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J. J. BLACKMORE.

DOMESTIC WATER HEATER AND TANK SYSTEM.

APPLICATION FILED JUNE 25, 1904.

Fig. 4.

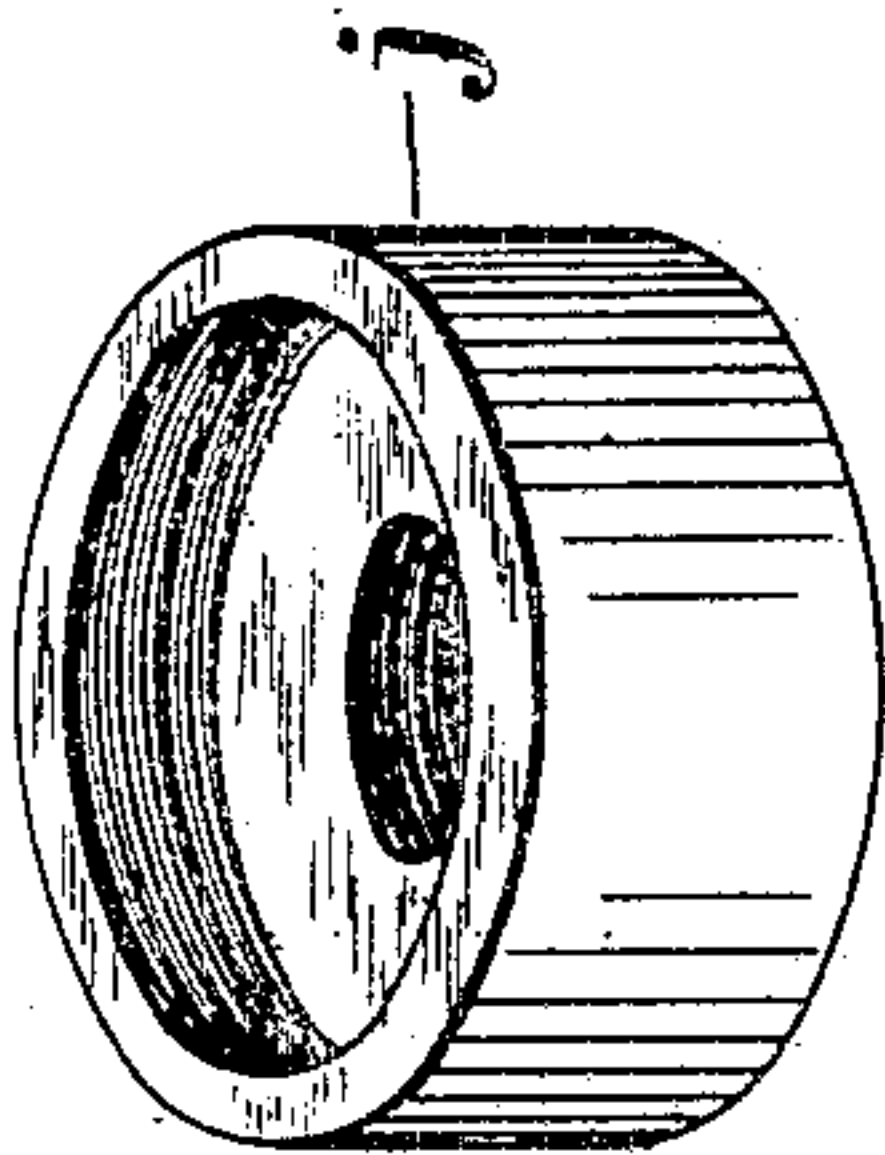


Fig. 3.

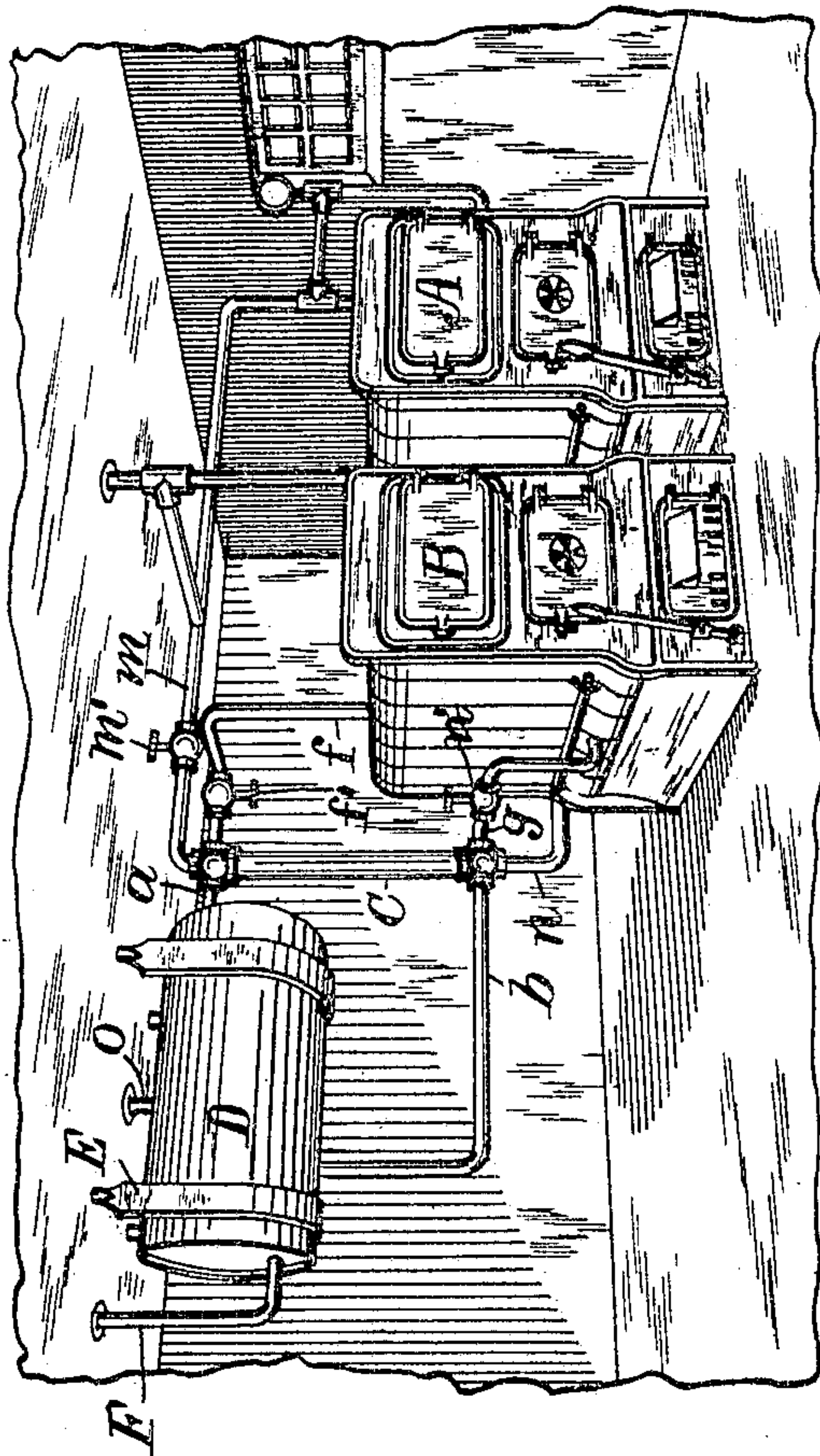
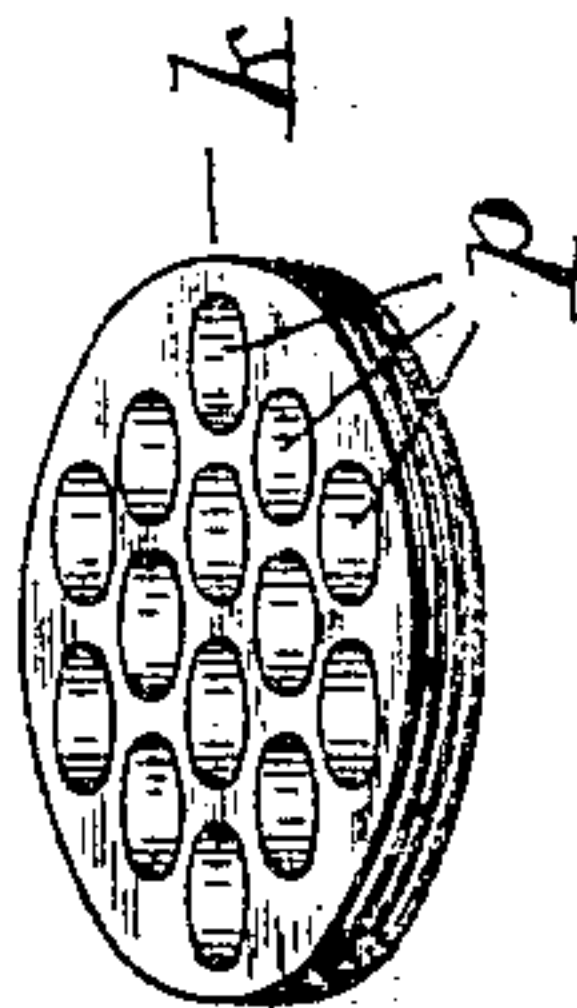
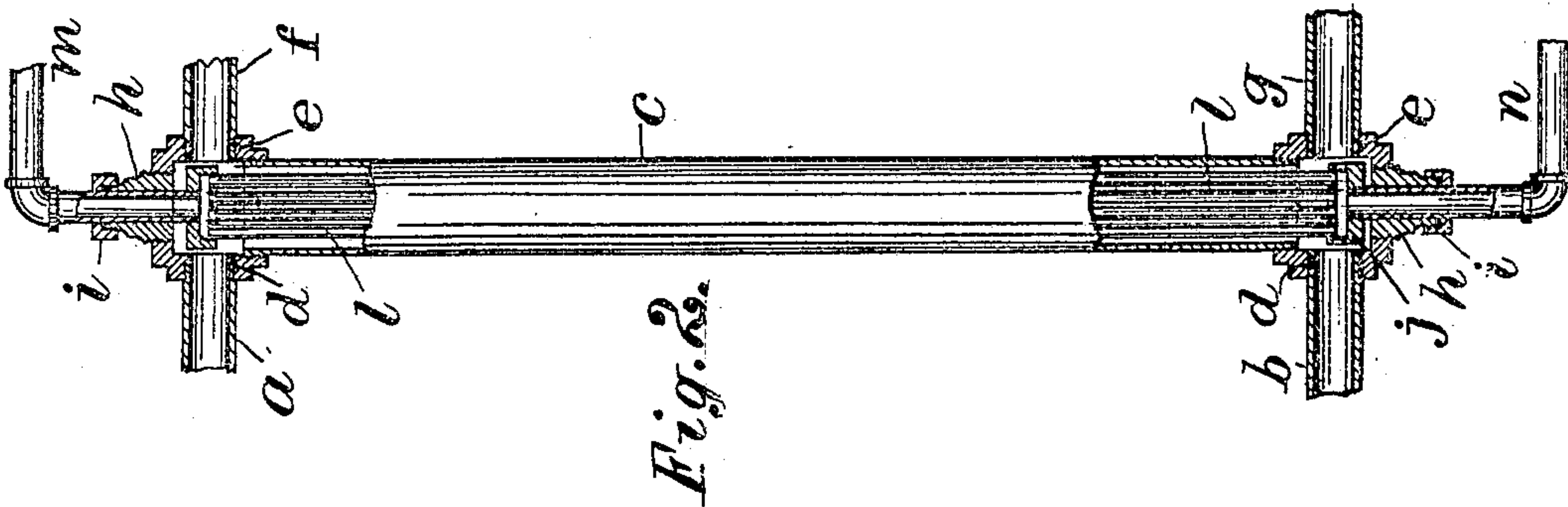


Fig. 1.



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DOMESTIC WATER-HEATER AND TANK SYSTEM.

SPECIFICATION forming part of Letters Patent No. 788,089, dated April 25, 1905.

Application filed June 25, 1904. Serial No. 214,121.

To all whom it may concern:

Be it known that I, JOSEPH J. BLACKMORE, a citizen of the United States, whose residence and post-office address is 204 Macon street, Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Domestic Water-Heaters and Tank Systems, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to furnish an effective apparatus for furnishing hot water at all times in apartment-houses and buildings which are heated by steam in the winter, but do not require any steam heat in the summer season.

I employ a reservoir-tank and steam-pipes inclosed in a casing containing water, with the upper and lower parts of the casing connected to the upper and lower parts of the reservoir-tank, so that when steam is available water may be supplied to the casing of the steam-heater and the hot water continuously circulated through the tank. When the steam is not available, I provide a separate water-heater having a furnace in which fuel is burned to heat the water, and I connect the upper and lower parts of the same to the upper and lower parts of the steam water-heater, which is so constructed that the hot water may be circulated through it and through the reservoir-tank from the hot-water boiler. The system thus requires a steam-generator containing a furnace for generating the steam, a water-heating boiler containing a furnace for heating the water, a reservoir-tank for holding a supply of hot water, and the steam water-heater containing steam-pipes and a water-casing which may at times be used for heating the water and which at other times furnishes a connection between the hot-water boiler and the reservoir-tank.

In my construction I employ a plain cylindrical tank to operate merely as a reservoir for the heated water and furnish an auxiliary tubular heater having a water-jacket with connections at its opposite ends to the upper and lower parts of the tank and a water-supply connected with the jacket, steam-tubes immersed in the water within the jacket, heads

upon the jacket, and steam-pipes connected with the steam-tubes and extended through the heads of the jacket, so that water may be automatically circulated through the steam water-heater and the tank, and fresh water introduced by the water-supply pipe is heated continuously as water is drawn from the tank.

The steam water-heater constructed as just described for supplying the hot-water tank can be made very cheaply and furnished, with the tank itself, at less cost than a coil-boiler of equal capacity, such as is commonly furnished to apartment-houses for delivering hot water, while it furnishes a construction which is more efficient and is also far more readily cleaned and repaired.

The water-heater described herein may be made almost wholly of wrought-iron pipe and common threaded pipe-fittings and is thus not only constructed cheaply, but readily taken apart or its parts renewed in case of injury.

The water-jacket of the steam water-heater is provided at opposite ends with cross connections which can be extended to the upper and lower parts of the fuel water-heater, and thus form part of the circuit between the fuel water-heater and the reservoir-tank when the steam-generator is not in operation. The pipe for supplying steam to the steam water-heater would in such case be closed by a valve and the connections with the fuel water-heater opened, the construction then permitting the hot water from the fuel water-heater to circulate directly across the steam water-heater to the hot-water tank.

My invention will be understood by reference to the annexed drawings, in which—

Figure 1 is a perspective view of a steam-generator, a fuel water-heater, a steam water-heater, and a hot-water storage-tank with the necessary pipe connections. Fig. 2 is a longitudinal section of the steam water-heater. Fig. 3 is a perspective view of the threaded disk *k*; and Fig. 4, a perspective view of the reducer *j*, to the larger end of which the disk is fitted.

In Fig. 1, A designates the steam-generator; B, the fuel water-heater; C, the steam water-heater, and D the hot-water tank or reservoir,

suspended from the ceiling by straps E. In Fig. 2 the water-jacket *c* is shown of wrought-iron pipe threaded at the ends, where it is provided with cast-iron crosses having openings *d* at the left, which are connected, respectively, by pipes *a* and *b* with the upper and lower parts of the tank D. On the right the openings *e* of the crosses are connected by pipes *f* and *g* with the upper and lower parts, respectively, of the fuel water-heater. These pipes are provided with valves *f'* and *g'*. The ends of the crosses are closed by plugs *h*, perforated for the passage of steam-pipes and provided with stuffing-boxes *i* upon their outer ends. A pipe-reducer *j* is shown within each of the crosses, with its smaller opening connected to a steam-pipe constructed through the stuffing-box. The larger opening of the reducer is closed by a threaded disk *k*, which is formed with a series of holes in which steam-tubes *l* are fitted and expanded to form tight joints. The steam-pipe *m* at the upper end of the steam-tubes is connected with the top of the steam-generator to receive steam therefrom and is provided with a valve *m'*. The steam-pipe *n* from the bottom of the steam-tubes drains the condensed water from the tubes and may return the same in the usual manner to the lower part of the steam-generator. The water-tank is provided near the upper part with a pipe *o* to draw off the heated water as required. A water-supply pipe F is shown extended from the hot-water tank and would in practice be connected with an open elevated tank to keep the water-chamber in such heater constantly filled with water and to supply any loss of water when drawn from such water-chamber. When connected with the water-tank D, the water-heater may thus serve to keep the tank entirely filled while water is being drawn therefrom. With this system of apparatus when the steam-generator is in operation the valves *f'* and *g'* are closed and the steam is admitted to the steam water-heater, the steam-tubes of which are immersed in the water in the jacket *c*, which heats the water in the jacket and circulates the same through the boiler. The water rises in the jacket as it is heated, and the hot water thus enters the top of the water-tank and permits hot water to be drawn from such tank before the entire contents of the tank have been heated by passage through the water-heater. In the warm season when the steam-generator is not required for heating the apartments the valve *m'* is closed and the valves *f'* and *g'* opened, and the fuel water-heater is operated to supply the tank D with hot water.

The construction of the steam water-heater C permits the water to pass from the opening *e* to the opening *d* within the crosses and thence by the pipes *a* and *b* to circulate through the tank D. The particular construction for the steam water-heater thus facilitates the pas-

sage of the water through the same from the fuel water-heater when steam cannot be obtained. The steam enters all of the steam-tubes in the steam water-heater at once, and as it makes a short circuit to reach the return-pipe *n* the circulation of steam is very free and the water in the jacket is rapidly heated.

This apparatus is designed exclusively for domestic use, and the complete system embraces the steam-generator and the fuel water-heater in addition to the steam water-heater and the hot-water tank. The fuel water-heater is essential for use in large apartment-houses, as a very large amount of hot water is used in such houses in the warm season and the fuel water-heater is required to maintain the supply of hot water when the steam water-heater is unable to operate for want of steam.

I am aware that gas has been employed to heat a hot-water tank when such tank is normally supplied by a water-back in a cooking-range, the gas being required to heat the tank when the range is put out of use in the warm season by the substitution of a gas-cooker.

In cases where the steam-generator is used for warming apartments I am not aware that a steam water-heater has ever been used independently of the hot-water tank to supply the hot water to the tank, and such combination offers many advantages in cheapening the construction and in facilitating cleaning and repairs. Either end of the water-heater shown in the drawings can be readily unscrewed and all of the parts examined for cleaning or repairs and the parts replaced in their working position with very little delay or expense.

By substituting the auxiliary steam water-heater and tank for the ordinary coil-tank the steam water-heaters can be manufactured of several sizes and readily kept in stock, so that they can be supplied with the tank to meet any requirement at very short notice, which cannot be done at the present time where a coil-boiler is demanded.

Having thus set forth the nature of the invention, what is claimed herein is—

1. A domestic water-heater and tank system, comprising a reservoir-tank, the steam water-heater C with water connections at its opposite ends to the upper and lower parts of the tank, a steam-generator having furnace to generate the steam, steam-pipes within the steam water-heater having a connection therefrom to the steam-space of the generator, and an outlet for the condensed water, the fuel water-heater B having a furnace to heat the water for use in emergencies and in summer, and branch water-pipes connecting the opposite ends of the steam water-heater with the upper and lower parts of the fuel water-heater, whereby the tank can be supplied with hot water from the fuel water-heater when the steam-generator is not in use.

2. A domestic water-heater and tank system, comprising a reservoir-tank, a steam-generator having a furnace for generating the steam, a steam water-heater having a water-jacket of
5 wrought tubing with pipe-crosses at opposite ends, and stuffing-boxes upon the end outlets, the pipe *b* connecting the lower part of the tank with the jacket, steam-tubes immersed in the water within the water-jacket with
10 steam-pipes extended therefrom through the stuffing-boxes to the top and bottom of the steam-generator, a fuel water-heater for use in emergencies and in summer and having a furnace to heat the water, and branch water-
15 pipes connected respectively with the side openings of the pipe-crosses and with the upper and lower ports of the fuel water-heater, whereby when the steam is not available, the water from the fuel water-heater may be cir-
20 culated to the tank across the opposite ends of the steam water-heater.

3. A domestic water-heater and tank system comprising the reservoir-tank D, the steam-generator A having furnace therein for gen-
25 erating the steam, the fuel water-heater B

having furnace therein for heating the water, and the steam water-heater C having steam-pipes for heating water, the steam water-heater having its water-chamber connected at
opposite ends to the upper and lower parts of 30 the tank D, and its steam-chamber connected at opposite ends to the upper and lower parts of the steam-generator A, an outlet for hot water from the tank D, an inlet upon the tank for fresh water, and branch water-pipes F and 35 G connecting the opposite ends of the water-chamber of the steam water-heater with the upper and lower parts of the fuel water-heater B, whereby steam from the generator may be used to heat the tank-water in the cold 40 season, and the fuel water-heater B may be used to heat the tank-water in the summer season.

In testimony whereof I have hereunto set my hand in the presence of two subscribing 45 witnesses.

JOSEPH J. BLACKMORE.

Witnesses:

L. LEE,

THOMAS S. CRANE.