No. 740,959. PATENTED OCT. 6, 1903.

L. H. WATTLES.

OIL BURNER.

APPLICATION FILED FEB. 20, 1903.

NO MODEL.

FIG. 1.

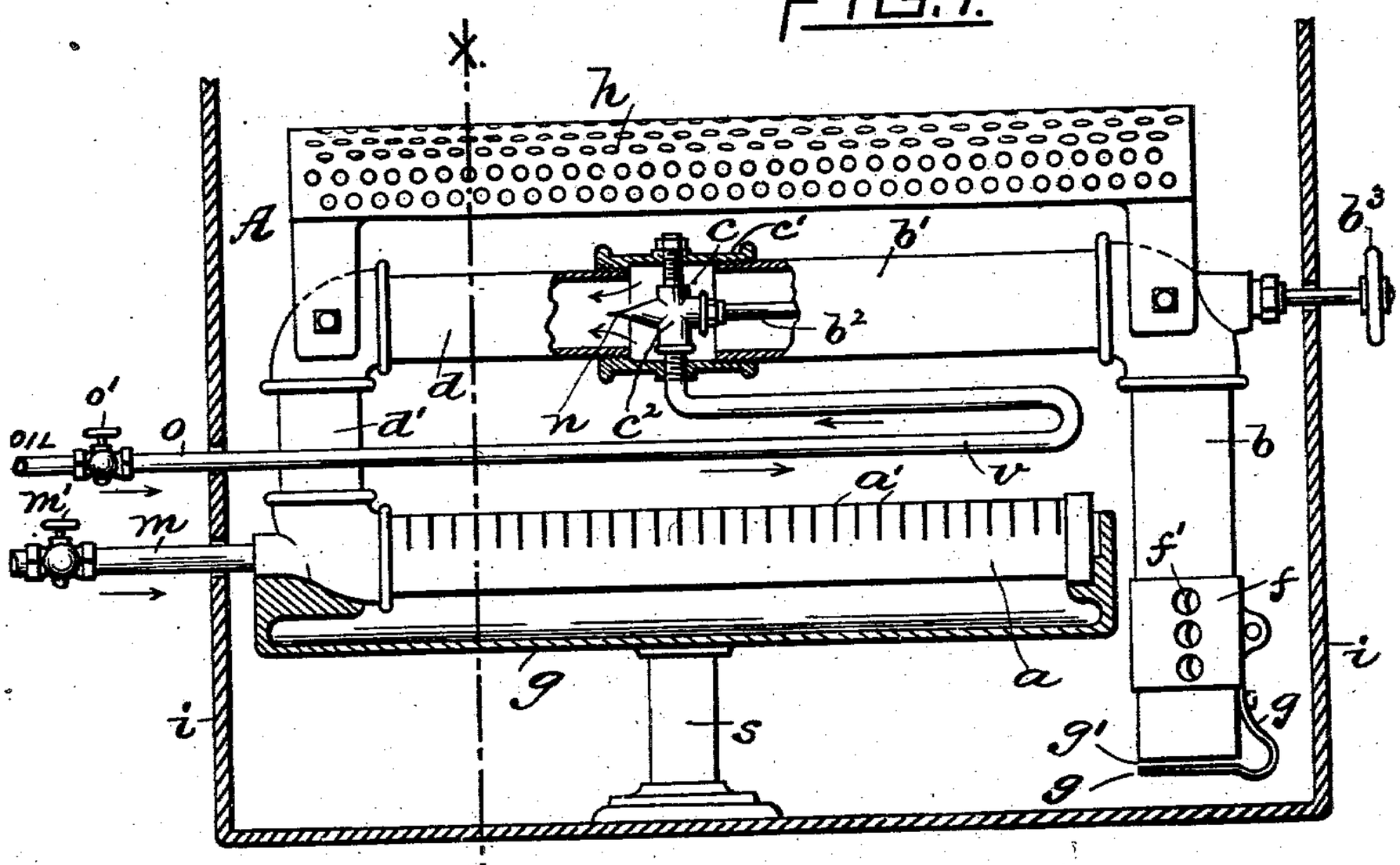
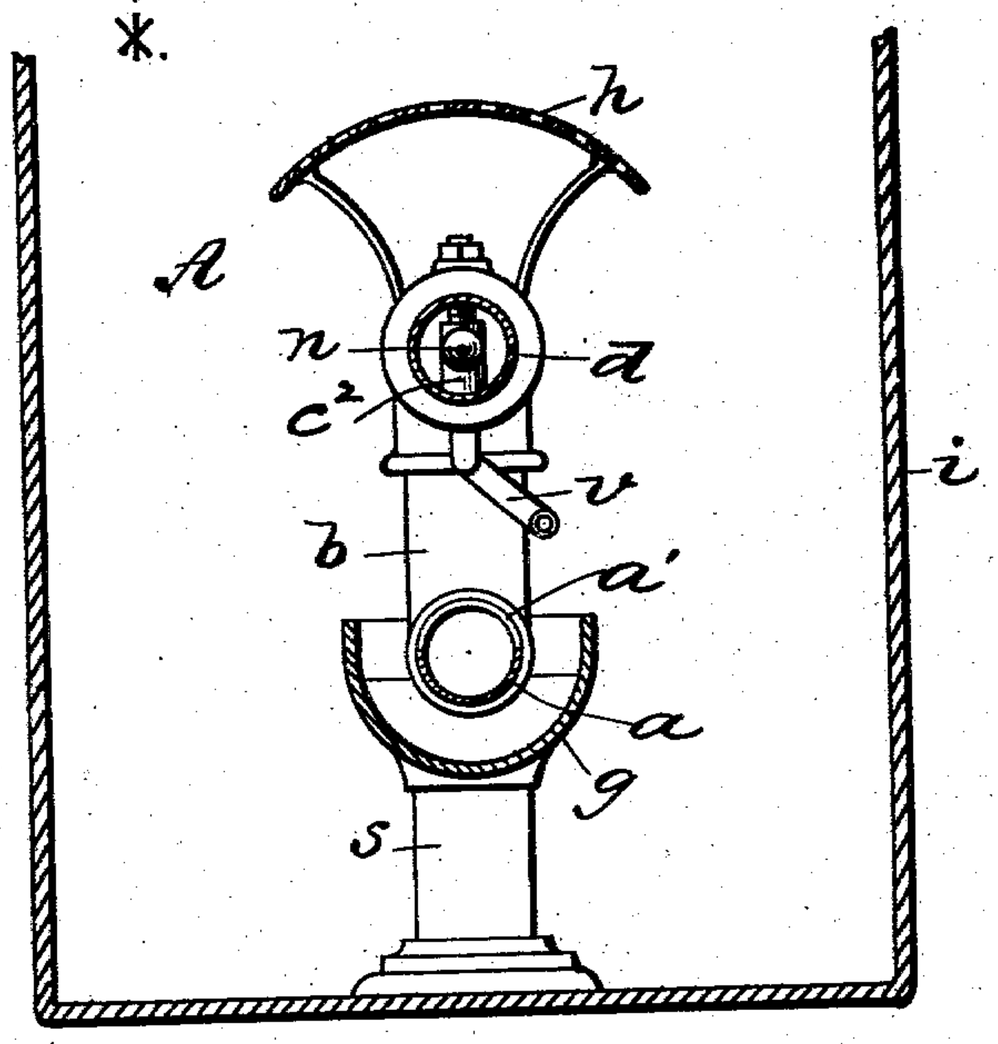


FIG. 2.



WITNESSES.

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No. 740,959. Patented October 6, 1903.

UNITED STATES PATENT OFFICE.

LUTHER H. WATTLES, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR OF TWO-THIRDS TO FREDERICK F. TAFT AND GEORGE W. PARKER, OF PROVIDENCE, RHODE ISLAND.

OIL-BURNER.

SPECIFICATION forming part of Letters Patent No. 740,959, dated October 6, 1903.

Application filed February 20, 1903. Serial No. 144,256. (No model.)

To all whom it may concern:

Be it known that I, LUTHER H. WATTLES, a citizen of the United States of America, and a resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Oil-Burners, of which the following is a specification.

My invention relates to improvements in "oil-burners," so called—that is, burners of the class or type in which hydrocarbon or other suitable oils are vaporized or converted into gas and then introduced into the apertured burner-head or burner proper. The gas thus produced mixed with atmospheric air flows from the burner and is ignited. The heat from the flame or gas-jet is also utilized to vaporize the oil, thus rendering the action of the burner automatic and continuous. Burners of the class referred to are usually employed in stoves, ranges, furnaces, &c., for culinary and heating purposes in lieu of coal or other fuel burning devices.

In oil-burners heretofore devised it has been usual in some cases at least to construct them so that the oil is fed directly into the burner-heads, the heat from the latter converting the oil into a gas or vapor, which, mingling more or less imperfectly with comparatively cool air, forms the gaseous product constituting the fuel used. There are serious objections to such former oil-burners due to the fact that the oil is not properly or completely vaporized and also to the further fact that the atmospheric air mingled therewith is of too low temperature and too variable in volume. The result is that the oil becomes carbonized more or less in the burner and obstructs the burner-orifices, while at the same time it produces a disagreeable or offensive odor, thereby imparing the efficiency of the burner.

The object I have in view is to produce an oil-burner for heating purposes in which the objectionable features or disadvantages inherent in former devices of this class are reduced to a considerable extent.

In carrying out my invention I employ a device in which the oil (under suitable pressure) is first vaporized. The gaseous product then flows into a mixing-chamber, where it mingles with hot air. The mixture in its passage to the burner-head is further heated or superheated, so that the flame practically consumes all the elements of the oil, thus forming practically perfect combustion. The under side of the burner-head is protected, so as to prevent the gaseous mixture in the burner from being chilled or cooled before it is ignited as it flows from the open orifices or jets. The quantity of oil fed into the burner is accurately controlled by means of a small needle-valve located in the mixing-chamber. The normal supply of air to the burner is regulated by a suitable damper, while a light spring-damper mounted at the open end of the air-supply pipe operates to automatically maintain the proper volume of inflowing air corresponding with the variations of pressure of the gas being discharged from the needle-valve, or, in other words, as the gas-pressure is reduced the spring-damper opens and closes more frequently.

In order to provide means for effecting an initial heating of the device, as in starting, the burner-head is adapted to be connected with an illuminating-gas supply. By means of such construction and arrangement it is clear that upon igniting the last-named gas flowing from the burner the heat thus produced will quickly increase the temperature of the oil and air passages communicating with the mixing-chamber, so that upon opening the needle-valve the gas thus generated from the oil, together with the inflowing air, will become mingled together in the mixing-chamber and pass therefrom under pressure through the superheater before entering the burner-head. The temperature of the flame produced from the thus-heated mixture as it issues from the burner jets or orifices is now utilized for cooking, heating, &c., as desired, the flame, too, at the same time operating to vaporize the oil and heat the air, as before stated, thus producing and maintaing a continuous heating system. The initial or temporary gas-supply is shut off at or about the time the oil becomes sufficiently heated.

I would add that the device is adapted to greatly heat the inflowing air before it min-

gles with the oil-gas flowing through the comparatively small orifice or needle-valve, thereby preventing carbonization and condensation of the gases in the valve and mixing-chamber. The cold-air inlet is preferably located below the burner-orifices, as shown, thus increasing the draft. Consequently as the air becomes heated, as just stated, and therefore lighter, it will seek to escape through the freest outlet, which in this case is the burner-head itself.

In the accompanying sheet of drawings, Figure 1 is a side elevation in partial section of my improved oil-burner, and Fig. 2 is a transverse sectional view taken on line $x\,x$ of Fig. 1.

A in the drawings designates the device as a whole. The bottom or burner-head member a thereof is hollow and adapted to lie horizontally. It is provided with a series of apertures or jets a', at which points the outflowing gas is ignited. The burner-head is partly inclosed by a shield g^2, which serves to protect it against currents of cool air, thus preventing the gas in the burner-head from condensing. The shield, as drawn, supports the burner and is in turn supported by a suitable standard s. The burner-head has a pipe m, communicating therewith, adapted to conduct illuminating-gas thereto from any suitable source of supply. A shut-off valve m' is used for obvious purposes. At or near the center of the burner and above the burner-head is located a casting or fitting c', forming a mixing-chamber c. An air-pipe b' is screwed into one end of said fitting and a pipe d into the other end. This latter pipe is in direct open communication with the burner-head, as clearly shown. The said pipe b' has a vertical inlet air-pipe b secured to its outer or right end, its lower portion having a series of suitable holes therein and also having an outer movable sleeve-damper f, provided with holes f', arranged to register with those of the pipe b. To the lower end of the last-named pipe is secured a light spring-damper g, adapted to practically close the open end of the pipe when in engagement therewith. In the normal position a small air-space g' is formed between the damper and pipe, as clearly shown. Within the mixing-chamber is mounted a member c^2, containing a needle-valve n, the stem b^2 of which extends rearwardly through the pipe b' and carries an operating-handle b^3.

A pipe o is adapted to connect with a suitable oil-supply, a shut-off valve o' being located therein and exterior of the burner-casing, as clearly shown. The pipe o is arranged between and parallel with the burner-head and air-pipes b' d and is bent to form what may be termed a "vaporizer" v, its discharge end being tapped into the lower side of the valve casing or fitting c^2. As thus constructed and arranged the heat of the burning jets raises the temperature of the oil in pipe v and practically vaporizes it, so that when the valve n is retracted or open the pressure of the oil will force the vapor or gas from the valve-chamber into the mixing-chamber, where it becomes mingled with the heated air, the latter being carried forward or forced to flow by reason of the pressure of the outflowing gas in a manner analogous to the action of an injector.

In order to more uniformly equalize the heat of the burner-flame and also to prevent it from unduly heating the top of the fire-pot in the case of a stove or range, I prefer to employ a fixed curved perforated deflector h, substantially as shown in the drawings.

The manner of operation of my improved oil-burner A is as follows: Assuming first, however, that the device is mounted in a suitable fire-pot or casing i and connected and adjusted with respect to the oil, gas, and air pipes o, m, and b, respectively, after the gas fed from pipe m to the burner-head has been burning a short time—say two or three minutes—it will have heated the vaporizer v and the air-passages, so that upon opening the valve n the vapor or gas in the valve-casing will discharge itself into the mixing-chamber and mingling with the air therein flow along the pipe d, which latter at the same time further heats or superheats the mixture, and into the burner-head a, from which it issues via the slotted openings a' and becomes ignited, the heat thus generated being utilized as desired, while it at the same time serves to vaporize the oil and further increase the temperature of the air in its passage through the apparatus. Meanwhile the gas-supply valve m' is closed, thus completing the operation. The degree of heat thus produced corresponds closely with the quantity of oil used and is readily controlled by means of the valve n, manipulated by the handle b^3. To some extent, also, the valve may control the pressure of the discharge from the valve-outlet. After the normal adjustment of the air-inlet passages through the damper f has been effected any material variation in the oil or gas pressure will be automatically corrected or regulated by the action of the spring-damper g, the arrangement being such that as said pressure is reduced the damper will open and close more frequently, it being understood that the movement of the damper is vibratory.

I would add that in burners of this class, even when normally working, the pressure of the gas issuing from the valve n is usually quite variable, owing to the rapidity with which the oil is converted into gas and also to the comparatively small amount of gas constantly flowing into the mixing-chamber. An open air-space g' is formed between the open end of the air-pipe b and the face of damper g. The latter, as before stated, serves to some extent to prevent a too great variation of pressure and temperature in the mixing-chamber—that is to say, when the pressure increases beyond the normal the action of the inflowing air through inlets f' will

produce a partial vacuum, thereby, as it were, sucking the damper g upwardly against the end of the air-pipe and temporarily closing the passage g' to some extent. In case, however, the pressure is reduced below the normal the increased flow of air through the space g' will produce a more rapid vibration or pulsation of the damper g, it being understood that the bent connection uniting the damper to its support is quite light and resilient.

I am aware that needle-valves have been employed in hydrocarbon-burners for feeding small quantities of oil to the mixing-chambers. In such former devices the combustible mixture itself was not heated before passing to the burner, although the oil and air unmixed were heated. In my invention it will be seen that the heat from the burner not only heats the air and oil or gas before entering the mixing-chamber, but it further heats or superheats the mixture before the latter passes into the burner to maintain combustion, thus materially increasing the burner's efficiency.

What I claim as new, and desire to secure by United States Letters Patent, is—

1. In an oil-burner, the combination with the burner-head connected with an auxiliary gas-supply for initially heating the burner, of a mixing-chamber located above and capable of being heated by the heat from said burner-head, suitably-controlled oil and air conductors discharging into said chamber and into which latter the already-heated oil and air are thoroughly mingled and superheated, and a pipe or conductor interposed between and uniting the chamber and burner-head members, whereby the temperature of the mixture is practically maintained during its passage to the burner-head, substantially as described.

2. In an oil-burner, provided with a mixing-chamber communicating with an oil-vaporizer, the combination therewith of an air-supply pipe communicating with said mixing-chamber having a register or damper for controlling the normal air-supply, and an automatic auxiliary damper adapted to open and close as the pressure in the mixing-chamber varies.

3. In an oil-burner, provided with a burner-head and suitable means for vaporizing the oil and mixing the resulting vapor or gas with heated air and conducting the mixture to the burner-head, the combination therewith of a flame-deflector mounted above the vaporizer, and a guard or protector inclosing the lower portion of the burner-head member, substantially as described.

4. In an oil-burner, provided with suitable oil and air connections, and means for heating the same, the combination with the apertured air-inlet pipe, of a movable damper or register for controlling the normal inflow of air and a light yielding or resilient auxiliary damper, capable of short vibratory movements, mounted below or independently of said register.

Signed at Providence, Rhode Island, this 19th day of February, 1903.

LUTHER H. WATTLES.

Witnesses:
FREDERICK F. TAFT,
GEORGE W. PARKER.