No. 765,338. PATENTED JULY 19, 1904.

A. D. GORDON.

WATER HEATER.

APPLICATION FILED AUG. 25, 1903.

NO MODEL.

Fig. 1.

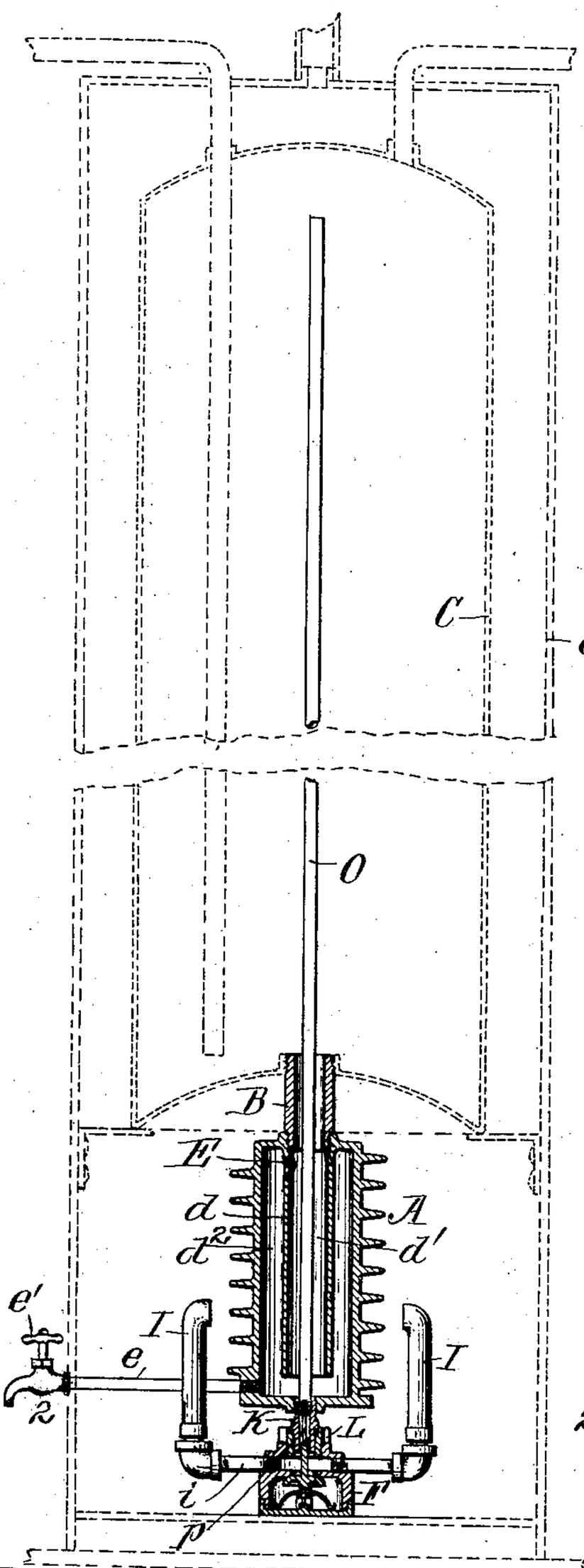
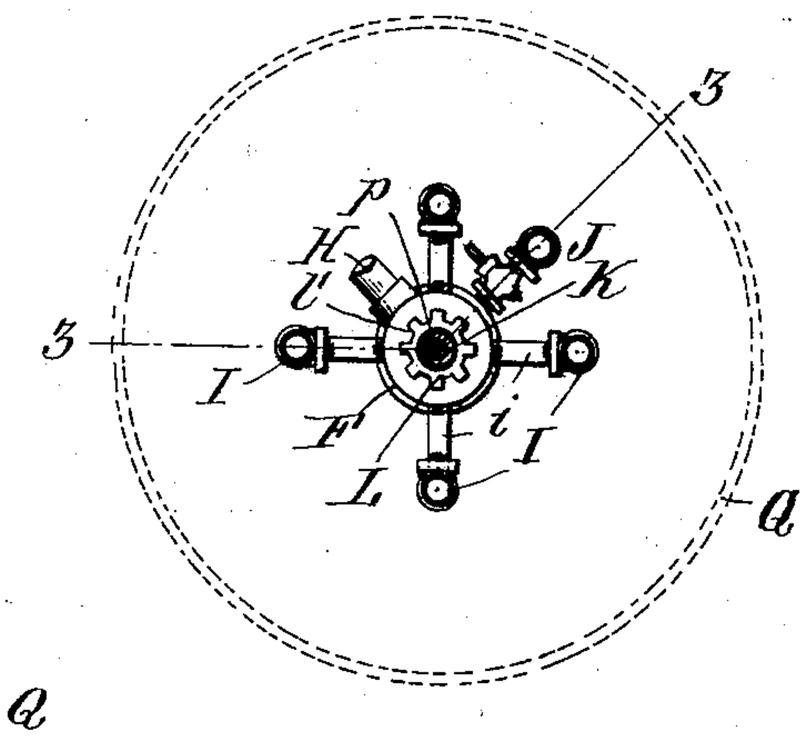


Fig. 2.



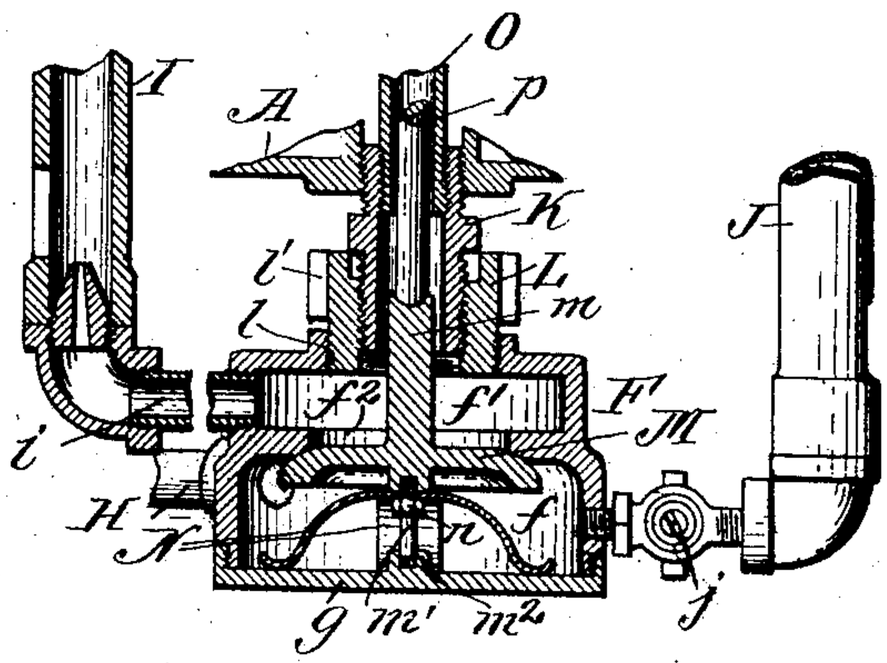


Fig. 3.

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No. 765,338. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

ALEXANDER D. GORDON, OF BUFFALO, NEW YORK,

WATER-HEATER.

SPECIFICATION forming part of Letters Patent No. 765,338, dated July 19, 1904.

Application filed August 25, 1903. Serial No. 170,675. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER D. GORDON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Water-Heaters, of which the following is a specification.

This invention relates to a water-heating apparatus or attachment for domestic and other boilers or water-reservoirs, and comprises a reservoir or water-heating chamber or receptacle, a gas-burner for heating the same, and a thermostat which is controlled by the temperature of the water and which regulates the supply of gas to the burner.

One object of the invention is to provide a practical efficient water-heating attachment of simple and inexpensive construction which is complete in itself and can be readily applied to the ordinary boiler or water-reservoir.

Another object of the invention is to provide the attachment with simple and convenient means for adjusting the automatic valve of the gas-burner to regulate the supply of gas to the burner.

In the accompanying drawings, Figure 1 is a vertical sectional elevation of a water-heater embodying the invention and showing by dotted lines a boiler to which the same is applied and an inclosing casing for the boiler. Fig. 2 is a horizontal section, partly in plan, in line 2 2, Fig. 1. Fig. 3 is a fragmentary vertical section of the gas-burner, on an enlarged scale, in line 3 3, Fig. 2.

Like letters of reference refer to like parts in the several figures.

A represents a water-heating chamber or receptacle which is provided at its top with a short pipe or tubular coupling B, by which the heating-chamber is connected to the boiler or water-reservoir C. (Indicated by dotted lines in Fig. 1.) The heating-chamber is located beneath the reservoir, and the coupling is screwed into the threaded central hole in the bottom of the reservoir or detachably secured thereto in any other suitable manner. The heating-chamber is preferably cylindrical and is provided exteriorly with radiating projections or portions to increase the area of the heating-surface and serve as baffles to prevent a too ready escape of the flames from the burner. The heating-chamber is divided by a vertical annular partition d into two concentric compartments d' d^2, which communicate at their lower ends, for which purpose the partition preferably terminates above the bottom of the heating-chamber. The inner or descending compartment d' of the heating-chamber communicates directly with the water-reservoir through the tubular coupling, and the upper end of the outer or ascending compartment d^2 communicates indirectly therewith through the coupling and a hole or holes E in the upper part of the annular partition.

The heating-chamber is preferably provided at its lower end with a drain or draw-off pipe e, having a faucet e'.

The gas-burner, which is arranged beneath the heating-chamber, is constructed as follows: F represents a burner casing or body which is substantially cylindrical in form and is divided by a horizontal partition into a lower or valve chamber f and an upper or gas-distributing chamber f', which communicate through a valve-controlled opening f^2 in the partition. The valve-chamber is provided with a removable bottom or screw-cap g. H indicates the gas-supply pipe, which communicates with the valve-chamber and is provided with the usual valve.

I represents upright burner tubes or nozzles, which are arranged around the lower portion of the heating-chamber and are connected by radial pipes or couplings i with the distributing-chamber of the burner-body. The burner-nozzles are of the well-known air and gas mixing type, and the outlet-orifices at their upper ends face toward the heating-chamber to direct the flames against the outer surface of the latter. Any desired number of burner-nozzles may be employed, and, if preferred, the cylindrical wall of the distributing-chamber may be provided with additional openings closed by removable plugs to facilitate the attachment of additional burner-tubes.

J represents a pilot-burner which connects directly with the gas-receiving chamber of the burner-casing and is provided with a regulating-valve j.

K represents a tubular nipple or coupling

screwed into a central threaded hole in the lower end of the heating-chamber. The burner-body is adjustably connected to the nipple K by an adjusting-sleeve L, which is externally screw-threaded and screwed into a threaded hole *l* in the burner-body. The adjusting-sleeve is also internally threaded and screwed on the screw-threaded lower end of the nipple K. One thread of the adjusting-sleeve is a left-hand thread, while the other is a right-hand thread, so that when the sleeve is turned the burner-body is moved toward or from the heating-chamber, according to the direction of rotation of the adjusting-sleeve. The latter is provided with a portion *l'*, which is fashioned to enable it to be readily turned by hand or with a suitable tool.

M represents the gas-controlling valve, which is arranged in the valve-chamber of the burner-body and is provided with an upper conical face, which seats against a corresponding conical face surrounding the opening f^2 in the partition which forms the top of the valve-chamber. The valve is retained in position and guided in its movements by upper and lower upright stems *m m'*, which respectively engage loosely in the bore of the nipple K and a guide-hole in a boss m^2, rising from the removable cap of the valve-chamber. The valve is pressed upwardly to its seat by one or more springs N, arranged between the valve and removable cap. The spring, which is preferably made from thin spring metal, is secured on the lower stem of the valve by a nut *n* and has projecting radial arms which extend downwardly and bear at their free lower ends on the removable cap. The described spring is preferable to a coil spring or springs, as it holds the valve from tilting and seating unevenly. As the valve is located in the lower chamber of the burner-body and seats upwardly, the gas-pressure in the valve-chamber and the spring hold the valve to its seat and prevent any leakage of gas past the valve when the water in the reservoir has been raised to the desired temperature and the valve closed.

O represents an expansible or thermostat tube, which is screwed at its lower end into a threaded hole in the nipple K and extends up through the inner compartment of the heating-chamber and tubular coupling into the boiler or water-reservoir. The upper end of the thermostat-tube is closed and is connected to the upper end of a vertically-movable valve-operating rod *p*, inclosed in the thermostat-tube and bearing at its lower end on the top of the upper stem of the gas-valve, whereby the valve is opened and closed more or less by the contraction and expansion of the thermostat-tube.

In operation the water is quickly and highly heated in the heating-chamber and passes up through the coupling B into the reservoir, displacing the cooler water therein, which passes down through the coupling into the heating-chamber, where it also circulates from one compartment to the other by means of the communications at the upper and lower ends of the compartments. The water is thus kept in circulation from the water-reservoir to the heating-chamber, through the two compartments of the latter, and back to the reservoir through the coupling B, and the entire volume of water in the boiler or tank is soon raised to the desired temperature. As the temperature of the water in the boiler or reservoir rises the thermostat-tube expands and permits the valve to close more or less under the action of its spring, and as the temperature of the water falls the thermostat-tube contracts and opens the valve to a greater or less extent, thus controlling the flow of gas to the burner and maintaining the water at the desired practically constant temperature. The extent to which the valve is opened, and consequently the heating-flames, can be quickly and easily regulated by turning the adjusting-sleeve, and thereby moving the burner-body and valve toward or from the valve-operating rod. The apparatus comprising the heating-chamber, burner, and thermostat is complete in itself and can be applied with little labor and expense to the ordinary household boiler or other water-reservoir.

The described construction and arrangement of the heating-chamber necessitates but a single connection with the water-reservoir or boiler, thereby minimizing the cost of the apparatus and labor of attaching the same to the boiler or water-tank.

The boiler or reservoir and the heating attachment are usually inclosed by a jacket or casing Q, (indicated by dotted lines in Fig. 1,) which confines the products of combustion around the boiler to heat the latter and leads the same to a suitable flue or chimney connected to the jacket.

I claim as my invention—

1. The combination of a heating-chamber provided with a partition dividing the same into compartments which communicate at both their upper and lower ends, a tubular connecting part at the top of said heating-chamber for attaching the latter to a water-reservoir, said tubular part constituting the only connection between said heating-chamber and the water-reservoir and communicating with the upper portion of one of said compartments whereby the ascending and descending currents of water pass through said tubular part, and a burner connected to said heating-chamber, substantially as set forth.

2. The combination of a heating-chamber provided with a partition dividing the same into concentric compartments which communicate at their upper and lower ends, a tubular connecting part at the top of said heating-chamber for attaching the latter to the bot-

tom of a water-reservoir, said tubular part constituting the only connection between said heating-chamber and the water-reservoir and communicating with the upper portion of one of said compartments, whereby the ascending and descending currents of water pass through said tubular part a burner arranged below and connected to said heating-chamber, a valve for said burner, and a thermostat for controlling said valve connected to said heating-chamber and extending through the same and said tubular part, substantially as set forth.

3. The combination of a heating-chamber provided at its upper end with a tubular part for attaching it to a reservoir, a thermostat, a valve-operating rod connected therewith and passing through said heating-chamber, a substantially cylindrical gas-burner body arranged below said heating-chamber and connected thereto by a central tubular part through which said valve-operating rod passes, said burner-body having a horizontal partition dividing the same into a distributing-chamber above and a valve-chamber below said partition, a valve-seat on said partition, an upwardly-seating valve directly below said valve-operating rod and operated thereby, and upright burner-tubes connected directly to said distributing-chamber and arranged around said heating-chamber, substantially as set forth.

4. The combination of a heating-chamber, a burner arranged below the same, a valve carried by said burner, a thermostat connected to said heating-chamber for controlling said valve, and means for adjusting said burner bodily toward and from said heating-chamber to regulate the operation of said valve, substantially as set forth.

5. The combination of a heating-chamber, a burner, a valve-chamber, a valve for the burner arranged in said valve-chamber below said heating-chamber, a valve-operating rod extending through said heating-chamber, and means for adjusting said valve-chamber toward and from said heating-chamber to regulate the operation of said valve, substantially as set forth.

6. The combination of a heating-chamber, a burner, a gas-valve carried by the burner, an automatic valve-operating rod connected to said heating-chamber, and an adjusting-sleeve connecting said heating-chamber and burner whereby the burner and valve are adjusted toward and from the valve-operating rod, substantially as set forth.

7. The combination of a heating-chamber, a thermostat connected therewith, a valve-operating rod connected with said thermostat and passing through said heating-chamber, a gas-burner arranged adjacent to said heating-chamber, a valve-chamber situated directly below said heating-chamber, a valve controlling the gas-supply to said burner situated in said valve-chamber, and means for adjusting said valve-chamber toward and from said heating-chamber to regulate the operation of said valve, substantially as set forth.

8. The combination of a heating-chamber, a burner arranged below the same and having a valve-chamber, an upwardly-seating valve in said chamber, an automatic valve-operating rod bearing on top of said valve for opening the same, and a spring-plate secured centrally to said valve and having downwardly-projecting radial arms bearing at their free ends on the bottom of said valve-chamber, substantially as set forth.

Witness my hand this 20th day of August, 1903.

ALEXANDER D. GORDON.

Witnesses:

JNO. J. BONNER,

C. M. BENTLEY.