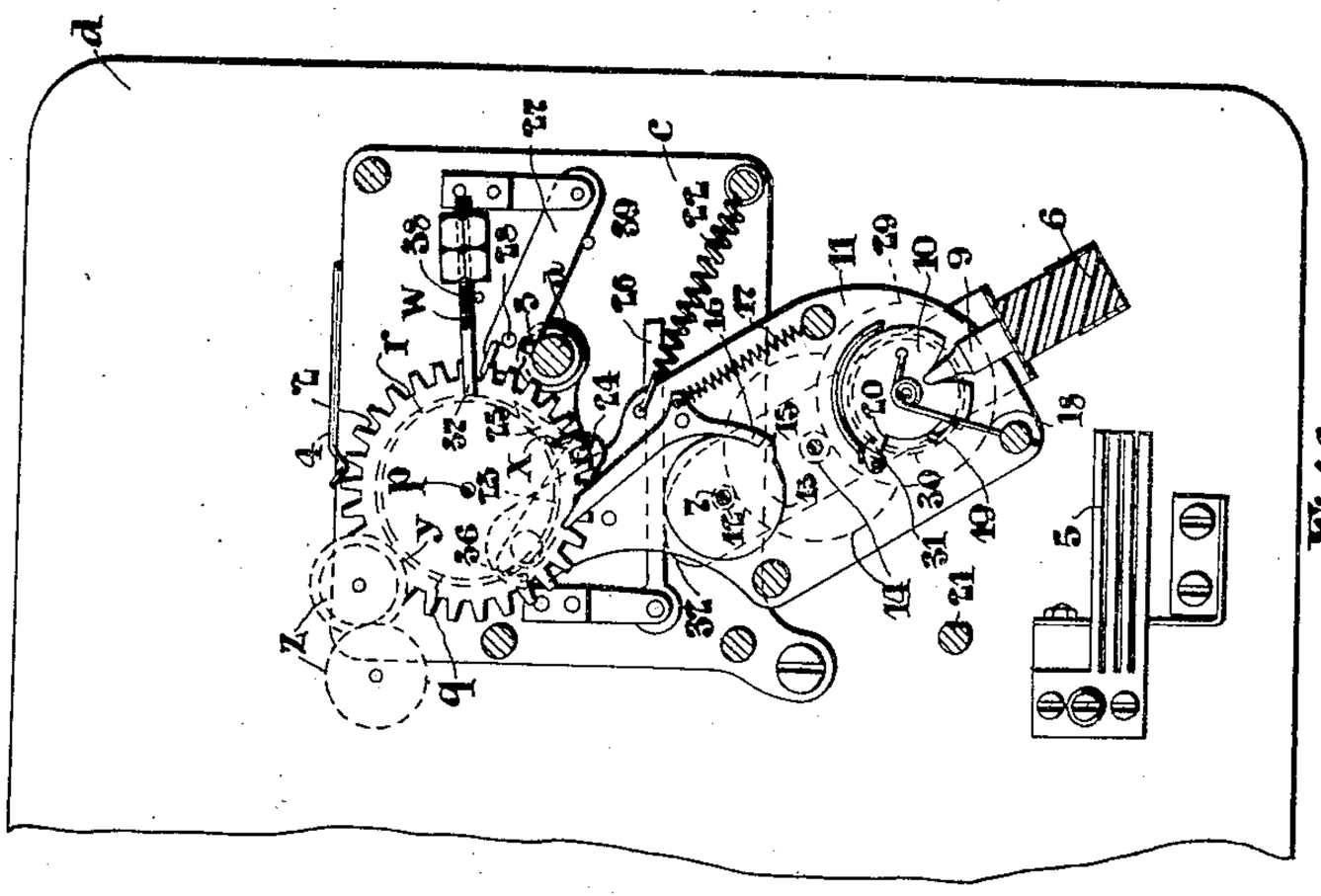

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM HAMILTON, OF HOLLINWOOD, ENGLAND, ASSIGNOR TO FERRANTI LIMITED OF HOLLINWOOD, ENGLAND.

COIN-FREED PREPAYMENT MECHANISM.

965,891. Specification of Letters Patent. **Patented Aug. 2, 1910.**

Original application filed November 4, 1907, Serial No. 400,597. Divided and this application filed June 21, 1909. Serial No. 503,434.

To all whom it may concern:

Be it known that I, WILLIAM HAMILTON, a subject of the King of Great Britain and Ireland, and residing at Hollinwood, in the county of Lancaster, England, have invented certain new and useful Improvements in and Relating to Coin-Freed Prepayment Mechanism, of which the following is a specification.

The present application is a divisional from my prior patent application No. 400,597, filed November 4 1907.

This invention relates to coin-freed prepayment mechanism and is especially applicable to such mechanisms as are used in conjunction with gas and electricity meters.

This invention consists broadly in a coin freed prepayment mechanism in which means are provided for reducing the force required to retain the controlling mechanism in its operative position or release it therefrom.

This invention consists more specifically in a coin-freed prepayment mechanism for meters in which a train of gearing is interposed between the release and fluid control gears whereby a substantial reduction is effected in the force required to release the control gear or retain it in the operative position.

Referring now to the accompanying drawings which illustrate the invention and form part of the specification, Figure 1 shows a front elevation of a meter provided with prepayment mechanism according to my invention, Fig. 2 shows a side elevation of the view shown in Fig. 1 with the meter portion removed, Fig. 3 is an elevation of the prepayment mechanism with the front plate removed. Figs. 4 and 5 are detail views of the mechanism showing the switch in the open and closed positions respectively. Fig. 6 is a part plan view showing the differential gearing. Figs. 7 and 8 are detail views of the coin receiver.

In carrying the invention into effect according to one form and as applied by way of example to an electricity meter, a coin shaft, *a*, Figs. 2 and 3, is rotatably mounted in a frame composed of front and back plates, *b* and *c*, respectively, assembled in any suitable manner; this frame is preferably mounted on the structure, *d*, which carries the meter. To the coin shaft a cylindrical coin receiver, *e*, Figs. 7 and 8, is attached which rotates in a casing, *f*, disposed on the front plate, the end of the receiver being suitably formed for attaching the operating handle, *g*, thereto.

In the cylindrical coin receiver a chamber, *h*, is formed into which the coins discharged from the coin guide, *i*, Figs. 1 and 2, are conducted, the external casing of the coin receiver being dispensed with in proximity to the coin guide so as to allow the coin to enter the receiver and also for a purpose to be hereinafter explained.

When no coin has been introduced into the receiver the operating handle can only be partially rotated as its movement is limited by a stop, *j*, on the coin receiver shutting against stops, *k* and *k'*, on the front plate, Figs. 7 and 8. The stop, *j*, in the coin receiver is mounted on a spring, *l*, which forms the bottom of the chamber, *h*, into which the coin is discharged from the coin guide, and is adapted to be prevented from engaging with the fixed stop, *k*, when the coin is inserted and the operating handle, *g*, is rotated.

The above result is effected by forming the aperture, *m*, in the casing at the coin guide of sufficient size to accommodate the coins used, at the initial position of the coin receiver, *i. e.*, when the stop, *j*, abuts against the stop, *k'*, and the chamber *h*, in the coin receiver registers with the coin guide, *i*, while for the part of the revolution of the receiver corresponding to the amount of movement of the coin shaft between the stops, *k'* and *k*, the aperture in the casing is diminished in width as shown in Fig. 2, so that the coin may project from the receiver. The restricted width of the aperture acts to retain coins of the correct size while allowing smaller ones to fall out, thereby preventing disarrangement as the receiver and coin shaft are rotated on the manipulation of the operating handle. When the coin receiver into which a coin has been introduced has arrived at the position where the engagement of the stops hereinbefore referred to is effected the part of the coin which projects from the receiver comes into contact with a projection, *n*, Figs. 1 and 7, formed on the stationary casing, thereby causing the coin to be forced against the spring, *l*, which forms the bottom of the

coin chamber and preventing the engagement of the stops, *j* and *k*. On continuing the rotation of the operating handle, the switch for the current is closed in a manner to be hereinafter described while the coin on coming opposite a second opening, *o*, in the casing is discharged into the coin receptacle, further rotation of the coin shaft being prevented on the reëngagement of the stops, *j* and *k*. It will thus be understood that the insertion of a coin in the coin guide allows a complete revolution of the coin shaft to be effected on the manipulation of the operating handle.

A shaft, *p*, carrying differential gearing, *q*, Figs. 2 and 6, is rotatably mounted on the same frame as the coin shaft, the differential gear preferably consisting of a member, *r*, rigidly attached to the shaft, *p*, and carrying a pinion, *s*, which engages with crown wheels, *t* and *u*, disposed on either side of the sleeve and forming the other members of the differential train. The shaft on which the differential gear is mounted, carries a pointer, *v* for indicating the amount of current prepaid. The sleeve just mentioned also carries an adjustably weighted lever, *w*, and a stop, *x*, Figs. 2, 3, 4 and 5, the lever assisting the stop to free the switch mechanism when the amount of current prepaid has passed through the meter. A spur wheel, *y*, is rigidly attached to the crown wheel, *u*, in the differential train and is connected through suitable gearing, *z*, with the meter spindle, 1, Fig. 1, a star-wheel, 2, being attached to the crown wheel, *t*, and engaging with a single tooth, 3, formed on the coin shaft, *a*, so that for every revolution of the coin shaft the star-wheel is rotated through the distance of one tooth. A spring-mounted pawl, 4, Fig. 3, also engages with the star-wheel so as to retain it in any given position while at the same time permitting of its rotation when required.

The switch which may preferably be of the knife type consists of a stationary member, 5, Figs. 1, 3 4 and 5, fixed to the structure carrying the meter and prepayment mechanism and a knife member, 6, rotatably mounted on a shaft, 7, on the frame which carries the shaft of the coin mechanism and the differential gearing. The switch is retained in the open position by means of a coil or other spring, 8, attached to the knife member, one of the sides of which is shaped as shown so as to form a projection, 35, which abuts against a stop, 34, when the switch is in the open position; the other side of the knife member is shaped so as to form a cam surface, 32, and operates in a manner to be described hereafter.

The knife member carries at its lower extremity a tooth or projection, 9, which engages with a detent wheel, 10, rotatably mounted on a swinging member, 11, mounted co-axially with the knife member. A pinion, 12, and cam, 13, are mounted on the shaft, 7, which forms the axis of the knife and swinging members, the pinion, 12, being in gear with a train of wheels, 14, mounted on the swinging member, 11, the last wheel, 29, of which train is rotatably mounted on the same shaft, as the detent wheel, 10, which engages with the tooth or projection, 9, on the knife member before mentioned, while the cam, 13, is provided with a projection, 15, which engages with a trip finger, 16, rotatably mounted on the swinging member and normally kept in contact with the cam by means of a spring, 17.

The detent wheel, 10, is connected to the wheel, 29, of the train by means of a ratchet wheel, 30, fixed to the wheel, 10, and a pawl, 31, fixed to the wheel, 29, in such a manner that the rotation of the detent wheel, 10, relatively to the wheel, 29, can only take place in one direction.

The detent wheel, 10, is limited in its motion in one direction by the spring, 18, attached to the swinging member, 11, and in the other direction by means of a stop, 19, also fixed to the member, 11, and against which a tooth, 20, on the detent wheel abuts. A stop, 21, is disposed in a suitable position for limiting the motion of the swinging member, 11, which is kept pressed thereagainst by means of a spring, 22, fixed to the frame so that any motion of the swinging member takes place against the tension therein. It will thus be evident that by interposing a train of gearing between the finger, 16, and the detent wheel, 10, a very slight force is sufficient to release the finger, 16, and allow the spring, 22, to free the knife member of the switch.

In the upper extremity of the swinging member a lever arm, 23, Fig. 5, carrying a pin, 24, is pivotally mounted, the motion of the arm being limited by a stop, 36. This pin, 24, when the switch is on open circuit lies in the path of a cam, 25, rigidly fixed to the coin shaft, *a*, but when the switch is put on closed circuit a second pivotally mounted lever, 26, rotatably mounted on the frame and operated by the cam surface, 32, Fig. 3, on the knife member causes the pin, 24, to be lifted clear of the cam 25, on the coin shaft, and allows the coin shaft to be rotated when the switch is closed.

In order to prevent the manipulation of the operating handle after the full amount has been prepaid which is permissible at any one time, the stop, *x*, Figs. 3, 4 and 5, on the sleeve of the differential train engages with a pin, 37, on the lever, 27, pivotally mounted on the frame and limited in its motion by the stops, 38 and 39. A pin, 28, fixed on this lever is thereby raised into the path of, and prevents the motion of the cam, 25, fixed on the coin shaft, until

the meter has passed at least an amount of fluid corresponding to the value of one coin. Pressure applied to the coin shaft, while in this position, is transmitted through the cam, 25, to the lever, 27, and then to the frame. Thus the meter and prepayment trainwork have no undue pressure to bear, and the meter record is not impaired.

Recording mechanism, 33, Fig. 1, of any known type for indicating the amount of current prepaid coöperates with the rotation of the coin shaft.

The prepayment mechanism is preferably mounted on the structure carrying the meter in order to arrange the device in as compact a manner as possible.

The operation of the device is as follows:—On the insertion of a coin in the coin guide, *i*, the operating handle, *g*, is rotated through a complete revolution during which the cam, 25, on the coin shaft causes the swinging member, 11, to move forward and effect the engagement of the detent wheel, 10, thereon with the projection, 9, on the knife member, 6. When the detent wheel, 10, intermeshes with the projection, 9, the knife member, 6, and the swinging member, 11, are locked together as the detent wheel, 10, is prevented from rotating independently of the wheel, 18, by the pawl 31, while the wheel 18, itself being in gear with the train 14, is prevented from rotating in the opposite direction by the engagement of the finger 16, with the projection, 15, on the cam wheel, 13. Both members being thus locked together the tension on the spring, 22, causes the members 5 and 6, to engage and the switch to be closed. During this operation the tooth, 3 on the coin shaft has moved the star-wheel, 2, through the distance of one tooth and allowed the trip finger 16, on the swinging member, 11, to engage with the projection, 15, on the cam, 13, thereby preventing the opening of the switch. On inserting more coins in order to prepay the full amount of current permissible at one time the star-wheel, 2, on the differential train is rotated one tooth for every revolution of the coin shaft until the stop motion hereinbefore described comes into operation to prevent further rotation. The meter mechanism which starts recording when the switch is closed is geared to the member, *t*, of the differential train and by its rotation causes the sleeve, *r*, of the differential train to rotate in the reverse direction to that above described until the amount of current prepaid has passed through the meter when the stop *x*, on the sleeve comes in contact with the trip finger, 16, on the swinging member, 11, and releases it from the cam 13, Fig. 3, whereupon the tension in the coiled spring, 8, coöperating with the knife member, causes the opening of the switch.

It will be evident that by interposing a train of gearing between the cam, 13, on the axle of the swing member and the tooth, 9, on the knife member the pressure required to release the switch or hold it in the closed position is reduced to a minimum while the construction of the coin receiver and the mechanism coöperating therewith is such as to provide an exceedingly compact and efficient coin-freed prepayment mechanism.

Although the present invention has been described with reference to an electricity meter it is not to be regarded as limited to such application as it can be applied to other devices operated by coin freed mechanism without departing from the scope of the present invention.

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

1. In combination, means for controlling the supply of current, means for holding said controlling means in the operative position together with a train of gearing coacting with said holding means for reducing the force required to hold said controlling means in the operative position or release it therefrom.

2. In combination, a movable switch member, a stationary switch member, a swinging member coacting with said movable switch member, means for causing said movable switch and said swinging members to engage and when engaged, to cause said movable switch member to contact with said stationary switch member, together with means coacting with said engaging means for reducing the force required to hold said switch members in the engaged position or release them therefrom.

3. In combination, a movable switch member, a stationary switch member, a swinging member coacting with said movable switch member, together with means including a train of gearing carried by said swinging member for causing said movable switch and said swinging members to engage with one another, and in the engaged position to cause said movable switch member to contact with said stationary switch member.

4. In combination, a stationary switch member, a movable switch member having a projecting tooth disposed thereon, a swinging member carrying a train of gearing including a detent wheel and resiliently mounted cam coaxially mounted with said movable switch member, withdrawable means for preventing rotation of said cam in a certain direction, means for causing said detent wheel to engage with said projecting tooth and said switch members to contact, together with means for actuating said withdrawable means for disengaging said switch members.

5. In combination means for controlling the supply of current, means for holding

said controlling means in the operative position, a train of gearing co-acting with said holding means for reducing the power required to hold the said controlling means in the operative position, together with means for preventing the operation of the controlling means in certain circumstances.

6. In combination means for controlling the supply of current, means for holding said controlling means in the operative position, a train of gearing co-acting with said holding means for reducing the power required to hold the said controlling means in the operative position, means for preventing the operation of the controlling means in certain circumstances, together with means for preventing straining of the gearing when operation of the switch is attempted in said circumstances.

In testimony whereof, I affix my signature in presence of two witnesses.

WILLIAM HAMILTON.

Witnesses:
ERNOLD SIMPSON MOSELEY,
MALCOLM SMETHURST.