April 13, 1943. L. MEYER ET AL 2,316,273

HEATER

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Fig. 1.

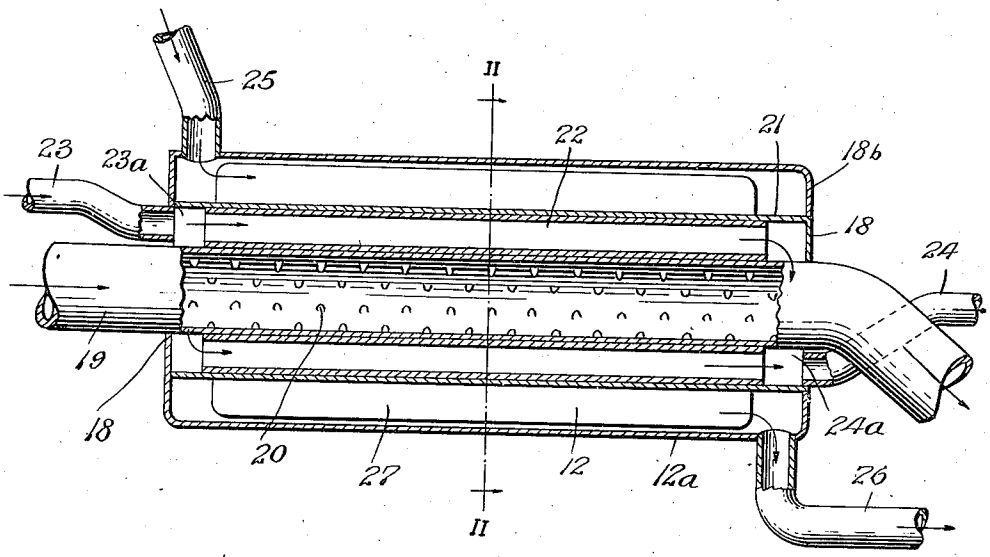
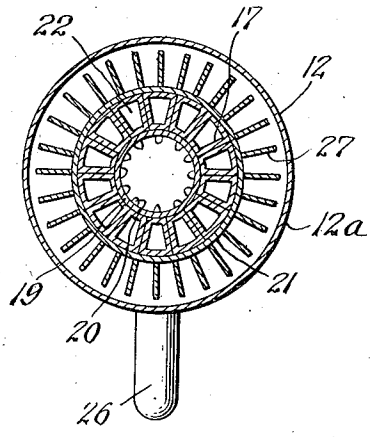


Fig. 2.



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HEATER

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4 Claims. (Cl. 257—241)

This invention relates to improvements in heaters, and refers particularly to heaters primarily intended for use on airplanes.

Heaters operated by the heat generated by an engine are in common use, and consist usually either of air heaters, or steam or hot water heaters. Many heaters of the former type are open to the grave objection that exhaust fumes are liable to mix with and poison the air being heated, which is particularly dangerous in airplane installations; and heaters of the latter type are not satisfactory on airplanes for the reason that they are liable to freeze up.

It is an object of this invention to provide a heater of the air type wherein the pipe through which the exhaust gases flow is spaced from the chamber through which the air to be heated passes by tubes through which air also travels; and to utilize these tubes as a heat transfer medium between the exhaust pipe and the air chamber so that a high ratio of heat exchange is provided.

Another object of the invention is to provide such a heater centrally through which the exhaust pipe extends, and to provide an air chamber around this pipe which is spaced therefrom by an annular arrangement of tubes so disposed that a plurality of connected walls extend continuously around the pipe and amply protect the air chamber from contamination by exhaust gases in the event even of cracking of the pipe itself.

A further object of the invention is to provide such a heater wherein the tubes, preferably rectangular in cross section, extend contiguous to one another parallel with the exhaust pipe, and are brazed or welded to the outer periphery of the latter, to the inner wall of the air chamber and to one another, so that efficient heat transfer is obtained from the pipe to the chamber.

Yet another object of the invention is to provide a heater which is light in weight, compact, efficient in operation, relatively easy to manufacture, and easy to install.

Having thus briefly enumerated some of the objects and advantages of the invention, I will now proceed to describe a preferred embodiment thereof, with the aid of the accompanying drawing, in which:

Figure 1 illustrates a longitudinal section of the invention, and

Figure 2 is a section on the line 2—2 of Figure 1.

Referring to the drawing, 19 denotes an exhaust pipe preferably provided with a plurality of small indentations 20 therein to increase its radiating capacity. Spaced concentrically around the pipe 19 is a second pipe 21 which forms the inner annular wall of an air chamber 12 the outer encircling wall of which is shown at 12a. Closing the ends of the heater are two annular walls 18 the margins of central openings of which are brazed, welded or otherwise suitably secured around the exhaust pipe 19. In this instance each wall 18 consists of two separate annular portions, the outer periphery of the inner portion being secured to the pipe 21, and the outer sections 18b being formed of flexed extremities of the outer chamber wall 12a which are brazed or welded at their margins to the pipe 21, as a safety precaution to prevent the entry of exhaust gases into the chamber 12. 27 denotes radiating fins which project part way across the chamber 12 from the pipe 21 which forms the inner wall of such chamber.

A plurality of annularly arranged spacing members or tubes 22, preferably substantially rectangular in cross section, extending parallel with the exhaust pipe 19, have their adjacent walls brazed or welded to the latter, and their opposite walls similarly secured to the pipe 21 which forms the inner wall of the chamber 12. The contiguous, substantially radial sides of the tubes 22 are also welded or brazed to one another throughout their entire length, so that the tubes thus united to one another form an annular arrangement of radial walls between pipes 19 and 21 so that should the former crack ample protection is afforded for preventing contamination of the air flowing through the chamber 12 by the exhaust gases, and at the same time the sides or radial walls of the tubes 22 constitute excellent heat transfer means for the passage of heat from the exhaust pipe 19 to the chamber 12. The tubes 22 open at their extremities into annular chambers 23a and 24a closed at their outer ends by the walls 18, and projecting from these chambers and open to the outside air are pipes 23 and 24 respectively. Connected to one extremity of the chamber 12 is an air inlet pipe 25, and projecting from its opposite extremity is a second pipe 26 through which heated air flows to a suitable register or outlet (not shown).

From the foregoing it will be clearly seen that high heat transfer is obtained from the exhaust pipe 19 to the air chamber 12, mainly through the walls of the tubes 22; that the continuous annular arrangement of the connected tubes and the joints formed between them constitute addi-

tional protection against leakage of gas from the pipe 18 into the chamber 12; and that the end wall construction further assists in preventing such leakage. Also that, due to the tubular construction of the heater, it is light in weight and therefore specially suited for use in airplanes.

While the preferred construction has been described and shown, it is understood that alterations and modifications may be made thereto provided the said alterations and modifications fall within the scope of the appended claims.

What we claim is:

1. A heater comprising an annular chamber having an inlet and an outlet pipe extending therefrom, an exhaust pipe projecting through the annular chamber and spaced therefrom, the chamber having annular end walls which project inwardly and are secured around the exhaust pipe, tubular spacing members annularly arranged around the exhaust pipe and welded or brazed thereto and to said chamber, said spacing members being contiguous and brazed or welded to one another to form an encircling gasproof joint between the exhaust pipe and chamber, said members acting as a heat transfer medium between the exhaust pipe and the chamber, and radiating fins projecting partway across the interior of the chamber from its inner wall.

2. A heater comprising the combination set forth in claim 1, wherein the spacing members are substantially rectangular in cross section and terminate a short distance from both end walls thereby forming compartments into which the tubes open, and pipes open to the air extending from the compartments to permit passage of air through said members.

3. A heater compriesing an annular air chamber having an inlet pipe and an outlet pipe connected thereto, an exhaust pipe extending through said annular chamber, means directly connected to the exhaust pipe and the inner wall of the chamber spacing the exhaust pipe inwardly from the chamber comprising tubular spacing members of substantially rectangular cross section, the sides of contiguous members being secured to each other throughout their height to form an encircling gasproof wall between the exhaust pipe and the chamber and to serve as means for transferring heat from the exhaust pipe to the chamber.

4. A heater comprising an annular air chamber having an inlet pipe and an outlet pipe connected thereto, an exhaust pipe extending through said annular chamber sealed therefrom and spaced from the inner wall thereof to provide an annular intermediate chamber, and spacing members directly connected to the exhaust pipe and to the inner wall of the chamber constituting heat transfer means from the former to the latter, said spacing members comprising a plurality of tubes annularly arranged around the exhaust pipe and having juxtaposed flat walls connected to one another to form an encircling gas-proof wall between the exhaust pipe and the chamber.

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