I. J. O'MALLEY.

THERMOSIPHON HEATING APPARATUS.

APPLICATION FILED JAN. 19, 1910.

1,050,038.

Patented Jan. 7, 1913.

2 SHEETS—SHEET 1.

FIG. 1

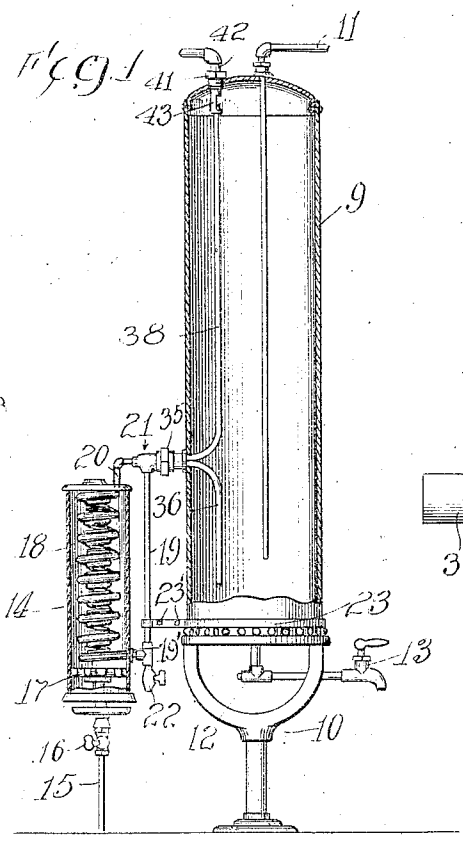


FIG. 4

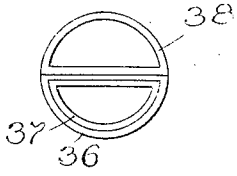


FIG. 3

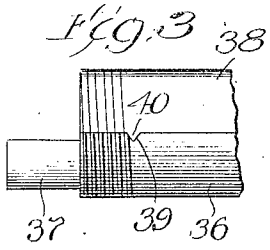
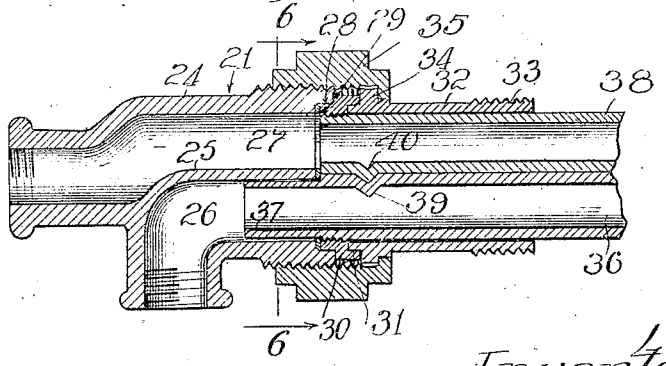


FIG. 2



Witnesses:

H. B. Ewlite

H. J. Wilson

Inventor:

Ira J. O'Malley

By Linthicum, Beck & Fuller

Atty's.

I. J. O'MALLEY.

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2 SHEETS—SHEET 2.

Fig. 5.

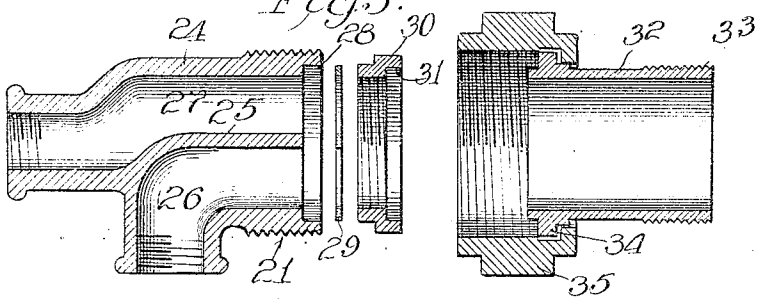


Fig. 7

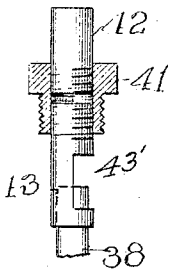


Fig. 6.

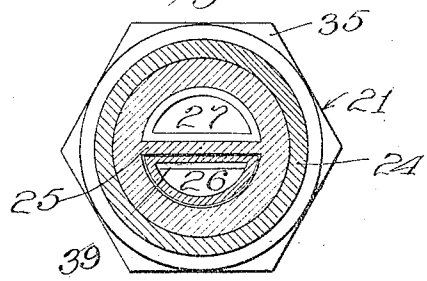
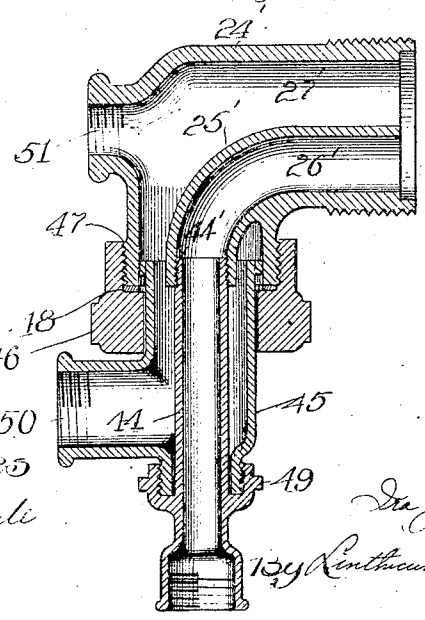


Fig. 8.



Witnesses

H. E. Whittle

H. P. Wilson

Inventor:

Jno. J. O'Malley

by Linthicum Belt & Fuller

Attys.

UNITED STATES PATENT OFFICE.

IRA J. O'MALLEY, OF CHICAGO, ILLINOIS.

THERMOSIPHON HEATING APPARATUS.

1,050,038. Specification of Letters Patent. Patented Jan. 7, 1913.

Application filed January 19, 1910. Serial No. 538,937.

To all whom it may concern:

Be it known that I, IRA J. O'MALLEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Thermosiphon Heating Apparatuses, of which the following is a specification.

My invention relates generally to heating systems or to any system of liquid distribution wherein it is desirable to conduct a plurality of streams through a single pipe or opening, and particularly to the fittings and connections of such systems, and the particular embodiment which I have chosen for illustration shows my invention as connecting a gas water-heater to an ordinary kitchen range boiler.

More specifically, my invention comprises a fitting of novel construction for connecting a tank or boiler, and heater, and a system of piping in conjunction therewith, which enables the tank and heater to be assembled in the shop and shipped intact, thereby obviating the necessity of cutting and fitting the connecting pipes at the place where the apparatus is to be set up, and thus materially reduce the time and cost of installation.

In heating systems of this character as ordinarily connected up, the cold water outlet pipe is connected from the bottom of the tank to the heater, and as a result the dirt and sediment which collects in the tank, eventually settles into this cold water pipe, and is carried by the flow into the heater where it is baked upon the heating surfaces, thus decreasing the efficiency of the heater. This objectionable feature is overcome in my invention, by siphoning the water from the tank, and while the lower end of the siphon may be located sufficiently near the bottom of the tank to draw practically all of the water therefrom, the sediment which accumulates in the bottom of the tank is left undisturbed and is not drawn into the heater coils or connecting pipes.

In my construction the various parts are so arranged and united, that considerable saving in labor, in cutting, threading, and fitting of pipes, and a saving in material such as fittings, unions, and pipes, is accomplished, and furthermore, by providing a device which can be shipped already assembled great economy of time and labor in the installation of the apparatus is effected.

It is also one of the aims of my invention to provide a connection between the heater and tank which will have few joints, thus reducing the liability of leakage and consequent cost of maintenance.

It is also an object of my invention to provide a heating apparatus in which the loss of heat due to the usual reverse circulation which is set up when the heater is shut off, and which is customarily known as "chimney loss", shall be entirely eliminated.

Further objects are the production of an apparatus which shall be cheap to manufacture, simple in construction, and easy to install.

Additional aims, objects, purposes, and advantages of my invention will be apparent to those skilled in the art as it becomes better understood by reference to the following description when taken in connection with the accompanying illustration of one preferred embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

Referring now to the drawings illustrating a preferred embodiment Figure 1 is an elevation showing a portion of the tank and heater as broken away to show the interior construction. Fig. 2 is a vertical section of the connecting fitting. Fig. 3 is an elevation of the inner ends of the D-shaped tank pipes. Fig. 4 is an end elevation of the pipe shown in Fig. 3. Fig. 5 is a view similar to Fig. 2, but showing the various parts in detail. Fig. 6 is a section on the line 6—6 of Fig. 2. Fig. 7 is a sectional elevation of the support for the upper end of one of the tank pipes, and, Fig. 8 is a sectional elevation of the modification of the connecting fitting.

Referring to Fig. 1 of the drawings, a tank or storage chamber 9 of any preferred construction and shown as an ordinary kitchen range boiler, is supported upon a suitable base 10, and provided with an inlet pipe 11, by which the tank is supplied with cold water, and a drain 12 provided with a spigot 13 for draining the tank.

A heater 14, of any preferred type, but shown as a gas heater, adapted to be supplied with gas from a pipe 15, which gas supply may be controlled by a cock 16, is provided with a burner 17, and a heating coil 18 connected by means of the pipes 19 and 20, to my improved fitting 21. The pipe 19 which is adapted to supply the heater with cold water from the tank, is preferably provided with a drain cock 22,

and is clasped by a clamp 23, which also embraces the tank, whereby the heater is partially supported and is rigidly maintained in position.

The fitting 21 through which the water is circulated from the tank to the heater and back again into the tank, comprises an annular shell 24, having an inner partition 25, to form a plurality of passages 26 and 27, which are internally threaded at their outer ends for connection to the pipes 19 and 20, respectively. The inner end of the shell is provided with an annular recess 28 in its walls for the reception of a webbed packing washer 29, which is interposed between the shoulder of the recess 28 and the inner face of an internally threaded connecting ring 30, provided with an internal shoulder 31. A sleeve 32 is adapted to fit into the shoulder ring 30, and is provided with external threads 33 which are adapted to be screwed into an opening tapped in the side of the tank 9, whereby the fitting is connected to the tank. An annular shoulder 34 is provided near the end of the sleeve 32, to cooperate with a coupling ring 35, which is threaded to be screwed onto the inner end of the casing 24, whereby the sleeve 32, connecting ring 30, washer 29, and casing 24 may be drawn together to provide a water tight coupling.

For the purpose of conducting the water from near the bottom of the tank to the passage 26 and subsequently to the heater 14, I have provided a D-shaped bent tube 36, provided with a reduced extension or nipple 37 which is adapted to be inserted into the passage 26 in the casing as shown in Fig. 2. A similar D-shaped tube 38 is adapted to communicate with the passage 27 and to conduct the heated water which is delivered to the pipe 20 from the heater 14, into the passage 27, to a point near the top of the tank, where it is discharged into the tank. The two D-shaped tubes 36 and 38 are each semicircular in cross-section, and when brought together they form a circular divided water conductor similar in cross-section to the partitioned casing 24. The tubes are threaded at their outer ends for engagement with the internally threaded ring 30, so that when the ring is screwed onto the ends of the tubes, when they are in juxtaposition as shown in Fig. 2, they will be maintained in proper relation to communicate with the passages in the casing 24. In order that the threads on the two tubes may be brought into proper relation to be engaged by the threads on the ring 30, and to prevent longitudinal displacement of the tubes relatively one to the other, the flat face of one of the tubes, preferably tube 36, is provided with a V-shaped groove 39 extending transversely thereof and adapted to receive a similarly shaped rib 40 projecting out from the flat face of the tube 38 as shown in Figs. 2 and 3.

Since the tank, heater, and connections are designed to be assembled before shipment to the place where they are to be installed, it is desirable to provide a support or retaining means for the upper end of the tube 38, which reaches nearly to the top of the tank, and because of its length is very liable to become broken off if the structure should be subjected to rough usage in shipment. In order to sustain the upper end of this tube in the desired position, I have provided the ordinary spud 41 into which the outlet pipe 42 is customarily threaded with a downwardly extending supporting member 43, which fits loosely over the tube 38 and is threaded at its upper end to be screwed into the lower side of the spud 41, as shown in Fig. 7. This supporting member 43 is preferably cut away at one side 43′ in order that the water which is discharged from the tube 38, may flow into the tank 9, and also that the water from the tank 9 may be admitted into the outlet pipe 42. The support 43 at the end of the pipe 38 is designed to maintain the end of the tube in proper position without in any way interfering with the flow of water from the tube or to the outlet pipe.

In assembling my construction, the tubes 36 and 38 are first inserted into the opening in the side of the tank and the ends are then brought into the proper longitudinal relation so that the rib 40 will be in engagement with the groove 39 with the ends of the tubes projecting out through the side opening in the tank. The sleeve 32 carrying the coupling ring 35 is now slipped over the ends of the tubes and screwed into position in the tank side, the tubes meanwhile being maintained in proper position by a suitable tool which can be inserted into the ends of the tubes and which will grip or tightly clasp the tubes so that they can be held. The ring 30 is next screwed upon the ends of the tubes, thus preventing them from being withdrawn from the sleeve 32. The washer 29 which may be of soft metal, leather, or any other suitable packing material, is placed upon the projecting end or nipple 37 of the tube 36. The lower passage way 26 of the casing 24 is next slipped over the nipple 37, thus bringing the tubes 36 and 38 into registration and communication with the passage ways 26 and 27, respectively. By screwing up the coupling nut 35 so that the casing 24 will be drawn tightly against the ends of the tubes 36 and 38 with the washer 29 tightly clasped therebetween, a water tight fitting is secured, which has a plurality of passages communicating with the interior of the tank, and each entirely independent from the other. By slipping the supporting member 43 down over the tube 38 and screw-

ing the spud 41 into position at the top of the tank, the upper end of the tube is securely held in proper position. The heater 14 is next connected to the fitting by means of the pipe 19 provided with the lock-nut 19′, and the pipe 20, the strength and rigidity of the connection between the tank and heater being further increased by slipping the band or collar 23 over the tank 9 and screwing up the bolts 23′, so that the pipe 19 and the tank are both tightly clamped by the band. The heating apparatus assembled as described, with the tank and heater all connected together, may now be shipped to the place where it is to be installed, and it is only necessary for the workmen to place the tank in proper position, connecting the inlet pipe 11 and the outlet pipe 42 thereto, and connecting the gas inlet pipe 15 to the heater 14, and the installation is complete, without the usual loss of time, labor, and material, resulting from the cutting and fitting of pipes and connecting up of the heater and tank.

As is well known, kitchen range boilers of this kind are ordinarily connected to a heating coil either in the fire box of the kitchen range or in the house heating furnace, and in such cases the cold water connection from the tank to the heating coil is usually taken off from the bottom of the tank, and the hot water pipe from the coil usually discharges into the tank at or near its top. When thus connected, the sediment which settles to the bottom of the tank will be drawn into the coil, thereby greatly impairing its efficiency.

It is sometimes desirable to connect an ordinary furnace coil to a heating system embodying my invention, so that the water in the tank will be heated by the coil when the furnace is running, and the gas heater may be employed when the furnace is not in use. In connecting up such a system the cock 22 (Fig. 1), may be replaced by a pipe leading to the furnace coil through which cold water will be supplied from the tank to the coil. The return hot water pipe will be connected in any suitable manner to the passageway in the fitting which communicates with the hot water discharge tube 38.

In Fig. 8 I have disclosed a modification of the fitting above described which is particularly adapted for use in connecting up a system as above outlined. In this modification the casing 24′ is provided with a partition similar to that in the casing 24, and which divides the casing into the passage ways 26′ and 27′. The passage way 26′ is internally threaded at 44′ for the reception of the pipe 44 which extends downwardly therefrom and is adapted for connection at its lower end to the pipe 19, shown in Fig. 1, and is provided with an integral collar 49 internally threaded to be screwed to the reduced lower end of the shell 45. The upper end of this shell is adapted to be slid into the lower end of the enlarged passage way 27′, and a water tight fitting is produced between this shell and the casing 24′, by a packing ring 48 which is held in place between the lower end of the casing 24′ and a coupling ring 46 adapted to be threaded thereon. It will be evident from this construction that the shell 45 is capable of angular adjustment to bring the opening 50 into any desired position, thus permitting the heater 14 which is connected to the shell 45 by the pipe 20, to be swung and positioned at any angle relative to the tank 9.

It is well known that in heating systems of this type as ordinarily connected up, there is a considerable loss of heat known as "chimney loss," which occurs in the following manner: The cold water connection to the heater, as commonly connected up, is attached to the bottom of the tank and the hot water pipe on the heater is connected to the side or top of the tank. During the normal operation of the apparatus the cold water settles in the tank into the cold water pipe leading to the heater, and as the water in the heater becomes heated, it rises and is discharged into the top of the tank, while the cold water in the connection to the heater, rises into the heating coil and becomes heated, and eventually is discharged as hot water back into the tank. When the heater is turned off and the tank and coils are full of heated water, the heating coil becomes a heat radiator, and the water therein becoming cool, settles back into the tank and establishes a reverse circulation. It will be evident that in my construction, such a reverse circulation is impossible, since the cold water connection from the tank to the heater is in the form of a siphon, and if the water in the heated coil should be cooled below the temperature of the water in the passage way 27 and tube 38, it would settle only to the bottom of the heater itself, and would not work back into the tank. The objectionable feature of chimney losses in constructions of this character is thus entirely obviated.

While I have shown and described the embodiments of my invention, which appear at this time to be preferable constructions, nevertheless it will be understood that various changes in the structure and minor mechanical details of my invention may be made without departing from the spirit of the invention or from the scope thereof, as set forth in the following claims, or without sacrificing any of the material advantages thereof.

What I claim is:

1. The combination of a fitting having a plurality of passages extending therethrough, a plurality of tubes communicating with the passages in said fitting, one of

the tubes having a nipple fitting in one of the passages and means for connecting the tubes to said fitting.

2. The combination of a fitting having a plurality of passages extending therethrough, a plurality of tubes communicating with said passages, a telescopic nipple connection between one of the tubes and one of the passages and separate means for holding the tubes in position.

3. The combination of a fitting provided with a plurality of passages, a plurality of pipes connected with said fitting and communicating with said passages, a plurality of flat-faced tubes positioned with their flat faces together with the tubes in alinement with said passages, one of the tubes having a nipple fitting in one of the passages and means for connecting said tubes to said fitting.

4. In a device of the character described, the combination of a fitting divided by a partition into a plurality of passages, a plurality of tubes adapted to communicate with said passages, and having provisions for preventing relative longitudinal displacement of the tubes, and means for connecting said tubes to said fitting with each tube in alinement with its respective passage.

5. In a device of the character described, the combination of a fitting having a partition extending longitudinally thereof, dividing it into a plurality of parallel passages, a plurality of interengaging tubes adapted to communicate with said passages, and means for securing said tubes to the fitting.

6. In a device of the character described, the combination of a circular fitting provided with a partition dividing said fitting at one end into two substantially semi-circular passages, a plurality of semi-circular tubes disposed with their flat faces together and positioned in alinement with the passages in said fitting, means for preventing longitudinal movement of the tubes relatively one to the other; and means for securing said tubes and fitting together to provide a plurality of continuous and independent passages through said tubes and fitting.

7. In a device of the character described, the combination of a fitting divided by a centrally disposed partition into a plurality of passages, a flat-faced tube having a nipple extending into one of said passages in the fitting, a second flat-faced tube disposed in alinement with the other passage in said fitting, interengaging means located on the flat faces of said tubes to prevent longitudinal movement of one tube relatively to the other, and means for rigidly securing said tubes and fitting together.

8. In a device of the character described, the combination of a fitting divided longitudinally into a plurality of passages by a centrally disposed partition, a circular sleeve, a pair of flat-faced tubes located within said sleeve with their flat faces together, rib and groove connections between said tubes to prevent longitudinal movement of one relatively to the other, and means for securing said sleeve and tubes to said fitting with each tube communicating with a passage of the fitting whereby to provide a plurality of continuous and independent passages through said fitting and tubes.

9. In a device of the character described, the combination of two flat-faced tubes, a sleeve surrounding said tubes, and interengaging means between the tubes for preventing longitudinal movement of one tube relatively to the other.

10. A device of the character described including a fitting having a plurality of passages, a plurality of tubes registered with the respective passages, a sleeve embracing and engaged with the tubes and constituting a connection for engagement with a pipe or tank, and a coupling associated with the fitting and sleeve to hold together the tubes and the fitting, substantially as described.

11. A device of the character described including a fitting having a plurality of passages, a plurality of tubes registered with the respective passages, an external annular shoulder embracing the tubes and carried thereby, a sleeve embracing the tubes and engaging the shoulder and constituting a connection for engagement with a pipe or tank, and a coupling associated with the fitting and with the sleeve to hold together the tubes and the fitting.

12. A device of the character described including an externally threaded fitting having a plurality of passages, a plurality of tubes registering with the passages, an external annular shoulder embracing and carried by the tubes, a sleeve embracing the tubes and engaging the shoulder and constituting a connection for engagement with a pipe or tank, and an internally threaded coupling ring adjustably engaging the threads of the fitting and having a swiveled engagement with the sleeve.

IRA J. O'MALLEY.

Witnesses:
I. J. WILSON,
G. E. HOLMES.