Dec. 5, 1933. C. E. RUESCH 1,938,441

WATER HEATER

Filed June 9, 1931 2 Sheets-Sheet 1

Fig. 1

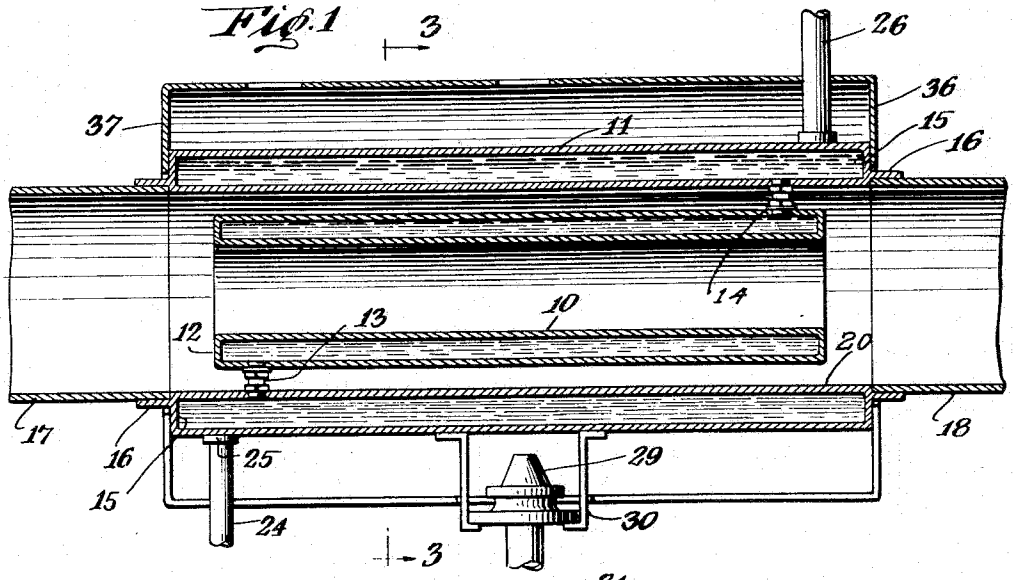


Fig. 2

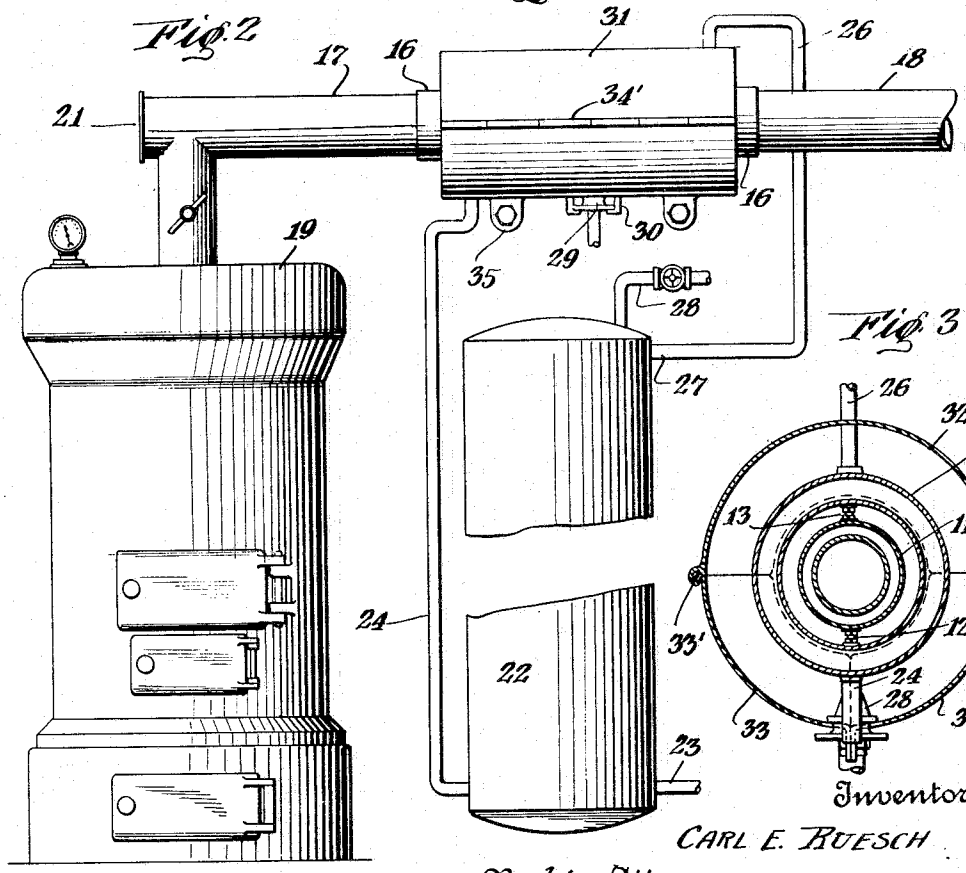


Fig. 3

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Dec. 5, 1933. C. E. RUESCH 1,938,441

WATER HEATER

Filed June 9, 1931 2 Sheets-Sheet 2

Fig. 4

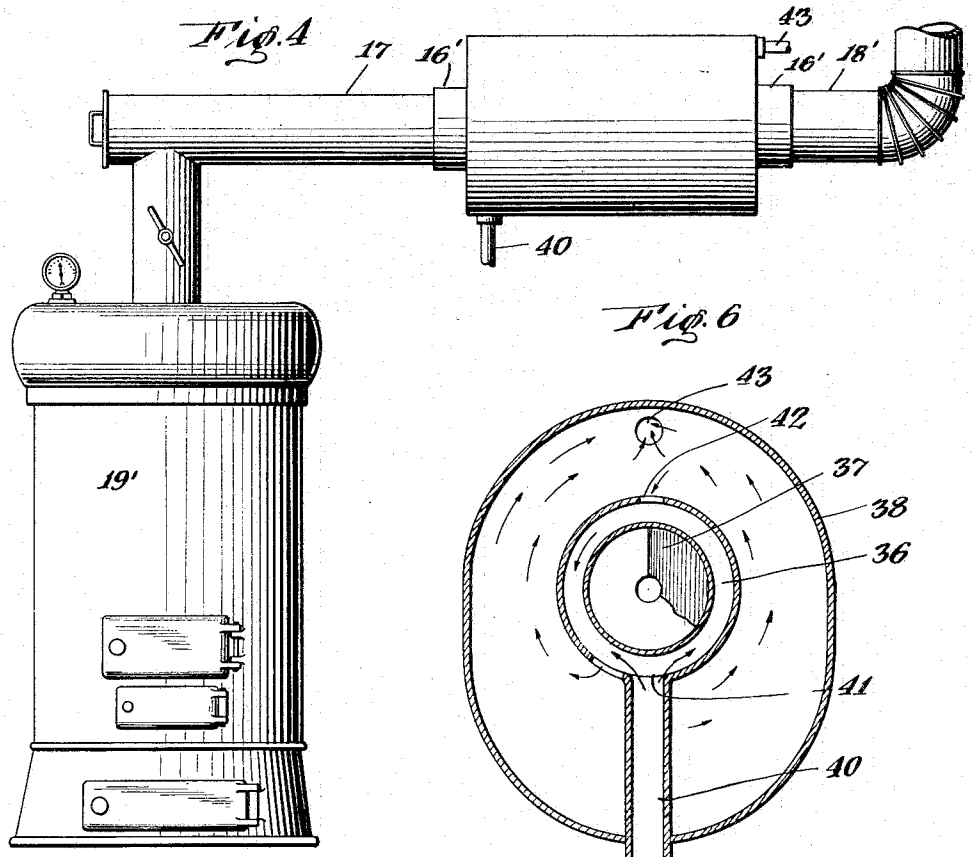
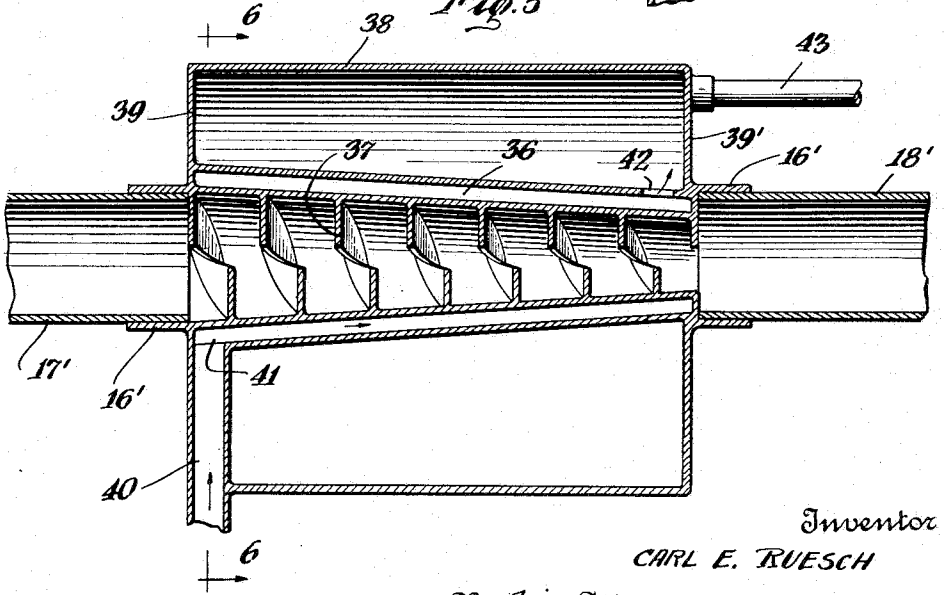


Fig. 6

Fig. 5



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UNITED STATES PATENT OFFICE

1,938,441

WATER HEATER

Carl E. Ruesch, Sayreville, N. J.

Application June 9, 1931. Serial No. 543,126

8 Claims. (Cl. 257—243)

This invention relates to water heating devices, and relates more specifically to a water heating apparatus for use with furnaces, steam and hot water boilers, and the like, wherein the unused heat of the products of combustion, which ordinarily passes out through the flue or chimney, is advantageously utilized for supplementary or additional heating purposes.

Heretofore water has usually been heated by means of a separate or special device for that purpose, or it has been heated by means of a coil or series of pipes mounted within the firebox or flue chamber of a furnace.

It is well known, however, that by far the greatest portion of the heat derived from gas, oil, coal or other combustibles pass out of the chimney, unused, thus materially reducing the efficiency of the heating apparatus.

One of the principal objects of the present invention is to employ, in a highly efficient manner, this unused heat for the purposes of heating water.

Another object of the invention is the provision of a water heating apparatus, for use in the home, as well as in apartment houses, large buildings and factories, wherein a pre-heating chamber will be provided to absorb the heat at tis hottest point, the water passing from the preheating chamber into a secondary chamber in which the said unused heat is further efficiently utilized.

Still another object of the invention is to provide a water heating device of the kind above referred to, wherein auxiliary means are provided for heating the water at times when the furnace or the like is not in use, for example in the summer time.

The invention also contemplates the provision of a device which may be easily and quickly installed in the heating system by the simple expedient of removing one of the sections of the draft or smoke pipe and mounting the device in its place.

A further object of the invention is to provide a water heating device which will have, integral with the same, a hot water reserve chamber, thereby providing an additional saving of heat.

Other objects and advantages of the invention will be hereinafter specifically pointed out, or will become apparent, as the specification proceeds.

With the above indicated objects in view, the invention resides in certain novel constructions and combinations and arrangements of parts, clearly described in the following specification and fully illustrated in the accompanying drawings, which latter show embodiments of the invention as at present preferred.

In the drawings,

Figure 1 is a longitudinal vertical sectional view taken through the center of one embodiment of the invention.

Figure 2 is a diagrammatic view showing the improved heater interposed in the smoke flue of the usual type of domestic furnace, and showing the relative position of the inlets and outlet, and the reserve tank.

Figure 3 is a transverse vertical sectional view taken on the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is a view similar to Figure 2, but illustrating a modification in the construction of the apparatus.

Figure 5 is a longitudinal vertical sectional view taken through the center of the modified form shown in Figure 4; and

Figure 6 is a transverse vertical sectional view taken on the line 6—6 of Figure 5, looking in the direction of the arrows.

Referring now to said drawings, by reference numerals, the embodiment as at present preferred, shown in Figures 1 to 3 inclusive, includes an inner or central preheating water chamber 10 and an outer or secondary water chamber 11.

The central chamber is preferably cylindrical in shape and is provided with closed end portions 12, an inlet 13 on the under side thereof at one end, and an outlet 14 on the upper side thereof at the opposite end. The inlet and the outlet lead into the outer chamber at points adjacent thereto, said outer chamber likewise having closed ends 15 and having flange portions 16, at each end thereof, for connection with the smoke flues 17 and 18 respectively, the former leading to the furnace 19 and the latter to the chimney (not shown).

It will be appreciated that the inner wall 20 of the outer chamber 11 acts as the flue through which the hot gas passes, the hotter gases being at or near the center of the passageway. Thus the pre-heating chamber 10 receives the most heat by virtue of its central position and by virtue of the fact that it is heated on all sides, and as the water contained therein is heated to a certain temperature it rises through the outlet 14 into the outer chamber 11. The outer chamber, however, receives only slightly less heat and, with the constant feeding from the inner chamber, the water in at least the

upper portion of the chamber will be substantially as hot as that in the inner chamber.

The gases, in their passage through the device will have very little obstruction and the heat of the gases of combustion is thus efficiently utilized. A quantity, however, of the soot and other solid matter may accumulate in the recesses of the apparatus, and, in order to provide means for easily removing said accumulations, thereby maintaining the apparatus efficient at all times, the flue 17 is provided with a clean-out portion 21 at one end thereof.

A reserve tank 22 is mounted in any suitable position with reference to the heater. It is preferred, however, to have same slightly above the heater in order to enable the hot water to rise with greater facility. The tank, which for convenience in Fig. 3 is shown below the heater, is provided with a pipe 23 at the lower end thereof, said pipe leading to the water supply.

An inlet pipe 24 for the outer chamber is also connected, at one end thereof, to the tank 22 at its lower end, the opposite end of said inlet pipe being connected with the outer chamber at 25. Likewise an outlet pipe 26 is connected with the opposite end of the outer chamber on the upper side thereof. The opposite end of this pipe is connected to the upper end of the tank at 27. The hot water may be drawn off from the tank through the pipe 28 connected to the top of the tank.

In order to provide auxiliary heating means for the apparatus for use when the furnace is not being used, a gas heater 29 is mounted on the under side of the outer chamber by means of brackets 30. In a large heater it may be found desirable to provide two or more of these auxiliary gas heaters, all of which may be mounted in the same manner.

A cylindrical covering 31 is suitably mounted around the outer chamber in spaced relation thereto, in order to provide additional means for retaining the heat within the chamber when the auxiliary heater is used. This cylindrical covering comprises a half section 32 for the upper portion and two quarter sections 33 and 34 for the lower sections, the latter sections being hingedly connected at 33' and 34' to the free edges of the half sections, respectively, and carrying locking means 35 for holding the same together. The cover is also desirably provided with end portions 36 and 37.

The modified form of the apparatus shown in Figs. 4, 5 and 6 is arranged to be more compact in that the reserve tank is made a part of the device instead of being separated therefrom.

In this instance a central preheating chamber 36 is provided preferably with non-parallel or converging walls, the larger portions thereof being at the end situated near the furnace 19 and the portions of smaller diameter remote therefrom.

Suitable baffle plates 37, preferably of the spiral type, are mounted at the interior of the chamber, and are designed to enable the chamber to absorb more of the heat without impeding the passage of the gases therethrough.

The device is provided with a flange portion 16' at each end for engagement with the smoke flue sections 17' and 18', respectively.

A secondary or reserve chamber 38 having end portions 39 and 39' is mounted around the inner chamber, below the center thereof.

As the water enters the device through a pipe 40 it passes into the inner chamber 36 at 41 where it is heated. The water then passes out of this chamber, through an opening 42 at the opposite end thereof, and into the secondary or reserve chamber 38, from whence it is drawn off through the pipe 43 at the upper side of the secondary chamber.

It will be appreciated that, by virtue of this arrangement whereby the reserve chamber is mounted below the center of the inner chamber, the hot water will pass out of the opening 42 with greater ease, particularly when the reserve chamber is largely filled with hot water.

In the modification of the invention just described the hot gases of combustion exuding from the fire-box of the furnace and the like exert the greatest heating effect at a point close to the furnace, and the restriction of the smoke passage, due to the tapering diameter of the same, conserves the heat of the gases during their passage, so that practically an equal heating effect is produced at the end of the chamber 36 more remote from the furnace, thus more efficiently utilizing the heat of the gases and imparting a higher degree of general efficiency to the heating apparatus as a whole.

The hereinbefore described constructions admit of considerable modification without departing from the invention; therefore, it is the wish not to be limited to the precise arrangements shown and described, which are as aforesaid, by way of illustration merely. In other words the scope of protection contemplated is to be taken solely from the appended claims, interpreted as broadly as is consistent with the prior art.

What I claim is:

1. A water heater including the combination with the flue pipe of a furnace and the like, of an auxiliary heat abstraction unit interposed between sections of said flue pipe, said unit including a double walled inner water chamber affording an interior passage in communication with said flue pipe sections, a second water chamber surrounding said inner water chamber in spaced relation to the latter, water inlet and outlet connections for said inner chamber, the inlet connection being positioned at the lower portion of said inner chamber and the outlet connection being positioned at the upper portion thereof, and an inlet and an outlet for the outer chamber.

2. A water heater including the combination with the flue pipe of a furnace and the like, of an auxiliary heat abstraction unit comprising a casing interposed between sections of said flue pipe, said casing including flanged end portions for connection with said flue pipe sections, a double walled tubular water chamber within said casing and spaced from the walls of the latter, a second water chamber surrounding said casing, water inlet and outlet connections for the inner chamber between said inner and outer water chambers, water inlet and outlet pipes in communication with said outer water chamber, an outer cover surrounding said outer water chamber, in spaced relation to the latter, said outer cover including a semi-cylindrical portion and a pair of quarter sections hingedly connected to said semi-cylindrical portion, said outer covering including end portions surrounding the flanged end portions of said casing, and locking means for said outer cover quarter sections.

3. A water heater including the combination

with the flue pipe of a furnace and the like, of an auxiliary heat abstraction unit comprising a casing interposed between sections of said flue pipe, said casing including flanged end portions for connection with said flue pipe sections, a double walled tubular water chamber within said casing and spaced from the walls of the latter, a second water chamber surrounding said casing, an inlet connection for the inner chamber between said inner and outer water chambers, a water inlet pipe in communication with said outer water chamber, said inlet connection and inlet pipe being arranged contiguous to a section of said flue pipe in proximity to said furnace, an outlet connection for the inner chamber between said inner and outer water chambers, a water outlet pipe communicating with said outer water chamber, said outlet connection and outlet pipe being arranged more remote from said furnace, an outer covering surrounding said outer water chamber in spaced relation to the latter, said outer covering including a plurality of portions hingedly connected to each other, and locking means for said outer covering portions.

4. A water heater including the combination with the flue pipe of a furnace and the like, of an auxiliary heat abstraction unit comprising a casing interposed between sections of said flue pipe, said casing including flanged end portions for connection with said flue pipe sections, a double walled tubular water chamber within said casing and spaced from the walls of the latter, a second water chamber surrounding said casing, an inlet connection for the inner chamber between said inner and outer water chambers, a water inlet pipe in communication with said outer water chamber, said inlet connection and inlet pipe being arranged contiguous to a section of said flue pipe in proximity to said furnace, an outlet connection for the inner chamber between said inner and outer water chambers, a water outlet pipe communicating with said outer water chamber, said outlet connection and outlet pipe being arranged more remote from said furnace, an outer covering surrounding said outer water chamber in spaced relation to the latter, said outer covering including a plurality of hingedly connected portions, said outer covering including end portions surrounding the flanged end portions of said casing, and locking means for said outer covering portions.

5. A water heater including the combination with the flue pipe of a furnace and the like, of an auxiliary heat abstraction unit comprising a casing interposed between sections of said flue pipe, said casing including flanged end portions for connection with said flue pipe sections, a double walled tubular water chamber within said casing and spaced from the walls of the latter, a second water chamber surrounding said casing, an inlet connection for the inner chamber between said inner and outer water chambers, a water inlet pipe in communication with said outer water chamber, said inlet connection and inlet pipe being arranged contiguous to a section of said flue pipe in proximity to said furnace, an outlet connection for the inner chamber between said inner and outer water chambers, a water outlet pipe communicating with said outer water chamber, said outlet connection and outlet pipe being arranged more remote from said furnace than said inlet connection and inlet pipe, an outer cover surrounding said outer water chamber in spaced relation to the latter, said outer cover including a semi-cylindrical portion and a pair of quarter sections hingedly connected to said semi-cylindrical portion, and a heating unit contiguous to said outer water chamber, said outer cover including end portions surrounding the flanged end portions of said casing, and locking means for said outer cover quarter sections.

6. An apparatus of the kind set forth in claim 1 in which the double walls of the inner water chamber converge toward a point remote from said furnace, whereby to conserve and efficiently utilize the heat of the hot gases of combustion at points both in proximity to and remote from said furnace.

7. An apparatus of the kind set forth in claim 1 in which the double walls of the inner water chamber converge toward a point remote from said furnace, whereby to conserve and efficiently utilize the heat of the hot gases of combustion at points both in proximity to and remote from said furnace, said inner water chamber including a plurality of spirally arranged baffle plates in the interior passage through the inner water chamber, for further efficient utilization of the heat of said hot gases.

8. A water heater including the combination with the flue pipe of a furnace and the like, of an auxiliary heat abstraction unit interposed between sections of said flue pipe, said unit including an elongated double walled inner water chamber, open at opposite outer ends, and affording an interior through passage in communication with said flue pipe sections, an elongated outer water chamber surrounding said inner water chamber, means affording direct water communication between said inner and outer water chambers, said means including a water inlet at the lower part of said inner water chamber and a water outlet at the upper part of said inner water chamber, and a unitary outlet at the upper part of said outer water chamber for the contents of both said inner and outer water chambers.

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