No. 873,842. PATENTED DEC. 17, 1907.

D. S. COLE.

HOT WATER SUPPLY.

APPLICATION FILED OCT. 13, 1906.

2 SHEETS—SHEET 1.

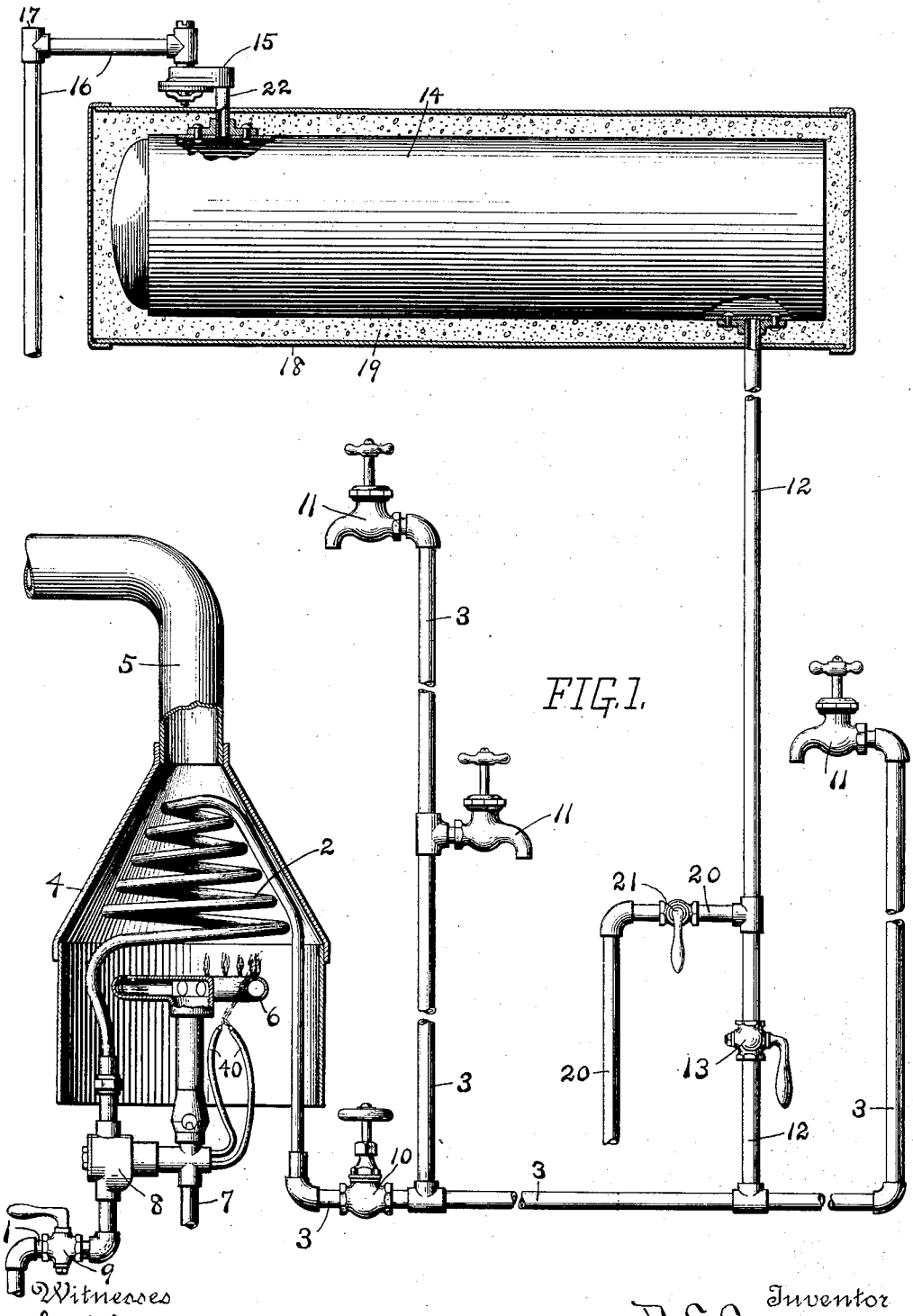


FIG. 1.

Witnesses
G. Wilson.
Geo. C. Burns.

Inventor
D. S. Cole.
By his Attorney
Edward N. Pagelsen

No. 873,842. PATENTED DEC. 17, 1907.

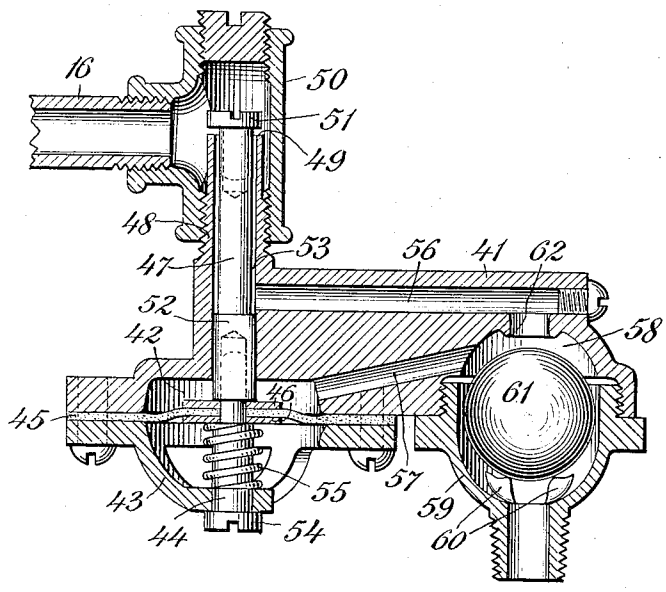
D. S. COLE.

HOT WATER SUPPLY.

APPLICATION FILED OCT. 13, 1906.

2 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

John Miner

Inventor:

D. S. Cole.

by Edward N. Pagelsen

Attorney.

UNITED STATES PATENT OFFICE.

DWIGHT S. COLE, OF DETROIT, MICHIGAN.

HOT-WATER SUPPLY.

No. 873,842. Specification of Letters Patent. Patented Dec. 17, 1907.

Application filed October 13, 1906. Serial No. 338,696.

To all whom it may concern:

Be it known that I, DWIGHT S. COLE, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Hot-Water-Supply System, of which the following is a specification.

An object of my invention is to provide an apparatus for increasing the possibilities of service of all sizes of automatic water heaters—the special value of the invention being, that it enables the smaller sizes of such heaters to render much greater service than has heretofore been possible.

Another object of my invention is to provide an automatic hot water supply system which is positive and reliable, easily assembled and installed, and easily and cheaply constructed.

A further object of my invention is to provide an automatic hot water supply apparatus whereby an ample store of hot water may be produced, and then delivered at a rate exceeding the heating capacity of the apparatus during the time of delivery; and in which, after the stored hot water has been exhausted, the heater will continue to deliver hot water at its fullest capacity so long as the delivery system remains open to permit such delivery.

As heretofore constructed and installed, automatic water heaters have had to be of a size and capacity to heat all the water required for maximum service at the rate of delivery—the cost of such large heaters being so great as to greatly limit their use. Moreover, the large quantity of gas necessary to supply the burners of heaters of such large size cannot ordinarily be had on the premises and the cost of providing this large necessary gas supply is often very considerable—thus further limiting the use of such heaters.

The common and well-known type of hot water service, in which a non-automatic gas heater of small capacity is connected to an ordinary storage tank of adequate size, does not render as efficient, safe or economic service as is rendered by employing an automatic heater installed in connection with a special tank or receiver as provided in my new hot water supply system. Where the former system is employed, very hot water is unobtainable until a considerable portion of the contents of the storage receptacle has been more or less heated; the heated water cannot be discharged without the introduction of a like quantity of cold water into the tank—thus cooling the heated water so that no considerable portion of the hot water can be discharged at a uniformly high temperature, and the operation of the system is subject to the dangers and errors of dependence upon personal manipulation for ignition and control.

In my improved hot water supply system, the entire quantity of water introduced into the storage tank is fully heated at the rate of its introduction while passing through the automatic heater; the entire quantity or any portion of the hot water in the storage receptacle can be withdrawn without the introduction of any additional water, either hot or cold—thus providing economic and efficient operation, and as the heater is wholly automatic in operation, all dangers from errors in personal manipulation are eliminated. It is thus obvious that my new hot water supply system achieves new and useful objects.

I attain the objects above set forth in the construction shown in the accompanying drawings, in which

Figure 1 is a general view of my improved hot water supply system. Fig. 2 is a cross section of a desirable form of air valve.

Similar reference characters refer to like parts throughout the several views.

In the drawings the service pipe 1 connects to the source of water supply and to the automatic fuel governing valve 8, which may be similar to that shown and described in my former patent No. 715,551, dated Dec. 9, 1902, or any other desirable valve for controlling the fuel supply operated by the pressure of the water passing therethrough may be employed. Connected to this valve 8 is a coiled tube 2, the other end of which connects to the hot water delivery system of pipes 3. A hood 4 surrounds the coil 2 in which the water is heated, to prevent excessive waste of the heat and the flue 5 carries off the waste products of combustion. The gas burner 6 is shown to be in the form of a hollow perforated ring and fuel is supplied to it by means of the pipe 7. Any other automatic heater may be employed in place of the construction shown.

The hot water delivery system 3 is formed of pipes considerably larger in diameter and capacity than the heating coil 2, and is provided with a series of faucets or valves 11 for drawing off the hot water. A valve 10 may be connected into the system to limit the

rate of discharge from the heater and thus regulate the temperature at which water may be discharged from the heater.

A pipe 12 connects the delivery pipe system 3 with the storage tank 14 and is provided with a valve 13 to admit of cutting off the tank from the delivery pipe system, as will be explained later. The capacity of this pipe 12 is greatly in excess of that of the coiled tube 2. The tank 14 is provided with an air valve 15, and this valve with an overflow pipe 16 to carry off any water that passes the valve when the same is not in good operative condition. This tank, which is the type to be preferred in connection with this system of supplying hot water, is mounted at a sufficient elevation so that the water in the tank may be discharged through the outlets 11 by gravity.

Enclosing the tank 14 is a casing 18, and packed between the casing and tank is a non-conducting filler 19, such as felt or asbestos, which will minimize the loss of the heat from the water in the tank by radiation.

While I may employ any good type of air valve, that shown in Fig. 2 is peculiarly adapted for use with this system. The body portion 41 has a chamber 42, cap 43 for guiding the lower portion 44 of the valve stem, diaphragm 45, washers 46, upper part 47 of the valve stem, extension 48 of the body provided with valve seat 49 and the connection 50 screwed on to the extension. The pipe 16 is the same as shown in Fig. 1. The part 47 of the valve stem has a valve 51 and an enlarged portion 52 which fits the bore 53 of the extension 48, and the lower end has a head 54 which limits the action of the spring 55. The body has two passages 56 and 57 that connect with the chamber 58. A receptacle 59 is attached to the body as shown and is provided with shoulders 60 upon which the hollow ball or float 61 normally rests. The body portion 41 is provided with a valve seat 62 against which the float 61 seats whenever water passes from the tank to the valve. The operation of this valve is as follows. While air passes into or out of the tank, the float 61 will rest on the shoulders 60, leaving spaces between the shoulders for the passage of the air which flows through passage 56, bore 53 and pipe 16. When the tank is filled, water entering the chamber 58 will lift the float 61, pressing it against the seat 62 thus closing the passage 56, and at the same time it will pass through passage 57 into chamber 42 and acting on the diaphragm 45 pull the valve 51 against its seat 49. While there is a possibility that some water may pass around the float into passage 56, and from the chamber 42 around the part 52 of the stem, the valve 51 will seat itself perfectly because of the great area of diaphragm 45. This style of valve is adapted for high pressures.

When the tank is full of water and the system is closed; if one or more of the faucets 11 are opened so as to permit of the discharge of water at a more rapid rate than the heater can supply directly the fall of pressure in the delivery pipe system 3 will relieve the pressure on the water in the elevated tank 14 and thence upon the diaphragm 45 of the air valve 15 and the spring 55 will lift the valve stem 47 with the valve 51 attached and thus open the valve and freely admit air through the bore 53 passages 56, chamber 58, and connection 22 to the tank.

For laundry and bath tubs of dwellings, an interrupted service at the rate of from three to five gallons of hot water per minute is usually desired, the amount of each periodic delivery being from fifteen to twenty gallons, and the intervals between periods of delivery are generally not less than fifteen minutes. In addition to this periodic service, a smaller and instant lavatory and kitchen service requiring a delivery of from one and one half to two gallons per minute must be provided for. It is obvious that a heater having a capacity of from one and one half to two gallons per minute is sufficient for the above demands if satisfactory storage for the larger periodic service of hot water be provided. The storage requirements can ordinarily be met by a tank of from 15 to 20 gallons capacity, having a discharge pipe of such size as to convey the maximum quantity of hot water desired per minute under the gravity head due to the elevation of the tank above the delivery outlets.

The gas for supplying a heater of the capacity designated can ordinarily be supplied by a one-half inch gas pipe connected to the regular house service supply pipe, thus rendering the cost for gas connection very slight.

Referring to the drawings, the heater coil 2 may have a capacity of from one and one half to two gallons and the pipe 12 and pipes 3 a capacity of four or five gallons per minute and the tank 14 a storage capacity of from fifteen to twenty gallons. Starting with an empty tank 14, and valves 9 and 10 open, as soon as valve 13 is opened, water will pass through regulator 8, heating coil 2, and pipes 3 and 12 into the tank until it is filled and valve 15 is closed by the water reaching it. The instant the air valve 15 is thus caused to close (the outlets 11 all being closed) the system is sealed and the regulator 8 of the heater operates to shut off the gas supply to burner 6,—the pilot burner 40 burns constantly.

With the tank 14 filled with hot water and the system sealed, if any faucet 11 be opened to an extent permitting a discharge not greater than the heater can supply directly, there is no discharge of water from the tank 14, all the hot water discharged coming directly from the heater. It is thus obvious that the tank 14 has no part in all service re-

quiring hot water at no greater rate than the heater can supply directly, such as to lavatories and ordinary kitchen service. When, however, the rate of discharge from a faucet 11, or two or more of them open at the same time, is in excess of the rate of delivery directly from the heater, all excess of discharge will be supplied from the tank—until the entire quantity of stored hot water has been discharged, after which the rate of discharge through open faucets 11 will continue constant at the full capacity of the heater so long as the faucets remain open. After such rapid withdrawal of hot water has occurred and the faucets 11 are closed the heater will continue to operate until the entire amount of hot water withdrawn from the tank has been replaced and the system is again sealed by the automatic closing of air valve 15.

In practice the valve 13 in pipe 12 is closed immediately after the last of the series of successive large withdrawals for baths or laundry service and the storage tank remains shut-off and empty during ordinary service, which is supplied directly by the heater. When the large periodic delivery for baths or laundry is again desired the valve 13 is opened a few minutes in advance of the first withdrawal and the tank is filled with freshly heated water. During the period which intervenes between successive withdrawals for filling the bath or laundry tub the tank is automatically refilled with freshly heated water and the heater automatically turned off when the tank is filled, as heretofore described.

Should the water remain in the tank for a long period, as over a night, and become cold it can be discharged to waste by opening valve 21 in pipe 20. Occasions for thus emptying the tank rarely occur in practice, as good insulating packing 19 about the tank will keep the water hot for many hours after the tank has been filled.

From this description it will be clear that an automatic water heater installed as above described, may have an ordinary direct service capacity of a certain number of gallons per minute, and at the same time an intermittent extraordinary service capacity several times as great; while at the same time, the gas service for the heater need be but sufficient for the ordinary capacity.

The cost of this improved apparatus will practically be that of the usual direct automatic heater of the small capacity with the cost of the tank added, while its possibilities of service will be that of a direct automatic heater of a much larger capacity.

Having now explained my improvements what I claim as my invention and desire to secure by Letters Patent is,—

1. A hot water supply system, comprising a water heater including automatic means for controlling the action of the heating agent by the flow of water through the heater, a storage tank connected with the heater only through the hot water discharge pipe from the heater, means for restricting the amount of water passing from said heater into the storage tank and permitting the free discharge thereof, and a service pipe connecting to both heater and storage tank.

2. A hot water supply system, comprising a water heater including a heating coil and automatic means for controlling the action of the heating agent by the flow of water through the coil, one end of said coil being connected to the main water supply system, a storage tank connected into said system, and a service pipe of greater capacity than the heater coil connecting to both the storage tank and the delivery end of the heater coil and adapted to simultaneously convey the contents of the storage tank and the water passing through the heater.

3. A hot water supply system, comprising a water heater including a heating coil of limited capacity and a burner controlled by the flow of water through said coil, one end of said coil being connected to the water supply system, a receiver for hot water adapted to be alternately filled and emptied, a discharge pipe for said receiver having a capacity greatly in excess of that of the heater coil, and a connecting pipe extending from the delivery end of the heater coil to said discharge pipe, the flow of water to the hot water receiver being restricted to the limited capacity of the heater while the flow from the receiver is unrestricted.

4. In a hot water supply system, the combination of a water heater comprising automatic means for controlling the heating agent and a heating coil of limited capacity connected at one end to the water supply system, a storage tank, a delivery pipe of large capacity connecting to the delivery end of the coil and to said storage tank, and faucets or valves connected to said delivery pipe, said parts being so proportioned that when the faucets are closed, a restricted supply of water passing through the heater coil and delivery pipe will fill the tank, and when the discharge faucets are open, the discharge of water from the heater coil and from the tank will be simultaneous and unrestricted from the tank.

In testimony whereof I have signed my name in the presence of two subscribing witnesses.

DWIGHT S. COLE.

Witnesses:
EDWARD N. PAGELSEN,
E. M. BROWN.