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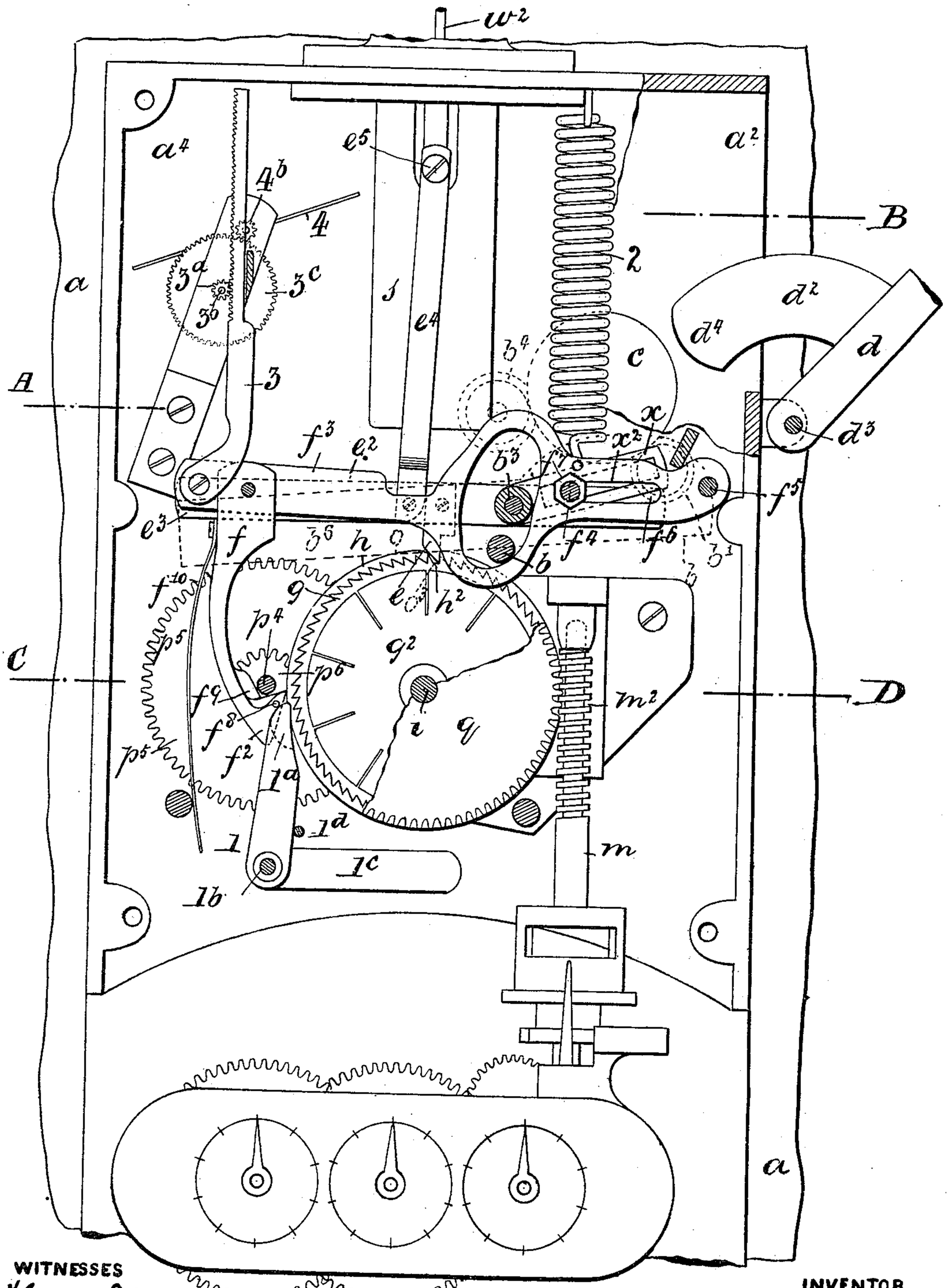
R. W. BROWNHILL.

APPARATUS FOR VENDING GAS.

No. 405,943. Patented June 25, 1889.

Fig. 1



WITNESSES

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R. W. BROWNHILL.

APPARATUS FOR VENDING GAS.

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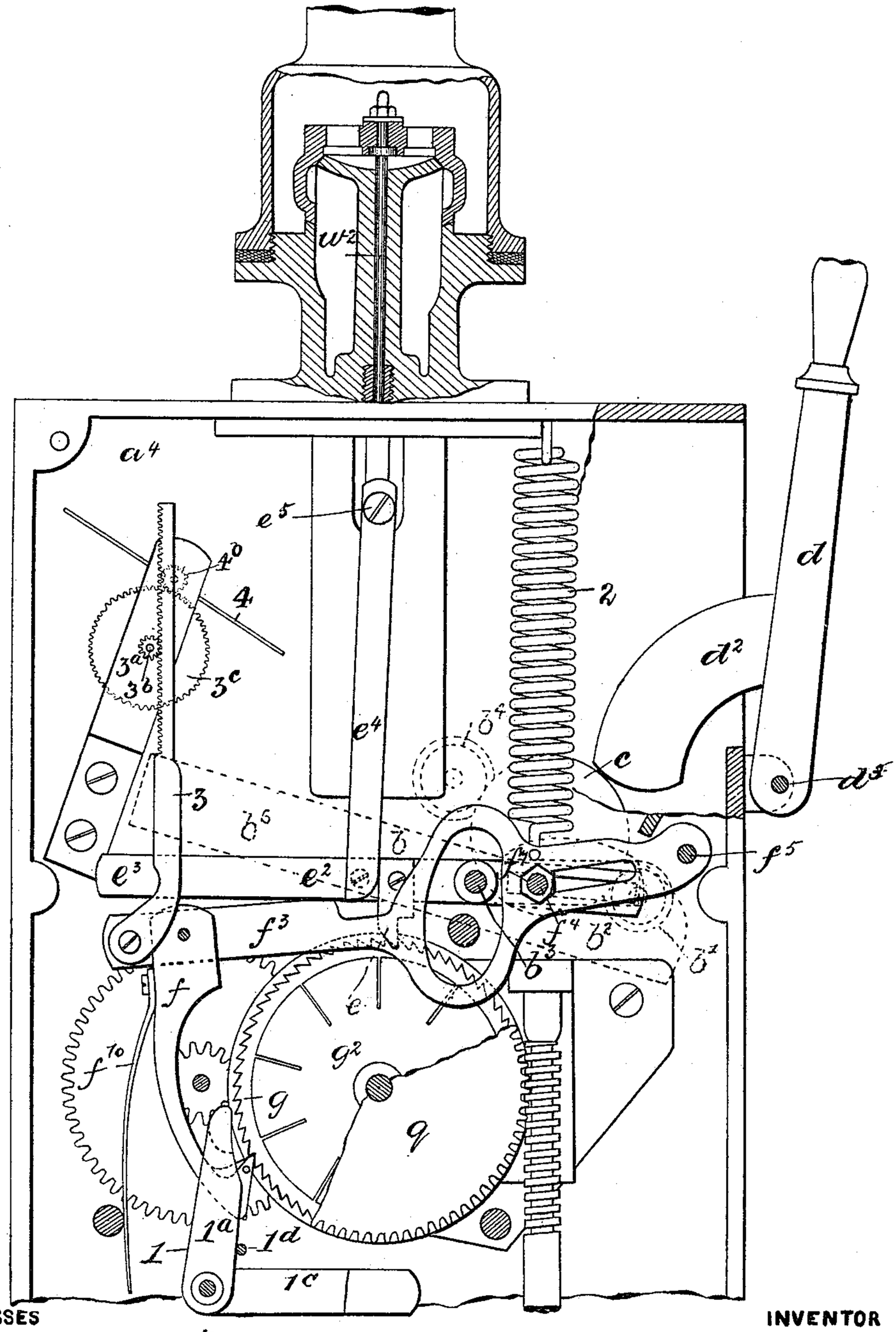
Fig. 2



WITNESSES

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R. W. BROWNHILL.

APPARATUS FOR VENDING GAS.

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Fig. 3

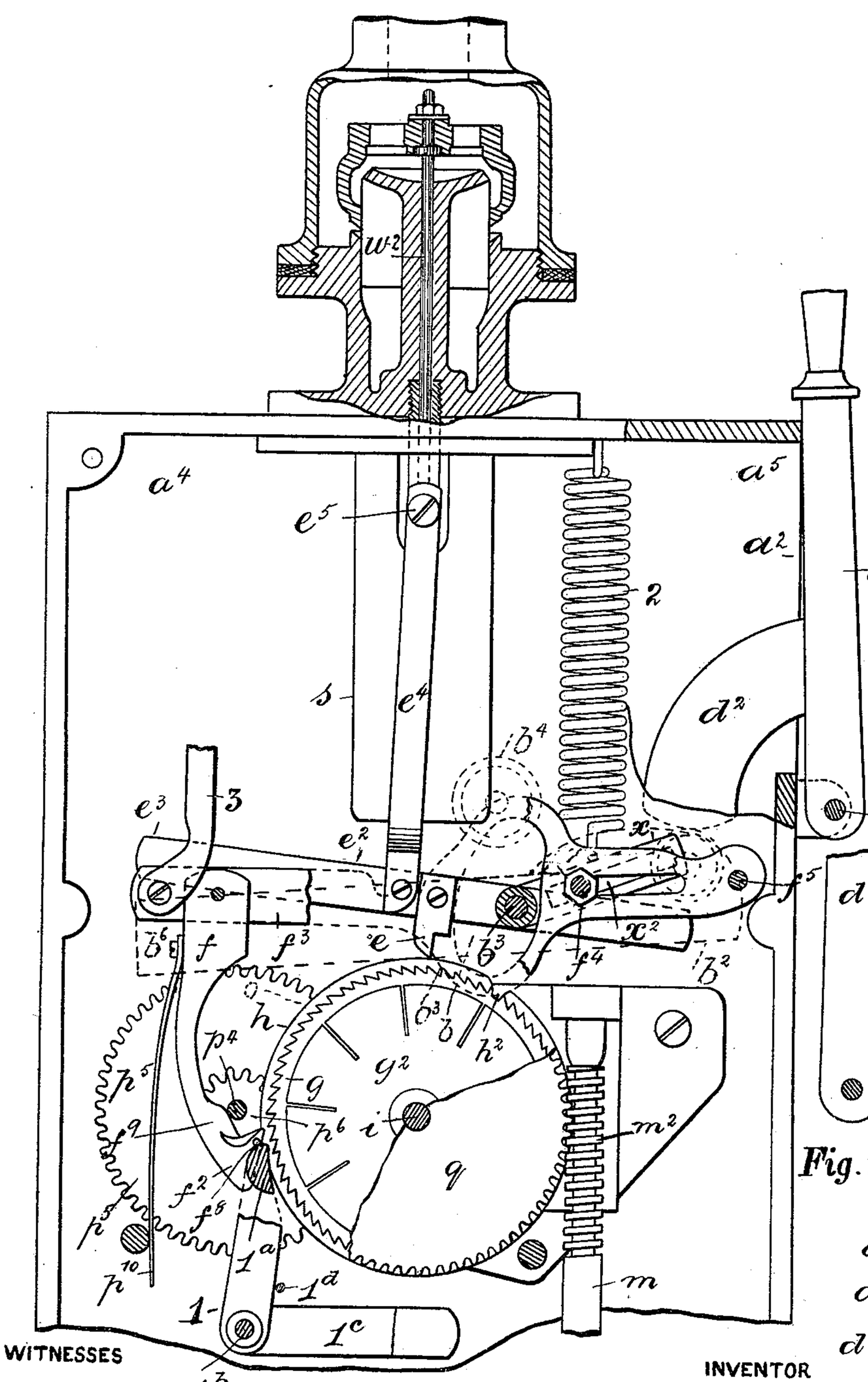


Fig. 9

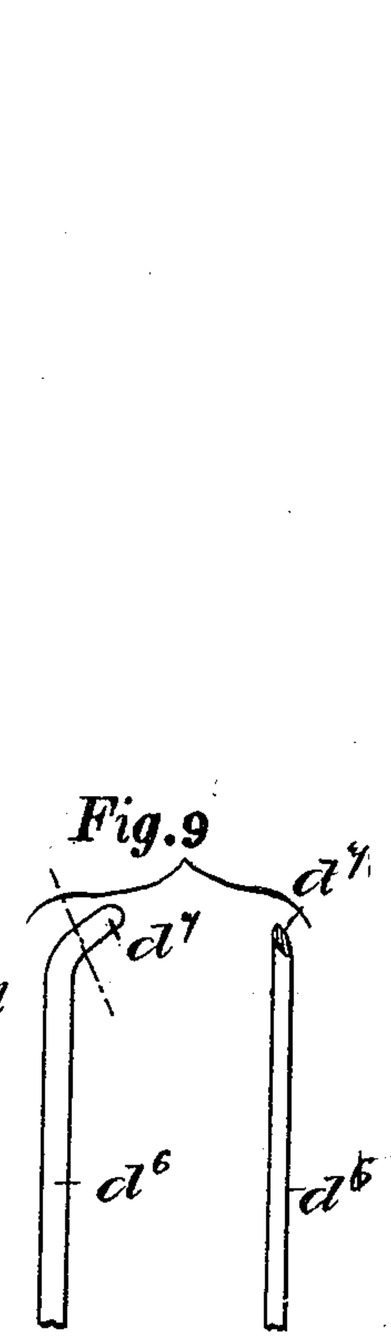


Fig. 8

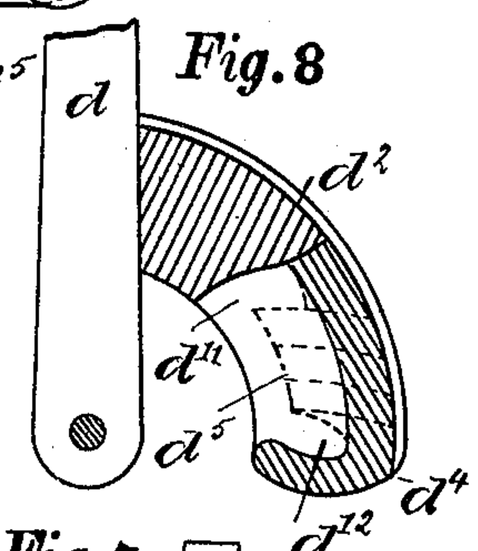
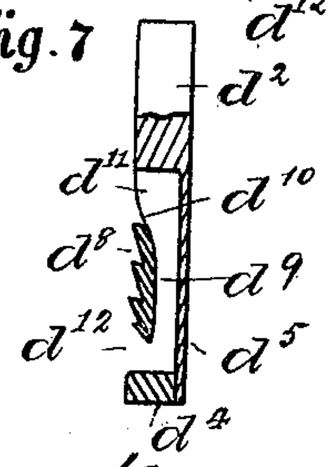


Fig. 7



WITNESSES

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(No Model.) 6 Sheets—Sheet 4.

R. W. BROWNHILL.

APPARATUS FOR VENDING GAS.

No. 405,943. Patented June 25, 1889.

Fig. 4

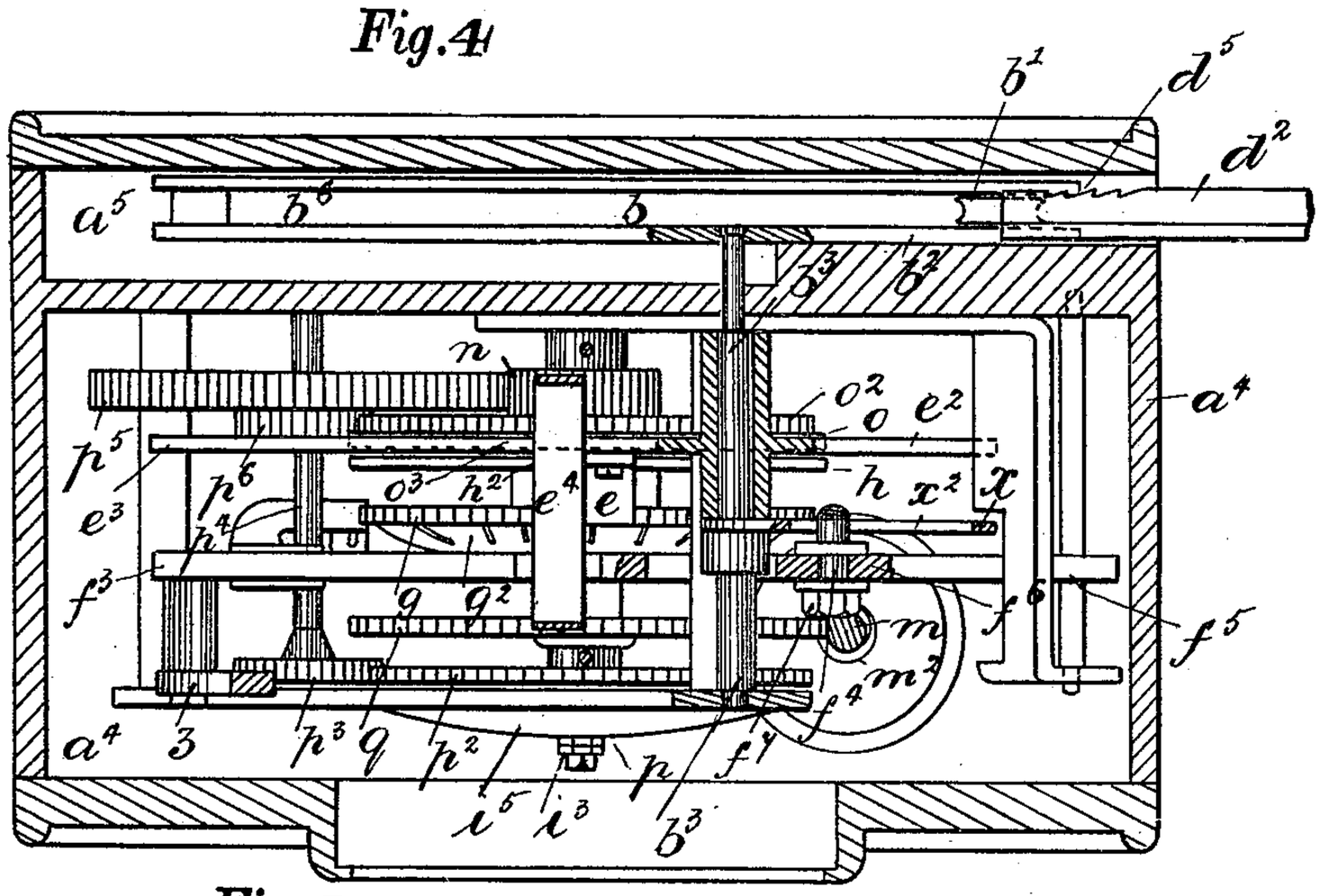


Fig. 5

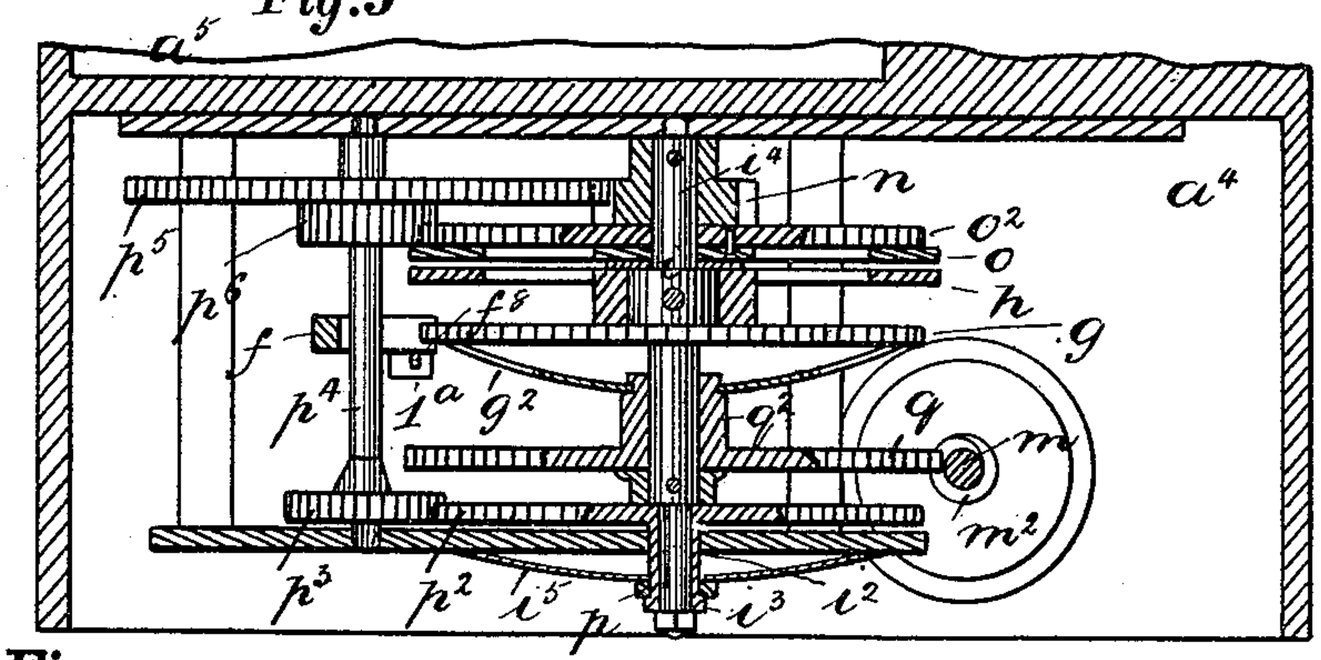
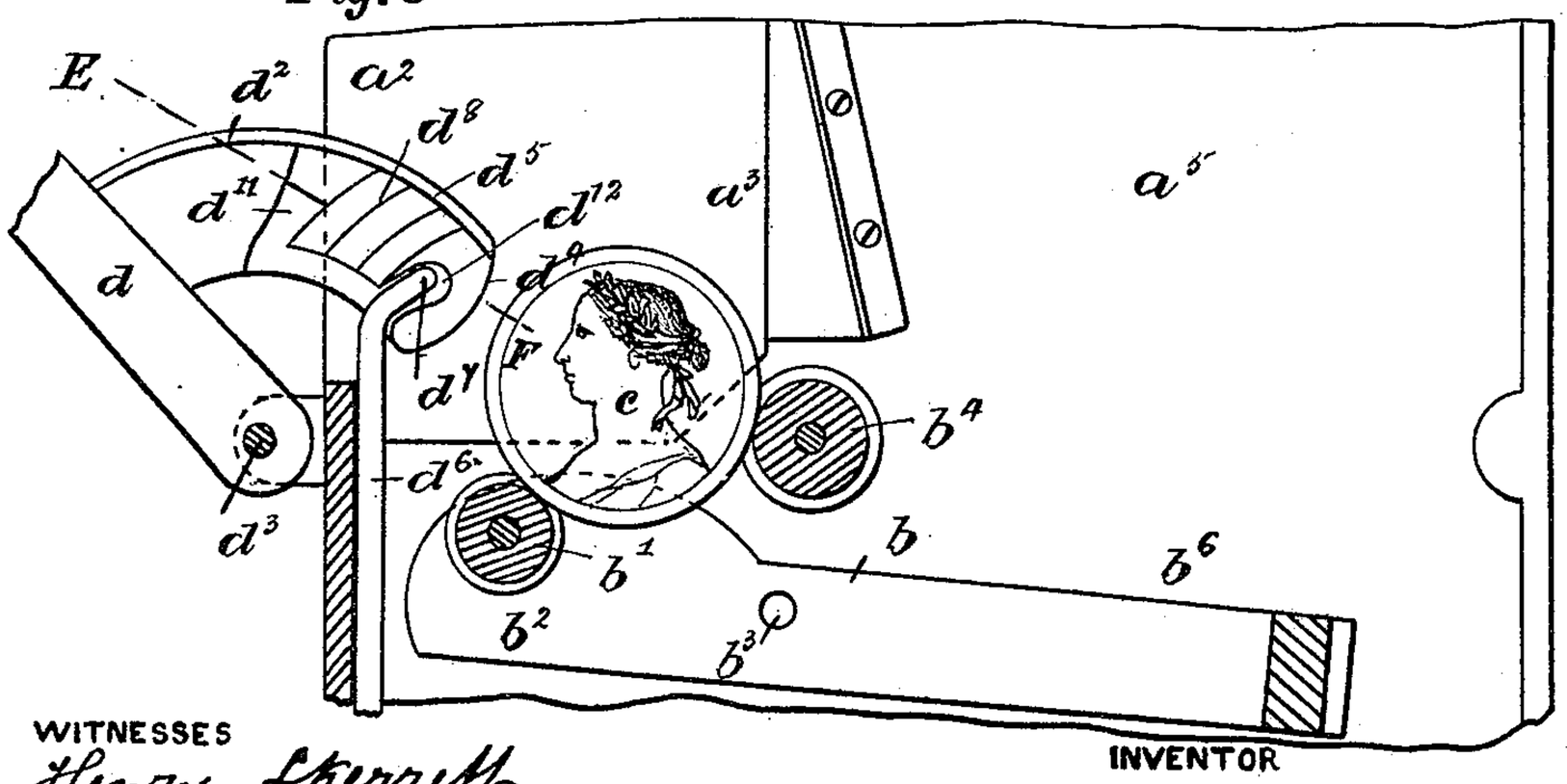


Fig. 6



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R. W. BROWNHILL.

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Fig. 10

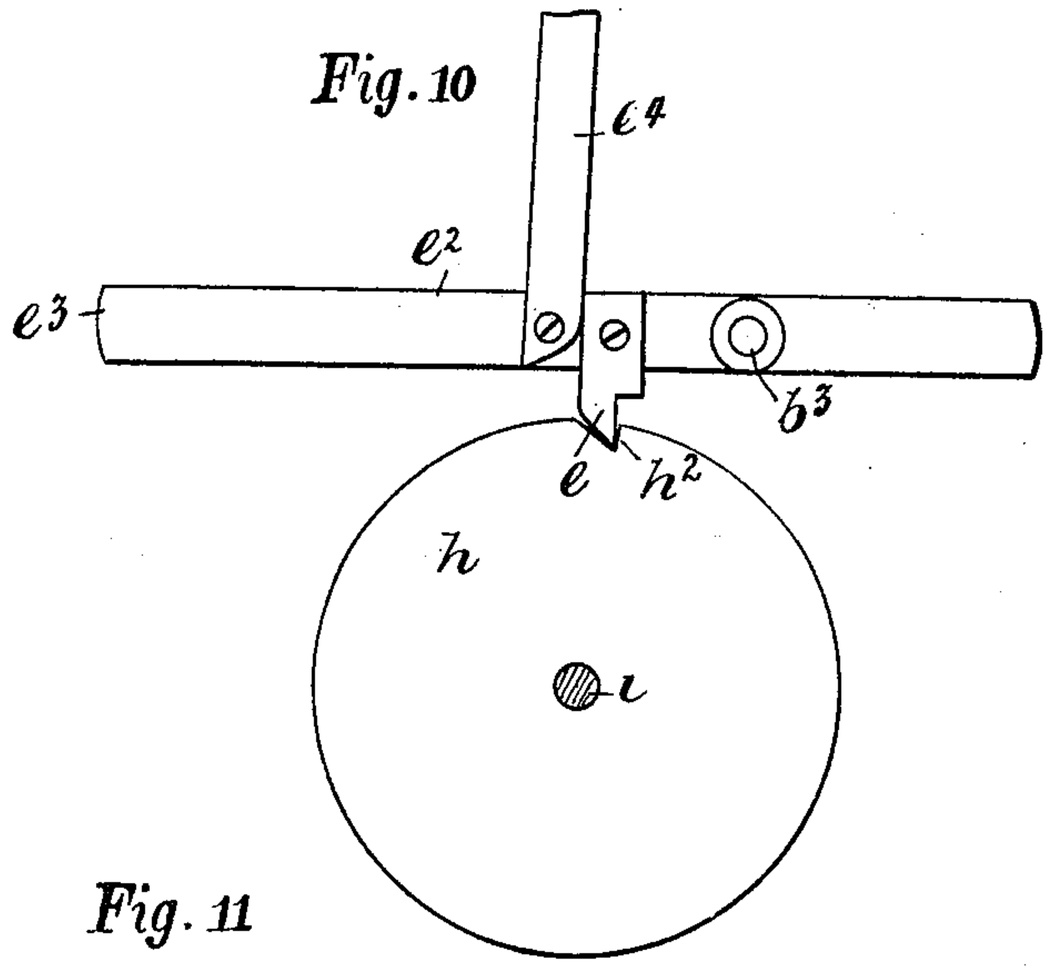


Fig. 11

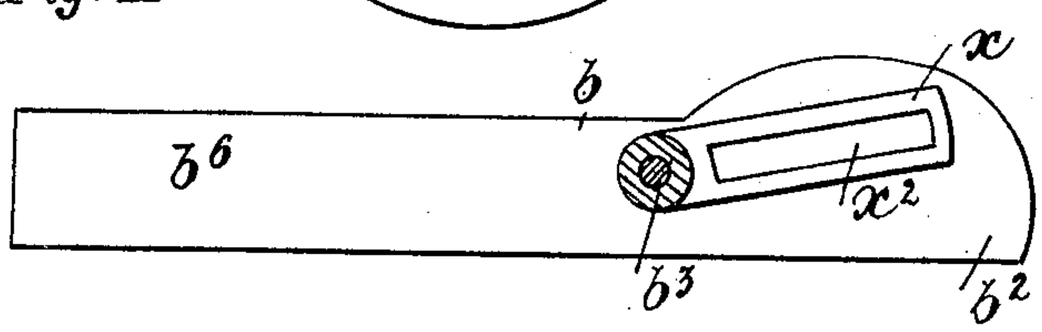


Fig. 12

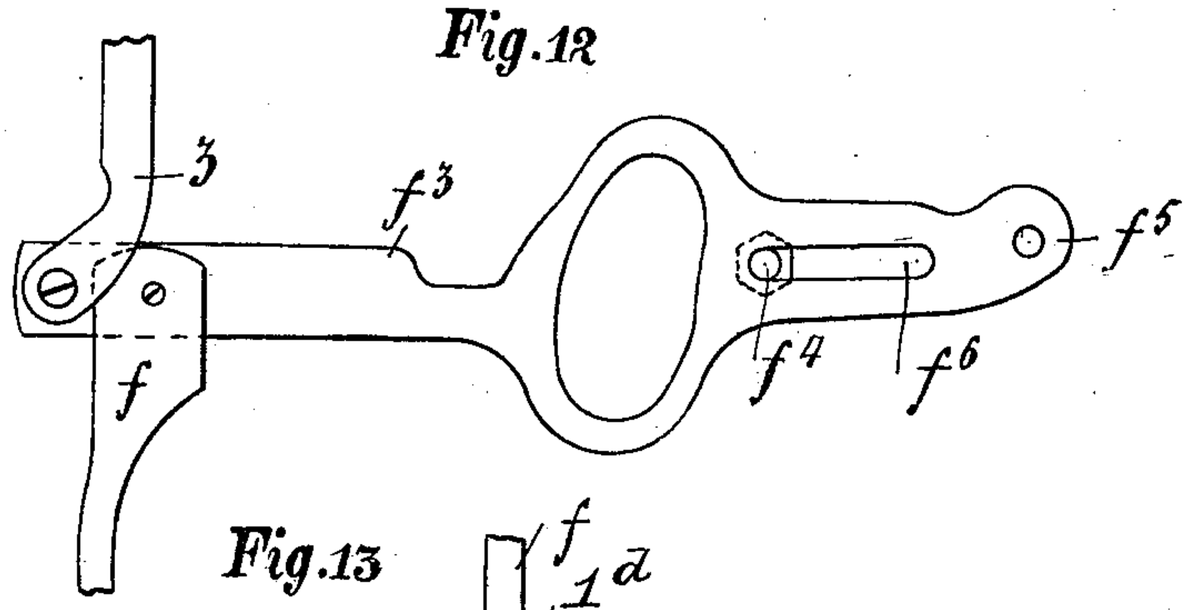
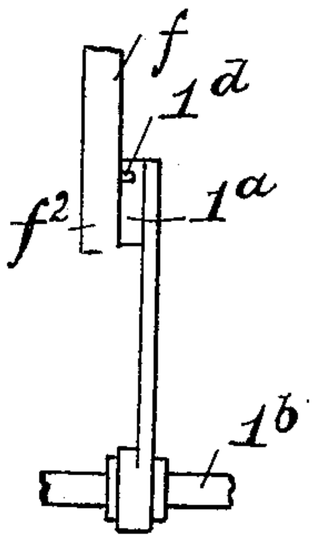


Fig. 13



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(No Model.) 6 Sheets—Sheet 6.

R. W. BROWNHILL.

APPARATUS FOR VENDING GAS.

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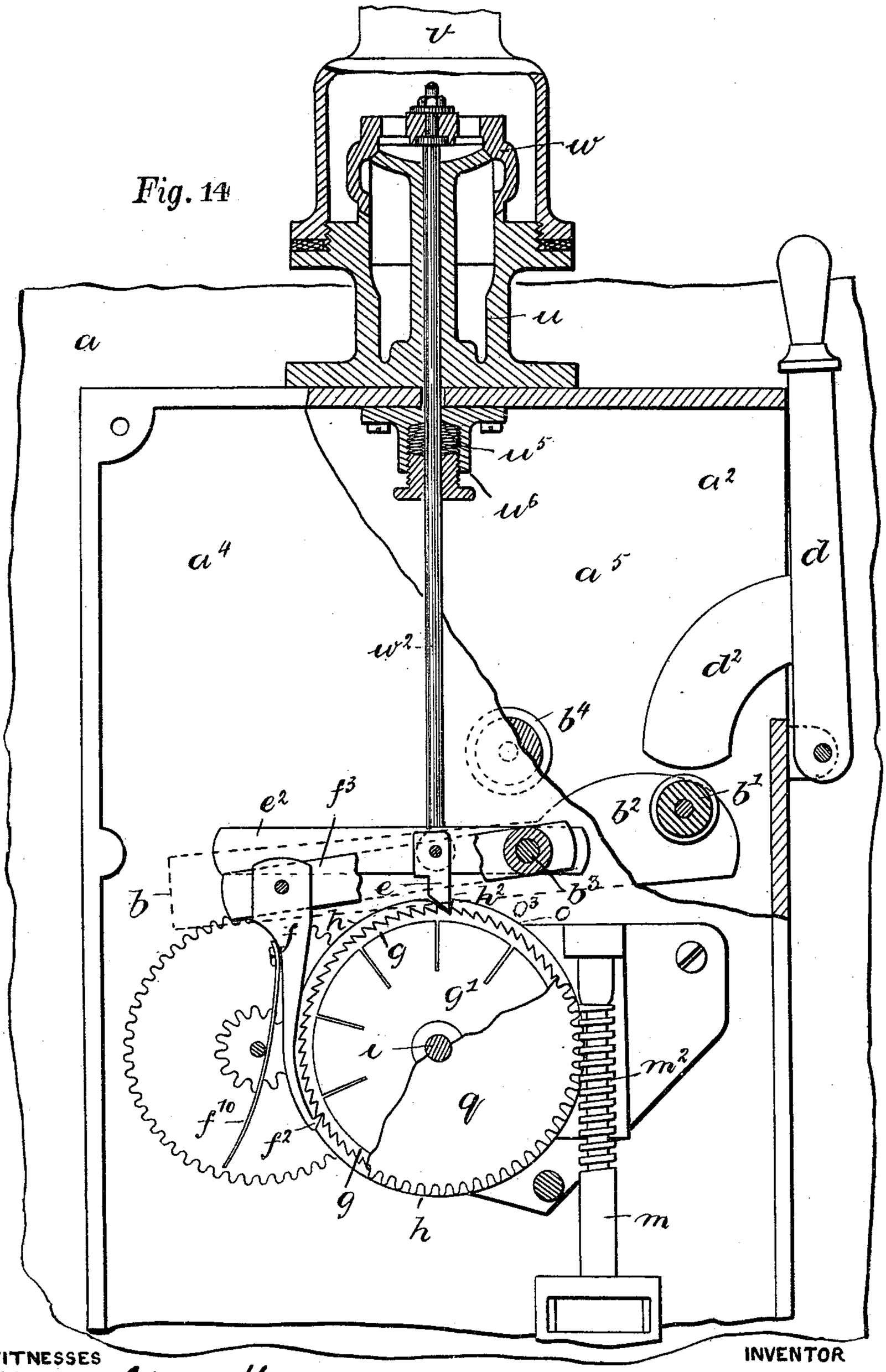
Fig. 14



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UNITED STATES PATENT OFFICE.

ROWLAND WILLIAM BROWNHILL, OF ASTON NEW TOWN, BIRMINGHAM, COUNTY OF WARWICK, ENGLAND.

APPARATUS FOR VENDING GAS.

SPECIFICATION forming part of Letters Patent No. 405,943, dated June 25, 1889.

Application filed June 12, 1888. Serial No. 276,846. (No model.) Patented in England May 13, 1887, No. 7,012; in France March 5, 1888, No. 176,142, and March 8, 1888, No. 176,220, and in Germany March 12, 1888, Nos. 22,737 and 22,738, and March 20, 1888, No. 23,292.

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 44½ High Street, Aston New Town, Birmingham, in the county of Warwick, England, have invented a certain new and useful Apparatus for Vending Gas, (for which applications for Letters Patent have been made as follows: Great Britain May 13, 1887, No. 7,012; France March 5, 1888, initial No. 176,142, and March 8, 1888, initial No. 176,220; Germany March 12, 1888, initial No. R. P. 22,737, March 12, 1888, initial No. R. P. 22,738, and March 20, 1888, initial No. R. P. 23,292;) 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.

The invention relates to an apparatus for vending gas in a determinate quantity on the same having been previously paid for by depositing a coin or coins within a receptacle or through a slit made in the inclosing-framing of the said automatic means. Thus the vending means, in connection with a gas-meter, consists, essentially, of a coin-lever which is operated by a coin or coins pushed or introduced into the apparatus in prepayment for gas to be supplied, and which lever through links or the like gives a proportionate or partial backward movement to a disk or disks having inclined notches cut within their peripheries, wherein a catch or cross-bar lies when the meter is at rest. The other parts consist, essentially, of trains of wheel-work which are driven directly from the drum of the meter and through some of them communicate the necessary backward movements to the disks, which are the gas-measuring-out disks.

Figure 1 represents in front elevation, with some of the parts broken off, and in vertical section a portion of a gas-meter provided with automatic sale, delivery, and check mechanism, constructed and arranged according to my invention, and the parts of which said mechanism are shown in the positions which they assume on a penny being first tendered in payment for a predetermined quantity of gas required to be delivered. It will be seen by the said Fig. 1 that the coin, which is marked *c*, has been dropped through the coin-slit and is resting between the grooved peripheries of two pulleys disposed at a distance apart. Fig. 2 represents a like elevation and section as that of Fig. 1, but with the parts of the said automatic sale and delivery check mechanism in the positions which they respectively assume after the coin has been forced partially between the grooved pulleys, as hereinafter described, and which said opening out of the pulleys to the extent of the coin's diameter is the limit of movement which the said parts make. Fig. 3 shows a like view as that of Figs. 1 and 2, but with the respective parts of the automatic sale and delivery mechanism in the positions which they assume after the coin tendered in prepayment of gas to be supplied has passed through the machine and been conveyed into a receptacle made to receive it. It will be observed that the machine is now delivering out by the back rotation of gas-measuring-out wheels, and that the mechanism only commences to deliver or act after the coin has been fully passed through the machine. Fig. 4 is a plan view, partly in section, of the said mechanism and inclosing-casing upon the dotted lines A B, Fig. 1; and Fig. 5 is a transverse section on the dotted lines C D, Fig. 1. Fig. 6 is a back elevation of the coin-lever and partition of an inclosing-casing wherethrough the spout of the coin-slit passes. This view is shown specially for the purpose of representing the back of the pushing-in lever, so that a coin or the lever must be pushed absolutely home before it can again be withdrawn, as the pawl, which is a spring-arm working upon the rack upon one side and a plain part on the other side, has to travel from front to back and in a circular manner in order that the lever may be pushed in for pressing the coins home and pulled out

in order to introduce others into the slit. Fig. 7 represents the box-rack in horizontal section; and Fig. 8 represents the same in vertical section on the dotted lines E F, Fig. 6. Fig. 9 represents an elevation and a section of the spring-pawl. Figs. 10, 11, 12, and 13 represent some of the main parts of the mechanism separately; and Fig. 14, a front elevation, partly in section, of a portion of a gas-meter constructed according to my invention, the gas-outlet being shown in section and in a closed position.

The same letters of reference indicate corresponding parts in all the figures of the drawings.

a is the gas-meter. a^2 is a coin-slit, and a^3 is the guide of the spout, (seen in the back elevation, Fig. 6,) and through which slit and down the said spout the coin falls and rests upon the short arm b^2 of a coin-lever *b*, whose long arm b^6 is weighted or counterpoised. The said lever is best shown in back elevation in Fig. 6. The short arm of this said lever, which is made up of sides, with a division or space between them, carries a grooved pulley b', and situated at a distance from the said pulley is a second grooved pulley b^4, turning upon a pin fitted within the fixed framing. Thus the pulley b^4 may be spoken of as a "fixed" pulley, and the pulley b' as a "movable" pulley, and between these said pulleys the coin deposited in prepayment of gas to be consumed rests before it is pressed home, which "act" measures out its worth of gas upon a measuring-out wheel, as hereinafter described.

The coin-lever *b*, which is mounted on and works with an axis b^3, has made fast upon it the inner end of a slotted arm *x*, and within the slot x^2 of which a fixed pin f^4, carried by the main lever f^3, and which said main lever turns upon an end fulcrum f^5, and with the other end provided with a swinging pawl *f*, whose lower end f^2 is hooked inwardly and engages with the teeth of a ratchet-wheel *g*, carried upon the front face of a penny measuring-out disk *h*, whose periphery is provided with a notch or inclined gap h^2, wherein the tooth or catch *e* engages. This tooth or catch is carried upon the under side of the long arm e^3 of a weighted lever e^2, whose fulcrum center is the cross-axis b^3 of the coin-lever *b* and slotted arm $x\,x^2$, and jointedly connected to the long arm of the said lever e^2 is a forked upright link e^4, jointed at its upper end by pins e^5, which connect it to the valve stem or stalk w^2, by means of which the valve is opened and closed.

The pin f^4, which is carried by the main lever f^3, is made adjustable and fixed within the slot f^6 by a screw-nut f^7, so that by increasing the distance between the main-lever fulcrum f^5 and the pin which controls the motion of a slotted arm *x* varying adjustments may be obtained. Thus, if the pin f^4 be placed in the slot nearer to the fulcrum center f^5, then the throw of the slotted arm *x* will be less, and the movement required to be made by the rocking coin-lever *b* will also be reduced.

It will be seen that by the pushing inward of a coin *c* between the movable and adjustable rollers b' b^4 the short end b^2 of the rocking coin-lever *b* is lowered, which on the turning of its fulcrum center b^3 gives the same motion to the slotted arm *x*, and in consequence of the pin f^4 being carried by the main lever f^3, whose fulcrum center is at f^5, the said pin moves up the slot x^2, and consequent thereby the main-lever long arm f^3 and swinging pawl *f* are depressed, taking the hooked end f^2 of the said swinging pawl at the back of the half-round snug 1^a of a crank-lever 1, fulcrumed at 1^b, and having the end 1^c weighted, and being kept in a determined position by a fixed stud or stop 1^d.

The hooked end f^2 of the swinging pawl *f* has a pin f^8, which traverses the convex of the snug 1^a, and then on the upward movement it comes on the front of the snug and passes upon the inner and flat side of the said snug, thereby keeping the hooked end always up to the teeth of the ratchet-wheel during the time that the ratchet-wheel is being advanced, and on the further rising of the said swinging pawl the swell f^9 upon its inner edge comes against the axis p^4 of the shilling-finger-transmitting wheel and pulls the hooked end f^2 from the teeth of the said ratchet-wheel. Thus by the oscillation of the main lever f^3 the pin f^8 of pawl *f* is made to travel around a snug, which, when it is upon its front side, keeps the hooked end of the pawl *f* up to its work, which is then drawn away by the swell, as aforesaid, as it will be observed that the down movement prevents the hooked end from wiping over the teeth, as is common with ordinary pawls, and, further, the said pawl is provided inward with a flat spring f^{10}. The downward movement of the main lever distends a coiled spring 2, disposed near its joint end and the top of the inclosing-casing.

The rear end of the main lever f^3 carries a rack 3, which engages with a pinion 3^a on an axis 3^b, which has fast upon it a toothed wheel 3^c, which gears with a pinion 4^b, whose axis carries a fly 4, which by its rapid rotation encounters the resistance of the air, and so prevents the return of the moving parts too precipitously.

d is a lever fulcrumed at d^3 for pushing inward a coin-pusher d^2, whose inner end d^4 impinges upon the periphery of a coin. The upright inner face of the said lever *d* covers up the coin-slit a^2 and prevents the introduction of moneys until the pusher-arm has been wholly withdrawn, so as to admit of the coin tendered in payment of the quantity of gas required to be properly directed to the top of the grooved pulleys, as aforesaid. The back of the pusher-arm d^2 is provided with a rack-and-pawl device for preventing the lever from being pulled back or the push-

er-arm withdrawn until the coin has been pushed or forced fully home—that is, the lever and the pusher-arm must make their allotted inward motion before they can be withdrawn or pulled back, and which is done by making the spring-pawl, which is nothing more than a catch, traverse both the toothed and plain side of a rack in a circular manner.

d^5 is a box-rack with teeth d^8 upon its one side and plain upon its inner side d^9, as best seen in Figs. 6, 7, and 8. The top d^{10} of the said inner side is inclined inward.

d^6 is a spring-pawl with returned or hooked end d^7, and when in its acting position its tendency is to spring outward, but not sufficiently far to interfere with its properly wiping over the teeth of the rack. Thus when the lever d is pushed inward for the pressing home of the coin the arm d^2 causes the teeth d^8 to be moved past and under the returned end d^7 of the spring-pawl d^6 until it arrives past the top tooth, when it falls and springs inward to a little inward of the incline d^{10}, when the outward movement of the lever now brings the pawl at the back d^9, and in consequence of it traveling up the incline d^{10} it has been bent inward, and on arriving at the gap d^{12} it resumes its normal condition and springs outward, with its under side resting at the bottom of the incline of the bottom tooth, so that by the pushing in and drawing out of the lever the hooked end is brought and made to travel up the inclines of the teeth, click over the shoulders, and each incline bends the pawl outward, so that on coming at the top of the incline of the top tooth it springs inwardly through the gap d^{11} to the commencement of the incline at the back, and which incline on being drawn forward with the rack bends the spring-pawl inward until it has again come to the gap d^{12} and completed its circular movement. The cross-section of the end d^7 of the spring-pawl d^6 is shown at Fig. 9.

It will be observed in referring back to the lever e^2 of the tooth or catch e, and by whose upward motion the valve-stalk w is raised and lowered, that it is simply an arm loosely turning upon the axis b^3 as a joint center, and is raised simply by the incline of the notches h^2 and o^3, the latter hereinafter described. On the advance movement made by the gas-measuring-out disks h and o consequent upon the pulling round of the ratchet-wheel, the tooth or catch e is removed from the notches onto the peripheries of the disks, respectively, and on the said disks moving backward to their allotted cubic metric distances the said tooth or catch falls again within the coincident notches, lowers the valve-stalk by the pulling down of the upright e^4, and so shuts off the gas or closes the valve, which is carried at the summit of the stalk.

The penny measuring-out disk h, which has upon its face the ratchet-wheel g, is tight upon the arbor i, whose outer end i^2 is reduced and carries the penny-indicating finger i^3, whose rotation is made in front of the dial i^5, so that the said wheels g h and arbor with finger at its end move together, and so does the rear part of the said arbor i^4, which has a pinion n fast upon it, which engages with a toothed wheel p^5, as best seen in the plan, Figs. 4 and 5, which communicates the motion of the finger-axis to the shilling-disk o, loosely running upon the axis i^4, and which shilling-disk has a toothed wheel o^2 fast upon its back, and which said motion to the shilling-disk and its finger p is communicated from the pinion n on penny-disk arbor to a toothed wheel p^5 and spindle p^4, carrying pinions p^3 p^6. The pinion p^6 transmits the motion of the spindle p^4 to the wheel o^2 at the back of the shilling-disk o, and so gives to the shilling-disk one hundred and forty-fourth of a revolution to every one-twelfth of a revotion made by the penny-disk h. Motion to the shilling-finger p is made through the large loosely-mounted toothed wheel p^2, whose outer end has a sleeve upon which the said finger is carried.

Working loosely upon the arbor i is a tangential or toothed meter-wheel q, driven from a worm m^2 of a meter-axis m, and which said axis receives its motion direct from the meter-drum.

Disposed between the inner end of the sleeve q^2 of the meter-wheel q and the ratchet-wheel g is a friction-clutch g^2, by means of which motion from the meter is transmitted to the penny and shilling measuring-out disks for taking them back through their measured-out and allotted distances, through which they have been moved forward, and which distances represent a fixed quantity of gas which is allowed to be consumed in exchange for the coin passed through the machine. The clutch consists of a dished disk of metal with radially-directed slit edges, so as to create sufficient binding for the moving together or in common with another the parts in juxtaposition to its two opposite faces. Thus the function of the clutch is to create sufficient binding-power between the face of the ratchet-wheel g and the meter-wheel q, that after the measuring-out disks have been advanced measured distances equivalent to the amount of gas paid for then the said disks and driven-wheels of the meter part move together proportional to the drum's motion. Thus the pulling up of the swinging-pawl f and the advancing of the ratchet-wheel g through a measured distance the meter-wheel q remains quiescent, as it cannot rotate in a reverse direction to the motion of the meter-drum, as it is pulling against the worm m^2, so that the friction of the clutch makes fast the measuring-out part of the mechanism when it is to move in the same direction as and with the drum of the meter.

The action of the said automatic sale and delivery gas mechanism is as follows: On a

penny being passed through the coin-slit a^2, when the lever d and pusher-arm d^2 are pulled back, the coin falls by its own weight into position between fixed and movable rollers b' b^4, and when in this position, as represented in Figs. 1 and 6, the lever d is forcibly pushed inwardly, when the extreme end d^4 of the pusher-arm d^2 impinges upon the rim of the coin and forces the said coin between the rollers b' b^4, which act or forcing inward of the said coin depresses the short arm b^2, and roller b' of the coin-lever b raises the weighted end b^6, and also turns its axis b^3 and with it the slotted arm x, whereby, through the intervention of the pin f^4, working within the slot x^2, the main lever f^3 is lowered upon its fulcrum center f^5, depressing the swinging pawl, and with the pin f^8 at the hooked end f^2 made to pass around the outside of the snug 1^a at the top of the arm 1 of the weighted cranked lever, which is fulcrumed at 1^b, and on the said pin f^8 arriving at the bottom of the said snug, the pressure of the said spring f^{10} takes the point of the hooked end, as aforesaid, into a tooth of the ratchet-wheel g, and when in this position, the coin having been forcibly pressed completely home, or inwardly from between the rollers, the spring 2, which became distended on the lowering of the arm-lever, now contracts itself, drawing upward the main lever f^3, and with it the swinging pawl f, which, being engaged with the tooth of the ratchet-wheel g, advances the ratchet-wheel to the extent of six teeth and with it the penny measuring-out disk h and shilling measuring-out disk o through a distance of the one equal to one-twelfth of a revolution, and with the other through one hundred and forty-fourth of a revolution. The upward movement of the hooked end f^2 causes the pin f^8 to travel up inside of the snug 1^a, and by the crank-lever being weighted the tooth thereby is constantly kept up to the face of the ratchet-wheel until it arrives above the top of the snug, when it is drawn from it by the swell f^9 being drawn against the axis p^4, which brings the pin f^8 to the top of the front side of the said snug ready for the next downward movement. The advancing forward of the penny measuring-out disk and the shilling-disk causes the point of the tooth or catch e, which acts in common to both disks, to be withdrawn up the inclines of the notches or depressions h^2 o^3 to the peripheries or edges of the disks, thus raising the tooth or catch lever e^2 upon its fulcrum or hanging center, and in consequence of its outer end being raised from a lower to a higher level by the forcible displacement of the tooth from the notches the forked upright link e^4 is consequently also raised, and the valve surmounting the valve-stalk w^2 is opened, thereby admitting gas to flow from the meter-pipe to the service-pipe until the notches of the measuring-out disks have returned to their normal and coincident positions and opposite the tooth e. The parts which have resumed their normal positions, as in Fig. 1, have been prevented from passing back too precipitously by the rack 3 engaging with the pinion 3^a and through its axis 3^b to the toothed wheel 3^c, which rotates the pinion 4^b, upon whose axis the fly 4 is fixedly secured, and thereby rotated, and whose motion is regulated by the resistance of the air. The advance movement of the ratchet-wheel, as aforesaid, turns the finger i^3 through a graduated distance in front of the dial, while the shilling-finger p and disk o are turned through corresponding reduced distances by the pinion n engaging with the toothed wheel p^5 to the spindle p^4, and from thence through the pinions p^3 p^6 to the toothed wheel o^2 of the disk o and the toothed wheel p^2 of the sleeve of the finger p. The advance movements of the disks are made in a direction contrary to the motion of the meter-drum, and as the force applied is greater than the pressure of the clutch, the ratchet-wheel g and measuring-out wheel h are moved through their allotted distances. The meter-drum, now moving, communicates its motion to the train of wheels, and through the clutch g^2 to the measuring-out wheels, carrying the said wheels back to their normal positions until the catch or tooth e of the catch-lever e^2 comes opposite the notches h^2 o^3, when the said catch, moving slowly down the inclines, gradually shuts off the gas by the lowering of the lever, upright link e^4, valve-stalk w^2, and valve, thereby cutting off communication between the pipe leading from the meter to the service-pipe.

Fig. 14 shows a modified form of my invention. a is the meter, a^2 the coin-slit, and a^4 the front casing, wherein the main portion of the automatic sale and delivery mechanism is inclosed. a^5 is the back compartment, wherein the coin-lever b works, of which b^2 is the short arm, carrying a grooved pulley b', and which lever turns with its fulcrum b^3, whose front end carries an arm f^3 with its outer end provided with a swinging pawl f, whose lower hooked end f^2 engages with the teeth of a ratchet-wheel g upon the front face of a measuring-out disk h, having a notch h^2 in its periphery. The swinging pawl f is pressed up to the teeth of the ratchet-wheel by a spring f^{10}, while connection between the meter-going wheels is made by the clutch g', and motion received thereby through the wheel q, which is driven from the worm m^2 of an axis m, with which the axis of the meter is in direct communication. e is the tooth or catch which engages with both the penny and the shilling measuring-out disk, and which is carried by a weighted and hanging lever e^2, fulcrumed and turning upon the pin b^3. w is a valve worked by a valve-stalk w^2, jointedly connected at its lower end to the lever e^2 and which stalk passes through a packing u^5, situated within a gland u^6 on the under side of the outlet u, leading from the meter, and by the raising of which said valve, gas is allowed to pass to the service-pipe v. d is the le-

ver, and d^2 the pusher-arm, while b^4 is the fixed pulley.

It will be thus seen that the arrangement Figs. 14 is only a simplified form of the arrangements Figs. 1, 2, and 3. Thus on placing a penny through the slit a^2 it drops upon the grooved pulleys b' b^4, and on the pressing inward of the pusher-arm d^2 of the lever d the coin is forced home between the rollers, which depresses the short arm b^2 of the lever b, turns its joint center b^3, and with it raises the lever f^3 and pawl f, whose hooked end f^2 engages with the teeth of the ratchet-wheel, pulling it round to the extent of six teeth, and also advances or winds up the penny and shilling measuring-out disks h and o, which causes the point of the tooth or catch e to travel up the inclines of the notches h^2 o^3 (the latter not shown) until the said tooth or catch rests upon the peripheries of the said disks, which change of elevation raises the lever e^2, valve-stalk w^2 and valve w, thus allowing gas to pass from the gas-meter outlet u to the service-pipe v, and as the whole of the other parts of the autoniatic sale and delivery mechanism are alike those of Figs. 3 to 13 the re-rotation of the measuring-out disks on the penny worth of gas being consumed brings the notches opposite the tooth or catch e, when by the change of elevation from the rims to the bottoms of the notches the valve is lowered by the falling of the valve-stalk.

In applications filed by me June 12 and June 29, 1888, Serial Nos. 276,847 and 278,565, I have shown, described, and claimed certain improvements in gas-vending apparatus, and do not therefore herein claim the features specifically claimed in said applications.

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

1. The combination, with a gas-supply pipe, a valve therein, and a meter, of a vending apparatus comprising a train of gearing receiving motion in one direction from the flow of the gas through the said meter, a series of pivoted levers one of which carries a pawl adapted to engage with a ratchet-wheel in said train of gearing and turn the same in an opposite direction, a notched disk adapted to receive motion from said gearing, and a rod connecting said valve to one of said levers, which lever carries a tooth which rides on the periphery of the disk when the latter is in motion and rests in the notch on the same when the disk is at rest, substantially as described.

2. The combination, with a gas-supply pipe, a valve therein, and a meter, of a vending apparatus comprising a train of gearing adapted to receive motion from the flow of gas through said meter and in connection with said valve, and a series of levers one of which carries a pawl and constructed and arranged to give backward motion to said gearing, according to the amount of movement of said levers, and a fixed bearing between which and the free end of one of said levers a coin may be pushed to communicate motion to the levers, all being constructed, arranged, and adapted to operate substantially as described.

3. The combination of a meter, a gas-supply pipe, a valve therein, and coin-released vending mechanism comprising a train of gearing connected to and adapted to govern the opening and closing of said valve and constructed and arranged, substantially as described, so as to open said valve for a length of time dependent upon the coin by means of which said mechanism is brought into action, substantially as described.

4. The combination of the meter, a gas-supply pipe, a valve therein, and vending mechanism comprising a train of gearing and appurtenant parts located between the meter and valve and constructed and arranged substantially as described, and connected to said meter and valve, as set forth, so as to allow the meter to act and to open the valve for a determined length of time dependent upon a coin of certain size being pushed into the governing mechanism, as set forth.

5. The combination, with a meter and vending mechanism comprising a train of gearing connected with and receiving motion from the meter, and mechanism consisting of a lever and detent for releasing said train of gearing upon the insertion of a coin, of a valve connected to said gearing and interposed in a gas-supply pipe, substantially as described.

6. The combination of a gas-supply pipe, a valve therein, and a vending apparatus comprising a rod carrying a detent and connected to said valve, a disk mounted on an arbor and having a notch to receive said detent, a ratchet-wheel on said arbor, a pawl engaging with said ratchet-wheel, a pivoted lever carrying said pawl, a fixed bearing in proximity to the free end of said lever, a meter connected to said arbor, and a clutch arranged upon said arbor, all constructed and arranged substantially as described, whereby, when a coin is pressed through between said fixed bearing and said lever, the detent is thrown out of engagement with the notched lever, turned back, and then released and moved forward until the detent again engages with the notch, as set forth.

7. The combination, with a meter, gas-vending mechanism connected therewith through the medium of a clutch and comprising a train of gearing, a gas-valve receiving motion from said mechanism, and levers and pawls constructed and adapted to alternately engage with and release a ratchet-wheel arranged in said train of gearing, of a fly and intermediate gearing connecting the same with said levers, substantially as described.

8. The combination, with a coin-lever b and main lever f^3, of a slotted arm x x^2 and the pin or stud f^4, whereby the said main lever is worked on a coin being forcibly pressed home, as set forth.

9. The combination, with a coin-lever b and

main lever f^3 and penny and shilling disks h o, provided with notches h^2 o^3, of a lever e^2, having tooth e, as set forth.

10. The combination, with the main lever f^3, pivotally connected at its inner end to a fixed support, a swiveled pawl f f^2, aud a ratchet-wheel g, of disk h, receiving motion from a gas-meter and communicating motion to a valve arranged in a gas-supply pipe, as set forth.

11. The combination, with the pawls f f^2 f^8 and ratchet-wheel g, of a lever 1 1^a 1^c, joined at 1^b, as set forth.

12. The combination, with the clutch g^2 and meter-driving wheel q, of a penny-disk h, having a notch h^2, intermediate gearing between said driving-wheel and disk h, and a gas-valve receiving motion from said measuring-wheel, as set forth.

13. In a gas-vending apparatus, the combination, with a casing containing gas-vending mechanism and provided with a coin-slit a^2, of lever fulcrumed at d^3 and carrying a pusher-arm d^2, the upper part of the lever being normally located over the coin-slit a^2, as set forth.

14. In a gas-vending apparatus, the combination of a lever carrying an arm d^2, to which is attached rack d^5, having incline d^{10}, and spring-pawl d^6, adapted to engage with said rack when the arm is moved in one direction and to pass under the same on the return movement for preventing the return of the lever until the coin has been fully pushed home, substantially as set forth.

15. The combination, with the delivery mechanism and its main lever f^3, of rack-bar 3, attached to said lever, gearing 3^c 3^a 4^b, and fly receiving motion from said lever and gearing, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 26th day of April, 1888.

ROWLAND WILLIAM BROWNHILL.

Witnesses:

HENRY SKERRETT,

MILES E. HUGHES,

Both of Birmingham.