(No Model.) 3 Sheets—Sheet 1.

C. M. KEMP.

AIR GAS MACHINE.

No. 564,429. Patented July 21, 1896.

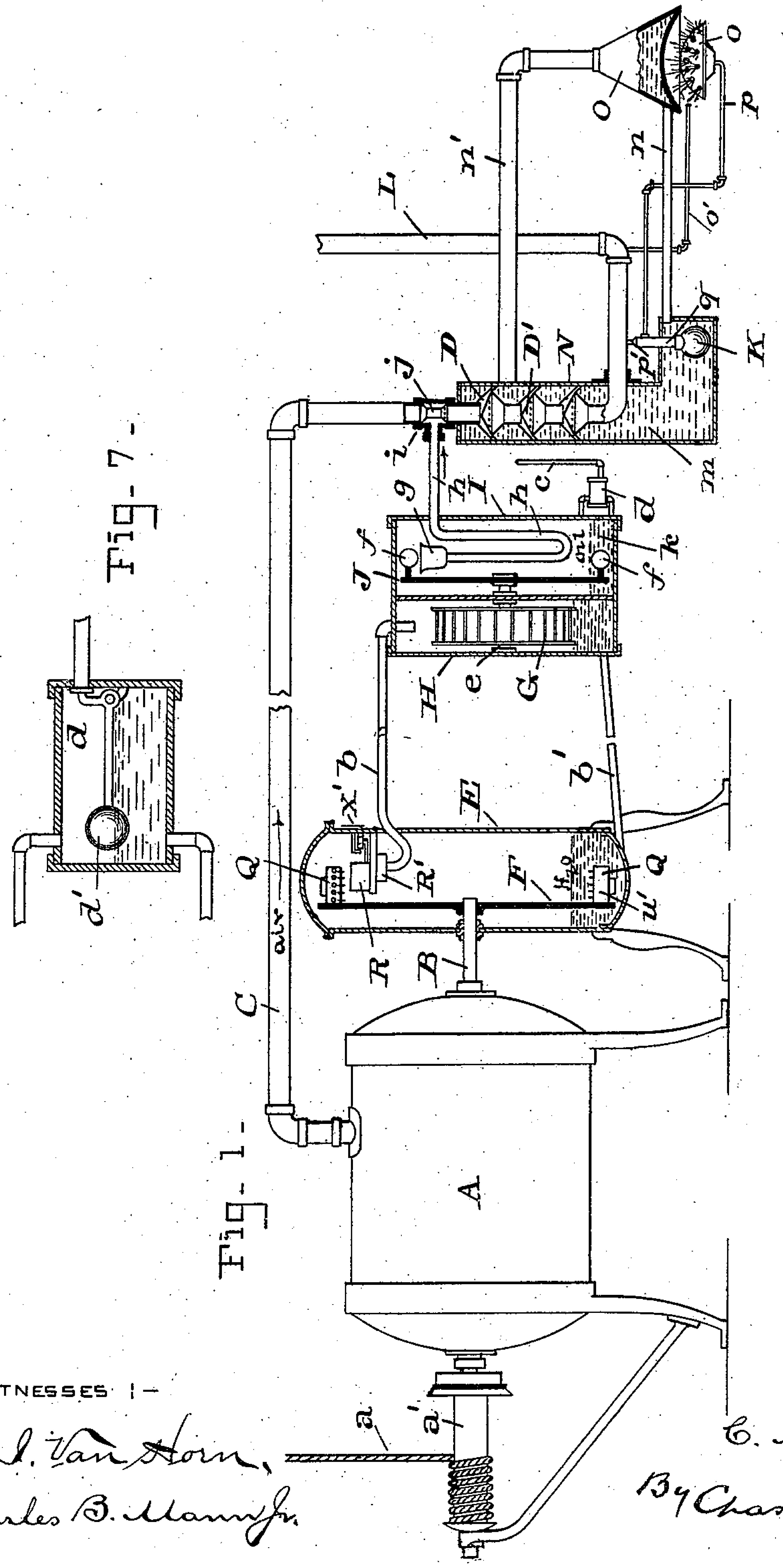

Fig. 7.

Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

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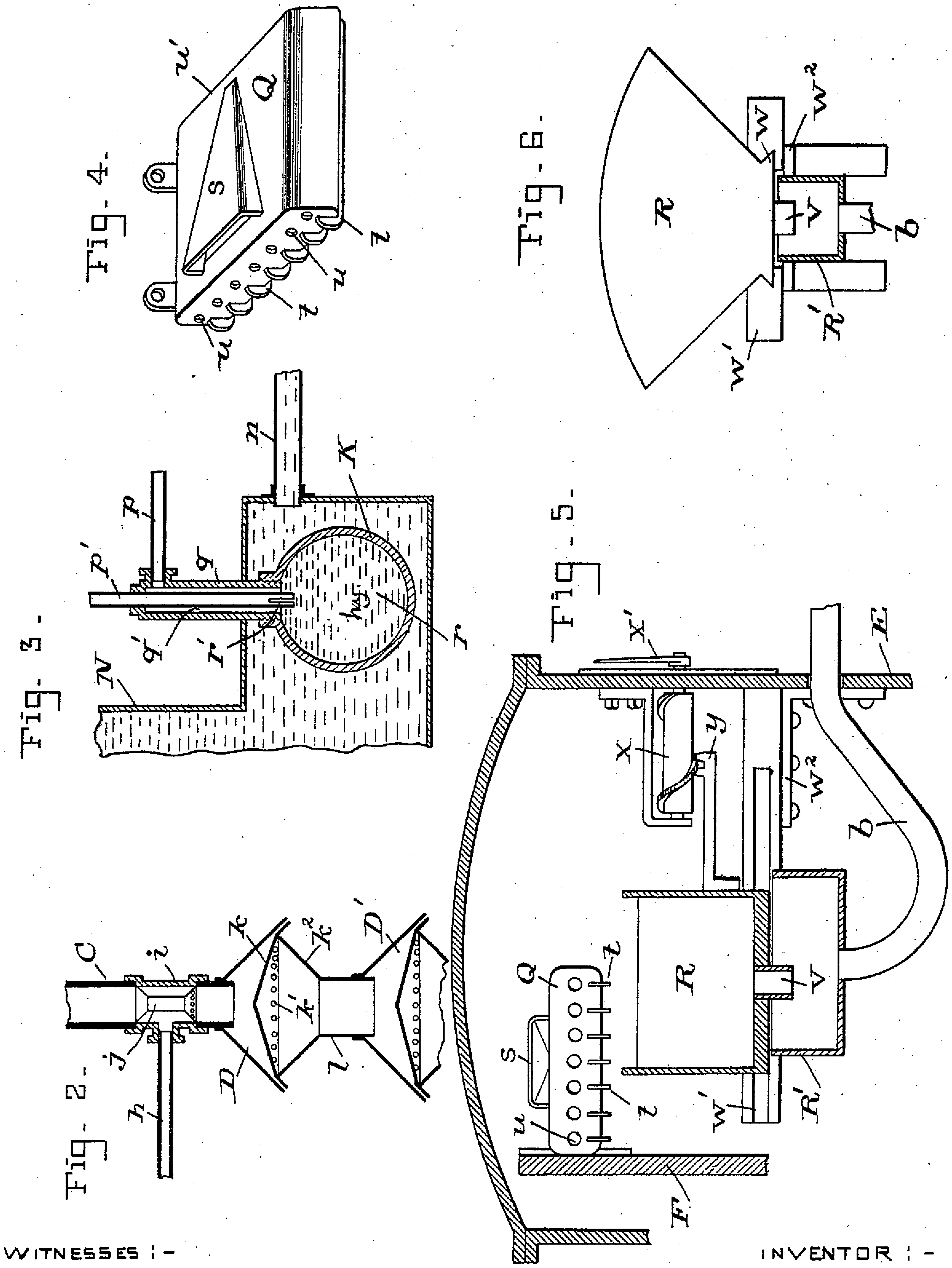

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(No Model.) 3 Sheets—Sheet 3.

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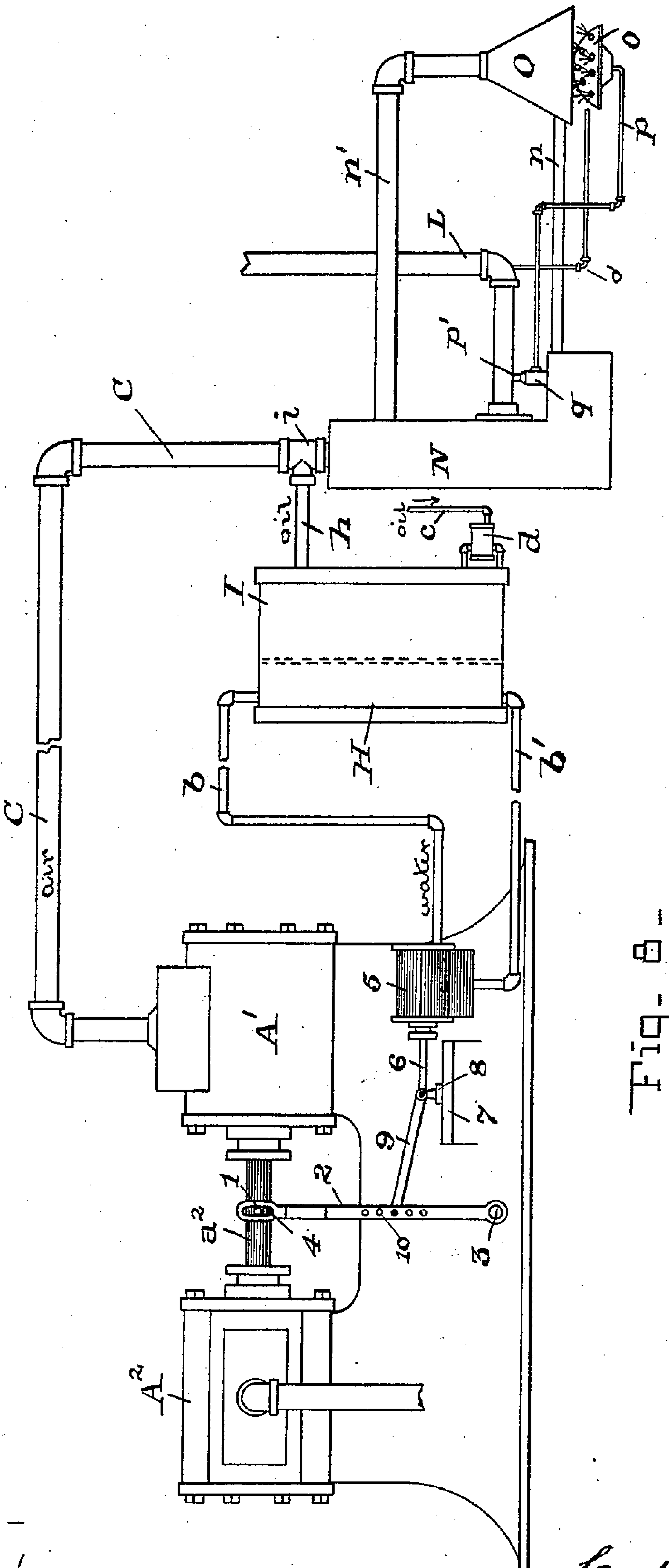

Fig. 8.

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UNITED STATES PATENT OFFICE.

CLARENCE M. KEMP, OF BALTIMORE, MARYLAND.

AIR-GAS MACHINE.

SPECIFICATION forming part of Letters Patent No. 564,429, dated July 21, 1896.

Application filed July 26, 1895. Serial No. 557,256. (No model.)

To all whom it may concern:

Be it known that I, CLARENCE M. KEMP, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Air-Gas Machines, of which the following is a specification.

This invention relates to an improved apparatus for combining atmospheric air and the vapor of a hydrocarbon liquid in definite or predetermined proportions in order to produce a gas of uniform quality.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation, partly side view and partly in section, of the improved apparatus. Fig. 2 is a view of the mixer separately. Fig. 3 is a view of the thermostatic cut-off device. Fig. 4 is a perspective view of one of the water-cups belonging to the water-lifting wheel. Fig. 5 is a view showing the details of construction of the means for adjusting the measured quantities of water delivered by the water-supply wheel. Fig. 6 is an end view of the adjustable water-funnel. Fig. 7 is an enlarged view of the float-valve which regulates the supply of hydrocarbon fluid. Fig. 8 is an elevation showing my invention applied to a different style of air forcing and measuring device than that seen in Fig. 1.

The letter A designates a suitable air-forcing device, which is also in the present instance a meter of well-known construction. The wheel of this meter is in the case A, and is mounted on the shaft B, which is rotated by a cord *a*, wound on a spool *a'* on the shaft. A weight (not shown) attached to the cord causes the air measuring and forcing wheel to revolve. The pipe C delivers the air to the mixer D. A box or receptacle E for water or other suitable liquid contains a water-supply wheel F, which is mounted on the end of the shaft B of the meter-wheel. This wheel elevates water and supplies it in measured quantities to a water-wheel G, inclosed in another compartment H. The measured quantity of water delivered by the water-supply wheel may be varied, to suit the requirements, so as to be more or less, by means of an adjustment hereinafter described. A pipe *b* conveys the elevated and measured water to the compartment H, and delivers said water into the top of the power-wheel G, and this latter wheel is thereby caused to revolve. Another pipe *b'* leads from the bottom of the compartment H back to the receptacle E. Adjoining the power-wheel compartment H is another compartment I for hydrocarbon liquid. The supply of liquid to this compartment is by a pipe *c*, and is regulated by a valve *d*, which is governed by a float *d'*. The pipe *c* leads from a reservoir or storage. (Not shown in the drawings.)

The hydrocarbon-compartment I contains a feed-wheel J, which is mounted on the same shaft *e* that carries the power-wheel G. The feed-wheel J carries a number of small dippers *f*, which, when at their lowermost position, are filled with the hydrocarbon liquid *k*, and as the feed-wheel turns these filled dippers are emptied into a funnel *g* on the upper end of a trapped pipe *h*, which leads to the mixer D.

It will be seen from the foregoing description that the supply of water which turns the power-wheel G is measured by the water-lifting wheel F, and this latter is turned directly by the shaft B of the wheel of the meter, and that the water which operates the power-wheel G runs back to the receptacle E, and thus the same water is used in this operation over again and again. It will also be seen that as the power-wheel G is not turned by a positive gearing, but is turned by definitely-measured quantities of water, which quantity may be increased or diminished, as hereinafter described, the feeding of the hydrocarbon liquid is under perfect control, and the proportion thereof relative to the air-supply may be varied as desired.

The air-delivery pipe C, the oil-supply pipe *h*, and the mixer D are united by a T-joint *i*. Within the T-joint is an oil-spreader *j*, and both air and oil pass below this spreader to the mixer. The mixer has a cone-shaped diaphragm *k*, which is provided with small holes *k'*, through which both the air and oil pass downward to a funnel k^2, and thence through a contracted throat *l* to another mixer D' of similar construction. Several of these mixers are mounted one above the other and all connected so that the air and oil are intimately associated, and the air thus becomes carbureted. From the lower end of the mixer the gas-pipe L leads to the burners, where the gas is to be consumed.

The mixers D D′ are inclosed in a vertical jacket N, which contains water *m*, and this jacket is connected with a water-heater O by means of a small and large circulating-pipe *n n′*. The small pipe connects the lower part of the jacket with the lower part of the heater, and the large or return pipe *n′* connects the upper part of the heater with the upper part of the jacket, and thereby a circulation is established when heat is applied to the heater O.

By inclosing the carbureter in a jacket through which heated water circulates, a uniformity of temperature throughout the entire surface of the carbureter is insured, and as the carbureter is entirely surrounded by water no explosion or taking fire of gas could occur in the event of the carbureter leaking. Flame is not in contact with the carbureter at all.

A burner *o* is under the heater, and a pipe *p* supplies this burner with gas. I have provided a thermostatic cut-off to control the supply of gas passing to the burner *o*. One form is herein shown, but any other suitable form may be used. The gas-pipe *p p′* connects with the main gas-pipe L. (See Figs. 1 and 3.) From the main pipe the pipe *p′* extends down into a neck *q* of a globe K, which contains mercury *r*. This globe is in the lower part of the water-jacket N, and the neck *q* passes out of and is fitted water-tight in the wall of this jacket. An annular space *q′* is formed in the neck between the down-pipe *p′* and the wall of the neck, and this space is open at the bottom, so as to allow the mercury in the globe, when it expands, to rise up in the said annular space. The lower end of the down-pipe has a vertical slot *r′*. The pipe *p* connects with the neck *q* and opens into the annular space *q′*, and thence extends to the burner *o*. Normally at the ordinary temperature the mercury in the globe does not touch the lower end of the down-pipe *p′*, and there is a free communication from the gas-pipe L to the globe K, annular space *q′*, and from thence through pipes *p* to the burner *o*. When the water in the jacket N warms up, the mercury expands until the temperature of the water is raised to the maximum point, which is sufficient to cause the mercury *r* to rise in the neck and close the vertical slot *r′* in the lower end of the pipe *p′*, and thereby cut off the flow of gas from the gas-pipe L to the burner *o*, and thus prevent any increase of heat. A small pipe *o′* from the gas-pipe L is for a constantly-burning jet-flame to relight burner *o*.

Referring now to Figs. 1, 5, and 6, the water-supply wheel F carries cups Q of special construction. These cups comprise a rectangular chamber having on one surface a funnel-shaped inlet *s*, which is on the under side of the cup when the cup is at the lowermost position, and said cup has on the opposite surface a number of drip-ribs *t*, extending parallel and the extremities of the ribs curving up at one end of the cup. One end *u′* of the cup is tight, but the other end is provided with outlets *u*, being small holes, one hole adjoining the curved-up extremity of each rib. The parallel drip-ribs extend in a direction at right angles with respect to the axis of the water-supply wheel F. By this construction when a cup Q is at the bottom of the wheel it dips in the water and fills at the funnel-shaped inlet *s*, and when the cup is at the top of the wheel the water it holds will run out of the small outlet *u* and onto the ribs *t*, from which the water will drip into the funnel R and pass therefrom by the pipe *b* to the power-wheel G.

The funnel R is movable horizontally in line or parallel with the axis of the water-supply wheel F, and in its bottom has a discharge-nozzle *v*, which is immediately over a fixed funnel or box R′, from which the pipe *b* leads. The funnel R′ has base-flanges *w*, which fit in horizontal guides *w′*. These two guides and the fixed box R′ are supported by a bracket w^2. When the wheel F revolves, the cups Q are carried over the funnel R, and said funnel is adjustable horizontally, so as to take position below one, two, or any number of the drip-ribs *t*, as seen in Fig. 5. The means for shifting the adjustable funnel R is a worm-shaft *x*, which is turned by a handle or lever *x′*. This worm acts on a grooved lug *y*, fastened to the funnel. It will be seen that when the handle *x′* is turned the funnel R will be moved in either direction on the guides *w′*, that is, toward the wheel F or away from the said wheel, and thus the funnel may be set to catch the water dropping from any desired number of the ribs *t*. In Fig. 5 the funnel is shown as having position below four of these ribs *t*, but it may be moved so as to take under only one or two ribs, or under five or more, and thus the measured quantity of water may be varied, and consequently the speed of rotation of the power-wheel G will be regulated to cause the feed-wheel to supply the hydrocarbon liquid slower or faster, as desired.

From the foregoing description it will be understood that my invention provides means to elevate water or other liquid in measured quantities and supply it to operate a hydrocarbon feed-wheel, and this means is operated by the movable part of the air-forcing meter. This combination is believed to be new.

In Fig. 8 my invention is shown embodied in a modified form and in connection with an air-forcing meter of a different type from that shown in Fig. 1.

In Fig. 8 the letter A′ designates the air-forcing meter, which in this instance is an ordinary pump-cylinder having a piston, the rod a^2 of which is shown connected with a steam-cylinder A^2. In this figure the mixer or carbureter inclosed in the water-jacket N, air-pipe C from meter A′ to the mixer, the water-wheel or power-wheel, which is inclosed by the case H, the hydrocarbon-compartment I, which contains the feed-wheel, hydrocarbon-pipe *h*, connecting with the mixer, heater O, and the various pipes connecting with the water jacket and heater, are all the same as in Fig. 1; but the receptacle E, water-supply wheel F for elevating the water, and the means for adjusting the measured quantities of water delivered by the water-supply wheel, which are in Fig. 1, are all dispensed with in the apparatus shown in Fig. 8. These means in Fig. 1 are operated by the movable part of the air-forcing meter, and in Fig. 8 I have substituted other means which will produce the same results and which are operated by the movement of the piston of the air-forcing cylinder A′.

In Fig. 8 the piston-rod a^2 has a pin 1, and an upright lever 2 has its lower end pivoted at 3 and its upper end provided with a slot 4, which engages the said pin 1 on the piston-rod. Thus as the piston-rod reciprocates the lever 2 must vibrate on its pivot. A water-supply pump or cylinder 5 has a piston-rod 6, a slideway 7, a cross-head 8, which reciprocates on the slideway, and a rod 9 connects the lever 2 with said cross-head. Thus every movement or stroke of the piston a^2 of the air-forcing pump A′ operates the piston of the water-supply pump 5, which in this instance is the substitute for the wheel F, (shown in Fig. 1,) which elevates the water and supplies it in measured quantities to the power-wheel inclosed in the compartment H. The pipe *b* conveys the measured water to the compartment H, where it serves to turn the power-wheel, and the pipe *b′* returns the water to the supply-pump 5.

The quantity of water which the apparatus shown in Fig. 8 will measure and also elevate to the compartment H for driving the power-wheel therein may be varied and adjusted to suit the requirements by simply increasing or diminishing the stroke of the piston in the water-supply pump 5. This is effected by providing a number of holes 10 in the upright lever 2, these holes extending in a line up and down the said lever. The rod 9 may then be connected by a pin with either one of said holes. Obviously the piston of pump 5 will make a longer or shorter stroke, according as the rod 9 is connected with a higher or lower hole on the lever 2.

It is immaterial how the wheel of the air-supplying meter is rotated. Other means than the cord, spool, and weight may be employed for this purpose. The water-elevating wheel F, which receives its motion from the meter-wheel, obviously, need not be mounted on the shaft of the latter, but may be connected in any other way to said meter-wheel. This invention includes a combination wherein a water-supplying wheel has movement imparted to it in exact accordance with the movement of the device which delivers and supplies air to the mixer or carbureter.

The breaks in pipes C *b b′* indicate that the parts to the right and left of same may be separated by any reasonable distance to insure safety in the operation of the apparatus. Those parts to the left containing water or other suitable liquid can be located in any insured building, and the parts holding gasolene or hydrocarbon can be located outside, where they would not be objectionable.

Equivalent results may be obtained by substituting the adjustable mechanism for varying the measured quantity of liquid in the receptacle E for that in compartment I, or transposing same, but for convenience I prefer the adjustment to be shown in the drawings.

Where steam is available, the water in water-jacket N can be dispensed with and the space in said jacket be charged with steam instead.

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

1. In a carbureter, the combination of an air-supplying meter; a mixer or carbureter; a pipe leading from the air-supplying meter to the said mixer; a feed-wheel provided with means to supply measured quantities of hydrocarbon fluid to the said mixer; a power-wheel turned by liquid and connected with the said hydrocarbon feed-wheel; liquid-measuring mechanism connected with a movable part of the air-supplying meter; and a pipe leading from the liquid-measuring mechanism to the said power-wheel, whereby the movement of the air-supplying meter results in delivering measured quantities of liquid for driving the said power-wheel.

2. In a carbureter, the combination of an air-supplying meter having a revoluble shaft; a mixer or carbureter; a feed-wheel supplying measured quantities of hydrocarbon fluid to the mixer; a power-wheel turned by liquid and connected with the said hydrocarbon feed-wheel; a liquid-elevating wheel driven directly by the revoluble shaft of the air-supplying meter and elevating measured quantities of liquid to supply the said power-wheel; and a pipe, *b′*, to return the liquid from the power-wheel to the liquid-elevating wheel to be again used.

3. In a carbureter, the combination of an air-supplying meter; a hydrocarbon feed-wheel, J; a power-wheel, G, turned by liquid and driving the said feed-wheel; a device to supply the liquid in measured quantities to the said power-wheel; means for varying each measured quantity of liquid supplied by the said liquid-supply device; a mixer or carbureter; an air-pipe leading from the air-meter to the mixer; and a pipe leading from the hydrocarbon feed-wheel to the mixer.

4. In a carbureter, the combination of an air-supplying meter; a water-elevating wheel receiving motion from the meter; a funnel horizontally adjustable in line parallel with the axis of said water-elevating wheel to receive the elevated water; and means to shift

said funnel for varying each measured quantity of water supplied by said wheel, as set forth.

5. In a carbureter, the combination of an air-supplying meter; a hydrocarbon feed-wheel; a power-wheel turned by liquid and driving the said feed-wheel; a liquid-elevating device receiving motion directly from the meter; a pipe to convey the elevated and measured liquid to the power-wheel; and a pipe to return the liquid from the power-wheel to the liquid-elevating device in order that the same liquid may be again elevated.

6. In a carbureter, the combination of a liquid-elevating wheel provided with cups each having a number of outlets in one end; a fixed funnel or box having a pipe to carry off the liquid; and a funnel horizontally adjustable in a line parallel with the axis of said water-wheel and above the fixed funnel, said adjustable funnel to receive the liquid from the said cups.

7. In a carbureter, the combination of a liquid-elevating wheel provided with cups which have parallel drain-ribs extending in a direction at right angles with respect to the axis of the wheel; a funnel to receive the liquid from the drain-ribs and said funnel horizontally adjustable in line with the axis of the wheel; and means to shift the said funnel.

In testimony whereof I affix my signature in the presence of two witnesses.

CLARENCE M. KEMP.

Witnesses:
CHAS. B. MANN, Jr.,
C. CALVERT HINES.