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J. R. NASON

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ECONOMIZER

Filed May 28, 1928

Fig. 1

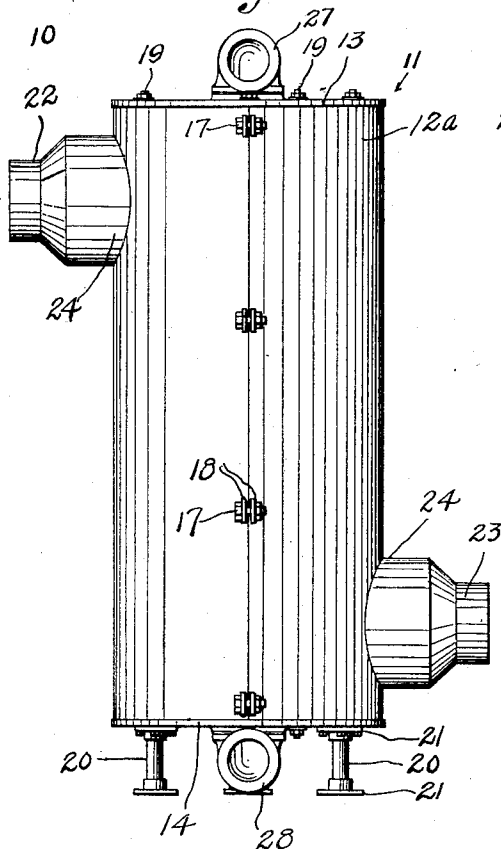


Fig. 3

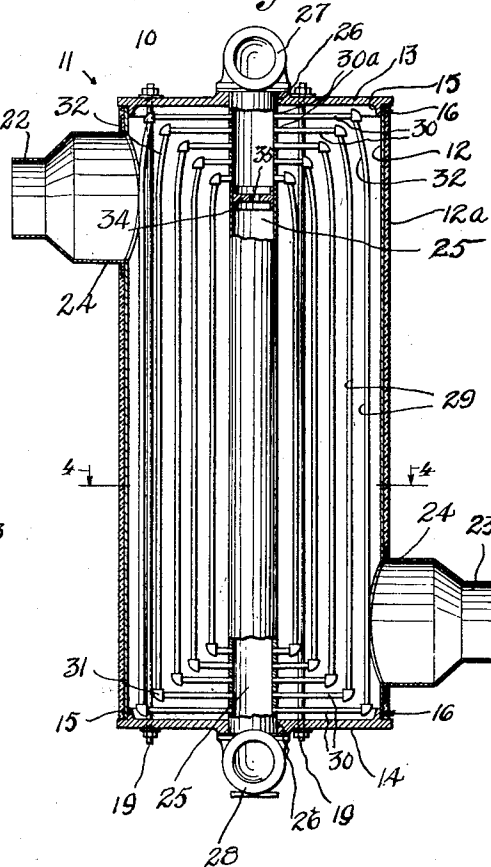


Fig. 2

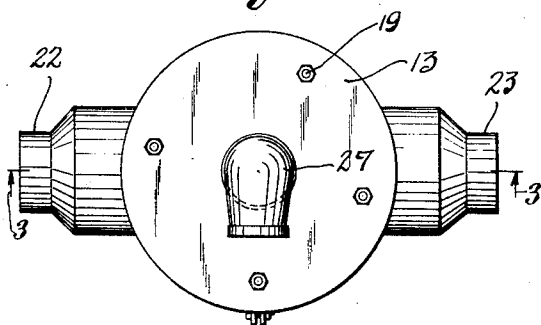
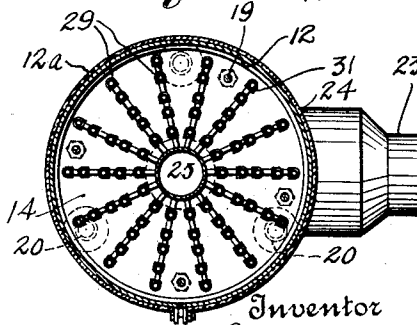


Fig. 4



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ECONOMIZER

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This invention relates to heat exchanging devices such as economizers.

One object of the invention is to provide an improved device of the character described comprising a main chamber through which extends an enlarged tube connected at its ends with a circulatory system, a plurality of smaller tubes communicating with the said main tube in proximity to its ends, and means being provided within the main tube to restrict the circulatory flow therethrough so as to cause the fluid or liquid as the case may be to pass chiefly through the small tubes.

Another object of this invention is the provision of a device of the nature set forth wherein the parts of the economizer are so constructed as to allow for expansion and at the same time to insure of a high degree of simplification.

A further object of the invention is to furnish a device of the class specified comprising comparatively few parts forming a compact rigid construction which is relatively inexpensive to manufacture and nevertheless efficient in use to a high degree.

Other objects and advantages of the invention will become apparent as the specification proceeds.

With the aforesaid objects in view, the invention consists in the novel combinations and arrangements of parts hereinafter described in their preferred embodiments, pointed out in the subjoined claims, and illustrated on the annexed drawing, wherein like parts are designated by the same reference characters throughout the several views.

In the drawing:

Figure 1 is a side elevation of an economizer embodying the invention.

Fig. 2 is a top plan view of the same.

Fig. 3 is a vertical section thereof taken on the line 3—3 of Fig. 2.

Fig. 4 is a horizontal section of the economizer taken on the line 4—4 of Fig. 3.

The advantages of the invention as here outlined are best realized when all of its features and instrumentalities are combined in one and the same structure, but, useful

devices may be produced embodying less than the whole.

It will be obvious to those skilled in the art to which the invention appertains, that the same may be incorporated in several different constructions. The accompanying drawing, therefore, is submitted merely as showing the preferred exemplification of the invention.

Generally described, the invention provides an economizer comprising a drum having means to connect the same into the flue pipe of a furnace, or the like. Positioned centrally in the drum and in substantially upright relation is a main tube of comparatively large diameter having at its ends connections for intercommunicating the same with a hot water circulatory system. Surrounding the main tube is a plurality of circulatory tubes of comparatively small diameter which may extend in parallelism to the main tube. At their ends the circulatory tubes have communication with the main tube and in the latter is positioned a member to restrict the flow therethrough so that the heated water will be caused to flow through the tubes of small diameter. Thus the said main tube furnishes a casing of inexpensive form with which the circulatory tubes are connected. Since the main tube is positioned in central relation to the smaller tubes, the hot flue gases may impart their heat to the latter with the highest efficiency.

Referring in detail to the drawing, 10 denotes a device embodying the invention. The same comprises a drum 11 consisting of a circular wall 12 having a coating of insulation 12^a. The wall 12 may be positioned between the upper and lower heads 13 and 14 which are provided with shoulders 15 forming seats 16 for the reception of the said wall. Bolts 17 may engage the lugs 18 of the wall 12 so as to cause the same to snugly engage the shoulders 15. Tie rods 19 extend vertically through the drum and engage the upper and lower heads 13 and 14 to cause the same to tightly embrace the wall 12. Supporting means for the drum may take any suitable form as may be desired, but in this embodiment of the invention, I show the same as

consisting of the members 20 which may be inexpensively made of short lengths of pipe threaded into end flanges 21. Connected with the drum at the top and bottom thereof and preferably in diametrically opposite relation to one another, are the members 22 and 23 which connect the drum with the flue system of a furnace, or the like. The members 22 and 23 may be enlarged at their points of connection with the drum as shown at 24 in order to avoid obstruction to the flow of the flue gas by the heat exchange means positioned within the drum.

Extending vertically through the drum is a main tube or chamber 25. The same may consist of the pipe, or the like, of a standard type and passes through openings 26 in the heads of the drum. Engaging the said main tube are upper and lower fittings 27 and 28 which are connected to a hot water system to which heat is to be imparted by the flue gas.

A plurality of circulatory tubes 29 of relatively small diameter are positioned around the main tube according to any desired scheme, but preferably along the radial lines of a series of circles concentric with the main tube. Each of the tubes 29 is connected to the main tube by nipples 30 which in turn are connected to the tubes 29 by elbows 31. The nipples 30 may have threaded engagement with the main tube and in each case engage the latter at 30° along radial lines at right angles to the axis of the main tube. To provide expansion of the system due to heating effects, the tubes 29 are preferably bent or offset at 32, but any other arrangement well known in the art may be employed.

To insure that the water will flow chiefly through the circulatory tubes 29, means is provided in the main tube to restrict the flow of water therethrough. The said means takes the form of a diaphragm member 34 which is perforated at 35 so as to permit a relatively small quantity of water to circulate there-through to the end that all parts of the economizer may be maintained at a substantially uniform temperature, thus avoiding overheating and consequent undue strains on any portion of the device.

It will be appreciated that by this invention, considerable heat that would otherwise be lost up the stack of the furnace is saved and that this economizer may be put to a large variety of uses in hot water systems of various kinds and may be employed generally as an efficient heat exchange device in numerous ways well known in the art.

It will thus be seen that I provide a device which fulfills the several objects of the invention and is well adapted to meet the conditions of practical use.

I claim:

1. A device of the character described, including a chamber through which hot flue gas is adapted to pass, a main water tube of com-

paratively large diameter extending through said chamber, a series of circulatory tubes of relatively small diameter communicating at their ends with the main tube, and means to restrict the flow of water through the main tube between the points of communication aforesaid, the circulatory tubes being disposed in angularly spaced relation and in spaced concentric circles, the outer tubes being longer than the inner tubes enclosing the same.

2. An economizer including a chamber, connections to cause the same to communicate with a flue gas line, a main upright water tube of comparatively large diameter extending through the chamber, means to connect the same at its ends with a hot water system, a series of upright circulatory tubes of relatively small diameter, nipples, at their ends communicating with the main tube in proximity to its ends, and means to restrict the flow of water through the main tube between the upper and lower ends of the circulatory tubes, said upright tubes being bent intermediate their ends to allow for expansion.

3. An economizer as set forth in claim 2, wherein the means restricting the flow of water through the main tube permits the passage of a small quantity of water there-through for circulation.

4. An economizer as set forth in claim 2, wherein the main tube is centrally positioned, and the circulatory tubes disposed about the main tube, the flue gas being caused to travel transversely of the tubes both in angularly and radially spaced relation.

5. A device as set forth in claim 1 wherein the main tube is centrally positioned, and the circulatory tubes disposed about the main tube, the flue gas being caused to travel through the chamber between the several tubes transversely thereof.

6. An economizer including a chamber, connections to cause the same to communicate with a flue gas line, a main upright water tube of comparatively large diameter extending through the chamber, means to connect the same at its ends with a hot water system, a series of upright circulatory tubes of relatively small diameter communicating at their ends with the main tube in proximity to its ends, and means to restrict the flow of water through the main tube between the upper and lower ends of the circulatory tubes, said chamber consisting of a drum having upper and lower heads engaging the main tube, said heads having circumferential shoulders providing seats for a cylindrical wall, and tension rods drawing the heads toward each other to cause the said wall to reliably seat in said shoulders.

7. A heat exchanging device of the character described, including a chamber consisting of circular end plates having annular aligned

flanges extending toward each other, a wall of sheet material in the form of a cylinder between said plates and engaging around said flanges, means to draw the edges of the wall tightly together along a line parallel to the axis of the cylinder and to strongly engage the said flanges, means to draw the plates toward each other to engage the cylinder, a central pipe of large diameter extending through said plates, tubes of small diameter spaced around said pipe within the cylinder and each tube communicating with the pipe at points spaced along the same, means to restrict the flow of a fluid through the pipe intermediate of said points, and means to separately connect the cylinder and the pipe into communication with fluids of different temperatures.

8. A heat exchanging device as set forth in claim 7, wherein the cylinder is upright, short feet being provided for the lower plate to rest on and support the device, and a connecting elbow for the pipe beneath the lower plate and within the bottom plane of the feet.

9. A device of the character described, including a drum, a pipe of relatively large diameter extending therethrough, a series of spaced tubes of small diameter within the drum outside of the pipe and along the length of the latter, each of said tubes communicating with the pipe at points in spaced relation to each other, the adjacent points of communication being spaced in the longitudinal direction of the pipe, means intermediate the points of communication of the ends of the tubes to restrict circulation there-through, and means to supply fluids at different temperatures separately to the pipe and the drum.

In testimony whereof I affix my signature.
JOHN R. NASON.