(No Model.) 4 Sheets—Sheet 1.

D. ORME.

COIN OPERATED GAS METER.

No. 497,682. Patented May 16, 1893.

FIG. 2.

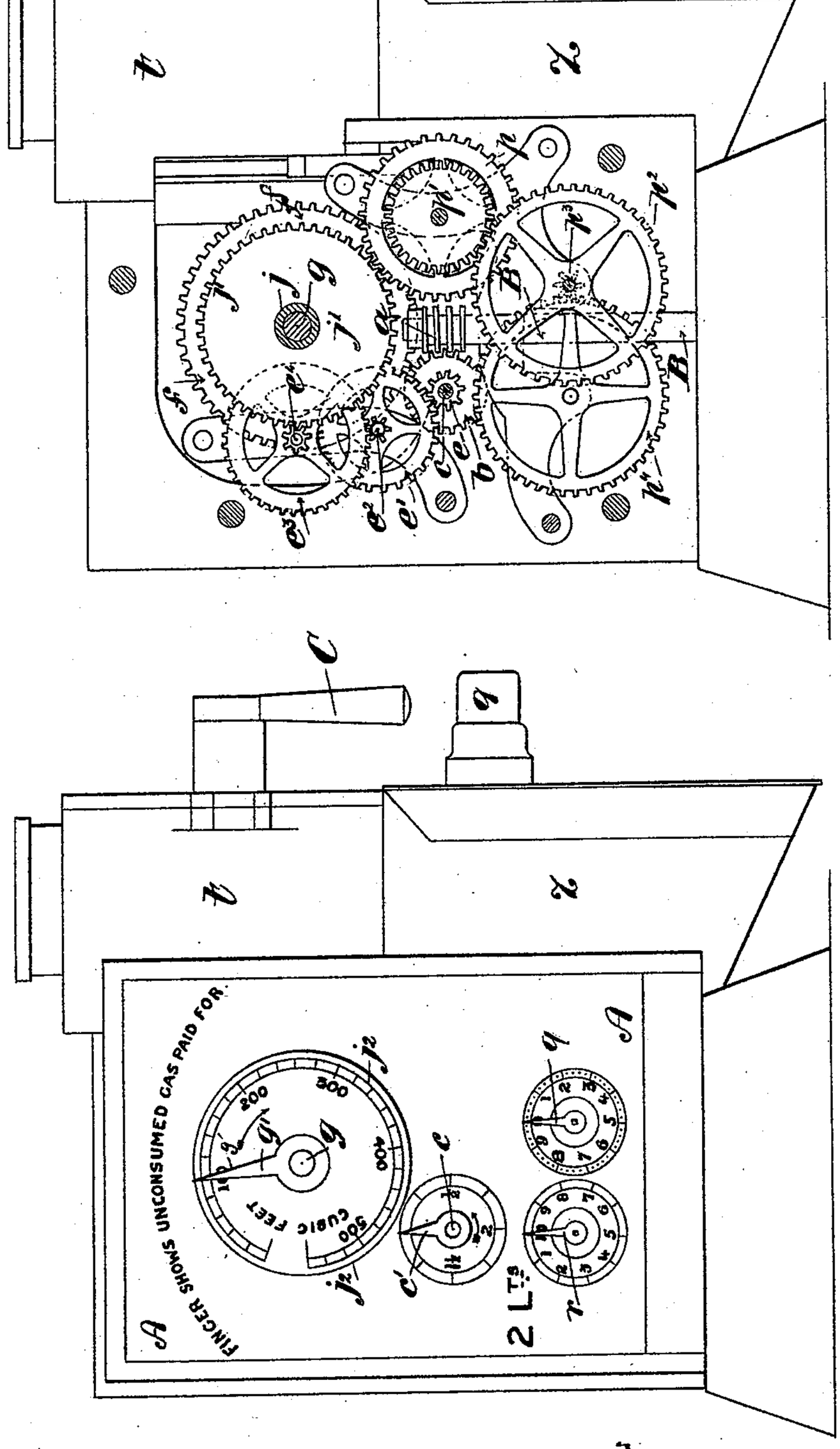

FIG. 1.

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FIG. 4.

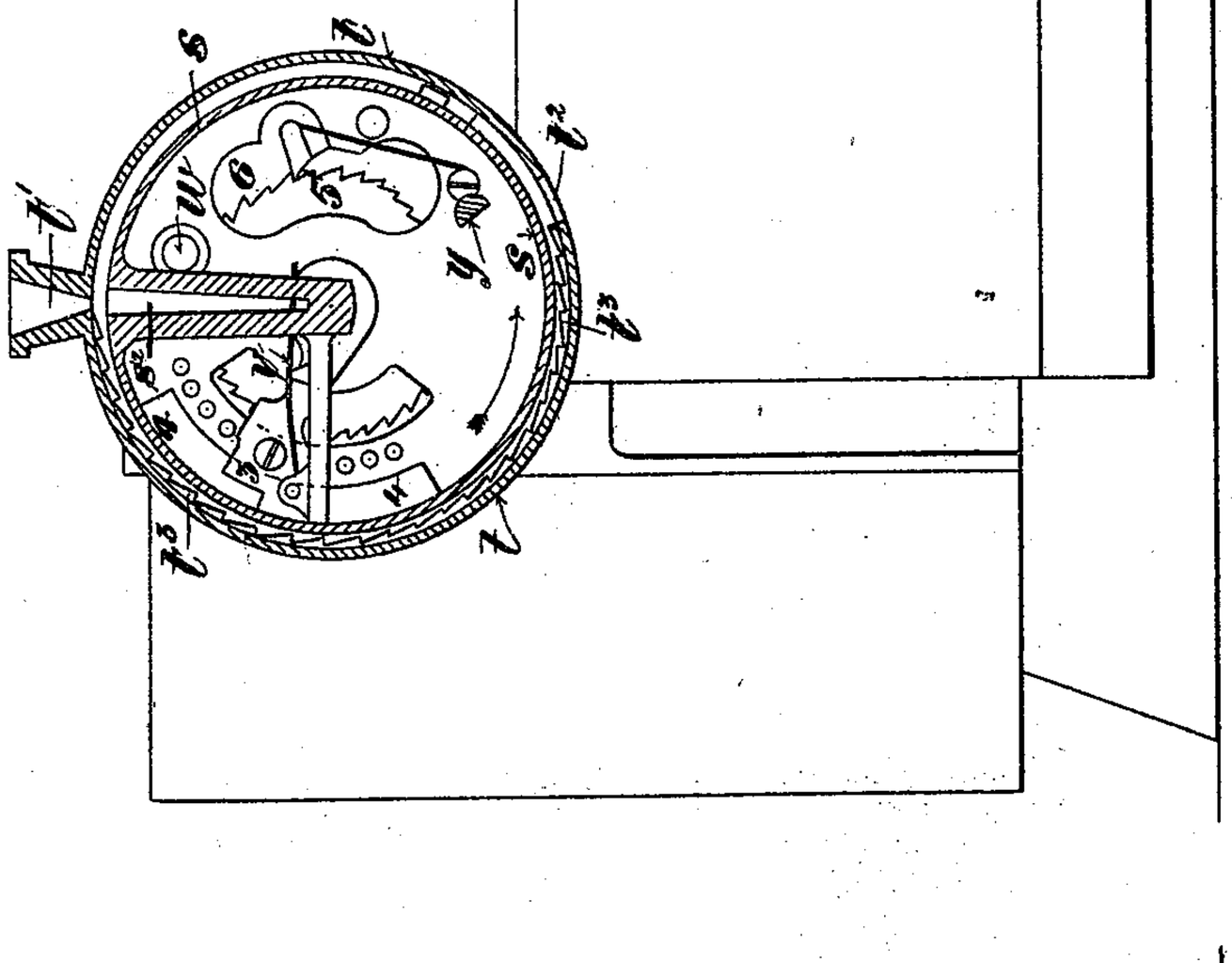
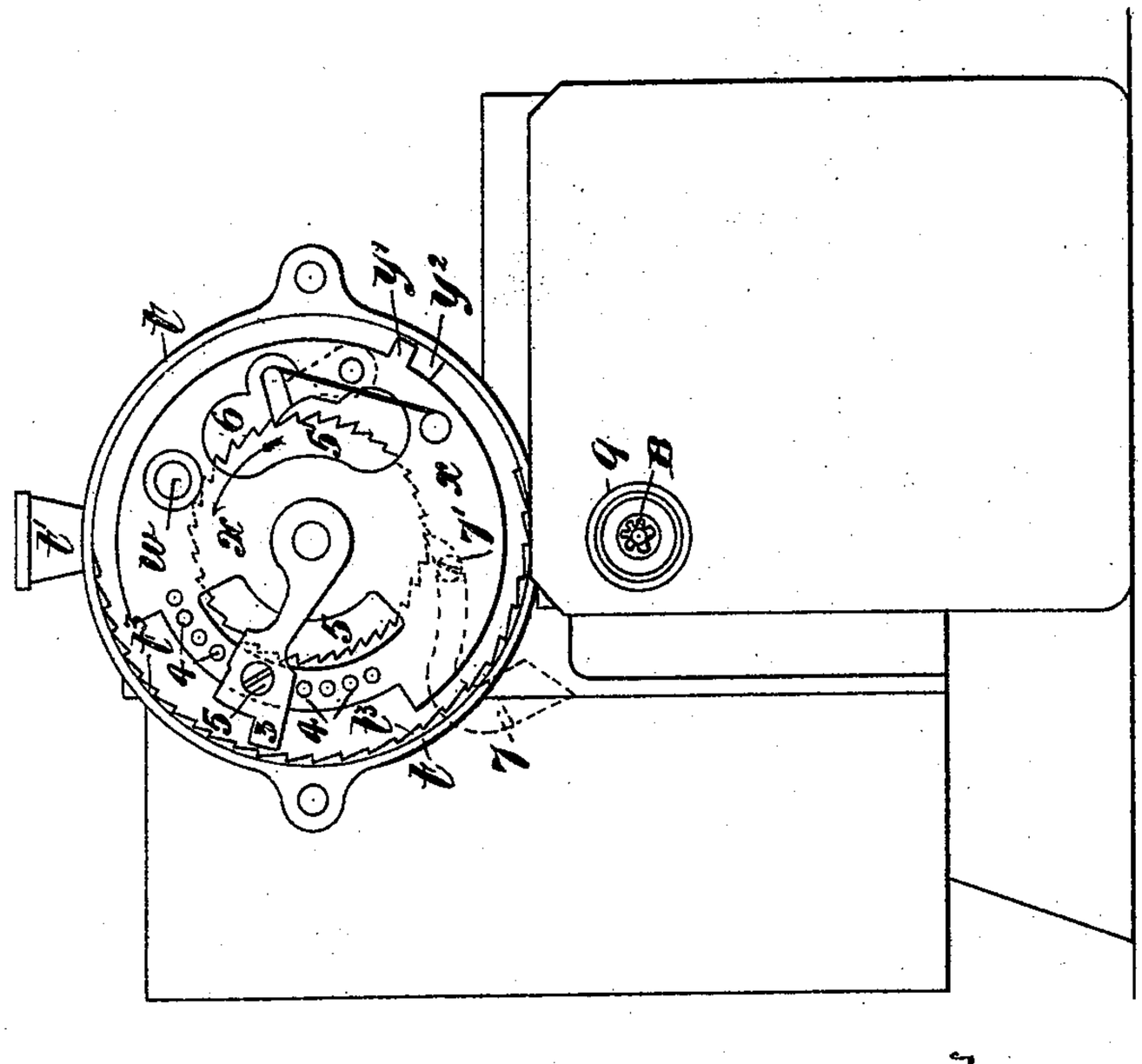


FIG. 3.



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(No Model.) 4 Sheets—Sheet 3.

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COIN OPERATED GAS METER.

No. 497,682. Patented May 16, 1893.

FIG. 7.

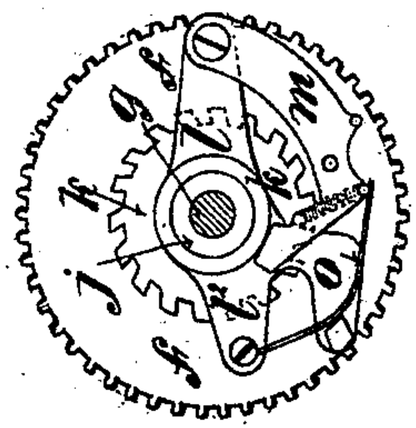


FIG. 6.

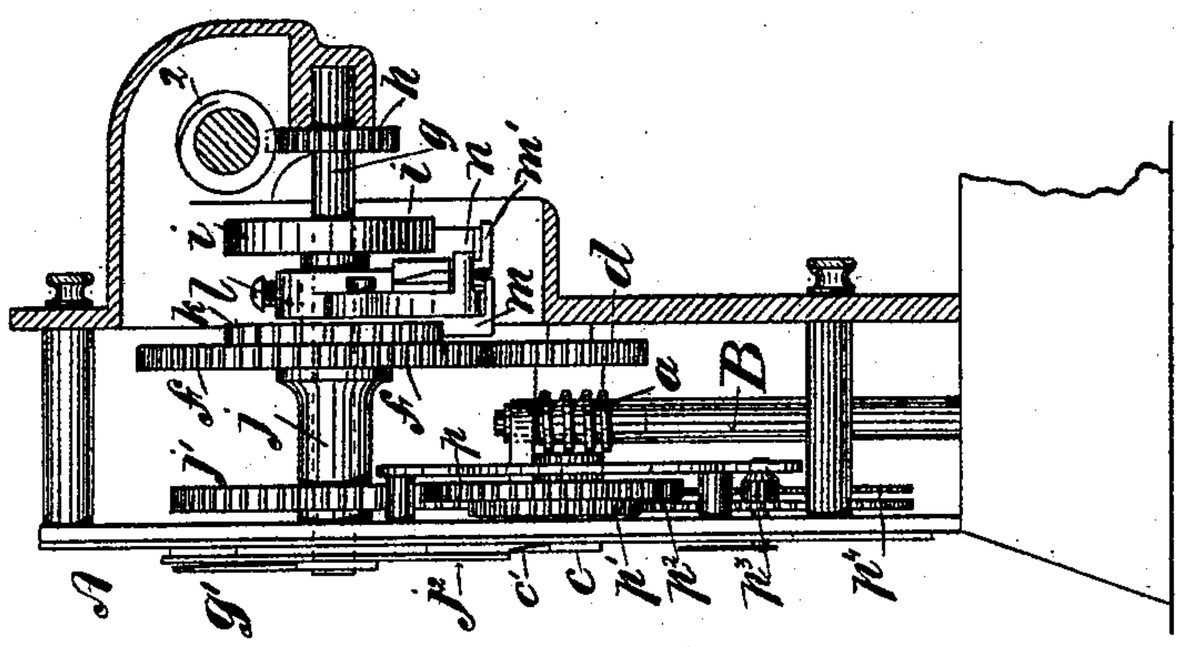
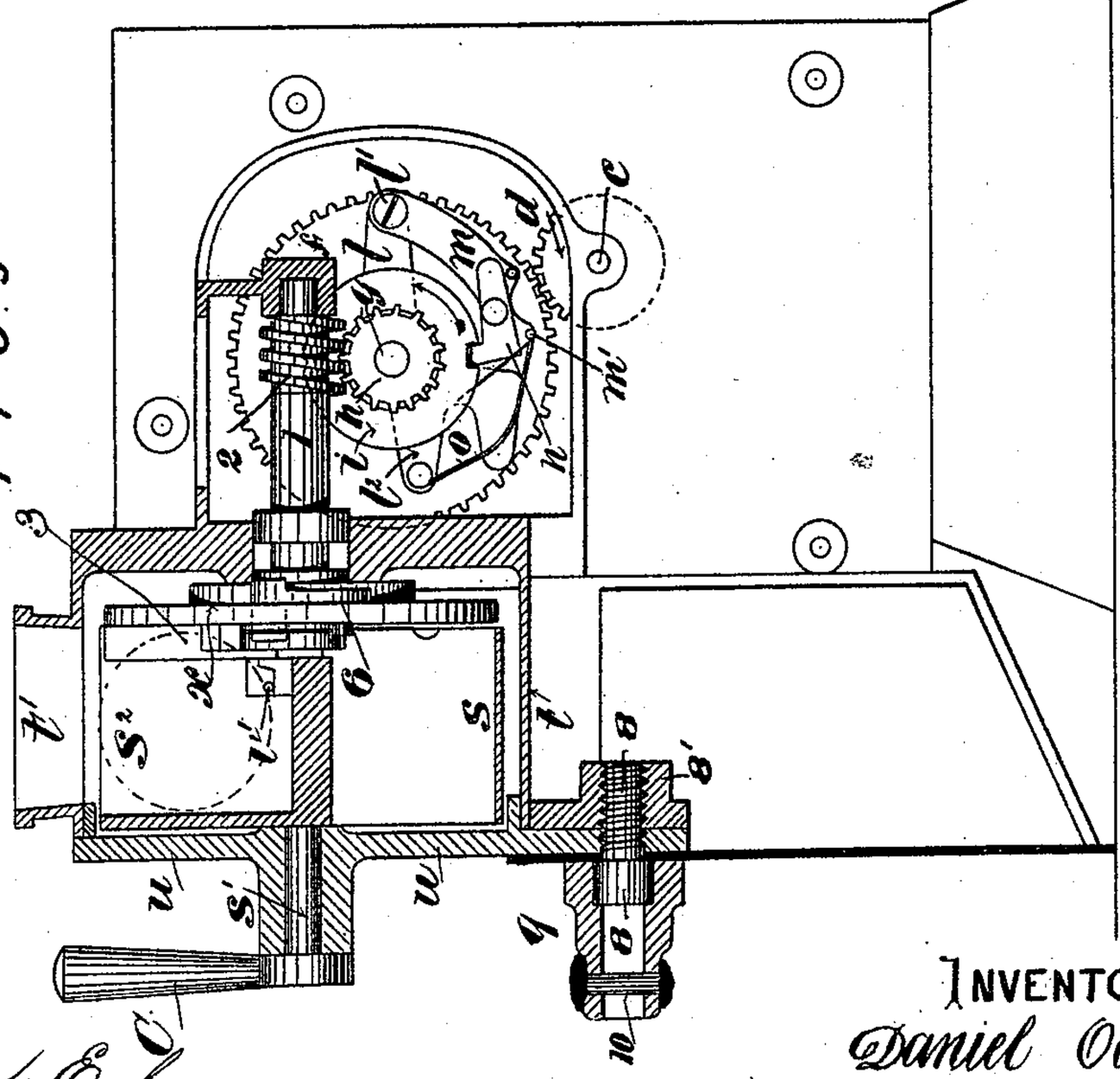


FIG. 5



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(No Model.) 4 Sheets—Sheet 4.

D. ORME.

COIN OPERATED GAS METER.

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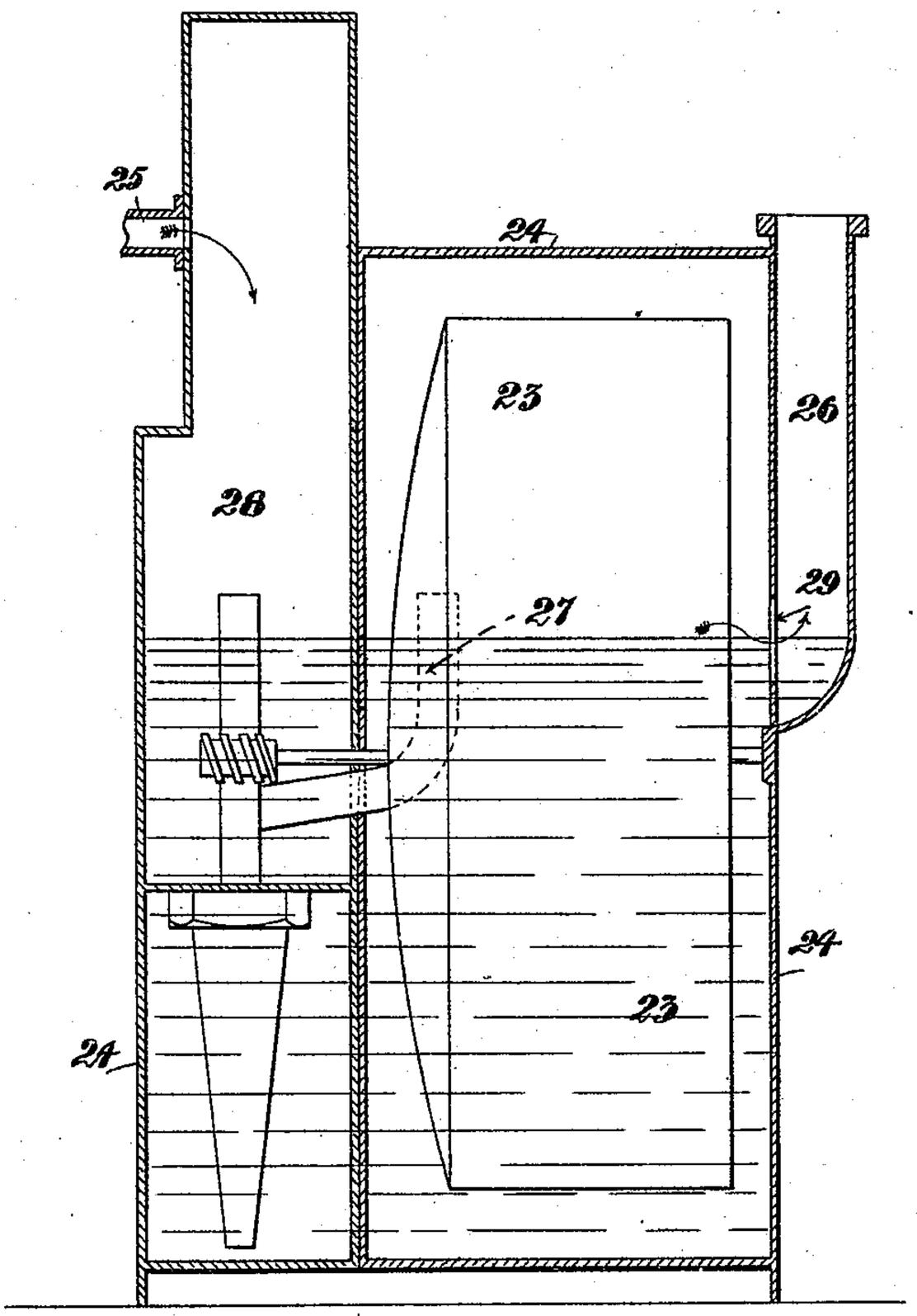
FIG. 8.



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Paul F. Perkins

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UNITED STATES PATENT OFFICE.

DANIEL ORME, OF OLDHAM, ENGLAND.

COIN-OPERATED GAS-METER.

SPECIFICATION forming part of Letters Patent No. 497,682, dated May 16, 1893.

Application filed December 10, 1891. Serial No. 414,629. (No model.)

To all whom it may concern:

Be it known that I, DANIEL ORME, a subject of the Queen of Great Britain and Ireland, residing at 95 Queen's Road, Oldham, in the county of Lancaster, England, have invented certain new and useful Improvements in Pre-payment Gas-Meters, for automatically supplying a predetermined quantity of gas in exchange for an inserted coin or coins or token or equivalents for value; and I do hereby declare the following to be 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.

My said invention relates to pre-payment gas meters through which a pre-determined quantity of gas is allowed to pass to the consumer on the insertion into a slit or receptacle of a coin or coins or other equivalent token or tokens representing the value of the required quantity of gas.

The invention is applicable to either wet or dry gas meters. A salient feature of my improved meter is that while adopting a fixed coin or other equivalent or token as a medium of payment, the delivery of its value in gas can be regulated according to the market or local price of gas.

To render my invention clearly understood I will now proceed more particularly to describe the same reference being had to the annexed five sheets of illustrative drawings:

Figure 1 is a front view of a pre-payment wet meter constructed in accordance with my invention. Fig. 2 is a similar view with the front plate and dials removed to show the mechanism. Fig. 3 is a side view of the meter at the right hand side of Figs. 1 and 2 the coin receiving frame or cylinder and pocket being removed to show more clearly the adjustable stop and ratchet arrangement. Fig. 4 is a similar view the coin box and coin receiving cylinder being shown in section. Fig. 5 is a view partly in section of the meter from the back, showing clearly the connection of the coin receiving mechanism with the mechanism of the meter. Fig. 6 is a side view of the mechanism of the meter. Fig. 7 is a separate view of the pawl carrier and notched stop disk. Fig. 8 shows a mode of automatically sealing a wet meter to prevent passage of gas after the drum has been arrested.

Referring in the first place to Figs. 1, 2, 3, 4, 5, 6 and 7 the mechanism is contained within a suitable casing similar to that shown in the drawings and may be said to consist of two divisions, namely, the gearing and stop mechanism situated behind the dial A and operated by the upshaft B and the coin receiving mechanism situated at the back and operated by the handle *c*.

I will describe the apparatus behind the dial first and then I shall describe the coin mechanism and show its effect in operating and controlling the said apparatus.

As already said the gearing behind the dial is operated from the up-shaft B or it might be from any other suitable working part of the meter. The shaft B carries a worm *a* which gears with a worm wheel *b* which is fast on the spindle *c* of the pointer *c'*. The same spindle *c* carries a second toothed wheel *d* Fig. 6 and a pinion *e*. The wheel *d* gears with a toothed spur wheel *f*. The axis upon which the spur wheel *f* is mounted consists of a central through spindle *g* carrying at one end and fixed thereon the worm wheel *h* and escapement disk *i* and at the other end the finger *g'*. Upon the spindle *g* there is also mounted a sleeve *j* the said sleeve carrying secured thereto a toothed wheel *j'* and also an outer revolving dial j^2. Upon a prolongation of the sleeve *j* there is mounted loosely the aforesaid spur wheel *f* and the said spur wheel *f* carries affixed to it a toothed or recessed disk *k*. The end of the prolongation of the sleeve *j* carries fixed thereon a pawl carrier *l* and upon the said pawl carrier *l* is pivoted at *l'* a pawl *m* which is arranged to engage with the toothed disk *k*. Upon the pawl *m* I pivot a secondary smaller pawl *n* with inclined faces as shown (see Fig. 5) which is intended to drop into the notch in the escapement disk *i* when the said notch and pawl come opposite to each other. It will be observed that owing to the presence of a prop or projection *m'* from the pawl *m* which projection *m'* engages with the pawl *n* the rising of the pawl *n* takes place at the same time with the larger pawl *m* and clears it from the toothed disk *k* by means of the inclined faces of said pawl engaging with the sides of the notch K. Similarly when the smaller pawl *n* drops into the notch in the escapement disk *i* the larger pawl

m is at the same time permitted to engage with the toothed disk k. A spring o extending from an arm l^2 of the pawl carrier l presses on the back of the pawl m and thus forces the two pawls into engagement when the notch in the escapement disk i comes opposite to the pawl n. The periphery of the toothed disk k is formed with as many notches or recesses as conveniently possible so as to provide that practically one of the notches in the disk k shall always be beneath and ready to receive the pawl m when the pawl n drops into the notch in the escapement disk i. The toothed disk k and the escapement disk i thus provide a double locking arrangement and the reason why I provide the toothed disk k in addition to the escapement disk i is simply because there is so long a train of gearing between the up-shaft and the axis of the escapement disk i that to attempt to stop the action of the meter against so much multiplying gearing would almost certainly entail breakage of some of the intermediate wheels and pinions. It would in other words be like applying force to the shortest portion of a fulcrumed lever instead of to the longest end. I therefore provide the toothed disk k fixed to its companion spur wheel f which gears as has been said with a toothed wheel alongside of the worm wheel which is driven from the up-shaft B. Thus when I arrest the motion of the disk k and spur wheel f they immediately bind the worm wheel operated from the up-shaft and stop the meter without any straining of intermediate parts.

The gearing which operates the pawl carrier and pawl and the pointers on the dial is as follows: The pinion e on the axis c gears with the wheel e'. On the axis of the wheel e' is a pinion e^2 which gears with a wheel e^3. On the axis of the wheel e^3 is a pinion e^4 gearing with the wheel j' already referred to as a fixture on the sleeve j. The wheel j' also drives a train of gearing $p\ p'\ p^2\ p^3\ p^4$ the axes of the wheels $p^2\ p^4$ carrying the pointers $q\ r$ which appear in Fig. 1. The pointer or index c' is chiefly for the purpose of testing the meter. The finger g' shows the consumer the amount of gas paid for and not yet consumed. The pointers $q\ r$ show a continuous and cumulative record of the gas passed through the meter. It will be evident that as the finger g' is fixed on the axis g the turning of the axis g will move the finger g' forward say in the direction of the arrow Fig. 1 and afterward when the meter begins to work, the dial j^2 revolves slowly in the same direction until the amount of gas paid for is consumed, when the aforesaid pawls drop into their respective notches and the meter is stopped and prevented from passing any more gas until a further payment has been made.

I will now show how the coin receiving mechanism is utilized to receive the money and permit or effect rotation of the spindle g to such a degree as will allow the meter to pass a quantity of gas corresponding to the sum paid. As clearly seen from the drawings the coin receiving cylinder s is contained within a casing t. The coin receiving cylinder s consists of a simple ring supported on a central spindle s' which is supported in a sleeve bearing formed for it in the cover u. The spindle and cylinder are turned by the handle C. The cylinder s contains a pocket s^2 to receive the coins which are dropped into the said pocket through a slit t' in the casing t. A spring v at the bottom of the pocket gives the coin an elastic support. Two stops are provided to limit the play of the coin receiving cylinder s. One stop w projects from the adjustment disk x and prevents the coin receiving cylinder from moving farther to that side; another stop y projecting from the cover u prevents the cylinder from being moved round farther than is necessary to discharge the coin through another slit t^2 in the casing, into the coin receptacle z Figs. 1 and 2. Terminal stops $y'\ y^2$ are also provided one being on the casing t and the other on the disk x. The inner circumference of the casing t carries an internal ratchet rack t^3 extending from the inlet slit t' to the outlet slit t^2. As the coin is carried round by the cylinder s it is held with an elastic pressure by the spring v against the ratchet rack, the edge of the coin serving as a pawl which permits of the rotation of the coin cylinder in the direction of the arrow (Fig. 4) but prevents it from being moved back until after the coin cylinder has been moved round sufficiently far to drop the coin through the delivery slot into the coin receptacle. The adjustment disk x is carried on a projection which is slid into a hollow spindle 1 which is supported in bearings in the casing and the spindle 1 is formed with a worm 2 which engages with the worm wheel h already referred to as being fast on the spindle g. Consequently any movement of the spindle 1 will correspondingly revolve the spindle g.

As I have already said in the former part of my specification a salient feature of my invention is the capability of adjusting the mechanism so that with a coin or token of a fixed value the quantity of gas to be delivered therefor can be regulated according to the local or current price of gas. To effect this adjustment I place a movable stop 3 on the face of the adjustment disk x and in the path of the coin as it is carried round by the cylinder s. In Fig. 5 the dotted circumference of the coin appears projecting from the side of the pocket and over against the stop 3 which it will strike when carried round. The adjustment disk x has a number of holes 4, screw-threaded to receive a set screw 5 which passes through the movable stop 3. The range of adjustment given by the holes 4 represents the range from the minimum to the maximum price of gas. It will be evident therefore that the stop 3 can be adjusted and fixed in any position corresponding to a certain current price of gas. If the price of

gas should increase or decrease the stop 3 can be adjusted to meet the variations. As the coin or token is carried round by the coin cylinder *s* it encounters the stop 3 sooner or later according to the position of the stop and then carries round with it the disk *x*. This turns the spindle 1 and worm 2 and effects the rotation of the spindle *g*, escapement disk *i* and finger *g'* which plainly indicates on the revoluble dial j^2 what quantity of gas stands to the credit of the consumer. It will be evident that the return of the coin cylinder *s* to its normal position, that is to say with the coin pocket s^2 opposite to the receiving slit *t*, must be effected without at the same time reversing the spindle 1 since this would merely return the various parts to the position from whence they started. I therefore form a ratchet connection between the disk *x* and the spindle 1 so that the said spindle can be easily turned in the direction which will advance the parts but is locked and held while the coin receiving cylinder is being brought back to its starting point. To effect this I mount the disk *x* loosely upon the end of the spindle 1 (see Figs. 3 and 5) a stump or projection entering a hole bored in the spindle 1. A ratchet wheel 5' is fixed on the spindle 1 behind the disk *x* and a pawl 6 pivoted to the disk *x* engages with the ratchet wheel 5' in such a manner that when the disk *x* is rotated in the direction of the arrow Fig. 3 the pawl 6 takes round with it the said ratchet wheel 5' thus revolving the spindle 1 and advancing the parts as already described. On the return of the disk *x* by the reversal of the coin cylinder the pawl 6 slips over the teeth of the ratchet wheel while at the same time the weighted pawl 7 which is pivoted at 7' to the casing *t* locks the ratchet wheel 5' and prevents it from being dragged back by the pawl 6. Thus the spindle 1 is rotated in one direction only.

Having thus set forth the parts in detail I will now describe the operation of the mechanism.

When the apparatus is at rest and the finger *g'* stands at *o* on the revoluble dial j^2 the escapement disk *i* and the toothed disk *k* are both held by the pawls *m n* which have dropped into their respective notches as shown for example at Fig. 5. The coin receiving cylinder being in the position shown at Fig. 4, I drop a suitable coin or token into the pocket s^2 through the slit *t'*. I then turn the coin cylinder *s* by means of the handle *c* the edge of the coin engaging with the internal rack t^3 as it is carried round until the coin comes opposite to the delivery slit t^2 through which it drops into the coin receptacle *z*. By thus turning the coin cylinder the shaft 1 is rotated thereby revolving the spindle *g*, escapement disk *i* and finger *g'*. By this movement the pawl *n* is lifted out by means of the reverse movement of the disk I of its notch in the escapement disk *i* so as to rest on the periphery of the disk and this displacement of the pawl *n* also lifts the pawl *m* clear of the toothed disk *k*. The escapement disk *i* is moved round a distance the extent of which is regulated by the position of the stop 3 on the disk *x* which as has been said is adjusted to correspond with the current price of gas. Suppose as an illustration that gas were sold at the rate of one thousand cubic feet for five dollars then the successive insertion of five dimes would bring the pointer *g'* round to 100 on the revoluble dial j^2 as shown at Fig. 1 or the insertion of one dime would turn the pointer through one of the divisions shown on the dial in Fig. 1. The turning of the escapement disk *i* and the consequent displacement of the pawls *m n* release the apparatus and the upshaft begins to revolve and actuate the hereinbefore described gearing in such a manner that the wheel *j'* and sleeve *j* are rotated the sleeve *j* carrying round the pawl carrier *l* and pawls *m n*. The pawls are thus carried slowly round until the pawl *n* overtakes and drops into the notch in the stop disk *i* the pawl *m* at the same time dropping into one of the notches in the disk *k*. This happens when the quantity of gas paid for has been consumed and the apparatus is thereby locked and held until again released by the insertion of money and the operation of the coin receiving cylinder is as hereinbefore described. The coin receptacle *z* for receiving the coins or tokens dropped out of the coin receiving cylinder consists of a box secured by means which are most clearly shown at Fig. 5. An opening 9 on the front of the box carries a screw 8 which engages with a nut 8' projecting downward from the casing *t*. The head of the screw 8 is formed so as to engage with a similarly formed key whereby the screw can be turned. The screw 8 engages with a nut 8' forming part of the casing. To secure the box or to disengage it the key is inserted into the opening and is caused to turn the screw 8 and thus release or secure the box *z*. As an additional security I might introduce across the bore of the opening 9 a soft metal rivet 10 placed in position and stamped or impressed at one or both ends with a private mark or stamp of the company or collector. This would form a safeguard against dishonest attempts to open the box and abstract the coins. Any other suitable or sufficiently secure lock or fastening might be substituted for the contrivance described.

The foregoing figures illustrate the application of my invention to a wet meter. It will however be apparent that with some slight modifications the invention can be used in conjunction with a dry meter.

What I claim is—

1. In a coin-operated gas meter, the combination of the shaft B, operated by the meter; shaft *g*, carrying a pointer *g'*; a sleeve *j*, carrying a movable dial j^2; connections between said shaft B and said sleeve *j*; a ratchet wheel *k*, loosely mounted on said sleeve *j*; connections between said ratchet wheel *k* and said

shaft B; coin-operated mechanism, operating in connection with said shaft *g;* an escapement disk *i*, on said shaft *g;* a pawl *m*, secured to said sleeve *j*, and engaging with said ratchet wheel *k;* and a pawl *n*, pivoted to said pawl *m*, and engaging with said escapement disk *i*, substantially as set forth.

2. In a coin-operated gas meter, the combination of a shaft B operated by the gas meter; shaft *g*, carrying a pointer arm *g'* a sleeve *j*, mounted on said shaft *g*, and carrying a movable dial j^2; a ratchet wheel *k*, loosely mounted on said sleeve *j;* connections between said shaft B, and said sleeve *j*, and between said shaft B, and said ratchet wheel *k;* an escapement disk *i*, on said shaft *g;* a pawl carrier *l*, secured to said sleeve *j;* a pawl *m*, pivoted to said pawl carrier *l*, and engaging with said ratchet wheel *k;* a pawl *n*, pivoted to said pawl *m*, and engaging with said escapement disk *i*, and arranged when elevated to engage with the stud *m'*, on the pawl *m*, so that when the pawl *n*, is elevated the pawl *m*, will be elevated with it; and coin-controlled mechanism, acting in connection with said shaft *g*, substantially as set forth.

3. In a coin-controlled gas meter, the combination of a shaft B, operated by the meter; the shaft *g*, carrying the pointer *g';* the sleeve *j*, surrounding said shaft *g*, and carrying a movable dial j^2; a gear wheel *j'*, rigidly secured to said sleeve *j;* the train of gears *e*, *e'*, e^2, e^3, e^4, and a worm *a*, connecting said shaft B, with said gear *j';* a gear wheel *f*, loosely mounted on said sleeve *j;* gear wheels *d* and *b*, and worm *a*, connecting said gear wheel *f*, with said shaft B; a train of gears *p*, p^2, p^3, and p^4, operated by said gear wheel *j'*, and carrying pointers *q*, and *r;* a ratchet wheel *k*, secured to said gear *f;* an escapement disk *i*, secured to said shaft *g;* a pawl carrier *l*, secured to said sleeve *j;* a pawl *m*, pivoted to said pawl carrier, and engaging with said ratchet wheel *k;* a pawl *n*, pivoted to said pawl *m*, and engaging with the escapement disk *i;* and coin-controlled mechanism, operated in connection with the shaft *g*, substantially as described.

4. In a coin controlled gas meter, the combination of the shaft B operated by the meter, shaft *g*, mechanism connecting the shafts B and *g* carrying the pointer arm *g';* a sleeve *j* carrying a movable dial j^2; mechanism connecting the shaft B and the dial j^2 and intermediate connections substantially as described, between said shaft B, and said sleeve *j*, and between said shaft B and said shaft *g;* a shaft 1, connecting with said shaft *g;* a coin receiving cylinder *s*, connected with said shaft 1, and a handle C, for rotating said coin receiving cylinder, substantially as described.

5. In a coin controlled gas meter, the combination of the shaft B operated by the meter, shaft *g*, mechanism connecting the shafts B and *g* carrying a pointer arm *g';* a sleeve *j* carrying a movable dial j^2; mechanism connecting the shaft B and the dial j^2 and intermediate connections between said shaft B, and said sleeve *j;* connections between said shaft B, and said shaft *g;* a shaft 1, carrying a worm 2, engaging with the gear *h*, on the shaft *g;* a coin receiving cylinder *s;* and a clutch connection between said coin receiving cylinder, and said shaft 1, substantially as set forth.

6. In a coin controlled gas meter, the combination of the shaft B operated by the meter, shaft *g*, mechanism connecting the shafts B and *g* carrying the pointer arm *g';* a sleeve *j* carrying a movable dial j^2 and intermediate connections between said shaft B, and said sleeve *j;* connections between said shaft B, and said shaft *g;* a shaft 1 carrying a worm 2, engaging with a gear *h*, on the shaft *g;* a coin receiving cylinder *s;* an adjustment plate *x*, carried thereby, and connecting with the shaft 1; and an adjustment stop 3, on said adjustment plate *x*, substantially as described.

7. In a coin controlled gas meter, the combination of the shaft B operated by the meter, shaft *g*, mechanism connecting the shafts B and *g* carrying a pointer arm *g';* a sleeve *j* carrying a movable dial j^2; mechanism connecting the shaft B and the dial j^2 and intermediate connections between said shaft B and said sleeve *j;* connections between said shaft B, and said shaft *g;* a shaft 1, carrying a worm 2, engaging with the gear wheel *h*, on the shaft *g;* a coin receiving cylinder *s;* an adjustment plate *x*, carried by the coin receiving cylinder *s*, and connecting with the shaft 1; an adjustable stop 3 carried by the adjustment plate *x;* and said plate provided with a series of holes 4, 4, with which said stop 3, engages, for the purpose mentioned, substantially as described.

8. In a coin controlled gas meter, the combination of the shaft B operated by the meter, shaft *g*, mechanism connecting the shafts B and *g* carrying the pointer arm *g';* a sleeve *j* carrying the movable dial j^2; mechanism connecting the shaft B and the dial j^2 and intermediate connections between said shaft B, and said sleeve *j;* connections between said shaft B, and said shaft *g;* a shaft 1, carrying a worm 2, engaging with the gear wheel *h*, on the shaft *g;* a coin receiving cylinder *s;* connecting with said shaft 1; a coin receiving pocket s^2, in said cylinder *s;* a bearing spring *v*, within said pocket s^2; the ratchet teeth on the interior of the coin receiving cylinder *s*, and with which the coin is adapted to engage, substantially as set forth.

9. In a coin controlled gas meter, the combination of the shaft B operated by the meter, shaft *g*, mechanism connecting the shafts B and *g* carrying the pointer arm *g'*, a sleeve *j* carrying a movable dial j^2, mechanism connecting the shaft B and the dial j^2 and intermediate connections between said shaft B,

and said sleeve *j;* connections between said shaft B, and said shaft *g;* a shaft 1, carrying a worm 2, engaging with the gear wheel *h*, on the shaft *g;* a coin receiving cylinder *s*, connecting with said shaft 1; a coin receiving pocket s^2 in said cylinder, adapted to receive the coin; and a coin receptacle *z*, beneath said cylinder, and into which the coin is dropped as the cylinder is revolved, substantially as set forth.

This specification signed and witnessed the 30th day of October, 1891.

DANIEL ORME.

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