(No Model.) 2 Sheets—Sheet 1.

J. W. & F. R. HOARD.

APPARATUS FOR MIXING LIQUID FUEL AND AIR.

No. 326,981. Patented Sept. 29, 1885.

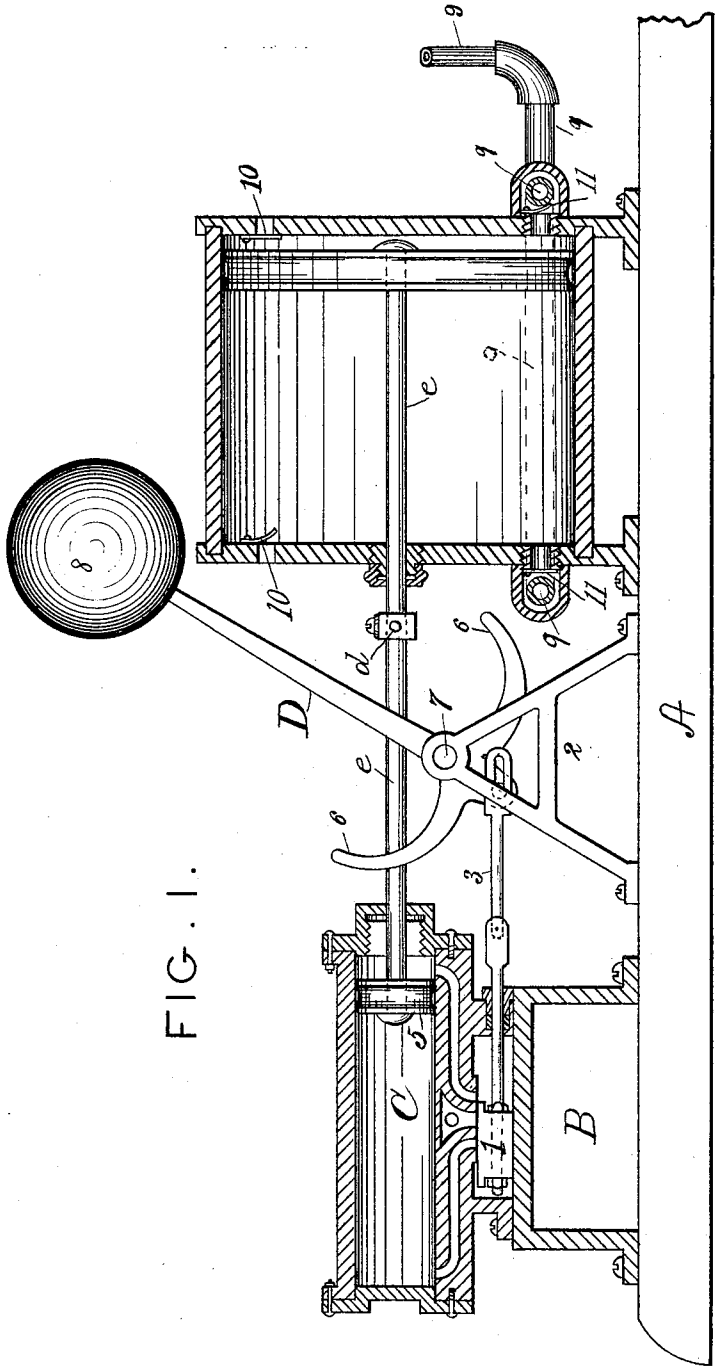


FIG. 1.

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Geo. C. Poulton

Inventors:
John W. Hoard.
Frederick R. Hoard
By John J. Halsted & Son.
their attys.

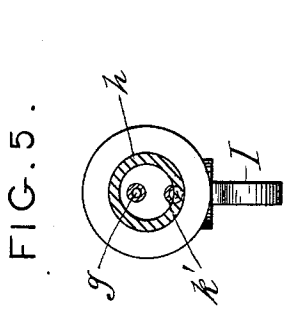
N. PETERS. Photo-Lithographer, Washington, D. C.

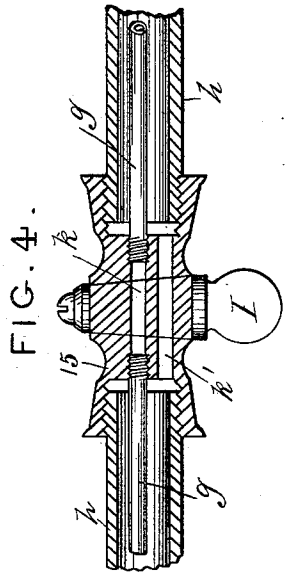
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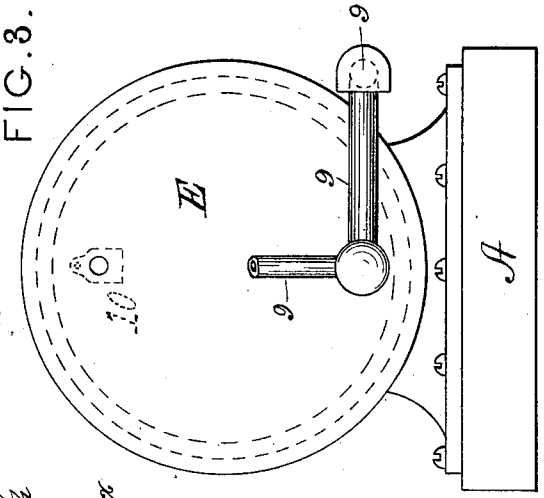
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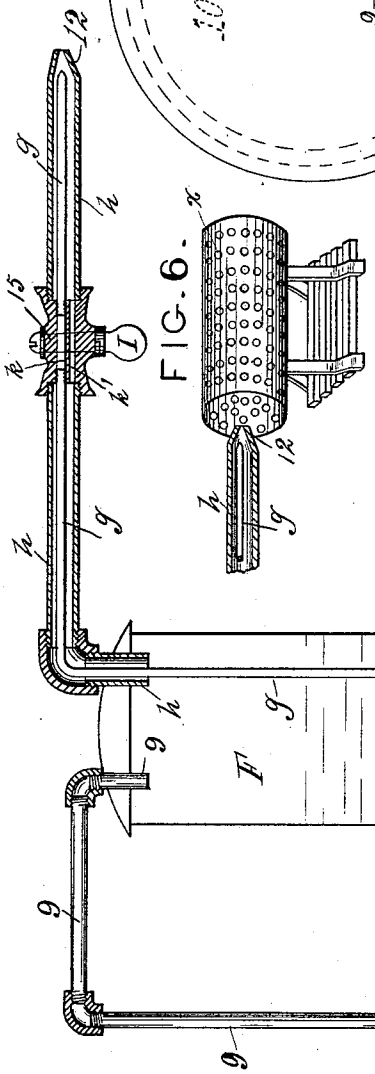
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UNITED STATES PATENT OFFICE.

JOHN W. HOARD AND FREDERICK R. HOARD, OF PROVIDENCE, R. I.

APPARATUS FOR MIXING LIQUID FUEL AND AIR.

SPECIFICATION forming part of Letters Patent No. 326,981, dated September 29, 1885.

Application filed May 23, 1884. (No model.)

To all whom it may concern:

Be it known that we, JOHN W. HOARD and FREDERICK R. HOARD, both of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful improvements in apparatus for mixing liquid fuel and air and forcing and delivering the same for heating purposes; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our invention comprises a water-engine operating by its piston-rod the piston of an air-pump, an air-conducting pipe leading from the air-pump to the upper part of a can or vessel containing the oil or liquid hydrocarbon, and a compound pipe, or pipe within a pipe, for discharging from such tank or vessel the air and the liquid under pressure, and commingled in any desired proportions.

The particulars of the construction and operation will readily appear from the following:

Figures 1 and 2 jointly represent a longitudinal section of the entire apparatus; Fig. 3, an end view of the air-pump. Fig. 4 is a longitudinal section of the two-way cock and oil and air pipes enlarged. Fig. 5 is a transverse section of the same, and Fig. 6 shows the perforated cylinder in its relation to the discharging ends of the oil and air pipes.

A is a metal bed or base-plate on which the apparatus may be secured; B, a standard or support secured to this base-plate, and upon which is secured a water-engine, C, which need not be particularly described, and in the cylinder of which is a piston attached to the piston-rod *e*, the engine having, of course, a water-supply and waste pipes, not necessary to be shown, and being provided with a slide-valve, 1, and appropriate ports.

D is a weighted rocker pivoted on a frame, 2, and in its rocking or swinging movements it actuates the slide-valve by means of the link or rod connection 3, which should be adjustably connected to the rocker to insure the proper action of the valve relatively to the ports.

E is the air-pump, which is connected to the water-engine by the piston-rod *e*, and on this same rod is the piston 5 of the water-engine, as well as the piston 4 of this air-pump, one movement, therefore, actuating both pistons in unison.

The rocker D has branches or arms 6 6, and on the rod *e* is a clutch or adjustable projection, *d*, which, when the rod moves in one direction, will come in contact with one of these arms and shift the slide-valve one way, and upon the piston-rod moving in the opposite direction the projection *d* will strike the other arm, 6, and work the slide-valve in the opposite direction, the rocker, as shown, being pivoted on its frame at a point, 7, and the ball or weight 8 at its top is made sufficient to hold the valve to its proper position until shifted to its reversed position, and it then holds it to this reversed position until again shifted by the projection *d*.

The liquid-can is shown at F, and it is connected at its top with an air-pipe, 9, leading from the air-pump, the latter being provided with an appropriate inlet and an outlet valve in each end or head. These valves may be simply a flap of flat leather, as indicated at 10 10 and 11 11, and the two outlets both connected with the pipe 9, so that at every stroke of the air-pump piston, both forward and backward, the air shall be driven into the can F.

The pipe which delivers the oil or liquid fuel from the can F is shown at *g*, and it extends down into the liquid and nearly to the bottom of the can. The air-pipe, which delivers the air from the same can, is shown at *h*, and it merely connects with the top of the can so as to communicate with the air in its upper, and from that point onward to the discharging end 12 the oil-pipe *g* is within or inside of and surrounded by the air-pipe *h*, and so that both may discharge at the same final outlet, 12, in a spray of commingled oil and air under pressure, the relative proportions of air and oil being controllable by means of a suitable two-way cock, (indicated at I,) the relative sizes or diameters of these pipes *g* and *h* and of the passage-ways through the cock being, of course, proportioned to the character and size of the apparatus, and to the special end desired.

The two-way cock has two independent parallel passages, *k k'*, one for liquid and the

other or larger one, *k'*, for air, the passages in the turning part 15 of the cock coinciding therewith in size and in their transverse line of direction, as shown, the receiving and discharging ends of this cock having cavities in each of them, into which the pipe *h* is screwed, and the pipe *g* being screwed into and extending into the cock, as shown, far enough to meet and communicate with the passage *k'*.

The flame from the burners—that is, from the end 12 of the combined pipes—may be made to enter a perforated box or cylinder, X, in the stove, furnace, range, open fire-place, &c. This will afford a more perfect combustion.

It will now be seen that when the apparatus is in operation there is always one and the same pressure of oil and of air in the pipes leading from the can F—viz., that induced by the action of the air-pump through the agency of the engine.

The operation is as follows: The water, being turned onto the engine, puts the air-pump in motion, and this pump sends a blast of air into the oil-can, and this, by reason of its force and pressure, acts upon the air and oil in the can and forces them each through its respective outlet-pipe *g* and *h* to the burner or point of combustion at 12.

It is not necessary that the engine, air-pump, and can be all upon the same base or bed plate, nor that they should be of the relative sizes shown. Each may be located as most convenient relatively to the others, as circumstances, or the surroundings, or the character of the room or building may require. They may be placed in a cellar, or under ground, or anywhere convenient, so long as the oil-can is not above the stove, furnace, or other thing to be heated, for it will be observed that we do not depend upon the weight of the oil in an elevated can or tank to force itself through the pipe, but use instead an independent power under control to raise the oil from a point below that at which it is burned, and we thus avoid all danger from the flow of oil which is incident to elevated tanks whenever the way-cock is left open, and which would permit the oil to siphon itself out of the can or tank.

Gas may be used instead of the oil.

We claim—

1. In a carbureting apparatus, the combination of the air-pump, the oil can or tank, and their connecting-pipe with the piston-rod having at one end a piston which is operated by an engine, and at the other end a piston for operating the air-pump, said piston serving to continuously force the oil and air upward and outward from said tank to the burner or point of combustion, substantially as set forth.

2. In combination with the oil-can, the oil-outlet pipe *g*, reaching nearly to its bottom, and the air-outlet pipe *h* at its top, the pipe *g*, from and beyond the upper part of the can being inside of or inclosed by the pipe *h*, and the two pipes terminating in proximity so as to form a burner, substantially as and for the purposes set forth.

3. In combination with the oil-can and the burner, the cock having two independent passages through it, the pipes *g* and *h*, one within the other, said cock and pipes permitting the control and delivery or cutting off the flow of different materials passing through these pipes, respectively, to the burner, substantially as set forth.

4. The described apparatus for supplying combined air and liquid fuel to burners for heating purposes, consisting of the combination of an engine or motor, the air-pump E, rocking lever D, piston-rod *e*, its clutch or projection *d*, slide-valve 1, pipe 9, oil-can F, and its outlet-pipes *g h*, one within the other, and terminating in proximity so as to form a burner, all substantially as set forth.

5. In combination with the oil can or vessel, and with its air-pipe *h* and oil-pipe *g* within said pipe *h*, the oil-pipe discharging at the outlet of the air-pipe *h*, and a box or cylinder into which such compound pipes discharge, substantially as and for the purpose set forth.

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Witnesses:
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HENRY B. ROSE.