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WASTE HEAT ECONOMIZER

Filed Sept. 7, 1934

2 Sheets-Sheet 1

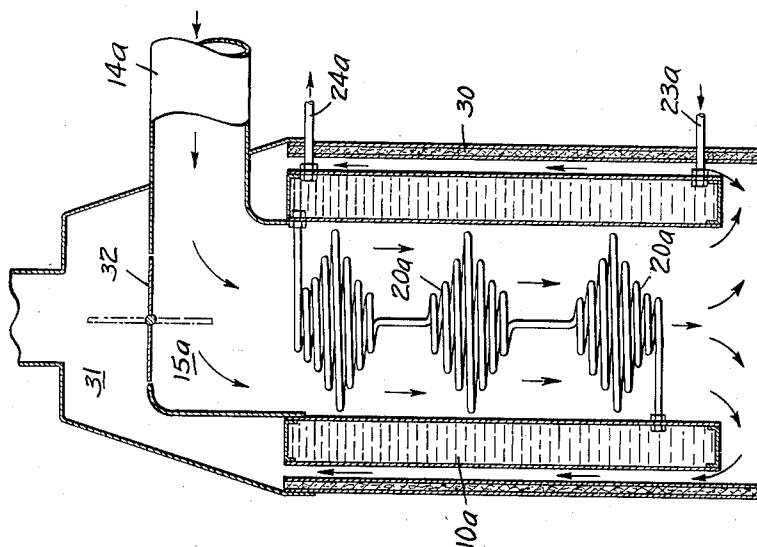


Fig. 2.

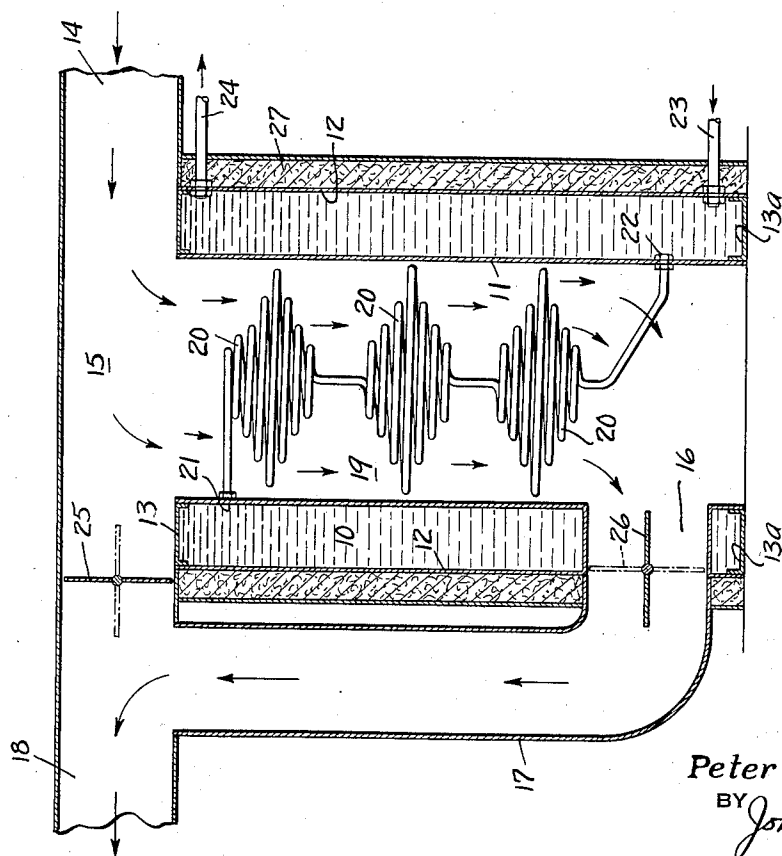


Fig. 1.

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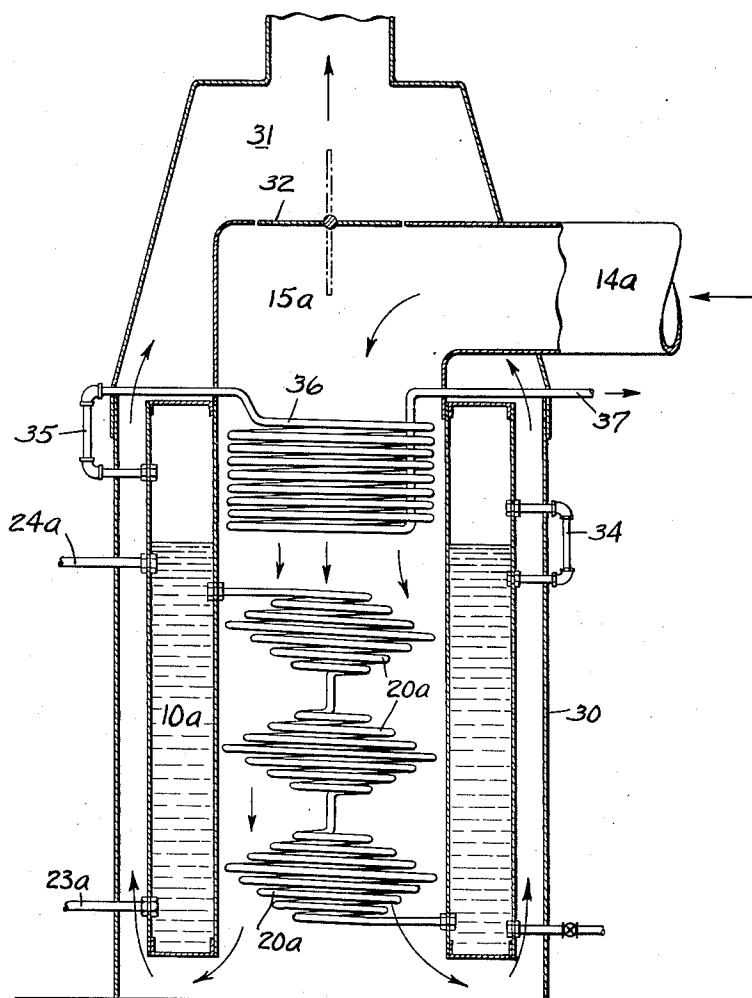


Fig. 3.

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WASTE HEAT ECONOMIZER

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3 Claims. (Cl. 122—20)

The present invention relates to waste-heat economizers and is more particularly directed toward economizers adapted for use in connection with domestic heating furnaces for obtaining hot water or hot water and low pressure steam.

It is well known that many furnaces employed for domestic heating are inefficient in the use of fuel in that a considerable portion of the heat energy available in the fuel is dissipated in the form of hot gases which pass up the chimney. These gases are much hotter than necessary to maintain the requisite draft. Attempts have been made to improve the efficiency of the furnaces by extending the boiler section or other part of the furnace so as to present more heating surface to hot gases so that the gases are cooled to a lower temperature before they are discharged. The altering of existing installations to secure the increased efficiency is not always feasible. As a plentiful supply of hot water is always desirable in the home, the present invention contemplates the use of a waste-heat economizer which can take the hot discharge gases from the furnace and utilize the heat energy in the same for heating water. This has been found to be more economical than to attempt to heat the water by coils placed over the fire box or by heat interchanges utilizing the hot water in a low pressure heating boiler.

Other and further objects of the present invention will appear as the description proceeds.

The accompanying drawings show, for purposes of illustrating the present invention, several of the many embodiments in which the invention may take form, it being understood that the drawings are illustrative of the invention rather than limiting the same. In these drawings:

Fig. 1 is a vertical sectional view diagrammatically illustrating an economizer of the single pass type.

Fig. 2 is a similar view illustrating a waste-heat economizer of the two pass type; and

Fig. 3 shows an arrangement for securing superheated steam.

In the form of construction shown in Figure 1 a hot water tank is indicated at 10. This tank is annular, having inner cylindrical walls 11, outer cylindrical walls 12, top wall 13 and bottom wall 13a, and may be made out of steel suitably welded or riveted together. The duct for receiving the hot discharge gases from the furnace is indicated at 14. It extends into a chamber 15 above the tank 10. As shown at the lower left of Figure 1, the tank is cut back at 16 to

provide a passage way for the gases. This passage way is connected to a duct indicated at 17 which extends upward to about the same level as the chamber 15 and then to a chimney or other source of draft as shown at 18.

The normal path of the gases is indicated by the arrows. The gas coming from the furnace passes into the chamber 15 down through the central opening 19 provided by the inner tank walls 11, out through the opening 16, ducts 17 and 18 to the chimney. In order to abstract a maximum amount of heat from the gases they are caused to pass through coils indicated at 20. These coils are made of copper pipe and are connected to the tank 10 as indicated at 21 and 22. The water supply is indicated at 23 and the hot water pipe for discharging hot water is indicated at 24. It will be obvious that the gases passing through the economizer will give up their heat energy to the water in the coils 20 and the tank 10 causing the water therein to become hot. The connection of the coils at the top and bottom promotes rotary circulation of the water in the tank 10.

A by-pass damper 25 is carried at the left of the chamber 15 and this damper is arranged to permit the direct passage of the hot gases from the chamber 15 to the duct 18 without passing them through the economizer. This by-pass damper may be manually controlled or automatically controlled by steam pressure or hot water temperature, employing known forms of device for such purpose. A supplemental damper 26 is placed between the exit passage 16 and duct 17 as an additional control for the gases. The tank is preferably surrounded by insulating material indicated at 27 and an ornamental covering indicated at 28.

The hot water produced in the economizer may be used for heating or other purposes. When used for heating, the economizer is connected in with the remainder of the hot water system.

In the form of construction shown in Figure 2, the tank 10a is similar to the tank 10 and is provided with coils 20a similar to coils 20. The hot gases are brought in through a pipe 14a which connects with the chamber 15a directly over the central opening of tank 10a. This tank is connected to supply pipe 23a and discharge pipe 24a and supported on suitable legs (not shown) so as to be above the floor line. It is received within a drum 30 concentric with the tank so that the hot gases flow as shown by the arrows, passing down through the coils, then under the bottom of the tank and up outside of the tank where

they pass into a chimney or flue as indicated at 31. The by-pass damper 32 corresponds with the damper 25 of Figure 1.

The modified form of construction shown in Figure 3, intended for both steam and hot water, may be generally like that shown in either Figure 1 or 2. For convenience, the two-pass arrangement of Figure 2 is selected for illustration, and corresponding parts are indicated by the same reference characters. In this case the tank 10a is provided with a water gage 34 and the water level is intended to be maintained so that it can be read from this gage. The steam space at the top of the tank 10a is connected by pipe 35 with a coil 36 placed in the path of the gases so that the steam generated in the tank 10a may be superheated by these gases. The steam is taken off by the pipe indicated at 37 for use.

It is obvious that the invention may be embodied in many forms and constructions within the scope of the claims, and I wish it to be understood that the particular forms shown are but a few of the many forms. Various modifications and changes being possible, I do not otherwise limit myself in any way with respect thereto.

What is claimed is:

1. A waste-heat economizer and water heater for operation by hot gases discharged from a furnace, said economizer comprising a double walled vertical water tank of annular cross section to provide an axial opening for passage of gases through the center of the tank, a hot gas supply duct connected with the top of said central opening, a discharge duct outside of and concentric with the tank, and communicating with the bottom of said central opening, a direct connection between the supply duct and the discharge duct, and a damper for opening or closing the direct connection at will so that the gases

may be directed through the economizer or so that the economizer may be bypassed at will.

2. A waste-heat economizer and water heater for operation by hot gases discharged from a furnace, said economizer comprising a double walled vertical water tank of annular cross section to provide an axial opening for passage of gases through the center of the tank, a hot gas supply duct connected with the top of said central opening, a discharge duct outside of and concentric with the tank, and communicating with the bottom of said central opening, a direct connection between the supply duct and the discharge duct, and a damper for opening or closing the direct connection at will so that the gases may be directed through the economizer or so that the economizer may be bypassed at will, said economizer having a water heating coil connected at its upper and lower ends to the tank and disposed in the central opening in the path of the gases.

3. A boiler and waste-heat economizer for operation by hot gases discharged from a furnace and comprising a double walled vertical tank of annular cross section to provide an axial opening for downward passage of gases through the center thereof, a hot gas supply duct connected with the top of said central opening, a discharge duct communicating with the bottom of said central opening, a direct connection between the supply duct and the discharge duct, a damper for opening or closing the direct connection at will so that the gases may be directed through the economizer or so that the economizer may be bypassed at will, and a steam coil disposed in the upper part of the central opening and in the path of the incoming gases, said coil being connected to the top of the tank to receive steam generated in the tank and superheat this steam.

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