(No Model.)

4 Sheets—Sheet 1.

C. W. HINMAN.

PREPAYMENT GAS METER.

No. 603,850. Patented May 10, 1898.

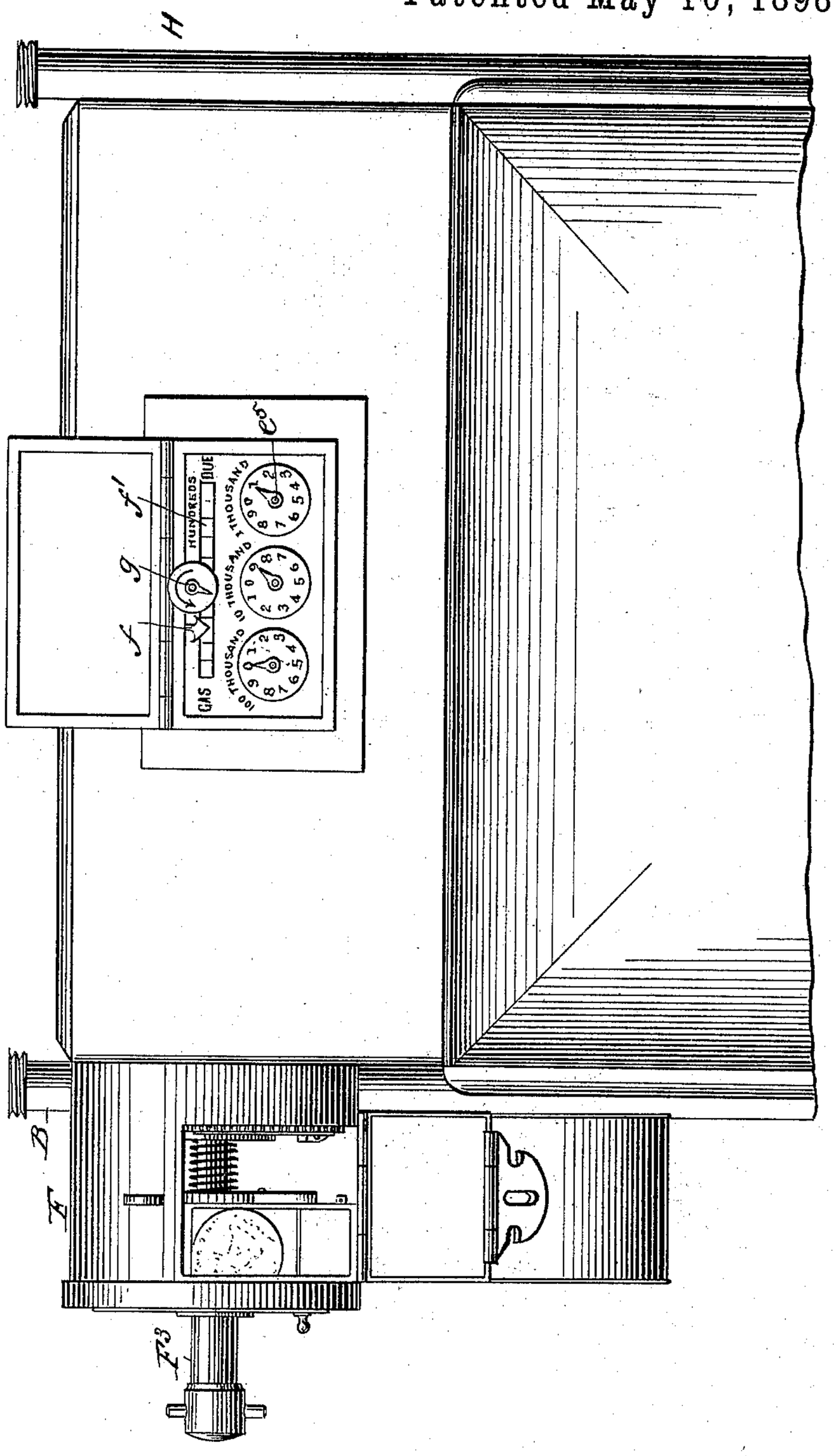

Fig. 1.

WITNESSES:
R. Guthman.
L. Goldstein.

INVENTOR
Charles W. Hinman
BY H. Alberus Neal
ATTORNEY

(No Model.)

4 Sheets—Sheet 2.

C. W. HINMAN.

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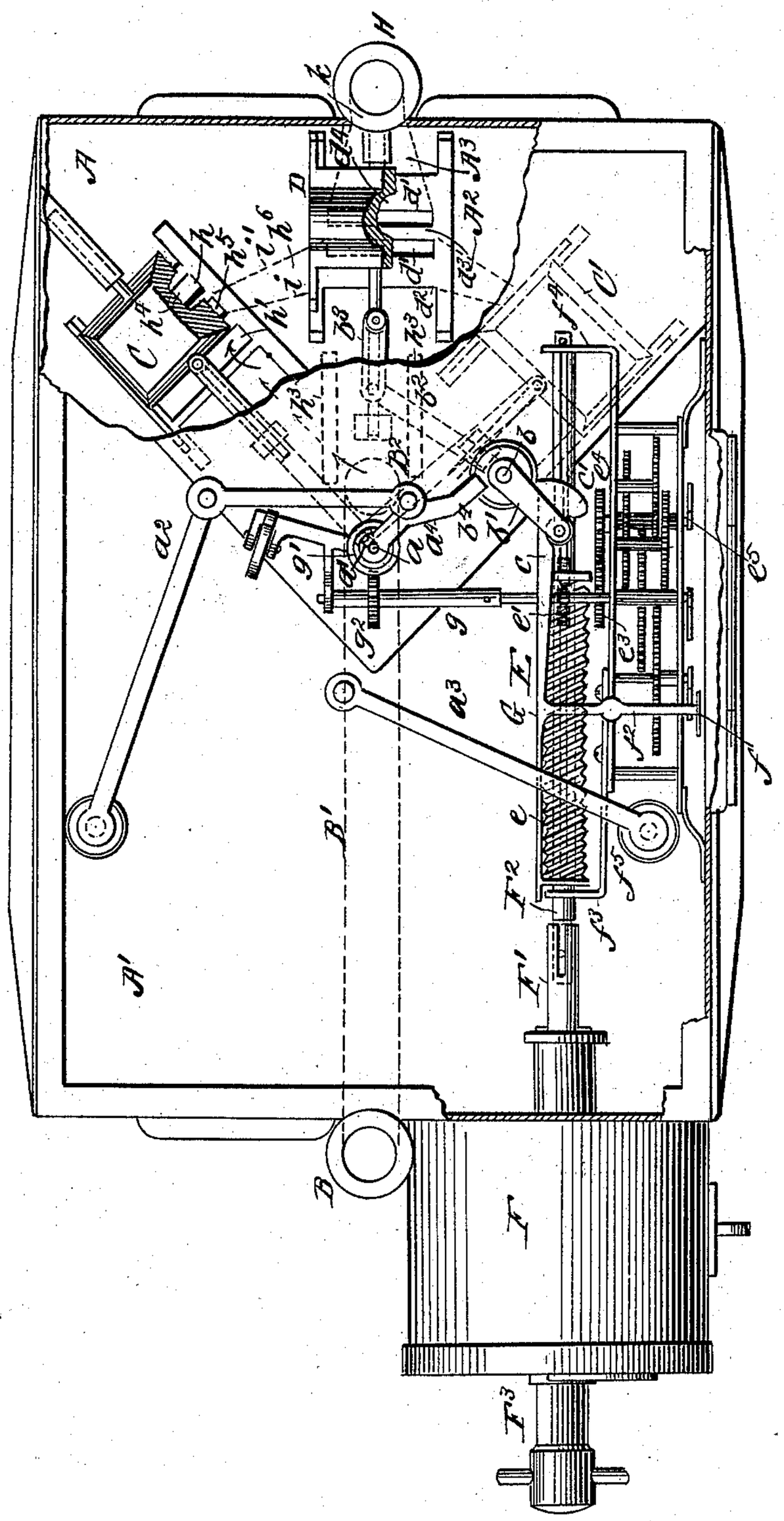
Fig: 2.



WITNESSES:

R. Guthman

L. Goldstein

INVENTOR

Charles W. Hinman

BY W. Alberts Heath

ATTORNEY

(No Model.)

4 Sheets—Sheet 3.

C. W. HINMAN.

PREPAYMENT GAS METER.

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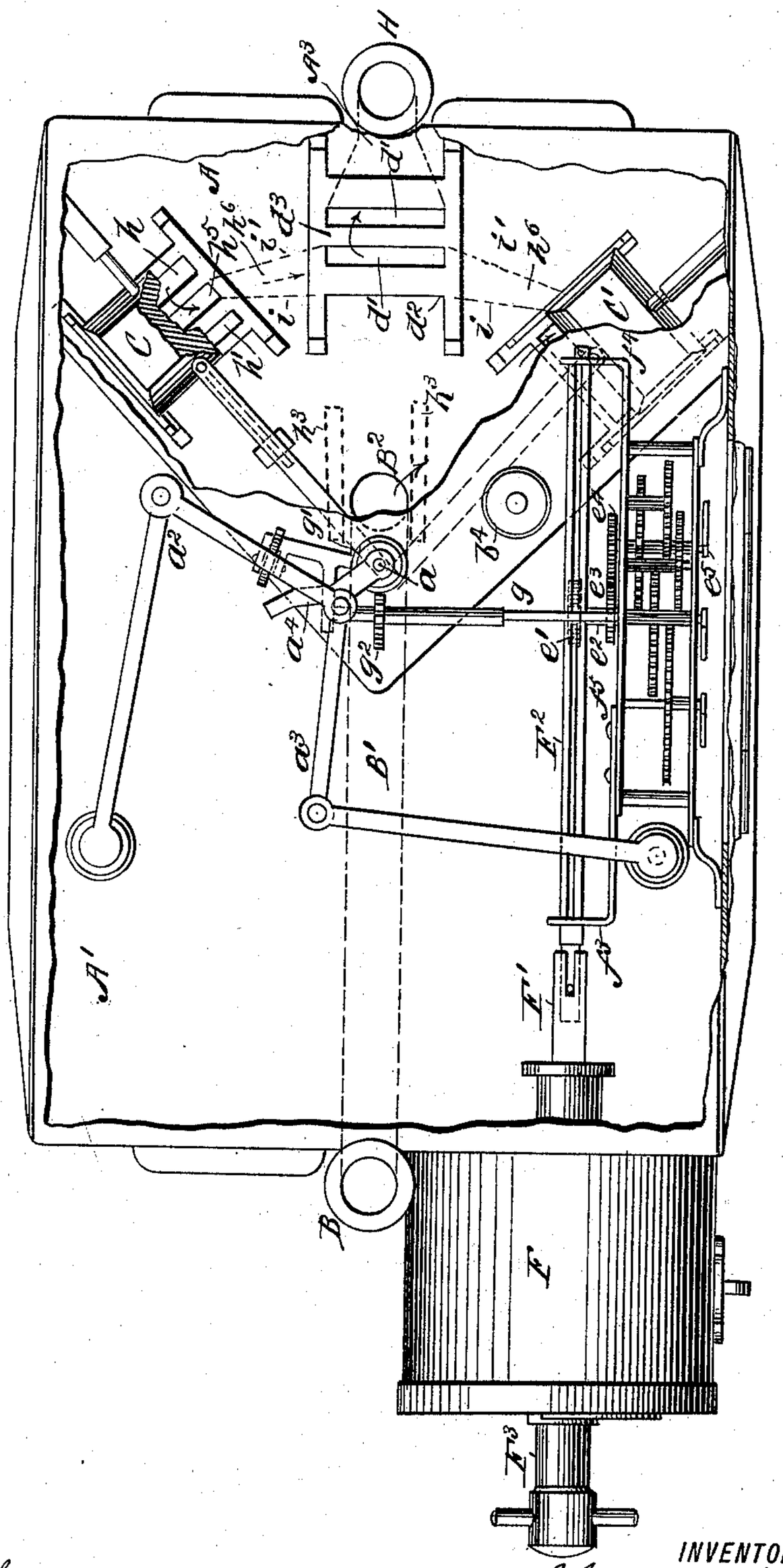
Fig. 3.



WITNESSES:

R. Guttman.

L. Goldstein

INVENTOR

Charles W. Hinman

BY W. Alberius Wood

ATTORNEY

(No Model.) 4 Sheets—Sheet 4.

C. W. HINMAN.

PREPAYMENT GAS METER.

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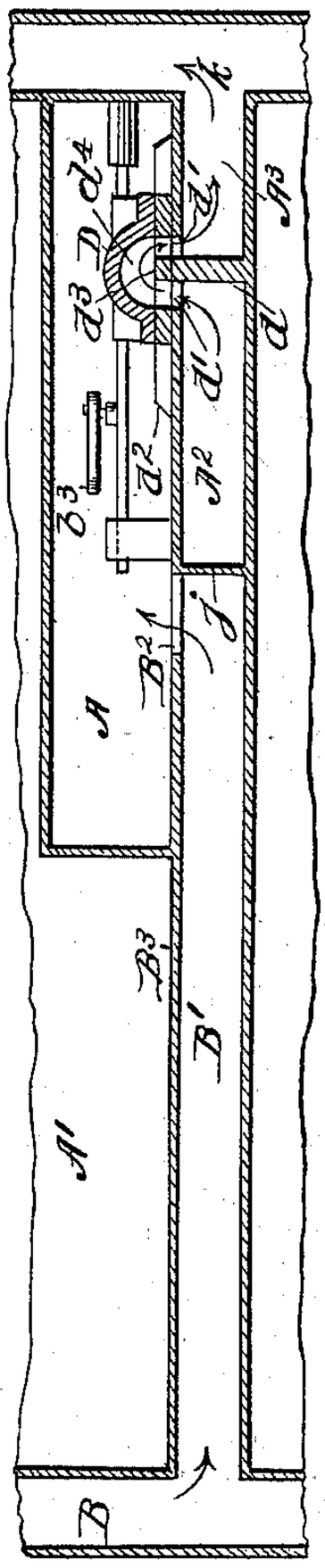

Fig. 5.

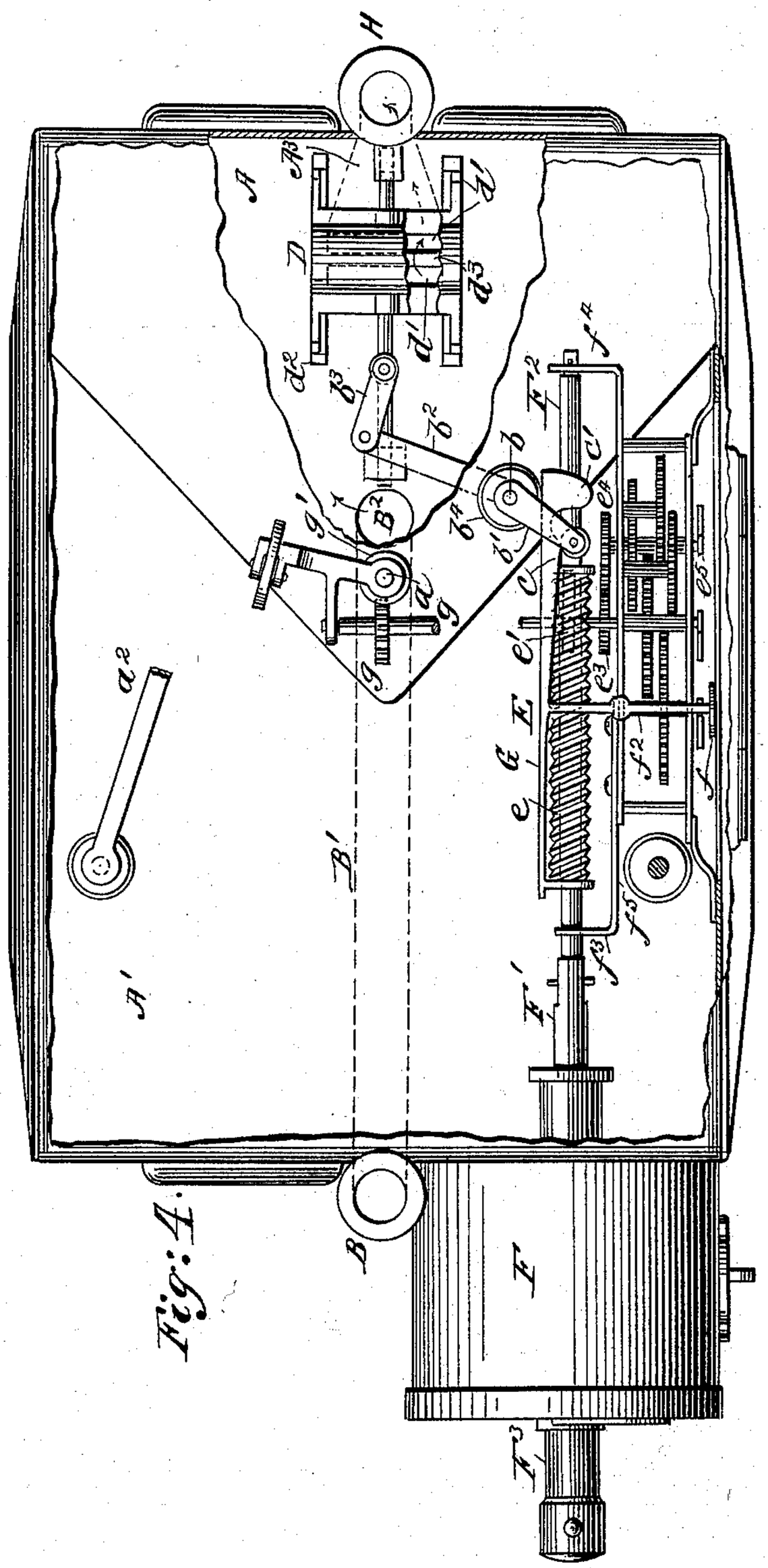

Fig. 4.

WITNESSES:

R. Guthman.

L. Goldstein.

INVENTOR

Charles W. Hinman

BY H. Albertus West

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES W. HINMAN, OF BOSTON, MASSACHUSETTS.

PREPAYMENT GAS-METER.

SPECIFICATION forming part of Letters Patent No. 603,850, dated May 10, 1898.

Application filed September 8, 1896. Renewed November 11, 1897. Serial No. 658,205. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. HINMAN, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Prepayment Gas-Meters, of which the following is a specification.

My invention relates to the construction of gas-meters designed to have attached to them coin-controlled gas-purchasing mechanism and supply-controlling mechanism, whereby a predetermined quantity of gas may be delivered through the meter in exchange for coin deposited in the coin-controlled mechanism; and the invention consists mainly in a valve or cut-off which so acts in conjunction with special construction of the gas-passages and the construction of the supply-controlling mechanism that the power of the meter, running substantially free of extra load, may be practically employed for shutting off the gas automatically at the time of complete delivery of the quantity of gas purchased.

The invention also consists in the special construction, arrangement, and combination of parts, all as hereinafter described and claimed.

In the accompanying drawings, to which reference is made and which form a part of this specification, Figure 1 is a front elevation of a meter having my invention applied thereto. Fig. 2 is a sectional plan view with the top of the meter-casing removed and a portion of the top of the valve-chamber broken away and showing in dotted lines the passages to the inner bellows or diaphragm chamber and showing also in dotted lines the gas-passage beneath the floor of the meter and the so-called "frog-chamber," the chamber to which the gas is admitted from the bellows-chambers and from which it passes to the eduction-pipe. Fig. 3 is a similar view of a portion of the supply-controlling mechanism, the valve D being omitted. Fig. 4 is a like view to Fig. 2, the valves C C′ being omitted; and Fig. 5 is a detailed sectional elevation showing the gas-passage, the valve-chamber, and the valve D.

A represents the valve-chamber of the meter, to which gas is admitted through the inlet pipes or passages B B′ and port B^2, the latter formed in the floor B^3 of the meter. In the said chamber A are fitted three slide-valves C, C′, and D. The valves C C′ are alternately reciprocated continuously while the meter is in operation by a crank a' on the vertical worm-shaft a, which is revolved by the flag-arms a^2 a^3, attached to the crank a^4. (See Figs. 2 and 3.) The valve D is reciprocated by the supply-controlling mechanism E, operating in this instance through the medium of a shaft b, its upper arm or crank b', its lower crank b^2, and the connecting-rod b^3, which connects the crank b^2 with the stem of the valve. The shaft b works in a stuffing-box b^4 to prevent escape of gas from the valve-chamber into the attic A′ of the meter above the floor B^3.

The supply-controlling mechanism E selected to be shown is of the reciprocating type, constructed mainly upon the plan shown in Letters Patent No. 526,251, granted to William N. Milsted September 18, 1894, but provided with a cam c for opening the valve D and with an arm or lug c' for closing said valve when the supply purchased at any one time has been consumed.

F represents the coin-controlled purchasing apparatus, which, as here shown, is the same as that described in Patent No. 550,633, granted to Frank E. Morgan December 3, 1895, and need not be described in detail more than to say that its shaft F′ is connected to the spline-shaft F^2 of the supply-controlling mechanism E and that both can be turned in one direction only by the handle F^2 through a given space for each operation upon the introduction of a coin of a given size or value into the slot of the said coin-controlled apparatus, as indicated in Fig. 1. Upon the said spline-shaft F^2 is placed a worm e, which engages with the teeth of a small gear-wheel e', keyed on the same shaft e^2 with another small gear-wheel e^3. The latter gear-wheel meshes with another gear-wheel e^4 on the inner end of the thousand-foot shaft e^5 of the usual meter-index mechanism. The gear-wheel e^4 locks gear-wheels e' and e^3 from backward movement, so that when the spline-shaft F^2 and the worm e are revolved by the purchaser of gas after the introduction of a coin into the slot of the coin-controlled mechanism the worm acting in the teeth of the gear e' is caused to slide on the

spline-shaft F^2 a given distance for each coin inserted, which movement prescribes the amount of gas to be delivered through the meter in exchange for the coin. This amount is indicated by a pointer f on the dial f'. (Shown in Fig. 1.) The said pointer is carried by an arm f^2, attached to a frame G, which is moved back and forth by the worm e on the spline-shaft F^2, which latter turns in the ears f^3 f^4, formed at the ends of a plate f^5—the back plate of the index mechanism. When gas is flowing through the meter and the two-foot shaft g is revolved by the worm g' and gear-wheel g^2, the slow revolution of the thousand-foot shaft e^5 turns gear-wheels e^4, e^3, and e' and causes the latter to react on the worm e and to slide it and the frame or carrier G back along the spline-shaft F^2, as will be understood by comparing the position of the worm shown in Fig. 2 with that shown in Fig. 4, the latter showing the position immediately after one coin has been inserted, the former the position after the supply purchased has been consumed.

The frame G, as above stated, is formed with a cam c and lug c', which engage the operating-crank for valve D. The cam c, immediately on the forward movement of the frame G, turns the crank b' and opens the valve D and admits a flow of gas through the meter, and the lug c' at the proper time acts to return the said arm and to close the valve, as shown in Fig. 2, and to cut off the flow of gas through the meter when in its movement backward the frame G reaches the end of its stroke. As the movement of the frame G is comparatively slow, the valve D will operate to cut off the gas gradually, and hence dim the light for a sufficient length of time to allow a renewed purchase of gas to be made before the gas is entirely cut off and the lights put out.

As above stated, the gas enters the valve-chamber through the inlet passage or port B^2 in the floor of the meter, the passage B' being closed by a partition j, (shown in Fig. 5,) so that entrance of gas to the so-called "frog" or exit chamber A^2 of the meter below the floor B^3 is prevented, except by way of the valves C C', after entering the bellows or diaphragm chambers of the meter. This action is usual in meters—that is to say, the gas in valve-chamber A passing, say, down port h, Figs. 2 and 3, enters the outer diaphragm-chamber on that side of the meter. The pressure will force the diaphragm inward toward the center of the meter and cause its flag-arms to turn the central crank-shaft a and cause valve C to close said port h. At the same time port h' will be opened, which will admit gas to the opposite or inner diaphragm-chamber on that side of the meter, the gas passing from port h' to a passage h^3, (shown in dotted lines,) which leads to the said inner diaphragm-chamber of the meter. The passage h^3 is separated from the frog or exit chamber A^2 of the meter by a partition i. (Shown in dotted lines, Figs. 2 and 3.) At the same time port h' is opened the space h^4 of valve C will put port h into communication with the central port h^5, which latter connects with a passage h^6, formed by the partition i and an opposite partition i', (shown in dotted lines,) and the gas from the outside diaphragm-chamber of the meter passes through said passage h into the frog A^2, being forced by the outward movement of the diaphragm, which takes place in consequence of gas entering ports h' and h^3. Further movement of valve C opens port h again and at the same time puts port h' into communication with the said central port h^5 and passage h^6, so that the gas is forced to pass into the frog from the inner diaphragm-chamber. The operation of valve C' is the same as and alternates that of C, just described, and hence the gas is taken from the valve-chamber A and measured in the diaphragm-chambers and discharged therefrom into the frog A^2 beneath the floor of the meter. The frog-chamber A^2 communicates with the eduction-pipe H through the valve D and an opening k in the eduction-pipe, Fig. 4. A partition or dam d is placed in the throat or passage A^3, which passage forms a part of the frog-chamber A^2, which latter, as stated, receives the gas from the ports controlled by the valves C C', and on each side of this said partition a slot or passage d' is formed through the floor B^3 of the meter. Over the said partition d is secured the valve bed or race d^2, formed with a partition d^3, which fits upon the edge of the partition d, and the valve D slides snugly upon this bed or race, and said valve is formed with a space d^4, which when the valve is opened forms a connecting-passage for the slots or passages d' d' for the free passage of gas to the chamber A^3 and the eduction-pipe H, as shown in Fig. 5, and at the same time the valve D separates the valve-chamber A from the passages A^2 A^3, which would otherwise be connected, and when so closed the gas already in the chamber A at the time of closing and the gas in the pipe H and the other pipes in the building continues to escape at the burners. The pressure of gas upon the upper surface of the valve D increases up to about the full main pressure and is thereby held gas-tight on the bed or race d^2. Upon opening the valve D the balance of pressure upon it is restored, and no matter how long it may remain open only a very small amount of power will be required to close it, and the power of the meter may be relied upon to cut off the delivery of gas after the coin's value has been delivered.

By varying the relative lengths of the arms b' b^2 the dimming action of the valve D may be increased or diminished as to time as desired or according to the capacity of the particular meter.

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

1. In a prepayment gas-meter, the combination with coin-controlled mechanism, and supply-controlling mechanism, of a valve operating to cut off the gas in the frog-chamber, and arranged to be closed by the supply-controlling mechanism; substantially as described.

2. In a prepayment gas-meter, the combination with coin-controlled mechanism, and a supply-controlling mechanism, of a valve operated in the valve-chamber by the supply-controlling mechanism and arranged to cut off the gas in the frog-chamber; substantially as described.

3. In a prepayment gas-meter the frog-chamber provided with a partition, and with two ports or slots one on each side of said partition opening into the valve-chamber, in combination with a valve arranged to control said ports and supply-controlling mechanism connected to operate said valve, substantially as described.

4. In a prepayment gas-meter, the combination with coin-controlled mechanism and supply-controlling mechanism, of a valve adapted to cut off the gas in the frog-chamber, a carrier adapted to move in one direction when one of said mechanisms is actuated and in the opposite direction when the other of said mechanisms is actuated, and means whereby said carrier, upon reaching the extreme of its movement by operation of the supply-controlling mechanism, moves said valve to cut off the gas in the frog-chamber; substantially as and for the purposes set forth.

5. In a prepayment gas-meter, the combination with coin-controlled mechanism and supply-controlling mechanism of a valve adapted to cut off the gas in the frog-chamber and to let it on again, a carrier adapted to move in one direction when one of said mechanisms is actuated and in the opposite direction when the other of said mechanisms is actuated, means whereby said carrier upon reaching the extreme of its motion by operation of the supply-controlling mechanism moves said valve to cut off the gas in the frog-chamber, and means whereby said carrier upon receding from said extreme by operation of the coin-controlled mechanism moves said valve to let on the gas again in the frog-chamber; substantially as and for the purposes set forth.

6. In a prepayment gas-meter, the valve-chamber A, and frog-chamber, A^2 A^3, separated by a partition *d*, and connected by passages *d'* in combination with the valves C C' and slide-valve D arranged to control the passages *d'* and connected to be operated by supply-controlling mechanism, substantially as described.

7. In a prepayment gas-meter the valve-chamber A provided with valves C C' and formed with passages *d' d'* to the frog-chamber, and provided with a two-way race d^2, in combination with a partition *d*, in the frog-chamber intermediate of said passage *d'*, and a slide-valve D, for controlling said passages and connected to be operated by the supply-controlling mechanism; substantially as described.

8. The combination in a gas-meter of the valve-chamber A, slide-valves C, C', therein, the frog-chamber A^2, A^3, below the floor B^3, the partition *d*, slots or ports *d' d'* in said floor one each side of the partition and a valve arranged to control said slots or ports, substantially as described.

CHARLES W. HINMAN.

Witnesses:
FRANK E. MORGAN,
CHARLES J. BRECK.