

No. 871,738.

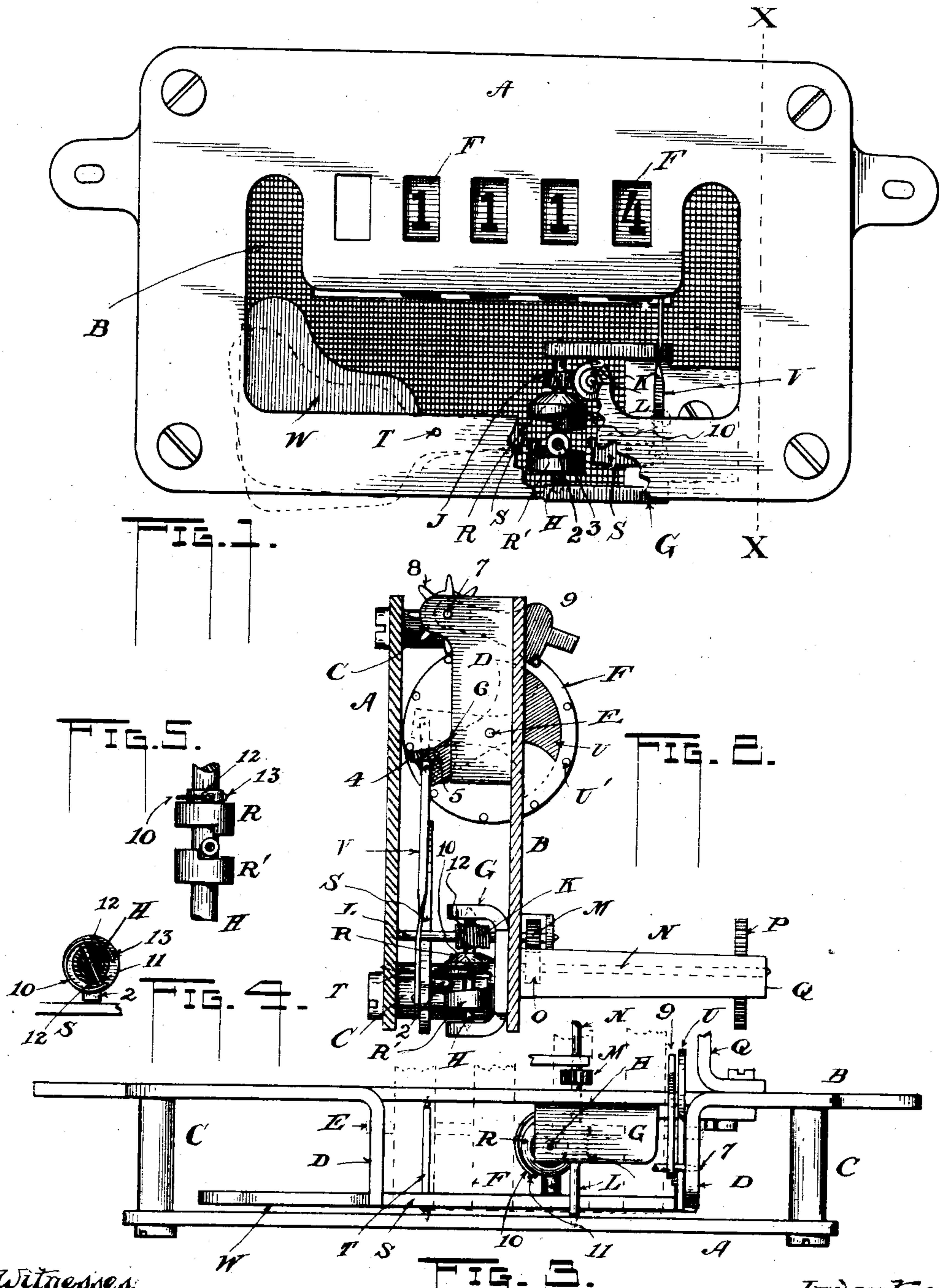
PATENTED NOV. 19, 1907.

D. E. SCRAFFORD.

METER.

APPLICATION FILED FEB. 6, 1905.

2 SHEETS—SHEET 1.



Witnesses:
E. J. Arnold
Max Davis

Inventor:
Daniel E. Scrafford
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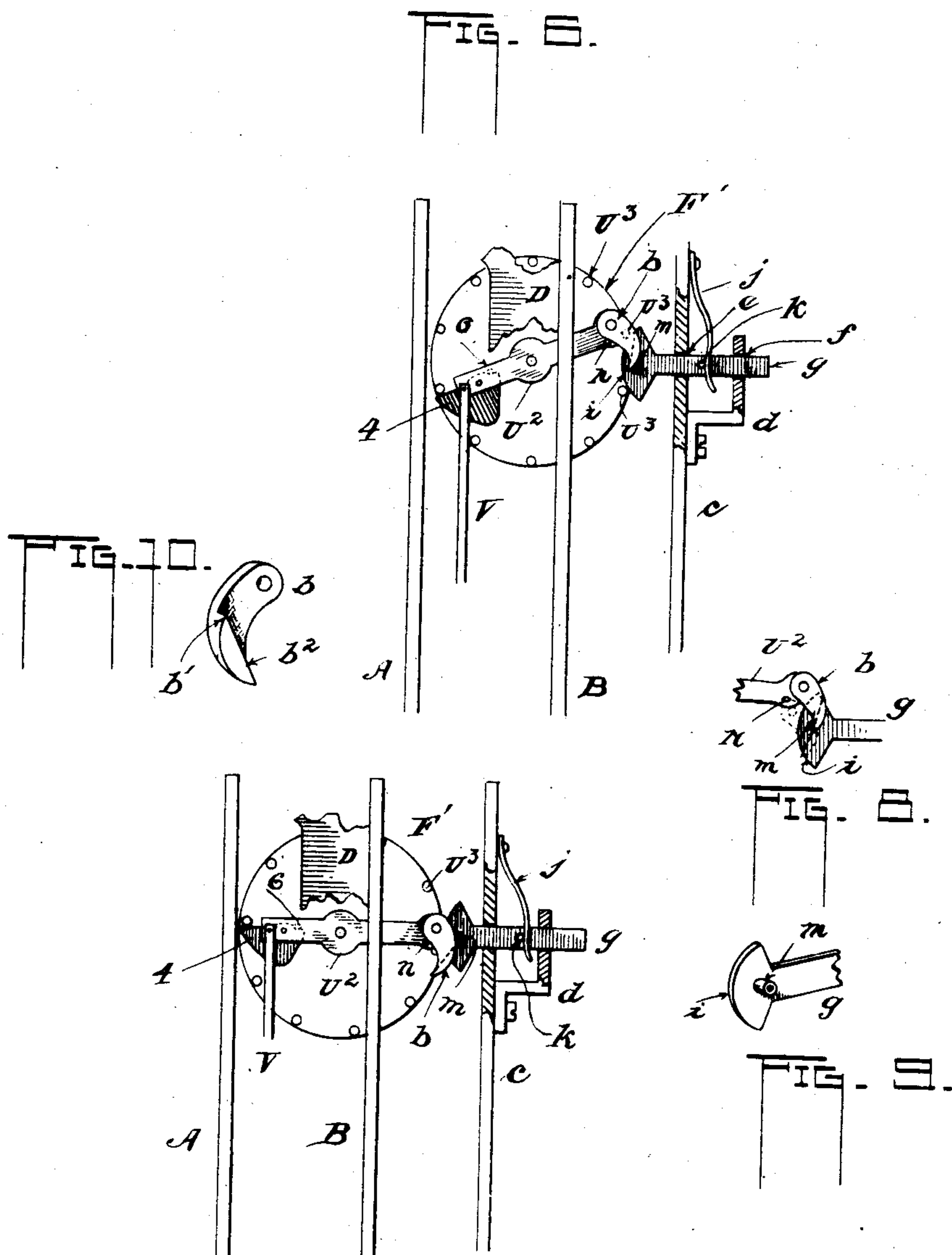
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Witnesses:
E. J. Burns
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UNITED STATES PATENT OFFICE.

DANIEL E. SCRAFFORD, OF PEORIA, ILLINOIS.

METER.

No. 871,738.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed February 6, 1905. Serial No. 244,393.

To all whom it may concern:

Be it known that I DANIEL E. SCRAFFORD, citizen of the United States; residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Meters; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to meters such as are adapted for registering the consumption of gas or an electric current, and its objects are to provide gravity actuated means whereby registering wheels may be moved step by step with entire certainty under all ordinary conditions, and to prevent accidental movements of the wheels in transporting or handling the apparatus.

In the accompanying drawings, Figure 1 is a front view of the apparatus, the inclosing case being omitted. Fig. 2 is a section on the line X—X, Fig. 1. Fig. 3 is a plan view of the same devices. Fig. 4 is a plan or end view of a certain cam. Fig. 5 is a side view of the same cam. Fig. 6 is a partial view similar to Fig. 2, showing additional features. Fig. 7 is a view similar to Fig. 6 but showing parts in a different position. Figs. 8, 9, and 10 are detail views of parts seen also in Figs. 6 and 7.

In these figures, A represents a front plate, B a back plate, and C the usual posts interposed between the two plates and forming with them a frame to support the moving parts. Portions, D, D, of the back plate are bent forward to serve as bearings for shafts E, and 7. Secured to the back plate B below the shaft E is a U-shaped member G supporting a vertical shaft H which carries a worm wheel J, the latter engaging a worm K borne by a shaft L mounted in the plates A, B. Upon the rear end portion of the shaft L is fixed a gear M, shown in this instance as driven by a power-actuated gear P, shaft N, and pinion O, the shaft N being mounted in or upon an arm Q projecting from the back plate. Below the worm wheel J and upon the same shaft is a two-part cam R, R' having between its parts a spiral passage of approximately uniform width and with its upper and lower ends joined by a vertical passage, the whole forming an endless path for a certain roller to be guided and carried by the cam. The vertical passage or portion of

the endless channel, is formed by abrupt offsets in each of the spiral faces of the parts of the cam, as shown. Alongside this cam is a lever S having an enlarged or weighted end W and pivoted between its ends to swing vertically upon a shaft T mounted in the main frame. From one side of this lever a roller 2 projects into and fits in the channel formed by the two parts of the cam, so that as the cam rotates the corresponding arm of the lever is gradually depressed until the roller 2 reaches the vertical part of the channel, when being free to rise it is suddenly raised by the dropping of the heavy opposite arm of the lever.

Upon the shaft E before mentioned, are mounted registering wheels F which may be of any desired form such that each at the completion of each revolution actuates the next succeeding wheel, as is usual in devices of this general class.

The non-weighted arm of the lever S is connected by a link V with one end of a bar U pivoted between its ends upon the shaft E and, if desired, having its opposite end enlarged or counterweighted, as shown in Fig. 2. The registering wheel F adjacent to this bar U is provided with ten evenly spaced lateral pins U' near its periphery, and in the operation of the apparatus these are engaged in succession by a gravity pawl 4 pivoted on the bar U and having its movement about its pivot 5, in one direction, limited by a stop 6. Above the shaft E, upon the shaft 7, are mounted pinions 8 of which but one is shown (Fig. 2). These pinions transmit movement through the entire train of registering wheels in a well known manner, and in this instance the first one is actuated by the pins U', above mentioned.

The entire movement of the apparatus thus far described will now be readily understood. The rotation of the cam R, R' gradually forces down the roller 2, rocking the lever upon its axis and raising its weighted end. When the roller reaches the vertical portion of the cam channel, the weighted end of the lever falls suddenly and the link V raises the end of the bar or arm U and its pawl 4 which is at this time in engagement with one of the pins upon the registering wheel F, whereby the latter is rotated. The parts are so proportioned that the rotation thus produced is one tenth of a complete revolution, and by this movement the number visible at the first window opening in the plate A (Fig. 1) is

changed. The continued rotation of the cam causes a repetition of the whole movement, the roller as it descends drawing down the arm U and dragging the pawl 4 over the next succeeding pin on the wheel F and engaging its under side before the link is again thrust upward.

Although I may fix both parts of the cam R, R' to the shaft, I have in this instance shown the upper part as loose upon the shaft, so far as rotary movement is concerned, but connected thereto by a light spring 10. In the form shown in Figs. 2, 3, the spring is connected at one end to the shaft and at the other to the body of the cam, the arrangement being such that the spring normally holds the upper part of the cam in such position that the vertical part of the cam channel is slightly narrower than the other portion.

Figs. 4 and 5 show the spring as having one end connected at 13 to a hub R², added to the cam member, while the other end engages a pin 11 passing through the shaft and through slots 12 in the hub. The effect of the spring is substantially the same in both cases. When the roller 2 presses upward and seeks to enter the vertical part of the cam channel, it meets a momentary resistance because the channel is narrowed, but the instant the spring yields and the channel receives the roller, the resistance ceases, practically. This momentary resistance causes no material loss of power, but it tends to prevent any displacement of the registering wheels in handling or transporting the apparatus. Should the roller from any cause fail to rise promptly in the vertical portion of its path, the rounded offset face of the unyielding portion of the cam serves to start it upward.

I have also shown, in Figs. 6, 7, 8, 9, 10, other means for resisting accidental movements of the registering wheels and for causing the pins U' to stop at precisely the right points, and to be held there during the interval between the upward thrusts of the link V. In these figures, c represents a plate added in the rear of the main frame and provided with a rigid arm d, both plate and arm being slotted at e, f to receive a sliding latch g having at its inner end a rounded head i provided with a laterally projecting pin m and adapted to fit between two consecutive pins upon the wheel F. The latch is constantly pressed inward by a light spring j acting upon a pin k. Upon the free end of an arm U² corresponding to the arm U already described, is pivoted a pawl or cam b having its swinging in one direction limited by a stop n and provided with a rounded face b' to engage the pin m and push back the latch quickly when the link V rises (see Fig. 7). At the moment when the movement of the link is completed, the pin passes off the face b' and

the spring j throws the latch again inward. When the pawl gradually rises with the descent of the link, the offset face b² (Fig. 10) moves over the short pin m until it reaches the position shown in Fig. 8 when the cam or pawl b drops back to the position shown in dotted lines, ready for the next upward movement of the link V.

1. A meter comprising registering wheels, devices for imparting motion to said wheels, a cam revoluble upon a vertical axis and provided with a channel having a spiral portion and a vertical portion connecting the highest and lowest parts of said spiral portion, a pivoted horizontal lever alongside the cam, having a lateral projection fitting in said channel and a weighted end to be raised by the cam, and means whereby the downward movement of said weighted end actuates said devices.

2. A meter comprising registering wheels, devices for imparting motion to said wheels, a two-part cam mounted upon a vertical shaft and having between its parts an endless channel made up of a spiral part and a vertical part connecting the highest and lowest portions of the spiral part, a weighted horizontal lever pivoted alongside said cam, a roller mounted upon one side of the lever and projecting into said channel, and means whereby the descent of the weighted lever, when the roller reaches the vertical portion of the cam channel, actuates said devices.

3. A meter comprising a series of registering wheels, a reciprocating member for imparting a step-by-step movement thereto, a lever connected at one end to the said member, the lever being weighted at the opposite end and fulcrumed between its ends, an upper and lower cam portion near the end of the lever which has connection with the reciprocating member, said cam portions being mounted on a vertical axis, the adjacent faces of the cam portions having an irregular passage between them and a vertical passage connecting therewith substantially as described and shown and normally narrower than the said irregular passage, and a member on the lever within the irregular passage the cam adapted to depress the lever to raise the weighted end thereof and then permit the latter to fall for the purposes described when the vertical passage of the cam arrives at the lever-member.

4. A meter comprising registering wheels, a reciprocating member adapted to impart a step-by-step movement to said wheels, a lever weighted at one end and connected at the other to the said reciprocating member and fulcrumed between its ends, a cam for depressing the lever at one end to raise the weighted end and then liberate it abruptly, said cam comprising two portions, an upper and a lower, there being a substantially horizontal passage and a substantially vertical

passage for the cam for operating the lever, one of said passages being normally narrower than the other, a vertical axis for said cam and means for imparting a continuous movement to the cam while the reciprocating member through the lever receives an intermittent movement.

5. A meter comprising registering wheels adapted for a step-by-step movement, a reciprocating member for imparting such movement, a gravity lever in connection with such member, a double cam comprising an upper and a lower portion, a roller on the lever for entering between the said cam portions, the opening between the cams being irregular in form and having an abrupt vertical opening substantially as shown and described, the width of said vertical opening being normally narrower than the irregular opening, the upper portion of the cam being adapted for slight rotary movement on its axis for opening the vertical opening by the passage of the roller therethrough, and also adapted to close after the passage of said roller for the purposes described.

6. A meter comprising registering wheels adapted for a step-by-step movement, a reciprocating member for imparting such movement, a gravity lever in connection with such member, a double cam comprising an upper and a lower portion, a roller on the lever for entering between the said cam portions, the opening between the cam portions being irregular and substantially horizontal, there being also a vertical opening communicating with and opening into the irregular opening, substantially as described, a weight at one end of the lever, the fulcrum of the lever being between the weighted end and the end having engagement with the cam, the vertical opening of the cam being normally narrower than the irregular opening for the purposes set forth, the upper portion of the cam adapted for a partial rotary movement on its axis, means for yieldingly holding the vertical opening partially closed as described but permitting the roller to open the same to pass through and again close as described.

7. A meter comprising registering wheels adapted for a step-by-step movement, a reciprocating member for imparting such movement, a gravity lever in connection with such member, a double cam comprising an upper and a lower portion, a roller on the lever for entering between the said cam portions, the opening between the cam portions being irregular and substantially horizontal, there being also a vertical opening communicating with and opening into the irregular opening substantially as described, a weight at one end of the lever, the fulcrum of the le-

ver being between the weighted end and the point of engagement with the cam, the upper cam portion adapted for partial turn about its axis, means for limiting such movement, a spring for normally holding the said cam portion to partially close the vertical opening, the weighted end of the lever adapted to fall when the vertical opening is opposite the roller of the lever, the said roller in rising turning the upper cam portion on its axis against the spring, the vertical opening again being closed by the spring after the passage of the roller therethrough.

8. A meter comprising a train, registering wheels adapted for a step-by-step movement, means for imparting the step-by-step movement thereto, a member in engagement with one of the wheels for holding the entire train from turning, and means carried by the step-by-step operating means for automatically moving the member from engagement with the wheels when the step-by-step movement is made, the member being yieldingly held in engagement with the wheels and returning to such engagement after its release.

9. A meter comprising a train, registering wheels adapted for a step-by-step movement, means for imparting such movement thereto, a member for normally holding the registering wheels from voluntary movement, said member being yieldingly held in engagement with the wheels, and means on the step-by-step operating means for automatically removing the locking member from the wheels when said operating means imparts the said step-by-step movement, said means for removing the wheel engaging member adapted to move said member when moving in one direction but adapted also to pass it when moving in the opposite direction.

10. A meter comprising registering wheels adapted for a step-by-step movement, a reciprocating member for imparting such movement to the wheels, a latch for engaging and holding the wheels from turning except by said step-by-step means, a spring for yieldingly holding the latch in engagement, and a pivotal cam carried by the reciprocating member for passing the latch when moving in one direction, said cam being limited in its movement when the member moves in the opposite direction to engage and remove the latch from the wheels, the spring again returning the latch to its normal position after the cam has released it.

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

DANIEL E. SCRAFFORD.

Witnesses:

L. M. THURLOW,
E. J. ABERSOL.