J. PONTON.

Gas Apparatus.

No. 78,006. Patented May 19, 1868.

Fig. 7.

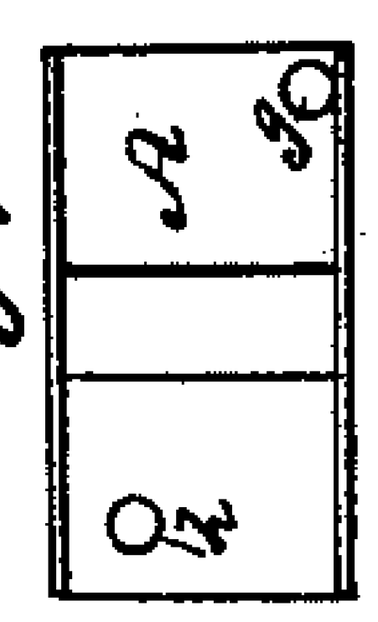


Fig. 6.

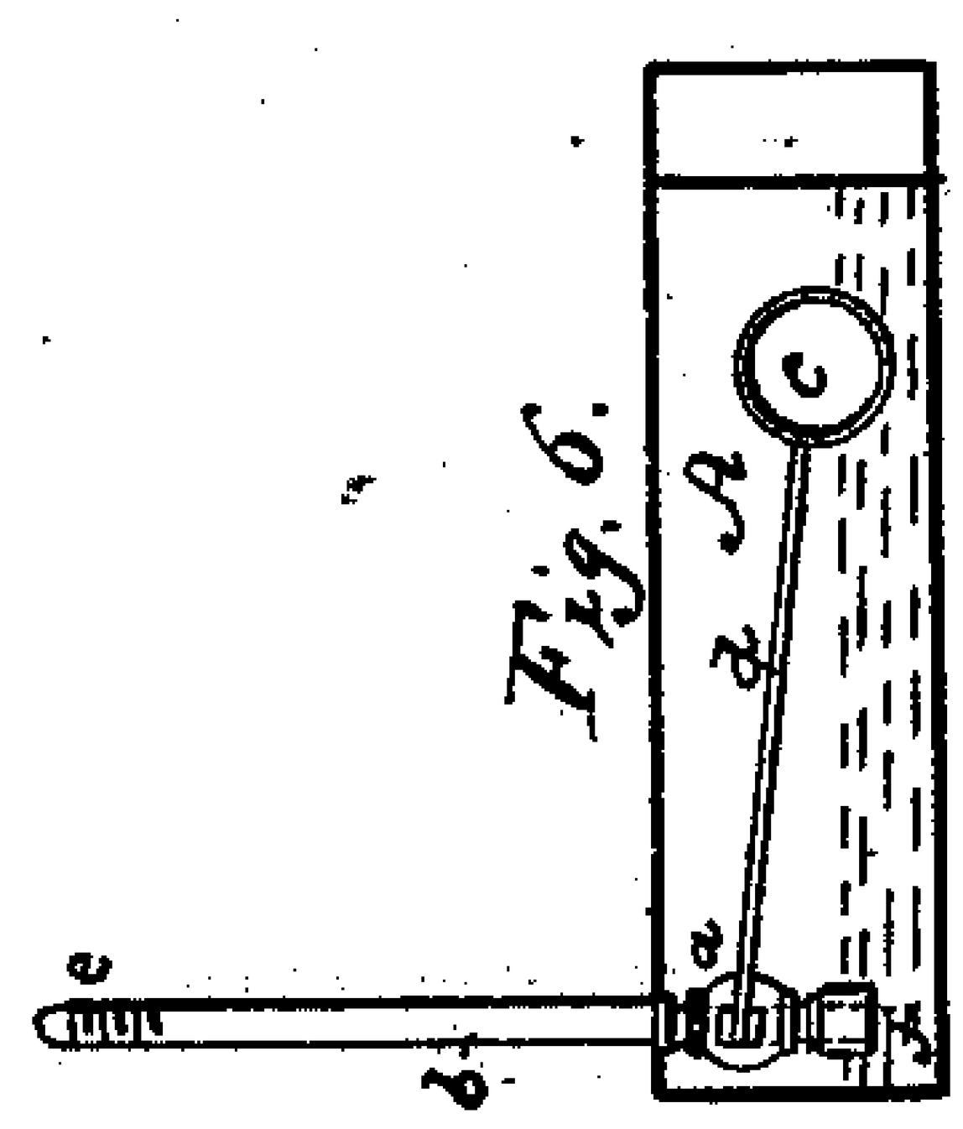


Fig. 1.

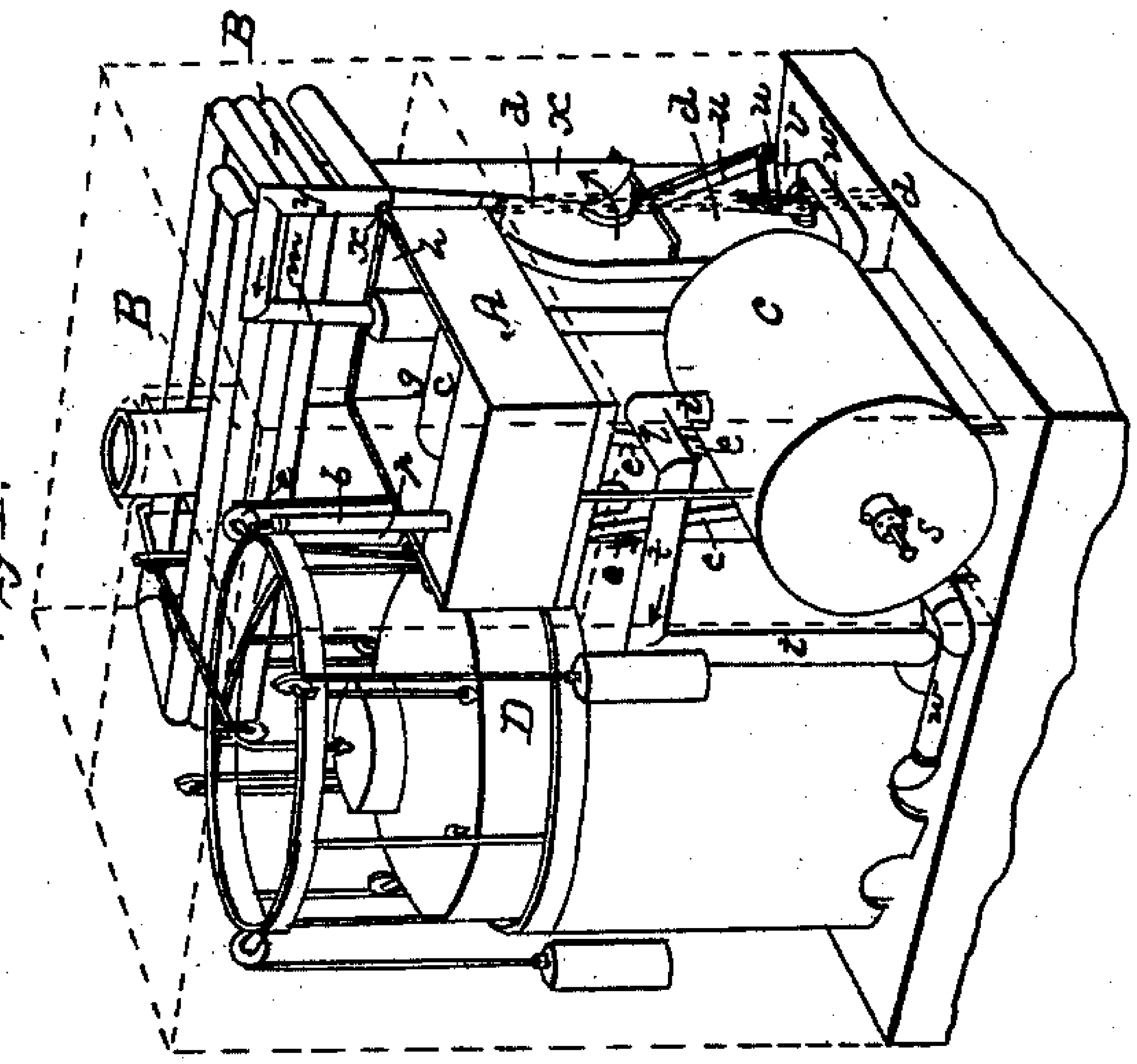


Fig. 3

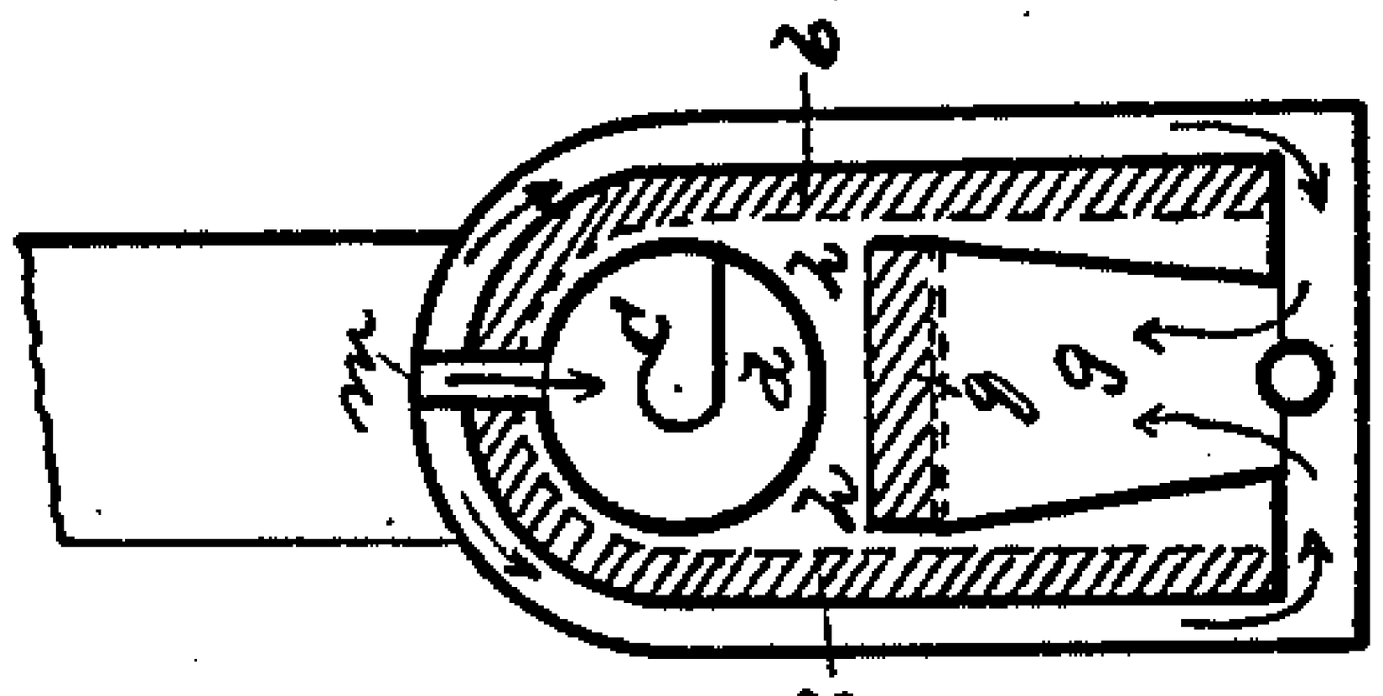


Fig. 5

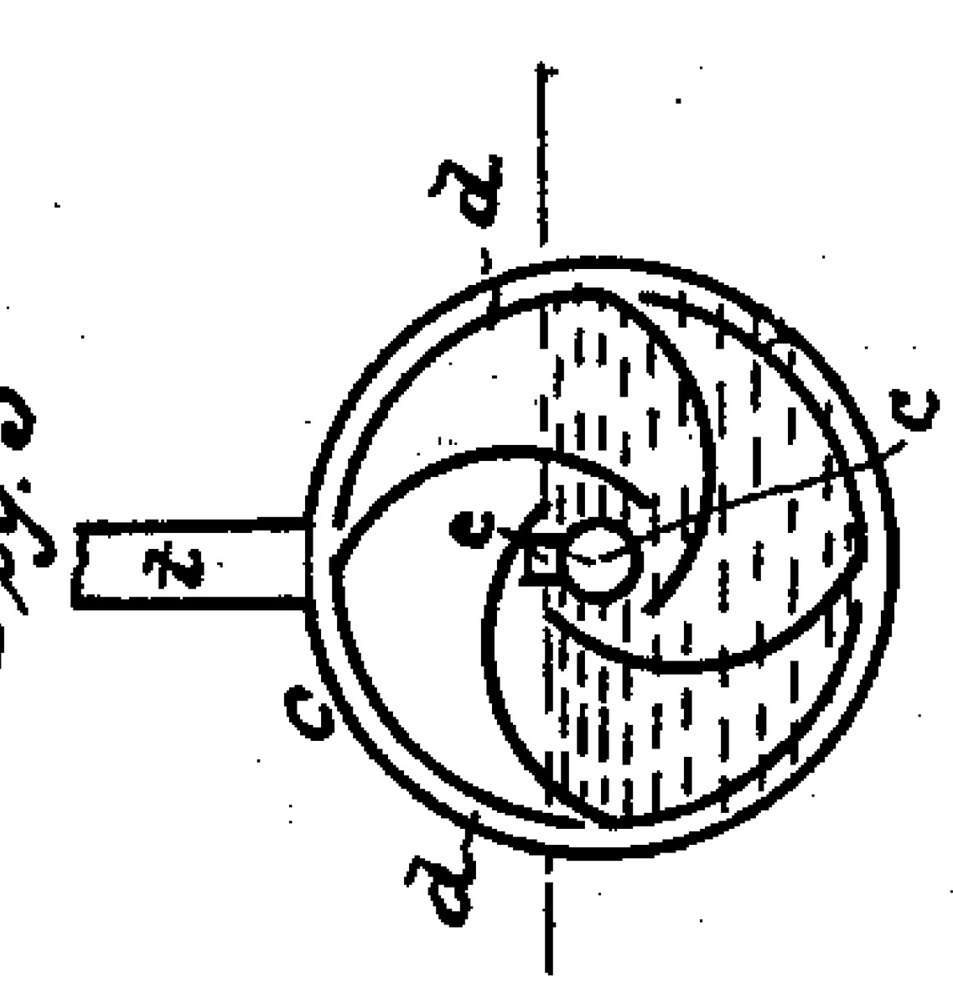


Fig. 2.

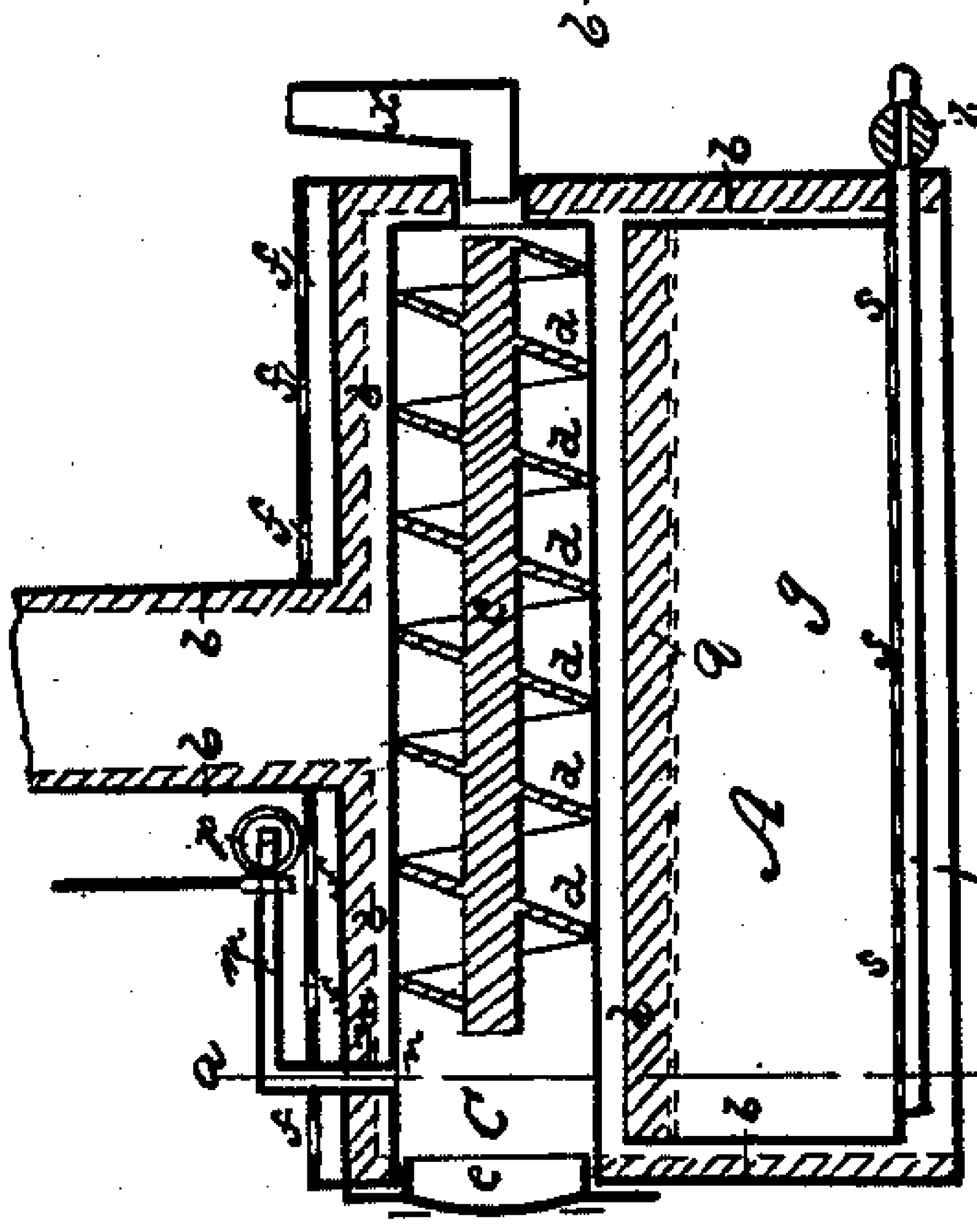
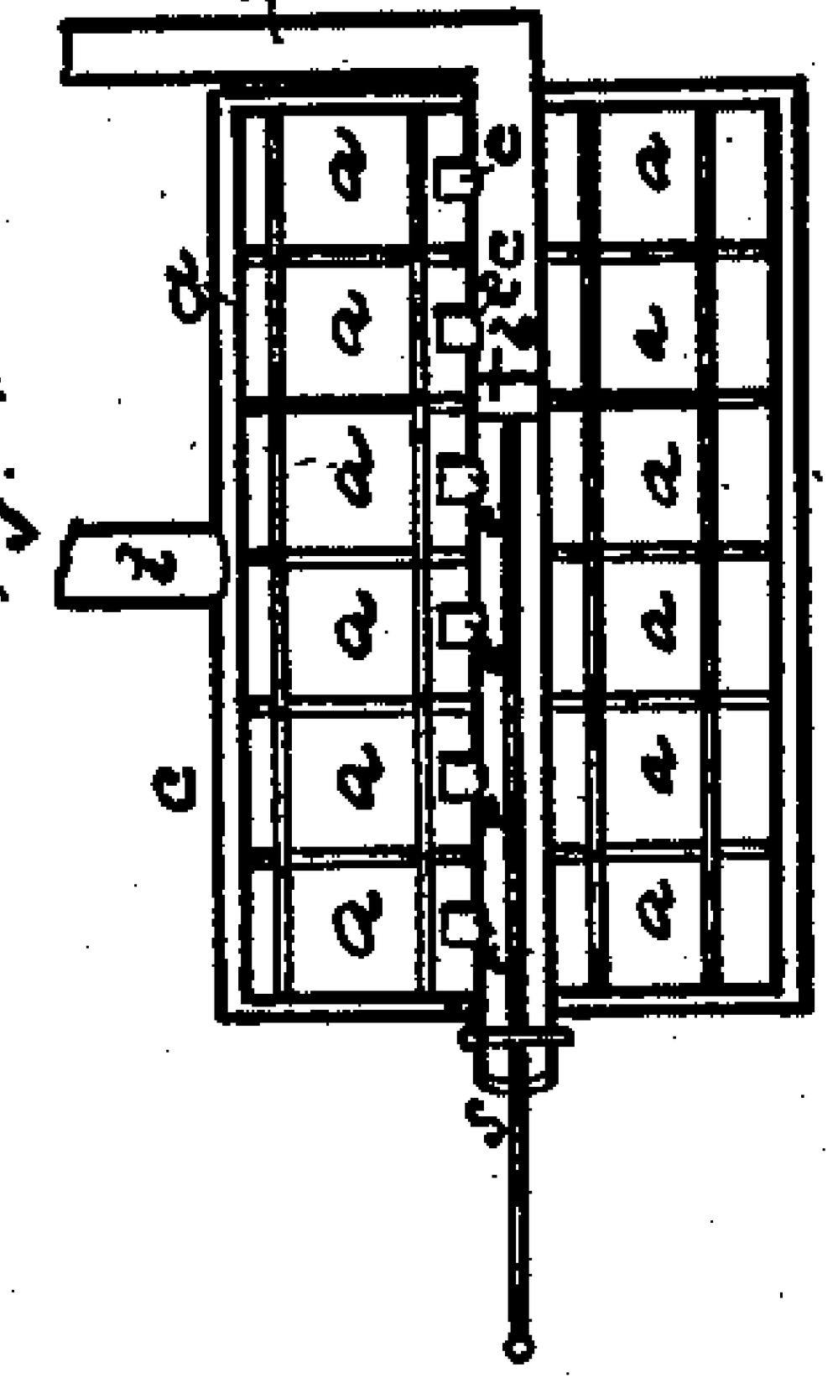


Fig. 4



WITNESSES
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UNITED STATES PATENT OFFICE.

JOHN PONTON, OF BUFFALO, NEW YORK, ASSIGNOR TO HIMSELF AND JACOB F. HAYEN, OF SAME PLACE.

IMPROVED GAS APPARATUS.

Specification forming part of Letters Patent No. **78,006**, dated May 19, 1868.

To all whom it may concern:

Be it known that I, JOHN PONTON, of Buffalo, in the county of Erie, in the State of New York, have invented a new and useful Machine for Making Fixed Illuminating-Gas from Petroleum Oil or other Hydrocarbons; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a perspective view of the whole machine; Fig. 2, a sectional side view of the furnace and retort; Fig. 3, a sectional end view of the same at line *a a* in Fig. 2; Fig. 4, a sectional side view of the air-mixer; Fig. 5, a sectional end view of the same; Fig. 6, a sectional side view of the sub-reservoir, and Fig. 7 an end view of the same.

I construct a furnace or furnaces of any desired size, A, Fig. 2, of which the outer shell is sheet-iron or other suitable material, with an inner lining of fire-brick or other non-conductor of heat, as at *b*, Figs. 2 and 3, so constructed as to leave between them the chamber or space marked by arrows in Fig. 3, in the interior of which furnace I place a movable retort, C, Figs 2 and 3, with an inclination toward the exit *x*, Fig. 2, made of iron or other suitable material, and place therein a movable screw, *c*, Fig. 2, constructed of iron or other suitable material, fitting accurately the interior surface of said retort, the flanges of which are perforated at the base, as at *d d*, Figs. 2 and 3, and arranged in such a manner that it may be withdrawn through the end of the retort by removing the cap *e*, Fig. 2, without interfering with the rest of the apparatus. The chamber marked with arrows in Fig. 3 has communication with the external atmosphere only through apertures *f f f* in Fig. 2.

In the base of the furnace is a chamber marked *g*, Figs. 2 and 3, which is separated from the fire-chamber *h h*, Figs. 2 and 3, by a wire-gauze partition, *i i*, Figs. 2 and 3, and a layer of porous fire-clay, *q*, in Figs. 2 and 3, or other suitable material of sufficient thickness to protect the said chamber *g*, Figs. 2 and 3, from the excessive heat of the flame in the fire-chamber *h h*, Figs. 2 and 3.

Into the chamber *g*, Figs. 2 and 3, is introduced the pipe *k k* in Figs. 2 and 3, perforated with holes at the top (marked *s s* in Fig. 2) along its entire length, on the outer end of which pipe is a check-valve, *l*, in Fig. 2, for the purpose of regulating the admission of gas into said chamber.

m m in Figs. 2 and 3 is a pipe through which petroleum or other fluid hydrocarbon is introduced into the retort C, Fig. 2, through the aperture marked *n n*, Figs. 2 and 3, from the reservoir, Figs. 6 and 7, and marked A in Fig. 1, the supply being regulated by a spring-valve marked *p*, Figs. 1 and 2.

A in Fig. 1 is a reservoir hermetically sealed for holding the petroleum or other fluid hydrocarbon in such quantities as may be required, constructed of iron or other suitable material, which is fed from the main tank or source of supply through the pipe *b* in Figs. I and VI.

c in Figs. I and VI is a float of any suitable material, connected by the rod *d* in Fig. VI with the valve *a* in Fig. VI, practically forming a float-valve regulating the supply of oil and maintaining it at a fixed level in said reservoir.

e in Figs. I and VI is a ball-valve, the proper position of which is at *f* in Fig. VI, intended to prevent the return of the oil to the main source of supply from any undue pressure in said reservoir.

Aperture *g* in Figs. I and VII is the point at which the supply-pipe for the retort *m m* in Fig. 2 is connected with said reservoir, and aperture *h* in Figs. I and VII is the point at which any distillate may be returned to said reservoir from the condenser marked B in Fig. 1.

C in Fig. I is an air mixer, of which Figs. 4 and 5 are sectional views, containing any desired number of chambers, as *a a a*, Fig. IV, into which the gas is introduced from condenser B, Fig. I, through the pipe *m* in Figs. 1 and IV, and into which atmospheric air is introduced through apertures *s s* in Figs. I and IV.

Fig. V is a sectional view of each of the chambers of the air-mixer, into any of which chambers either gas or air is admitted by moving the piston *b* in Fig. IV at pleasure in the tube *c*, Figs. 4 and 5. *d d* in Figs. 4 and 5 is the outer chamber, where the gas and air are mixed before passing into the gasometer

(marked D in Fig. 1) through pipe *t*, Figs. I, IV, and V.

e e in Figs. IV and V are the pipes above the water-line, through which the gas or air respectively is introduced into the said chambers *a a* in Fig. IV.

D in Fig. I is an ordinary gasometer, which by its rise or fall moves the weight *r* in Fig. I, attached to the spring-valve *p* in Figs. I and II, which regulates the supply of oil to the retort C, Figs. 2 and 3.

The dotted lines in Fig. I represent the frame in which the whole apparatus is contained, made of iron or other suitable material, the chief purpose of which is to separate the heated furnace from the rest of the apparatus by a water compartment, as at *d d* in Fig. I, and also for the purpose of having the condenser B and oil reservoir A, Fig. I, and the feed-pipe *e e*, Fig. I, and other pipes and connections completely submerged in cold water.

u u in Fig. I is an adjustable elbow, of brass or other suitable material, which is so connected with the outer end of the retort, and with the check-valve *v* in Fig. I and *l* in Fig. 2, that the expansion or contraction of said retort will open or close the said valve and regulate the supply of gas to the furnace in the proportions required.

n, Fig. I, is a pipe leading from the gasometer D, Fig. I, to the furnace under the retort, regulated as last above described.

x x, Figs. I and II, is the escape-pipe from the retort, connecting with condenser B, Fig. I; and *z* in Fig. I is a pipe through which the distillate enters the reservoir A from condenser B in Fig. I, (*h* in Fig. VII.)

The following is the operation of my machine: Gas being admitted through the valve *l*, Fig. 2, from any source of supply, passes through the pipe *k* in Figs. 2 and 3, and through small apertures in the top of said pipe (marked *s s* Fig. 2) into the chamber *g*, Figs. 2 and 3, where it is mixed with atmospheric air supplied from the apertures *f f*, Fig. 2, said current of air being described by arrows in Fig. 3. In that state of intermixture the gas and air passes through the wire-gauze *i i*, Figs. 2 and 3, and also through the porous fire-clay *q q*, Figs. 2 and 3, at which point it is ignited. As the furnace becomes heated the current of atmospheric air, (marked by arrows in Fig. 3,) becoming heated, returns the waste heat into the chamber *g*, Figs. 2 and 3, where it becomes utilized in increasing the temperature of the gas and air previous to ignition, until the required degree of heat is attained in furnace *h h*, Figs. 2 and 3. The heat having equal access to all sides of the retort C, Figs. 2 and 3, gradually expands said retort. When the required degree of heat is attained—say 900° Fahrenheit—the elbow marked *u u*, Fig. I, being attached to the outer end of said retort, is then adjusted to said valve *v* in Fig. I and *l* in Fig. II, so that any increased expansion of said retort will shut off the flow of gas and any contraction will turn it on. The required degree of heat having been attained in the retort, the petroleum or other fluid hydrocarbon is admitted into the reservoir A, Fig. I, through the pipe *b*, Fig. I, from any main source of supply, from thence finds an exit through the aperture *g*, Figs. I and VII, into the pipe *e e* in Fig. I, passes through the spring-valve *p*, Figs. I and II, and into the retort C, Figs. 2 and 3, through the pipe *m m*, aperture *n*, Figs. 2 and 3, where it is instantly decomposed as it comes in contact with the heated inner surface of said retort, and in the shape of gas passes round the screw *c*, Fig. 2, until it finds an exit at *x*, Fig. 2, into the condenser B, Fig. I. Should any portion of the fluid hydrocarbon not be instantly decomposed, it will flow down the inclined plane through the perforations *d d* in Figs. 2 and 3 in the base of the flanges of the screw *c*, Fig. 2, and become decomposed in such passage. From the point *x* in Figs. 1 and 2 the gas passes through the condenser B in Fig. I, where any unfixed portion will become condensed and find its way through the aperture or connection *z*, Fig. I, into the reservoir A, Fig. I, again to be passed through the retort, while all the fixed gas will ascend through the pipe *y* in Fig. I and pass and run through the pipe *m*, Fig. I, into the air-mixer C, Fig. I, where it is mixed with atmospheric air, as previously described, in proportions as arranged by piston *b*, Fig. 4, and from thence passes through the pipe *t* in Figs. I, IV, and V into the gasometer D, Fig. I, and is ready for illuminating purposes. As the gasometer rises it raises the weight *r*, Fig. I, which is attached to the spring-valve *p*, Figs. I and II, thereby stopping the supply of oil, and as the gas is consumed and the gasometer falls the weight *r*, Fig. I, is released and the oil readmitted through the spring-valve *p*, Figs. I and II, this operation continuing so long as there is any consumption of gas.

What I claim is—

1. An automatic machine, substantially as above described, for the purpose of making fixed illuminating-gas, which will regulate itself and maintain any desired degree of heat, and supply itself with petroleum or other fluid hydrocarbon in exact proportion as the gas generated by such machine is used or consumed from the gasometer.

2. The use of a retort arranged with an inclination, together with a movable screw or its equivalent, in the interior, substantially as described, arranged in such a manner that the gas generated from petroleum or other hydrocarbon will have to travel over the whole interior surface of said retort previous to its being let free.

3. The application of any mechanical device attached to said retort, in the manner substantially as above described, whereby the expansion or contraction of said retort will regulate the supply of fuel to the furnace.

4. The application of any pyrometer to any

retort, in connection with any mechanical device which will automatically regulate the supply of fuel to any furnace used in the manufacture of gas.

5. The application of a gas-furnace, substantially as above described, for the above purpose, the chief principle of which consists in utilizing the waste heat of the furnace for the purpose of causing the gas and atmospheric air which are used as fuel to be mixed at any high temperature before ignition.

6. A sub-reservoir in the above connection, substantially as described, the chief principle of which consists in its being hermetically sealed and entirely submerged, and so connected with the retort that the pressure of gas will drive the oil or other fluid hydrocarbon from the sub-reservoir to the retort, in lieu of atmospheric pressure.

7. The application of a float-valve, substantially as described, in connection with a reservoir, the chief principle of which consists in admitting only sufficient oil to said reservoir as will maintain any fixed level.

8. In connection with said reservoir, a ball, check, or other valve, substantially as described, the chief principle of which is to prevent the return of any fluid or gas from said reservoir to the main source of supply from any undue pressure in said reservoir.

9. The application of an air-mixer, arranged upon the principle of the old wet-meter, substantially as above described, in connection with said apparatus, the chief principle of which consists in having any desired number of compartments, and each compartment having buckets running in one and the same direction, so that air or gas can be admitted to either compartment by a movable piston or its equivalent, thereby mixing the gas and air in metrical proportions, as required. I do not claim a meter or air-mixer in which the buckets are reversed.

10. That the said mixer may be worked by power other than the pressure of gas, which will then answer the purpose of exhausting the gas from the retort and relieving it from pressure, as well as mixing the air and gas.

11. The application of a feed-pipe to the retort, substantially as above described, the chief principle of which consists in being totally submerged in cold water to the very point of ingress to said retort.

12. The application of a spring or other valve, substantially as above described, attached to the said feed-pipe, and arranged in any manner similar to that above described, so that the rise or fall of the gasometer will regulate the supply of oil to the retort.

13. In connection with above apparatus, a tank or tanks, arranged in any manner, so as to protect the different parts of the above apparatus from heat.

14. A condenser, substantially as above described, arranged in such a manner that the distillate will return to said reservoir.

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Witnesses:
BEN. P. WRIGLEY,
JAMES WINSHIP.