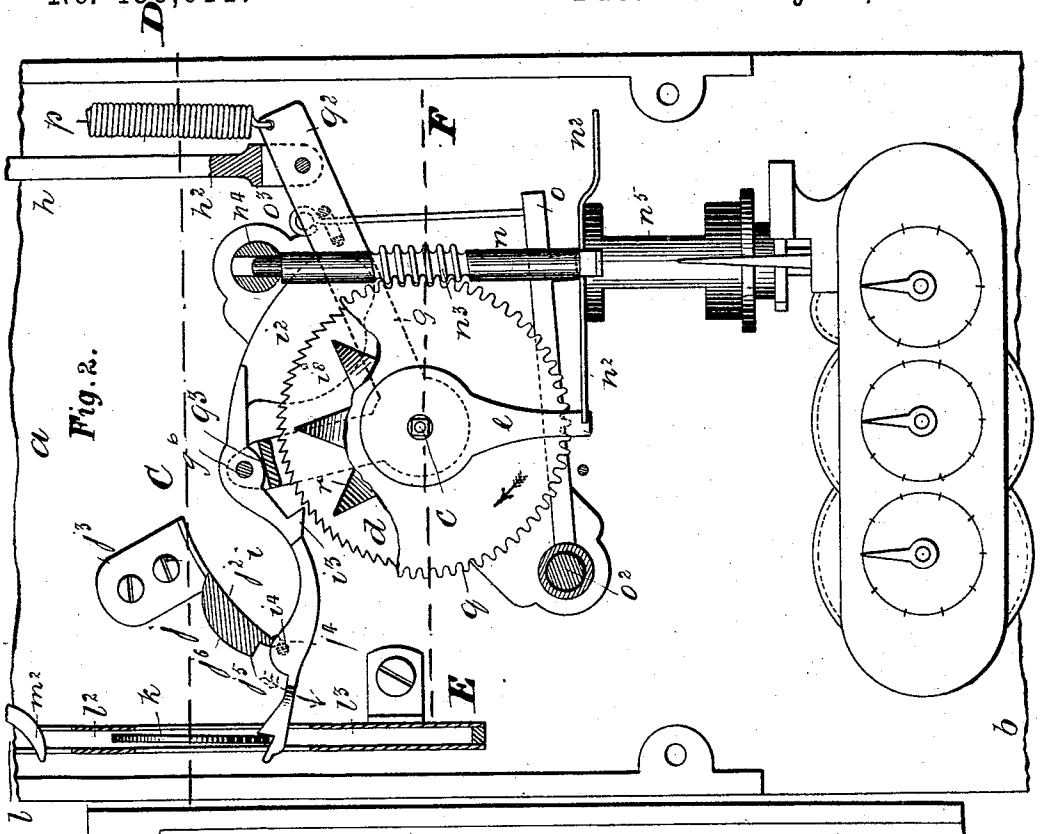
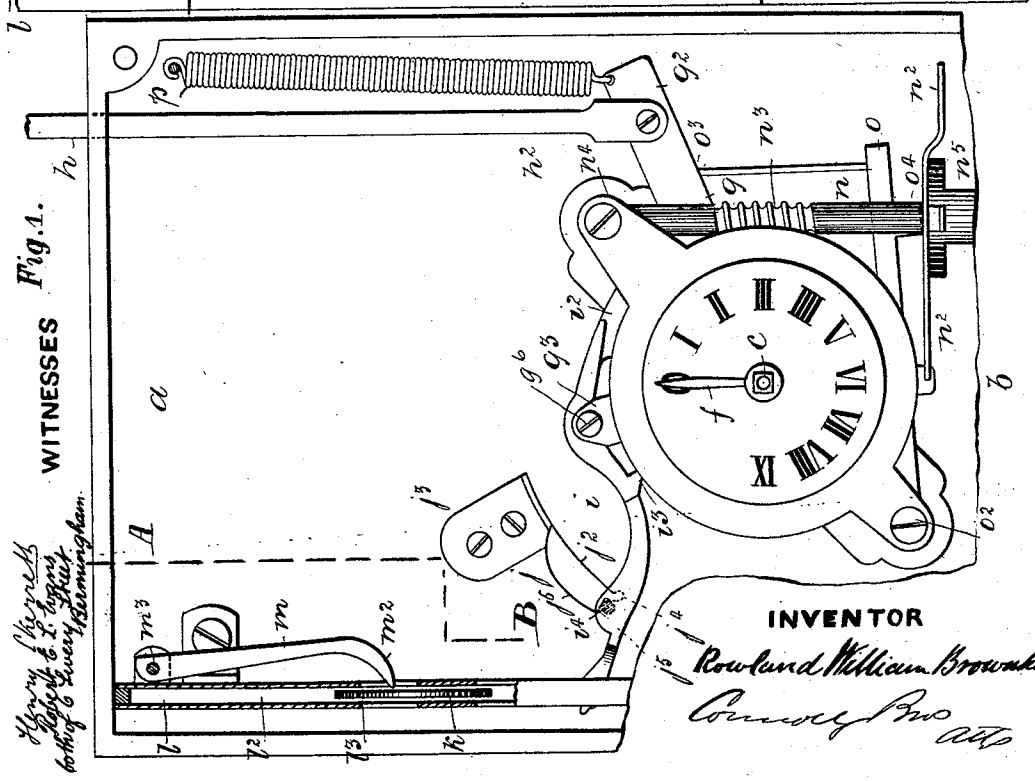
(No Model.) 4 Sheets—Sheet 1.

R. W. BROWNHILL.

PREPAYMENT ATTACHMENT FOR VENDING GAS.

No. 456,011. Patented July 14, 1891.





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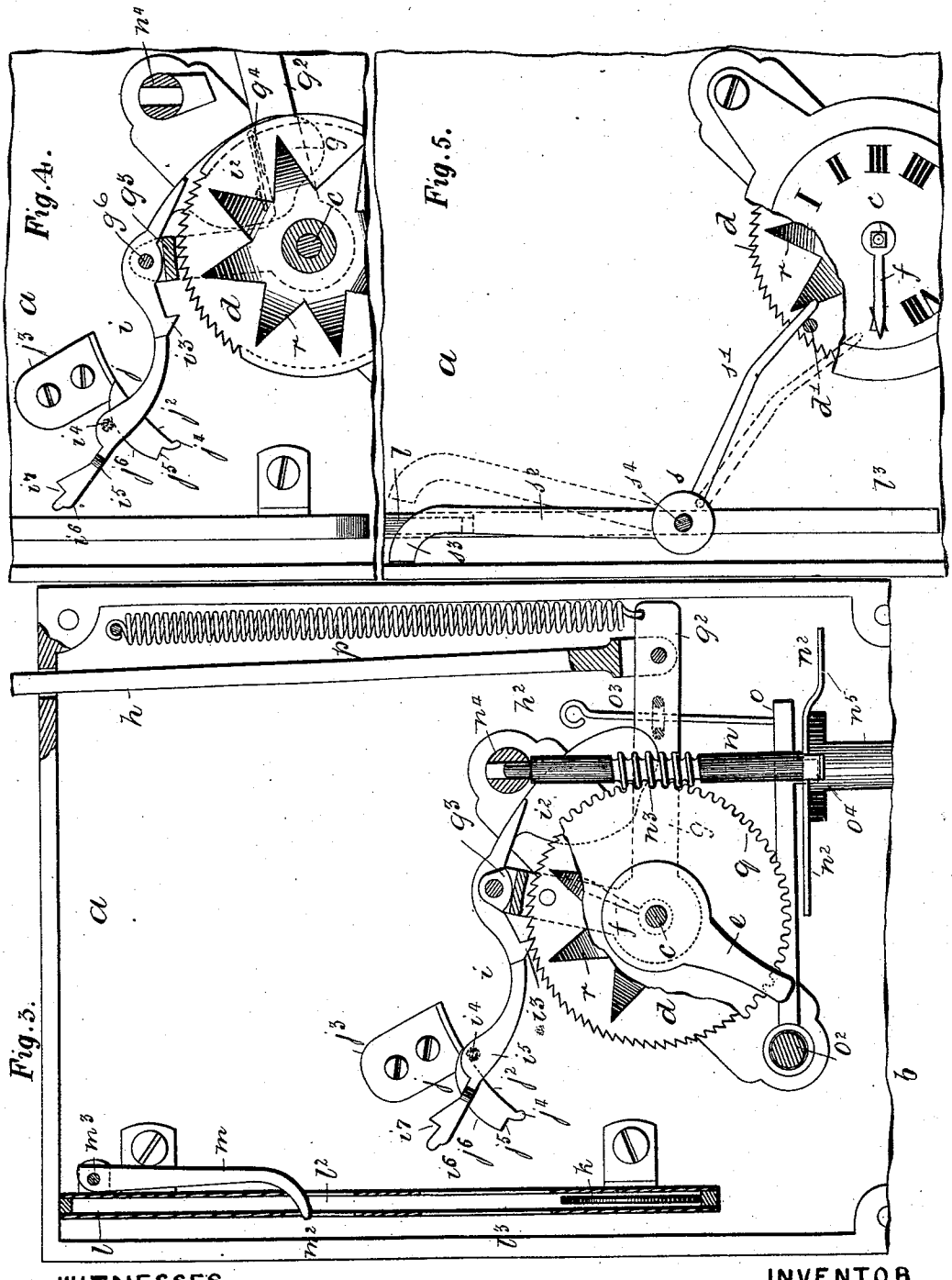

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(No Model.) 4 Sheets—Sheet 3.

R. W. BROWNHILL.

PREPAYMENT ATTACHMENT FOR VENDING GAS.

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Fig. 7.

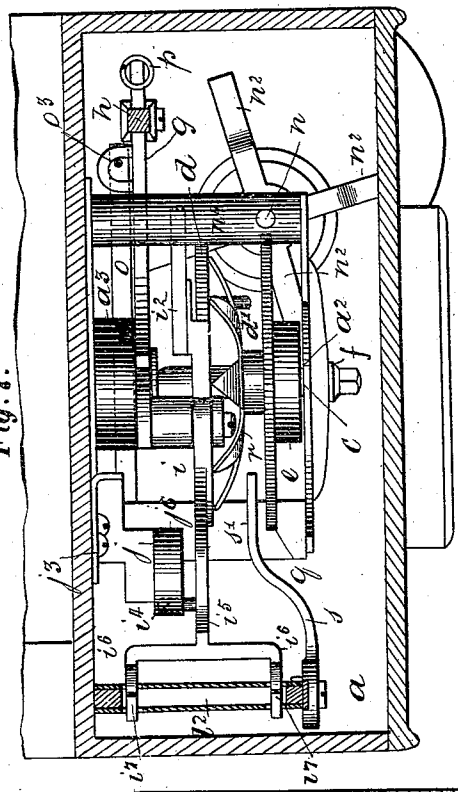

Fig. 8.

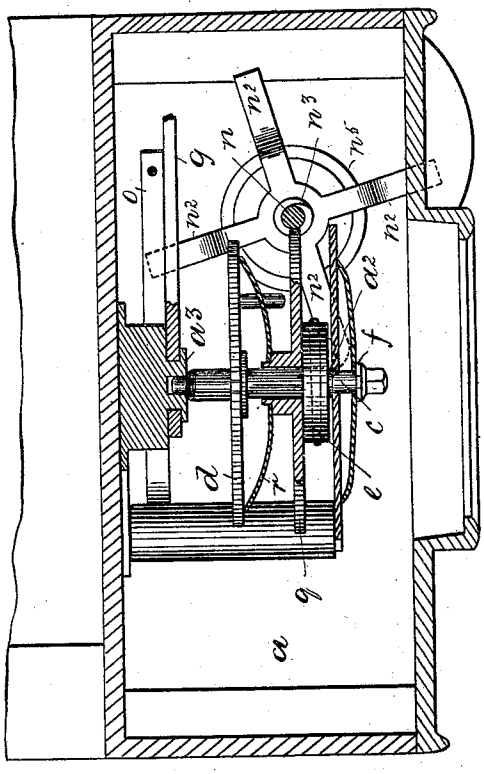

Fig. 6.

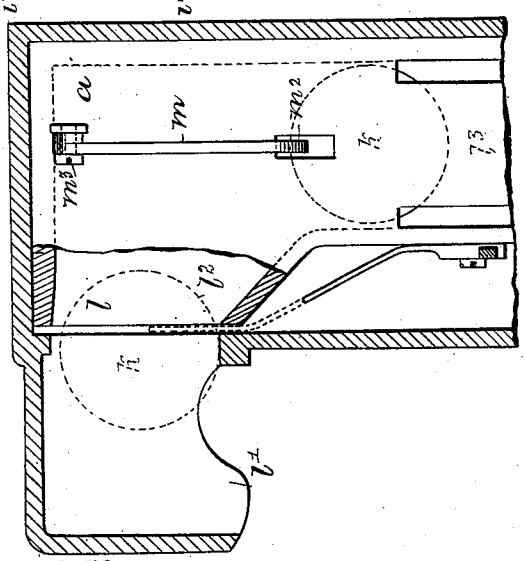

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Fig. 11.

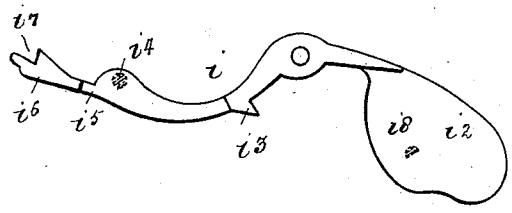


Fig. 12.

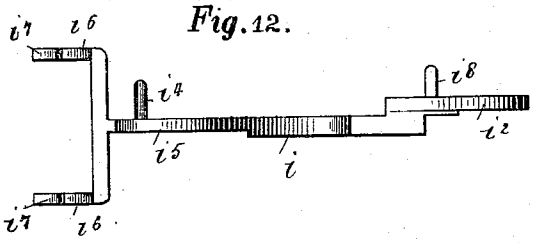


Fig. 15.

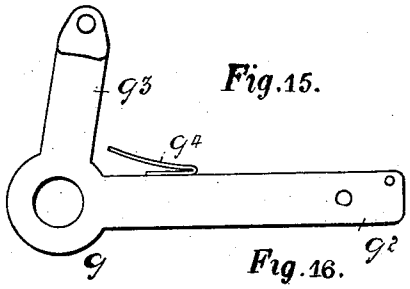


Fig. 16.

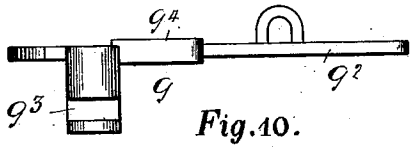


Fig. 10.

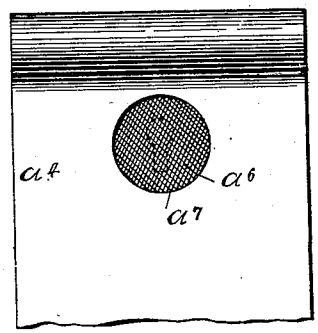


Fig. 13.

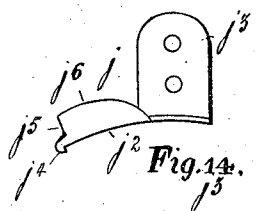


Fig. 14.

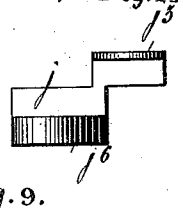
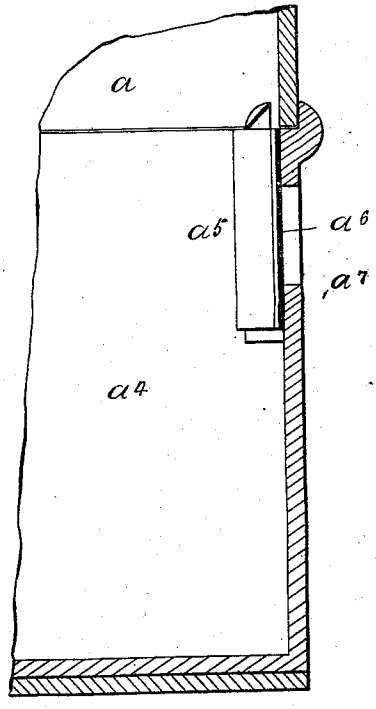


Fig. 9.



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UNITED STATES PATENT OFFICE.

ROWLAND WILLIAM BROWNHILL, OF ASTON, NEAR BIRMINGHAM, ENGLAND.

PREPAYMENT ATTACHMENT FOR VENDING GAS.

SPECIFICATION forming part of Letters Patent No. 456,011, dated July 14, 1891.

Application filed January 22, 1891. Serial No. 378,708. (No model.) Patented in England December 21, 1889, No. 20,583.

To all whom it may concern:

Be it known that I, ROWLAND WILLIAM BROWNHILL, engineer, a subject of the Queen of Great Britain, residing at Aston House, Victoria Road, Aston, near the city of Birmingham, England, have invented certain new and useful Prepayment Attachments for Vending Gas, (that the same has not been patented in any country except Great Britain, dated December 21, 1889, No. 20,583;) and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, which form part of this specification.

This invention relates to a prepayment attachment for meters or otherwise, an apparatus attached to a meter for supplying predetermined quantities of gas or liquid in exchange for coin or equivalent, and which invention is an improvement upon three several Letters Patent granted to me by the United States of America, and respectively bearing date June 25, 1889, and numbered 405,943, 405,944, and 405,983.

Figure 1 of the accompanying drawings represents in front elevation (with the front plate of the casing removed) a prepayment gas-meter attachment constructed and arranged according to my present invention. The said view represents the parts of the mechanism constituting the attachment in the positions which they normally assume prior to a coin being dropped upon the coin-lever or before a coin reaches the bottom of the coin-slot. It also exemplifies how the coin-lever or the mechanism of the attachment is prevented from being worked by the fully or partially pushing down of the pusher-rod to cheat or defraud the meter. A coin is shown in the act of dropping down the coin-slit and pushing outwardly a fraud-prevention arm, which is hung and jointed to a supporting-bracket. It may be here observed that the attachment both indicates the number of coins introduced and also the quantity of gas to be consumed.

Fig. 2 represents a like view as Fig. 1, but with the graduated dial and indicating-finger removed, and the coin, which has been dropped down the coin-slit, resting upon the coin-lever, which is counterpoised by a weight. It also shows a quantity-wheel and a toothed wheel, the latter with wormed teeth upon its periphery, which engage with the worm of an upright spindle or stalk of the drum of the meter; and it further shows the stop position of the stop-arm, which prevents the rotation of the drum-spindle until the said arm may have been removed through the influence of a dropped coin, and the pressing of the pusher when the coin is resting upon the coin-lever The .fraud-prevention arm is shown hanging in its stop position—that is, in a position which will prevent a coin from being withdrawn if it is let down or lowered by a string or thread. The coin-lever in this view is shown slightly tilted by the weight of a coin coming upon one end of it and a stud on the inner face near the coin end, which is forked, coming against a lip of a cam-shaped projection, which yields in obedience to pressure of the pusher-rod exerted, and allows a tooth on the under side of the said coin-lever to take and be retained within the teeth of the ratchet-wheel, so that the fully pushing home of the pusher-rod gives a curvilinear or crawl-like traverse to the said lever, takes the ratchet-toothed wheel, which is the quantity-wheel, round to the extent of a revolution, and removes the coin end of the lever from under the coin, which is now allowed to fall into a box or receptacle placed to receive it.

Fig. 3 represents a like view as Fig. 2 with some of the parts broken away and with the coin-lever shown at the end of its traverse, as aforesaid, and with its tooth taking into the ratchet-teeth of the quantity-wheel, and held there by the stud of the lever, as aforesaid, coming under the guide, which is struck from the center of the main axis upon which the quantity-wheel and stop-arm are made fast. It also shows the position of an auxiliary stop-arm, which falls by gravity on the fully pushing home of the pusher-rod, which it again raises, when the said rod assumes its normal position, as in Figs. 1 and 2. I wish it to be observed that unless some such means as an auxiliary stop is employed the drum-axis would rotate if continued pressure were applied to the pusher.

Fig. 4 represents a part view of the attachment, showing the coin-lever in the act of returning to its normal position by its stud

wiping over the top side of the cam-like projection, which forms both a stop for preventing its traverse until a coin has been introduced, a guide for keeping its tooth in the teeth of the quantity-wheel, and an inclined plane for taking its tooth from out of the quantity-wheel and returning it to its former position.

Fig. 5 represents a front view of a part of the attachment, showing a limiting lever-actuated by a stud on the quantity-wheel, which limits the maximum number of coins that can be introduced. Thus the stud is placed at the ninth part of a revolution of the wheel, so that after the introduction of nine coins the stud presents itself to the lever, and thereby closes the entrance to the coin-slot, which has an inverted mouth or entrance.

Fig. 6 represents a transverse vertical section upon the dotted lines A B, Fig. 1, looking from right to left.

Fig. 7 represents a horizontal or transverse section on the dotted lines C D, Fig. 2. Fig. 8 represents another horizontal section of the said attachment on the dotted lines E F of the said Fig. 2.

Fig. 9 shows the money-receptacle part of the casing with its seal. Fig. 10 is a front view of Fig. 9, showing more clearly a front elevation of the said seal.

Fig. 11 represents a side elevation of the coin-lever separately, and Fig. 12 a plan or edge view of the same.

Fig. 13 is a front view of the cam-shaped projection, and Fig. 14 a plan of the same.

Fig. 15 represents the operating-lever, and Fig. 16 a plan of it.

a is the attachment-casing, surmounted at the top of the meter b and above the indicator mechanism of the said meter.

c is an axis or arbor directed transversely to the said casing and having made fast upon it a quantity-wheel d, a stop-arm e, and a finger f, which all rotate together or in common one with each other. This axis or arbor works within bearings a^2 a^3, suitably mounted within the interior of the casing and adapted to carry the principal mechanism of the attachment. Working loosely upon the said bearing a^3 and located at the back of the quantity-wheel is an operating-lever or bell-crank lever g, with long and short arms g^2 g^3. To near the end of the former g^2 the lower end h^2 of a pusher h is jointedly connected, and which pusher-rod works through the top of the casing. The short arm g^3 of the operating-lever carries and is jointedly connected to a coin-lever i at g^6, which reciprocates in a curvilinear manner, from left to right and from right to left, by the depression and reaction of the pusher. This lever, which is counterpoised by a weight i^2, has a tooth i^3 upon its under side, which is located above the periphery of the quantity-wheel and is adapted to take within its ratchet-teeth and be kept there by the traverse of a side stud i^4, under the guide j^2 of a standing-out cam-shaped projection j, secured to the side of the casing by a bracket j^3, and provided with a lip j^4 at its front side and a stop j^5 above it and immediately at the back of a curved top side j^6, over which the said stud i^4 backwardly rolls or wipes on the said lever, making its return movement after the fulfilling of its office of taking the quantity-wheel round to a twelfth of a revolution for each coin deposited within the casing, or made to rest upon its tail end, which is forked and directed upwardly and is marked i^5.

The ends of the branches of the forks have supplementary fork formations i^6, with inclined sides i^7, between which the lower edge of a coin k comes and rests, after falling down the conducting-channel l^3 of the throat l^2 of the coin-slot l, which has hanging within and crossing it the hooked end m^2 of a fraud-prevention arm m, swinging and jointed at m^3 as a center, so that the said arm depends and its hooked end takes across the channel by its own weight, but is so hung and weighted that the gravitating effect of a coin (see Fig. 1) removes by pressure the said hooked end from out of the path of the channel until the said coin has passed it, when the arm by its own weight falls again into its blocking position, as represented in Fig. 2.

The mouth of the coin-slit is inverted and marked l', as shown clearly in Fig. 6, so that the coins are pushed upward in introducing them into the attachment. The walls of the conducting-channel of the coin-slot are pierced, wherethrough the forked branches of the tail part i^5 extend into the path of the channel in manner for the coins to drop upon it, and to tilt the same to a slight angle in order to take the stud i^4 from out of the range of the stop j^5 of the projection j, which slightly yields in obedience to the pressure exerted by the lever when its stud comes to the tip of the lip j^4. Thus a coin coming upon the tail end of the coin-lever and dropped down the coin-slot tilts the said lever in the direction of the arrow upon its joint-center g^6 to an extent that the stud i^4 of it is removed from the shoulder j^5, as in Fig. 2, and when at the tip of the lip j^4 the pressure of the pusher causes the projection j to slightly yield and allow the stud i^4 to pass it and take the tooth i^3 into engagement with the teeth of the quantity-wheel d and at the same time keep the said tooth within the teeth of the said wheel by the stud i^4 traveling under and against the curved guide j^2 on the forward traverse of the lever, which in its forward movement causes a stud i^8 on the counterpoised end i^2 to come upon and compress a spring g^4 of the bell-crank operating-lever g, for the purpose of taking back the said lever to its normal position, as in Fig. 1, after its backward movement, which is performed by the said stud i^4 rolling back or wiping over the curved top j^6. Should the pusher be operated without a coin having been introduced, then the result is that the coin-lever is blocked by its stud, as aforesaid, coming before the shoul-

der j^5 of the standing-out block j, and, further, should the said pusher be successively depressed to a short distance, so as to cause the coin-lever to try to take the teeth of the quantity-wheel one at a time, this is frustrated by the inclined formation of the ends of the branches of the forked rear part drawing the coin forward or against the inner sides of the conducting-channel, so that the coin forms a block and prevents the coin-lever being traversed even to the extent of a single or half tooth of the quantity-wheel.

The stop-arm e, which is, as aforesaid, fast upon the axis of the quantity-wheel, is for the purpose of blocking the drum-axis after the meter has supplied gas in volume equivalent to the value of a coin or coins deposited. Thus the movement of the quantity-wheel to the extent of one pennyworth and the twelfth of a revolution takes the blocking-arm away from the radial arms n^2 of a drum-axis n, which has about its middle a worm n^3 and is supported at top by a bracket n^4 and at bottom by a carrier n^5, which carries a toothed wheel adapted to intergear with other toothed wheels in connection with the index or indicating mechanism of the meter.

The radial arms n^2 are four in number, although I do not limit myself to any number without militating against the purpose for which they are applied.

When the blocking-arm is out of the path of the ends of the radial arms n^2, then the meter-drum rotates, and so also does its spindle pro rata with the quantity of gas consumed.

As a further means for preventing fraud by the holding down of the pusher and making a single coin do duty for an unlimited quantity of gas, I arrange at the back of the operating-lever an auxiliary stop o, jointed at o^2 and freely hung from the outer arm of the operating-lever at o^3, so that the said auxiliary stop is picked up on the said arm, making an ascending angular movement, but falls on it, making a descending angular movement. Hence the pushing down or holding of the pusher allows the auxiliary stop o to fall and cause the blocking part o^4 to come within the range of the arms n^2 of the drum-axis n, whereby the said drum-axis is stopped until the pusher has ascended or taken its normal position with the other parts by the reaction-spring p, which was elongated by the subsequent downward or pushing movement.

q is a toothed wheel free or turning on the axis c, and having interposed between it and the quantity-wheel d a spring sheet-metal clutch r, which creates sufficient friction between the said wheels for them to be carried backwardly together on the recedence of the part, consequent upon the rotation of the drum-axis, pro rata with the consumption of gas. Hence it is that the whole of the parts carried upon the axis or arbor c are taken back into their original positions and with the blocking-arm standing in the path of the arms of the drum-axis, so as to stop the drum from rotating. The quantity-wheel d has a stud d' situated at the ninth part of a revolution of it. s is the limiting-lever, consisting of arms s' s^2, with turned end s^3 and jointed at s^4, so that after the quantity-wheel has been moved forward to the extent of three-fourths of a revolution the stop d' comes against the arms s', raising the same and taking the end s^3 of the other arm s^2 in front of the entrance or across the throat l^2 of the coin-slot, thereby preventing any more coins being introduced within the attachment than what gas can be supplied for.

In lieu of the limiting-arm s and stop d', the quantity-wheel may be unprovided with teeth for about the last quarter of its revolution, so that gas cannot be supplied for more than a definite number of coins—to wit, nine—corresponding to about five-sixths of the periphery of the quantity-wheel provided with teeth.

The back of the coin receptacle or drawer is sealed by a paper disk or the like coming between the key-hole and a hole in the casing.

a^4 is a coin-receptacle; a^5, the lock; a^6, the seal, and a^7 a hole in the walls of the receptacle in front of the key-hole.

Operation: Assuming that the whole of the parts are in their normal positions before the introduction of a coin, with the auxiliary stop lifted and the stop-arm in its blocking position, and assuming no coin to be placed in the attachment or proffered in exchange for gas, then the application of pressure to the pusher slightly moves the operating-lever g and gives a slight forward traverse to the coin-lever i, which is blocked by its stud i^4 abutting against the shoulder j^5 of the standing-out cam-piece j. Besides the said lever having a slight traverse, it also has a small tilt imparted to it, which makes the ends of the branches of the forked rear part rise. Assuming that the parts are again in their normal positions, the passing of a coin down the slot l and the resting of the same upon the forked ends i^5 of the lever i causes the said lever to slightly tilt (see Fig. 2) and lower the said end upon which the coin rests, which thus takes the stud i^4 from the shoulder j^5 to the tip of the lip j^4 of the standing-out cam-shaped piece j and against which it bears. By now applying pressure to the pusher k the operating-lever g is turned from left to right, and its arm g^2 lowered, which thereby allows the auxiliary stop o by its own weight to fall and come within the path of the arms n^2 of the drum-axis n, thereby blocking the same and preventing the rotation of the drum and the passing of gas. The angular movement made by the arm g^3 of the operating-lever consequent upon the movement of its other arm presses the coin-lever i from left to right, and by the pressure of its stud i^4 upon the rounded end of the lip j^4 the cam-shaped standing-out piece j is caused to yield and al-

low the said stud to pass it and take the tooth of the lever i^3 into engagement with the teeth of the quantity-wheel d, and is kept there by the said stud i^4 coming upon the under side of the curved part j^2 of the said standing-out piece j, so that the continued pressure and movement of the pusher further turns the operating-lever and traverses forward the coin-lever, distends the spring p, and as the tooth i^3 is in engagement with the teeth of the quantity-wheel the said quantity-wheel is moved forward to the extent of one-twelfth of a revolution on the fully pushing home of the pusher, and as the quantity-wheel is fast upon the axis c the stop-arm e^2 is moved through a corresponding distance as the wheel d and without the range of the arms n^2 of the meter-drum axis. The toothed wheel q and spring-clutch r being free upon the axis c, they remain quiescent. Now that an amount of gas has been apportioned out equal to the value of the coin tendered, the pusher is released, when the coiled spring p, which is now under distended tension, takes the parts back to their normal positions, causing the stud i^4 to traverse rearwardly over the back of the standing-out projection j and come in front of the shoulder j^5 by the stud i^3 being lifted by the spring g^4 of the lever g, which, having ascended, takes the auxiliary stop o from out of the path of or before the arms n^2 of the drum-axis n, when the said drum-axis and its drum rotate pro rata with the consumption of gas. The drum-axis worm n^3 by its rotation turns backwardly the wheel q, and as the said wheel q is made temporarily fast to the quantity-wheel d, axis c, and cognate parts carried by it through the intervention of the clutch, the whole of the parts carried upon the said axis, including the finger f, move backwardly together until the coin's value of gas has been consumed, when the stop-arm e is presented to the arms n^2 of the drum-axis, whereby the drum is stopped by its interposition. The dropping of a second and further coins up to nine and the operation of the pusher for each coin deposited causes the quantity-wheel, arm e, and finger f to pass through nine successive parts of a revolution, which brings the stud d' on the said quantity-wheel in a position (see Fig. 5) that its further movement causes the limiting-lever s to be turned upwardly from the dotted lines into the full lines, and so come across the coin-slot and prevent further coins being introduced.

It is to be understood that the mechanism of the attachment can be adapted to receive any number of coins as may be desired and to deliver an equivalent amount of gas therefor.

The attachment, as shown, applies to a wet gas-meter, but is equally applicable to a dry one.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a coin-controlled gas-vending apparatus, the combination, with the registering devices and cognate parts, including a ratchet-wheel and an operating-lever, of a cam-shaped yielding projection for keeping in tooth, releasing, blocking, and taking back said lever to its normal position, substantially as described.

2. The combination, with an automatic vending gas-meter attachment, of a counterbalanced lever i, a cam-shaped projection j, with guide j^2, lip j^4, locking-shoulder j^5, and returning and curved top j^6, as set forth.

3. In a gas-vending prepayment attachment, the combination, with a coin-lever i, having a tooth i^3 and a stud i^4 and tail part i^5, of an outstanding cam-shaped yielding projection j, with guide j^2, releasing-lip j^4, blocking-stop j^5, and curved back j^6, for respectively guiding and keeping in tooth, releasing, blocking, and taking back the lever to its normal position, as set forth.

4. In a gas-vending prepayment attachment, the combination, with a coin-lever i, having a tail i^5, terminated by forks i^6, and also a coin and coin-slots $l l^2 l^3$, of a cleft formation i^7 of the said coin-lever, whereby fraud is prevented or the advancement of the coin-lever prevented by the jamming of the coin against the inside of its conducting-slot, as set forth.

5. The combination, with a gas-meter and an automatic vending gas-meter attachment for controlling the gas delivery and registration, of a stop-arm e, mounted upon an axis and located within the path of a radial arm or arms carried by an axis in communication with the drum of a meter, substantially as described and set forth.

6. The combination, with a gas-meter and an automatic vending gas-meter attachment, of an arm or arms carried by an axis in connection with the drum of the meter and whose path is or are directed within that of a stop-arm and is adapted for stopping the drum on the gas paid for being consumed, as set forth.

7. The combination, with a gas-meter and an automatic vending gas-meter attachment, of a supplementary stop o, which falls and blocks the meter-drum on the pusher being pushed or driven home, substantially as set forth.

8. In a gas-vending prepayment attachment, the combination, with a drum-axis having arms n^2, of a stop o, having an attach ment part o^3, as set forth.

9. In a gas-vending prepayment attachment, the combination, with a coin-lever, of a lever g, having long and short arms g^2 and g^3 and having connected with one of the said arms a pusher h.

10. The combination, with an automatic vending gas-meter attachment, of a quantity-wheel d, worm or toothed wheel q, and clutch r, disposed between them, and stop-arm e, made fast and strung upon an axis common to them, substantially as set forth.

11. The combination, with an automatic vending gas-meter attachment, of a coin-lever *i*, operating-arm *g*, pusher *h*, and spring *p*, as set forth.

12. The combination, with an automatic vending gas-meter attachment, of a coin-lever *i*, projection *j*, operating-arm *g*, pusher *h*, spring *p*, axis *c*, with stop-arm *e*, quantity-wheel *d*, toothed wheel *q*, interposed spring-clutch *r*, drum-axis *n*, having worm n^3 and radial arms n^2, and supplementary stop *o* o^3, as set forth.

13. The combination, with the throat of the coin-slot of an automatic gas-meter prepayment attachment, of a jointed fraud-prevention arm *m* with turned end m^2, as set forth.

14. The combination, with the entrance or passage of the coin-slot of an automatic gas-meter prepayment attachment, of a jointed lever *s*, worked from a stud *d'*, and the quantity-wheel *d*, whereby no more coin than gas can be supplied for can be inserted within the inclosing casing, as set forth.

15. The combination, with the throat or slot of an automatic gas-meter prepayment attachment, of an inverted entrance *l'*, as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of November, 1890.

ROWLAND WILLIAM BROWNHILL.

Witnesses:

HENRY SKERRETT,

ROBERT E. L. EVANS.