

(No Model.)

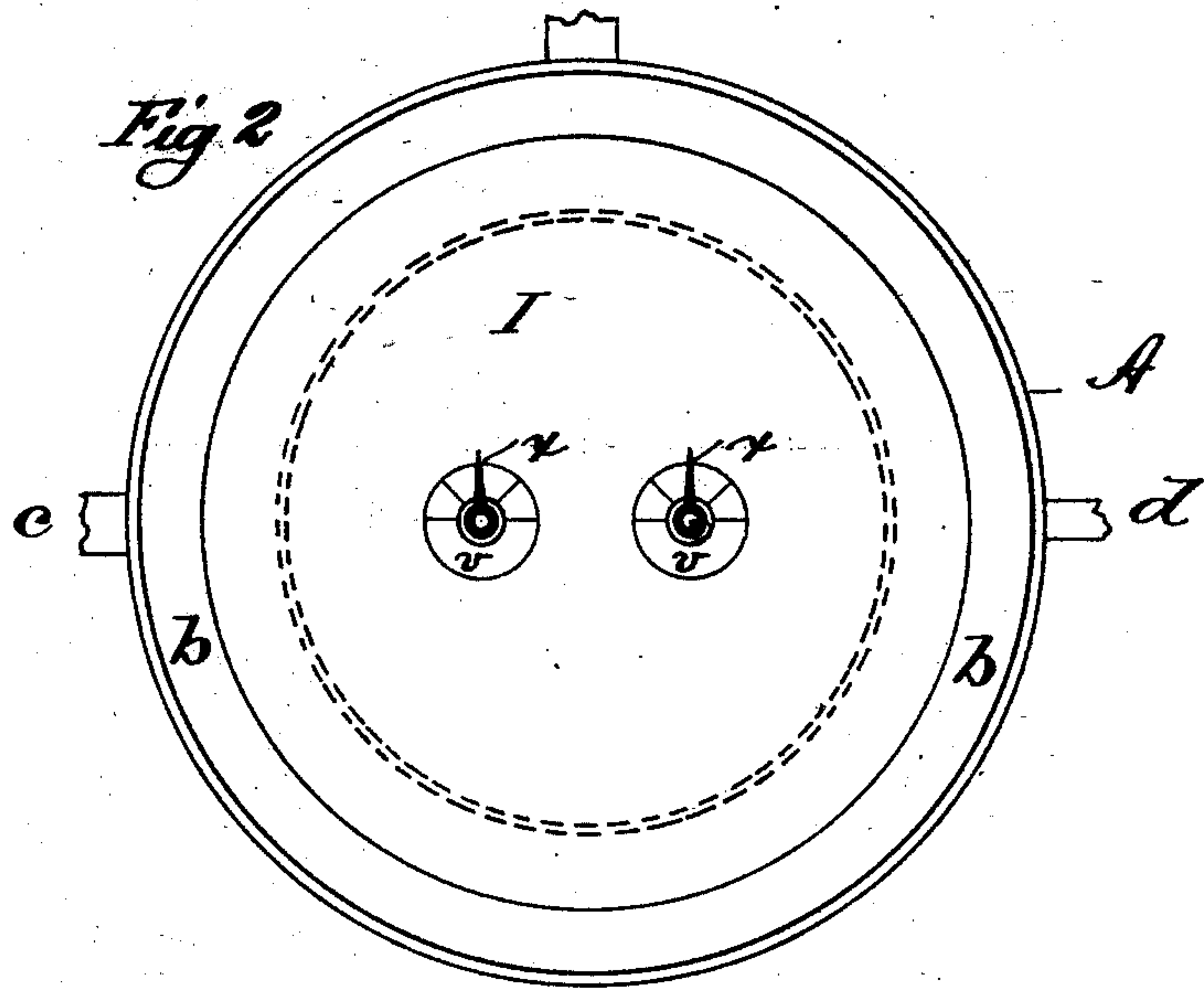
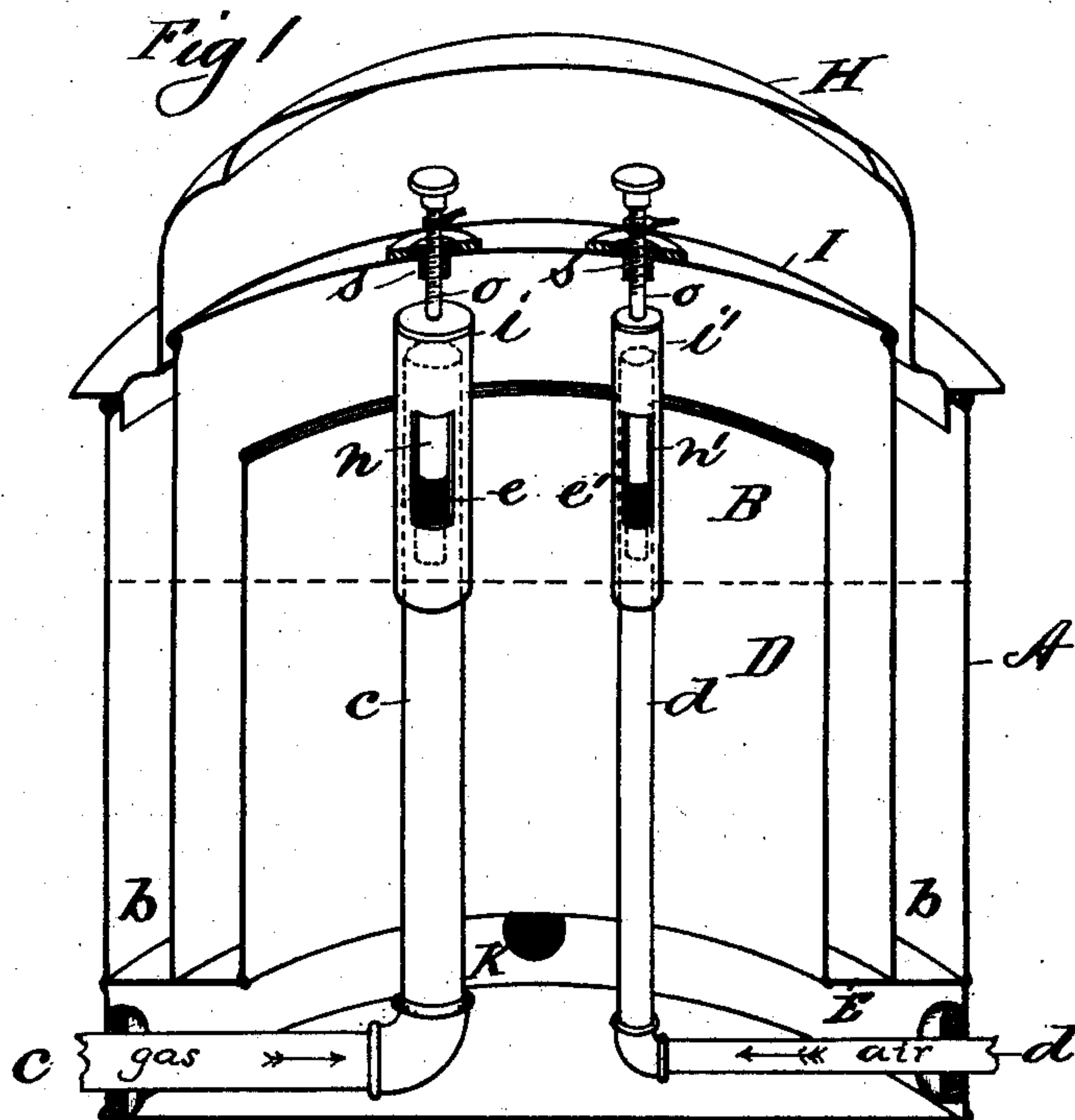
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E. A. BURDICK.

APPARATUS FOR REDUCING THE GRAVITY OF HYDROCARBON GAS.

No. 244,850.

Patented July 26, 1881.



Witnesses  
Wm H Chapin.  
J D Garfield

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2 Sheets—Sheet 2.

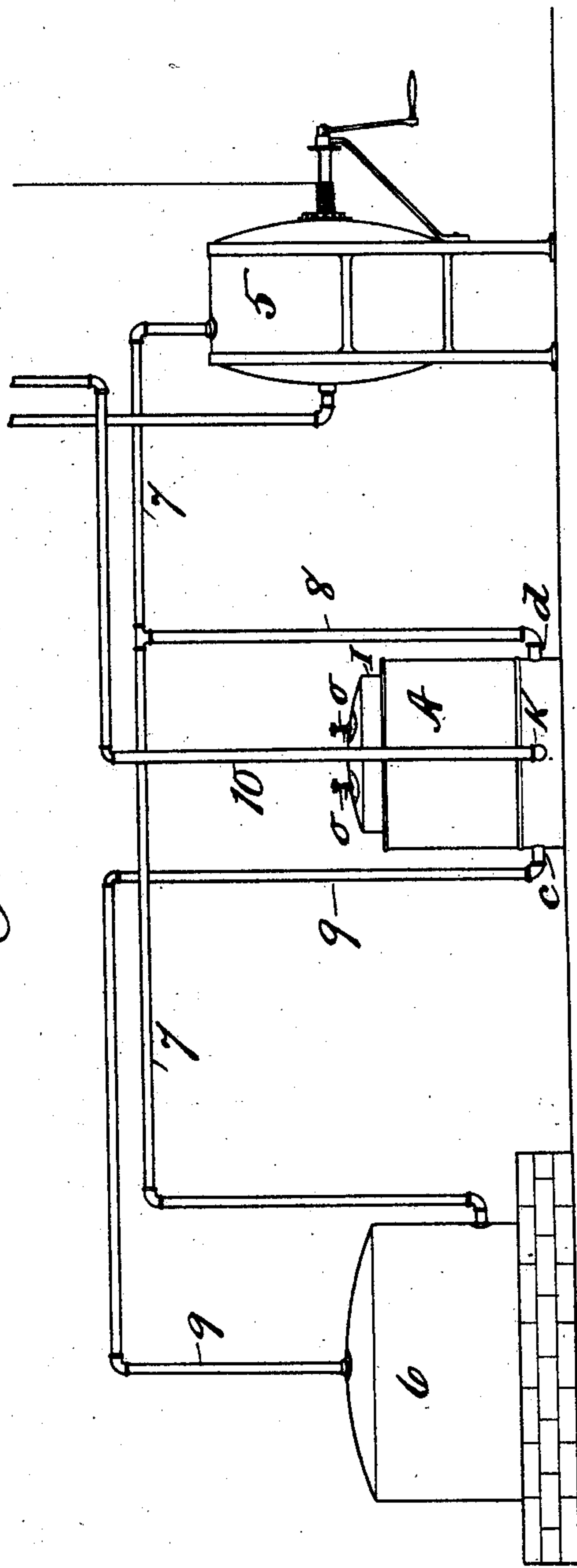
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Fig 3



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR REDUCING THE GRAVITY OF HYDROCARBON GAS.

SPECIFICATION forming part of Letters Patent No. 244,850, dated July 26, 1881.

Application filed January 22, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN A. BURDICK, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Apparatus for Reducing the Gravity of Hydrocarbon Gas, of which the following is a specification.

My invention relates to the details of construction of a gas and air receiver adapted to be interposed between the air-pump and carburetor of a hydrocarbon-gas machine, and so connected with them as to receive within it both gas and air and deliver them mixed in proper proportions for burning, the object being to provide simple, and to a certain extent automatic, means for regulating the flow and mixture of said gas and air within said receiver, whereby the volume of flow is easily regulated and practically a frictionless operation of the flow-governing devices secured.

In the drawings, Figure 1 is a vertical section, in perspective, of my improved apparatus. Fig. 2 is a plan view with the cover removed. Fig. 3 represents the air-pump and carburetor of a gas-machine, between which, and properly connected with the gas and air pipes thereof, is shown an elevation of my apparatus in operative position.

A is a tank, provided with a central gas and air chamber, B. A cylinder, D, concentric with the walls of said tank, is fixed within the latter, and secured thereto by the flat ring portion E in such a position as to leave a water-space, *d*, between the part D and the inner wall of tank A. A gas and air holder, I, of the usual form, sets in the water-space *d*, as shown, and a gas-induction pipe, *c*, and an air-induction pipe, *d*, lead from without the tank A and terminate therein. The said gas and air pipes *c* and *d* have their ends within said holder covered over, as shown in dotted lines in Fig. 1, but each one of them has a rectangular opening, *e* and *e'*, made in its side, near the end thereof.

Two caps or inverted cups, *i i'*, are suspended from the roof of the gas and air holder I by two rods, *o o*, whose upper portions are screw-threaded and pass through threaded nuts *s s*,

which are secured to the roof of the holder I, and the ends of said rods *o o* above said roof are provided with proper handles to enable one to turn said rods within their nuts, and the caps *i i'*, thereto attached. An indicating-pointer, *x*, is attached to each of rods *o o* above the roof of holder I, and when said rods are turned said pointers move round over the face of a dial, *v*, provided with graduating-marks, as shown. Said caps *i i'* are each of them provided with rectangular openings in their sides, as shown, and lettered *n n'*, and are fitted to move vertically upon the ends of pipes *c* and *d*, and to be turned thereon, and to so operate closely, but without friction.

To the lower part of tank A, and leading from the gas-chamber B within it, is connected an eduction-pipe, *k*, adapted to carry the mixed gas and air away from said holder I. A cover, H, is adapted to be placed upon the tank over said holder, after its operative parts have been properly adjusted for use.

In Fig. 3, 5 is the air-pump, and 6 is the carburetor. 7 is an air-pipe leading from the pump to the carburetor, with a branch, 8, leading therefrom into the gas-chamber in tank A, and a gas-pipe 9, leads from the carburetor to the tank A, and pipe 9 connects with the pipe *c* of my apparatus, and pipe 8 with pipe *d* thereof, as shown in said Fig. 3.

From the outlet *k* of my apparatus a pipe, 10, conducts the contents of chamber B to the location where the gas is consumed.

The use of hydrocarbon gas for illuminating and other like purposes is attended with more or less inconvenience, owing to the fact that when the carburetor is supplied with fresh gasoline the atmospheric air which is forced through it by the pump is so highly charged with the illuminating qualities which it has taken up from the gasoline vapors as to be too rich, and consequently in burning it emits disagreeable smoke and odors, and the gas so produced becomes gradually less and less rich or "heavy," as it is termed, by the exhaustion of the gasoline, until finally it possesses little or no illuminating quality. Hence it becomes desirable to reduce the gravity of such gas when it is too rich by supplying atmospheric air to it



after it has left the carburetor, while on its way to the burners, and so prevent the above-named disagreeable results arising from the combustion of too heavy or rich gas; and, furthermore, to provide simple and convenient means for admitting more or less air to the gas-current as it flows from the carburetor to the burners, at all times proportionate to its requirements to fit it for burning under the most satisfactory conditions, and to be able by simple and easily-managed devices to quite shut off the air-supply, while the carbureted air from the carburetor passes uninterruptedly to the burners.

The above-named conveniences, requisite to the most perfect operation of hydrocarbon-gas machines, are fully supplied by my apparatus herein described and shown, the operation of which is as follows:

My apparatus is connected to the gas-supply pipe 9, as shown in Fig. 3, in such a way that gas from the carburetor flows into and out of chamber B on its passage to the burners. From the air-pipe 7 a branch, 8, is led, by which air is supplied to chamber B also, and said gas and air are admitted respectively into said chamber through the openings  $e e'$  in the vertical pipes  $c d$ , and a proper mixture of gas and air in proper proportions in said chamber reduces the gas to the requisite gravity.

The caps  $i i'$ , which cover the ends of pipes  $c$  and  $d$ , are provided with like openings,  $n n'$ , to those above mentioned in said pipes, and of the same, or about the same, area, and consequently when said caps are in a certain position the openings  $n n'$  in said caps are directly over those in said pipes, so that the gas and air can flow therethrough to the full extent thereof.

The gas-holder I is made sufficiently light to permit it to be lifted and buoyed up in the water-space  $b$  by the ordinary pressure upon the pipes which supply the burners in the ordinary way. When said holder is so lifted the caps  $i i'$  may, by turning the rods  $o o$  in their nuts  $s s$ , be either lifted or lowered to reduce the length of the openings  $e e'$  in pipes  $c$  and  $d$ , and be turned around so as to reduce the width of said openings, and the pointer  $x$  and dial  $v$  (seen on the top of the holder I) serve to indicate when the openings in said pipes are full, one-half, or one-quarter open. The space  $b$  is supplied with water about up to the dotted line across Fig. 1. When the air-pump 5 is set in operation, gas enters the holder I, as above de-

scribed, and air also enters through pipe  $d$ . As soon as the quality of the gas which flows out of holder I can be ascertained by burning it, its quality indicates that it requires more or less atmospheric air to be mixed with it to reduce its gravity, and the proper flow of air to remedy this defect is obtained by turning rod  $o$ , secured to cap  $i'$ , over pipe  $d$ , and thus reducing or enlarging the escape-opening  $e'$  from said pipe; and if it be desirable to admit more or less gas through pipe  $c$ , the rod connected to cap  $n$  may be turned in like manner. The said caps having been thus adjusted to admit the requisite proportions of gas and air into said holder, the contents of the latter are permitted to flow to the burners, and as the pressure in the holder changes by the opening of many and then a few burners, or vice versa, the holder rises or falls a little, carrying with it the caps  $i i'$ , and sliding them up or down over the ends of the pipes  $c$  and  $d$ , and thus increasing or diminishing the openings through which gas and air enter said holder, according to the volume which is flowing to the burners.

What I claim as my invention is—

1. In an apparatus for reducing the gravity of hydrocarbon gas, the combination, with the tank A, gas-holder I, and pipes  $c$  and  $d$ , having openings  $e e'$  in their sides, of the caps  $i i'$ , suspended to said holder over and covering the ends of said pipes, and having the openings  $n n'$  therein, and appliances, substantially as described, for lifting, dropping, and turning said caps, substantially as set forth.

2. The combination, with tank A, holder I, and pipes  $c$  and  $d$ , of the caps  $i i'$  and appliances, substantially as described, for turning said caps to cover more or less of the openings  $e e'$  in said tubes, and for indicating upon the outside of the gas-holder the width of the said openings in said pipes, substantially as set forth.

3. The combination, with the air-pump and carburetor of a gas-machine, of the tank A, holder I, and pipes  $c$  and  $d$ , and appliances located within the gas-holder, substantially as described, for reducing and increasing the openings in said pipes through which gas and air are admitted to said holder, substantially as set forth.

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Witnesses:

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