June 27, 1933. G. W. LANGFORD 1,916,004

ECONOMIZER

Filed April 13, 1931 2 Sheets-Sheet 1

Fig. 1.

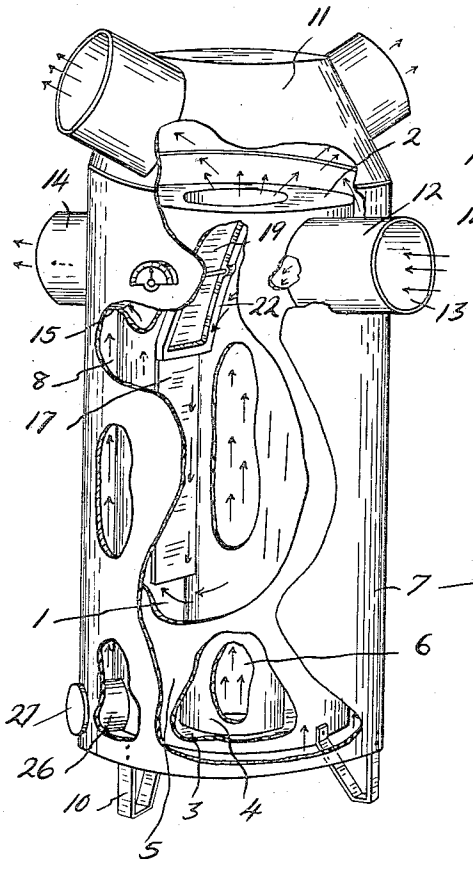
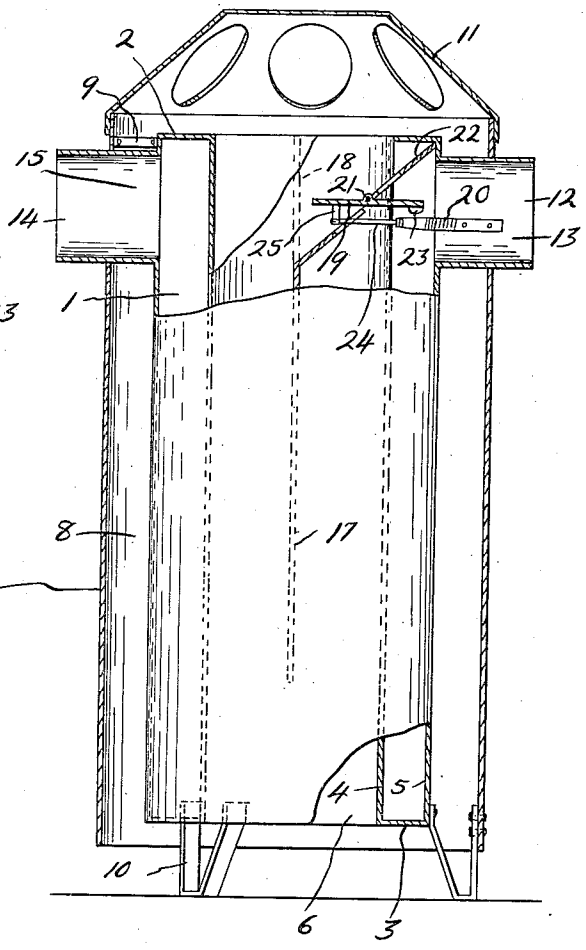


Fig. 3.



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Fig. 2.

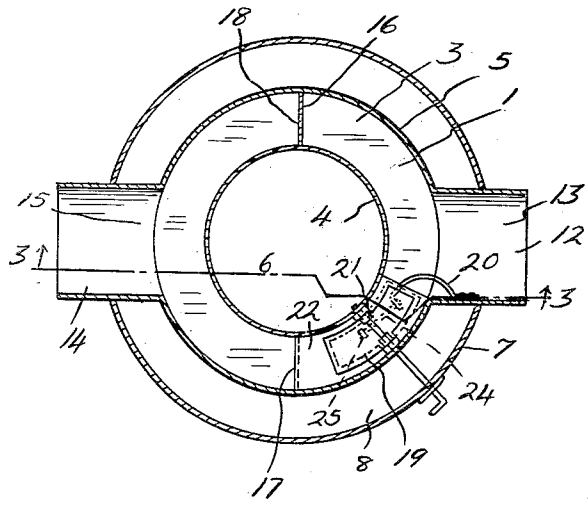


Fig. 3.

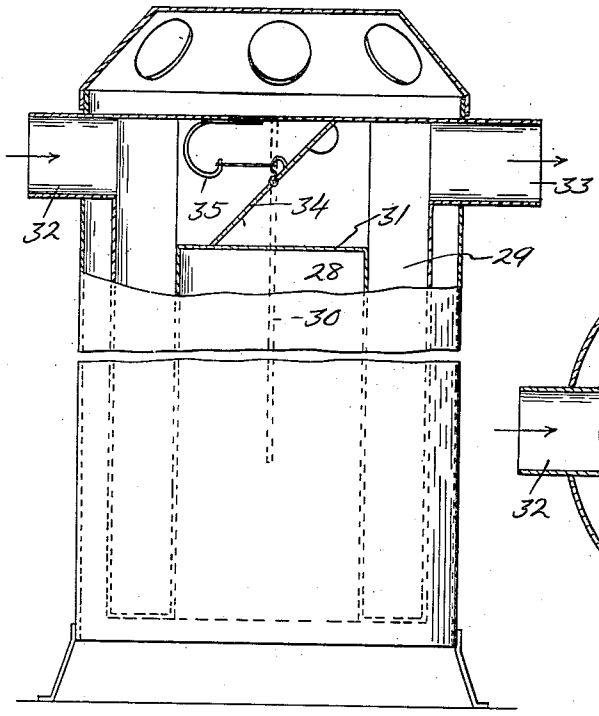
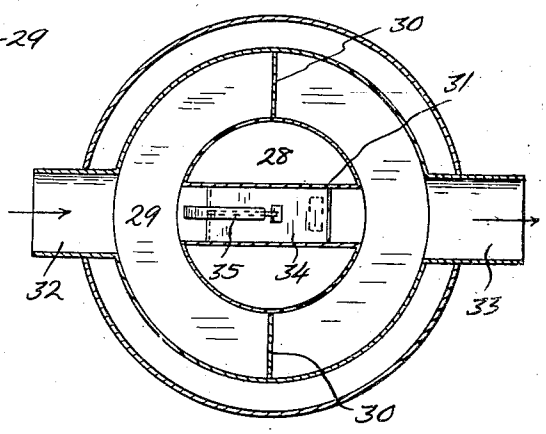


Fig. 4.



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UNITED STATES PATENT OFFICE

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ECONOMIZER

Application filed April 13, 1931. Serial No. 529,873.

The invention relates to economizers and refers more particularly to heat economizers for the gases leaving heating plants, such as furnaces, boilers and the like. One of the objects of the invention is to so construct the heat economizer that it forms a unit which is compact and efficient in operation and which may be readily installed between the heating plant and the chimney or stack. Other objects are to construct the heat economizer with tortuous and direct passages through which the gases may alternatively flow from the inlet to the outlet openings; with a passage for the flow of a medium to receive heat from the gases; and with a thermostatically controlled damper within the heat economizer for controlling the flow of the gases through either the tortuous passage or the direct passage. A further object is to so construct the damper and the thermostat that the damper will normally be moved to closed position by gravity and to open position by the thermostat.

These and other objects of the invention will become apparent from the following description, taken in connection with the accompanying drawings illustrating an embodiment of my invention, in which

Figure 1 is a perspective view, with parts broken away, of a heat economizer embodying my invention;

Figure 2 is a transverse section therethrough in the zone of the inlet and outlet openings for the gases leaving the heating plant;

Figure 3 is a longitudinal section thereof with the upper portion on the line 3—3 of Figure 2;

Figures 4 and 5 are views similar to Figures 2 and 3 respectively, showing a modified construction.

The heat economizer embodying my invention is designed to make use of the excess heat in the gases passing from a heating plant, such as a furnace, boiler or the like, and is designed to be placed between the heating plant and the chimney or stack. The heat economizer illustrated in Figures 1, 2 and 3 has the annular chamber 1 having the upper and lower closed ends 2 and 3, respectively, and the spaced inner and outer cylindrical walls 4 and 5, respectively. This chamber and more particularly the cylindrical wall 4 provides the chamber 6 having open upper and lower ends through which may flow a medium (air in the present instance) for receiving heat from the gases when they are passing through the chamber 1. Surrounding and spaced from this chamber 1 is the cylindrical casing 7 which with the outer cylindrical wall 5 forms the annular chamber 8, which also has open upper and lower ends for the passage of a medium (air in the present instance) to receive heat from the gases when they pass through the chamber 1. This casing 7 is concentrically positioned relative to the chamber 1 by a suitable means, such as the spacer 9 between the upper ends of the chamber 1 and the casing and the combined spacers and supporting legs 10 between the lower ends of the chamber and the casing. 11 is a dome upon and closing the upper end of the casing 7 and provided with one or more outlet openings which are surrounded by the pipes 9 through each of which the heated air passes to a conduit leading to a point where the heated air may be used.

12 is an inlet pipe for receiving the gases passing from the heating plant. This inlet pipe extends through the casing 7 near its upper end and through the chamber 8 and provides the inlet opening 13 in communication with the upper end portion of the chamber 1. 14 is the outlet pipe for the gases extending through the upper end portion of the casing 7 and the chamber 8 preferably diametrically opposite the inlet pipe 12 and providing the outlet opening 15 in communication with the upper end portion of the chamber 1 diametrically opposite the inlet opening 13. 16 and 17 are longitudinally extending baffles within the chamber 1 and located between the inlet and outlet openings and preferably extending at right angles to their axes. The baffle 16 extends from the upper end wall 2 downwardly to a point above the lower end wall 3. The baffle 17 has its lower end terminating at substantially the

same height as the lower end of the baffle 16 but has its upper end terminating below the upper end wall 2 to provide the passage 18 which directly connects the inlet opening 13 and the outlet opening 15. It will be seen that when the direct passage 18 is closed the baffles 16 and 17 form with the chamber 1 a down-draft passage communicating at its upper end with the inlet opening 13 and an up-draft passage communicating at its upper end with the outlet opening 15, these two passages communicating at their lower ends below the baffles and together forming a tortuous passage for the gases.

For controlling the flow of the gases through the economizer, I have provided the damper 19 which is adapted to close the direct passage and the thermostat 20 which is adapted to control the damper. The damper is pivotally mounted at 21 upon the inclined frame 22 which extends between the upper end of the baffle 17 and the upper end wall 2. This damper is weighted by the weights 23 so that it normally occupies a substantially horizontal position, at which time the damper is open. The thermostat 20 is a bi-metal thermostat fixedly secured at its outer end to the inlet pipe 12 and connected at its inner end by the pull-rod 24 to the arm 25, which is fixedly secured to the portion of the damper 19 below the pivot 21 when the damper is closed. It will be noted that the damper and the thermostat are so located with respect to the inlet opening 13 and the inlet pipe 12 that they may be reached for adjustment, repair or replacement, if necessary.

While the tubular chamber and the casing are shown with circular cross sections, they may have polygonal or other cross sections.

The construction is such that when the heating plant is not working or the gases passing from this heating plant have a relatively low temperature, the damper 19 is in open position so that the gases may pass directly from the inlet opening 13 to the outlet opening 15. However, if the heating plant is working or the gases passing from this heating plant reach an appreciably higher temperature such that they carry off excess heat, these gases coming into contact with the thermostat 20 cause this thermostat to flex and it, through the pull-rod 24 and the arm 25, causes the damper 19 to assume a closed position, at which time the gases then pass downwardly through the chamber 1 below the baffles 16 and 17 and then upwardly through the chamber 1 to the outlet opening. The passages 6 and 8 having open upper and lower ends permit air to pass upwardly through their lower ends and come in contact with the heated walls of the chamber 1 and continue to rise into the dome 11 and then outwardly through the one or more outlet openings 9.

To provide for cleaning the tubular chamber 1, I have provided the cleaning pipe 26 which extends through the lower end portion of the casing 7 and the chamber 8 and opens into the lower end portion of the tubular chamber 1. This cleaning pipe is normally closed by a suitable cap or door 27 outwardly beyond the casing 7.

In the modification shown in Figures 4 and 5, the same general arrangement of parts is present, but the direct passage for the gases between the inlet and the outlet openings is straight, thereby providing a more simple construction of damper. In this modification, the central chamber 28 formed by the tubular chamber 29 is preferably of greater diameter than the central chamber 6 and both of the baffles 30 extend completely to the upper end wall of the tubular chamber. The straight direct passage is formed by the pipe 31 extending through the central chamber 28 and having its vertical median plane substantially in the line of the axes of the inlet and outlet openings 32 and 33 respectively. The pipe 31 is rectangular and comparatively narrow and deep to have a cross sectional area substantially equal to that of either the inlet opening or the outlet opening and to reduce to a minimum the obstruction to the upward flow of the heated medium, such as air, passing through the central chamber.

The damper 34 and the thermostat 35 are located in the pipe 31, their arrangement and construction being the same as the damper 19 and the thermostat 20 with the exception that the pull-rod between the damper and the thermostat is pivoted to the upper portion of the damper when closed.

What I claim as my invention is:

1. A heat economizer for heating plant gases, comprising a unit having a chamber provided with inlet and outlet openings for the gases, a tortuous passage communicating with the openings, a chamber adjacent the first mentioned chamber for the flow of a medium to receive heat from the gases, a damper for closing the direct passage moved by gravity to open position, and a thermostat controlled by the flow of the gases through the unit for closing the damper.

2. A heat economizer for heating plant gases, comprising a unit having a tubular chamber provided with inlet and outlet openings for the gases and having a central passage therethrough for the flow of a medium to receive heat from the gases, longitudinally extending baffles within the chamber providing a tortuous passage for the gases flowing from the inlet to the outlet openings, one of the baffles terminating at a point to provide a direct passage for the gases flowing from the inlet to the outlet openings, a damper cooperating with the last mentioned baffle to close the direct passage, and a thermostat for controlling the damper.

3. A heat economizer for heating plant gases, comprising a unit having a tubular

chamber with closed ends and with inlet and outlet openings for the gases adjacent one end and at opposite sides, the tubular chamber providing a central longitudinally extending passage therethrough for the flow of a medium to receive heat from the gases, longitudinally extending baffles within the chamber and located between the openings, the lower ends of the baffles terminating above the lower closed end of the chamber, the upper end of one of the baffles also terminating at a point below the upper closed end of the chamber to provide a direct passage for the gases from the inlet to the outlet openings, a damper cooperating with the last mentioned baffle to close the direct passage, and a thermostat for controlling the damper.

4. A heat economizer for heating plant gases, comprising a unit having a tubular chamber with closed upper and lower ends and providing a central longitudinally extending passage therethrough for the flow of air, a casing surrounding and spaced from the chamber and forming therewith a second passage for the flow of air, a dome upon the casing provided with an outlet opening for the heated air, inlet and outlet pipes extending through the casing and communicating with the tubular chamber near its upper end and at opposite sides, longitudinally extending baffles within the tubular chamber providing a tortuous passage for the gases from the inlet to the outlet pipes, one of the baffles terminating at a point to provide a direct passage for the gases from the inlet to the outlet pipes, a damper cooperating with the last mentioned baffle to close the direct passage, and a thermostat for controlling the damper.

5. A heat economizer for heating plant gases, comprising a tubular chamber forming a longitudinally extending central chamber for the flow of a medium to receive heat from the gases, said tubular chamber provided with diametrically opposite inlet and outlet openings for the gases and with a tortuous passage between the openings, a pipe of greater depth than width extending through the central chamber in the direction of and forming a straight direct passage between the openings, and thermostatically controlled means for controlling the flow of the gases through the direct passage.

6. A heat economizer for heating plant gases, comprising a unit having a tubular chamber provided with inlet and outlet openings for the gases and having a central passage therethrough for the flow of a medium to receive heat from the gases, a tortuous passage surrounding the central passage aforesaid and communicating with the openings, a direct passage between the openings, means for controlling the flow of gases through the direct passage including a damper and a thermostat responsive to the temperature of the gases flowing through the inlet opening and connected to the damper for automatically actuating the same.

In testimony whereof I affix my signature.

GEORGE W. LANGFORD.