March 3, 1936. W. J. SPOELSTRA 2,032,553

HEAT ECONOMIZER

Filed April 30, 1934

Fig. 1.

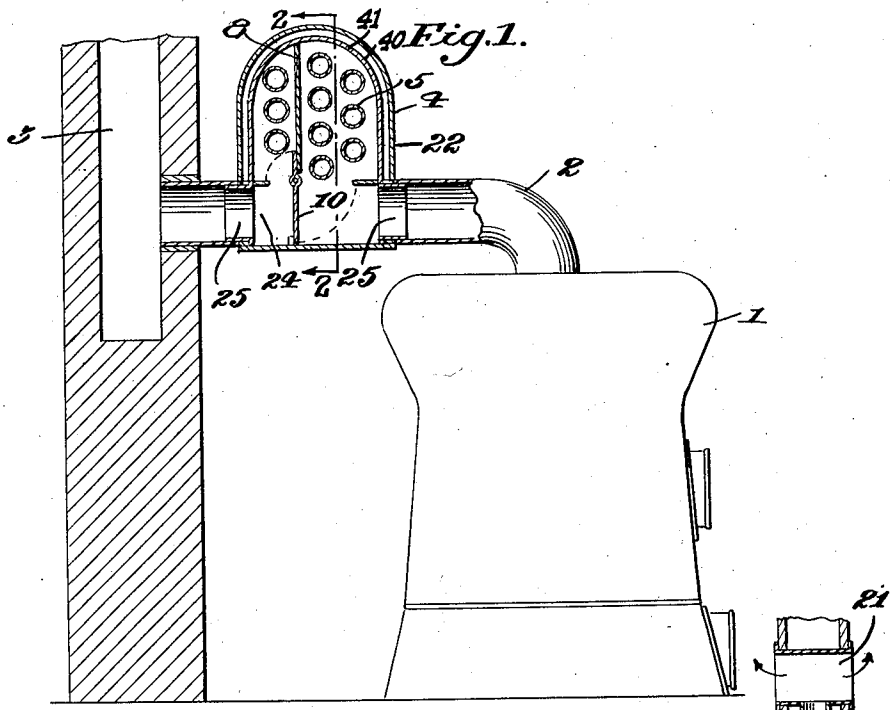


Fig. 2.

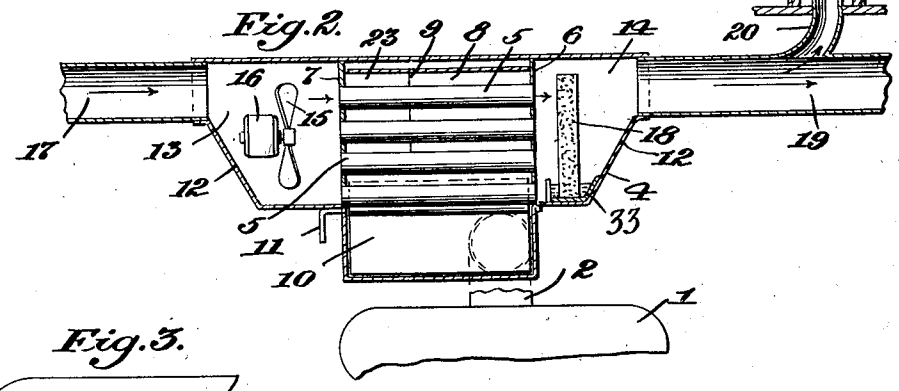


Fig. 3.

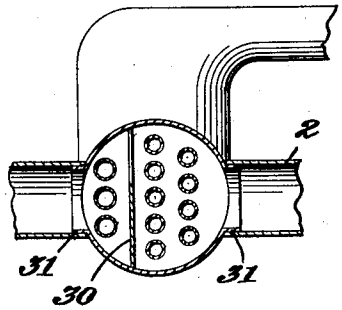
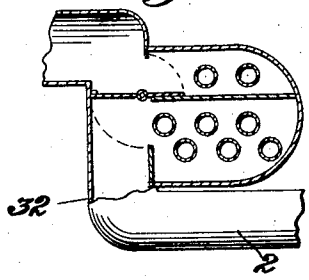


Fig. 4.



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HEAT ECONOMIZER

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Application April 30, 1934, Serial No. 723,281

6 Claims. (Cl. 257—171)

The present invention relates to a new and improved type of heat economizer which is adapted to be placed between the boiler and the chimney flue.

The economizer is designed especially for locations which can be heated with difficulty or not at all by steam or hot water heating apparatii.

An object of the invention is to provide an economizer in which a most efficient heat exchange can be effected by passing the combustion gases counter-current to the direction in which the air to be heated is passed.

A further object of the invention is to provide a compact and efficient economizer which can be inserted in the flue pipe leading from the boiler with little difficulty and at a minimum expense.

It is a further object of the invention to provide a valve construction whereby the entire economizer may be shut off from the heating operation and the economizer itself utilized for cooling purposes while the furnace is used for heating hot water.

With the above and other objects in view which will become apparent from the detailed description below, the invention consists in the combination and arrangement of elements which will be claimed in the claims and shown in the drawing, in which

Figure 1 is a side elevational view with certain parts in section so as to show the construction more clearly,

Figure 2 is a cross sectional view taken at right angles to the view shown in Figure 1 through the economizer, at section line 2—2.

Figure 3 is a detailed sectional view of a modified type of economizer, and

Figure 4 is a detailed sectional view of a further modification.

In the drawing 1 indicates the usual furnace used for heating purposes with the usual reservoirs and pipes eliminated for greater clearness. The smoke flue of the furnace is shown at 2 and the chimney flue at 3. Located in the flue pipe 2 is the economizer 4 which may be detachably interposed therein.

The economizer 4 has a substantially rectangular configuration shown more particularly in Figure 2 and comprises the air pipes 5 which are fixed in position in the partitions 6 and 7 thereby forming a compartment through which the combustion gases may circulate around the pipes or tubes 5. The economizer 4 comprises a sheet metal shell member 40 having an exterior surface 41 which with the partitions 6 and 7 and with the bottom of the economizer define a sheet metal container. Extending downwardly in the economizer is a partition member 8 which terminates at one end at the point 9.

Pivoted in substantial alignment with the partition 8 is a flat valve 10 capable of being actuated by a handle member 11 to any desired position. The flat valve 10 may be pivoted in the partitions 6 and 7 extending below the exterior walls 12 of the economizer.

The construction as shown in the drawing is such that at the ends of the air tubes 5 of the economizer and outside of the partition walls 6 and 7 there is provided two compartments 13 and 14. In the compartment 13 there is preferably located a pusher fan 15 operated by the motor 16 for forcing the air through the air tubes 5. The air supply is secured through a pipe 17 which may lead to the exterior of the house or to any other desired point for securing fresh air.

In the other compartment 14 there is preferably provided any practical type of humidifying apparatus such as 18 which is formed of porous brick capable of absorbing moisture from a water container 33. The air coming from the pipe 17 and forced through the air tubes 5 by the fan 15 is led through the distributing pipe 19 from which branch pipes such as 20 lead the air to the various rooms desired to be heated or cooled by means of the registers 21. It is obvious that due to the forced air pressure the heated or cooled air may be led to locations at a lower level than the furnace itself, such as a garage or recreation room.

It is also obvious that the humidifying apparatus such as 18 may be placed in the compartment 13 and the fan 15 placed in the compartment 14 where in such case it would exercise a suction effect for drawing the air through the tubes 5. Also any desired air purifying system may be connected up with the pipe 17 so as to purify the air before the air is heated, or if desired such air purifying apparatus could be located so as to come into operation after the air has been heated. Preferably the economizer 4 is jacketed as shown at 22 so as to provide insulation for the economizer. As will be noted from the construction of the jacket it forms a passageway for the air from the compartment 13 to the compartment 14 and naturally heat is absorbed by this air through contact with the exterior surface of the container. The space with the air circulating therethrough increases the capacity of the economizer and tends to prevent heat loss thereby acting as an insulating medium.

It will be noted that the flue 2 connects with the economizer at one of the lower corners thereof as shown particularly in Figure 2 thereby forcing the combustion gases to travel in an upward and diagonal direction towards the opening 23 in the partition 8. This is the most efficient method of securing heat exchange. After passing through the opening 23 the combustion gases will then have to move in a downward diagonal direction to the outlet 24 of the flue connected upon the other side of the economizer. As will be noted, the economizer is provided with tubular flanges 25 which will fit into the flue 2 at any desired point.

When it is desired to operate the furnace as in the summer time, for heating hot water, then in such case the combustion gases can be passed directly to the chimney by placing the by-pass valve 10 in closed position. At such time also the economizer can be used for circulation of relatively cool air through the various compartments of the house.

However, if the furnace is not to be used as a hot water heater during the summer time, then the arrangement shown in Figure 3 can be used as the heat economizer. In this case we have a tubular economizer which has a partition 30 therein arranged in the same way as in the modification shown in Figures 1 and 2 except that the partition extends to the bottom surface since there is no necessity for a valve such as the valve 10. The economizer in this case is connected to the flue 2 by the flanges 31.

In Figure 4 we have a further modification of the economizer which is essentially the same as that shown in Figures 1 and 2 except that the economizer is inserted in a portion of the flue pipe which extends vertically such as shown at 32. The other details in the economizer shown in Figure 4 are the same as those in Figures 1 and 2.

An important feature of the economizer described above is the fact that no down draft resistance is caused by the economizer arrangement. Whenever an economizer is so located as to cause a down draft resistance it reacts against the draft necessary for operating the furnace proper and may make it essential to have forced draft. By the construction described above also it is possible to use the heat economizer in the summer time as a cooling medium while at the same time using the furnace for heating hot water.

The economizer may if desired be located in an inclined flue provided at all times consideration is given to the necessity of preventing any down draft resistance.

It is obvious that various changes may be made in the construction described above, but it is understood that all such changes are contemplated as within the invention defined in the following claims.

I claim:—

1. An economizer comprising a sheet metal container, partitions located transversely of said container, air tubes fixed in said partitions, means for forcing air through said tubes, means for humidifying said air and means for by-passing the combustion gases through said economizer and for completely shutting out said gases from said economizer.

2. An economizer comprising a sheet metal container, jacket insulation for said container, transverse partitions provided in said container, a series of tubes mounted in said transverse partitions, a longitudinally extending partition extending part way between said transverse partitions to provide an opening at one end, means for attaching the container to a flue pipe at the other end from said opening and means for by-passing combustion gases through said economizer.

3. An economizer comprising a sheet metal container, means for leading combustion gases into said container at a lower corner thereof, a pair of spaced partitions in said container, tubes fixed in said partitions, a longitudinally extending partition extending part way between said spaced partitions to form an opening removed from the entrance of said combustion gases and a by-pass valve cooperating with said longitudinal partition for by-passing combustion gases through said economizer.

4. An economizer comprising a sheet metal container, a series of tubes located in said sheet metal container, means for connecting said container to a flue pipe of a furnace, said tubes being located above said flue, means for by-passing combustion gases through said container around said tubes and means for forcing air through said tubes and means for humidifying the air forced through said tubes.

5. An economizer comprising a container, partitions located transversely of said container, air tubes fixed in said partitions, a jacket surrounding partially said container and spaced therefrom, means for forcing fresh air through said tubes and through the space between said container and jacket, means for by-passing combustion gases around said tubes and for shutting out said gases from said economizer.

6. An economizer comprising a sheet metal container, a jacket spaced from said container defining a space through which air may be passed for insulation and heating purposes, transverse partitions provided in said container, a series of tubes mounted in said transverse partitions, a longitudinally extending partition, means for attaching said container at one end thereof to a flue pipe, means causing combustion gases to traverse said container first in one direction along said longitudinally extending partition and then in the opposite direction and means for by-passing combustion gases through said economizer.

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