

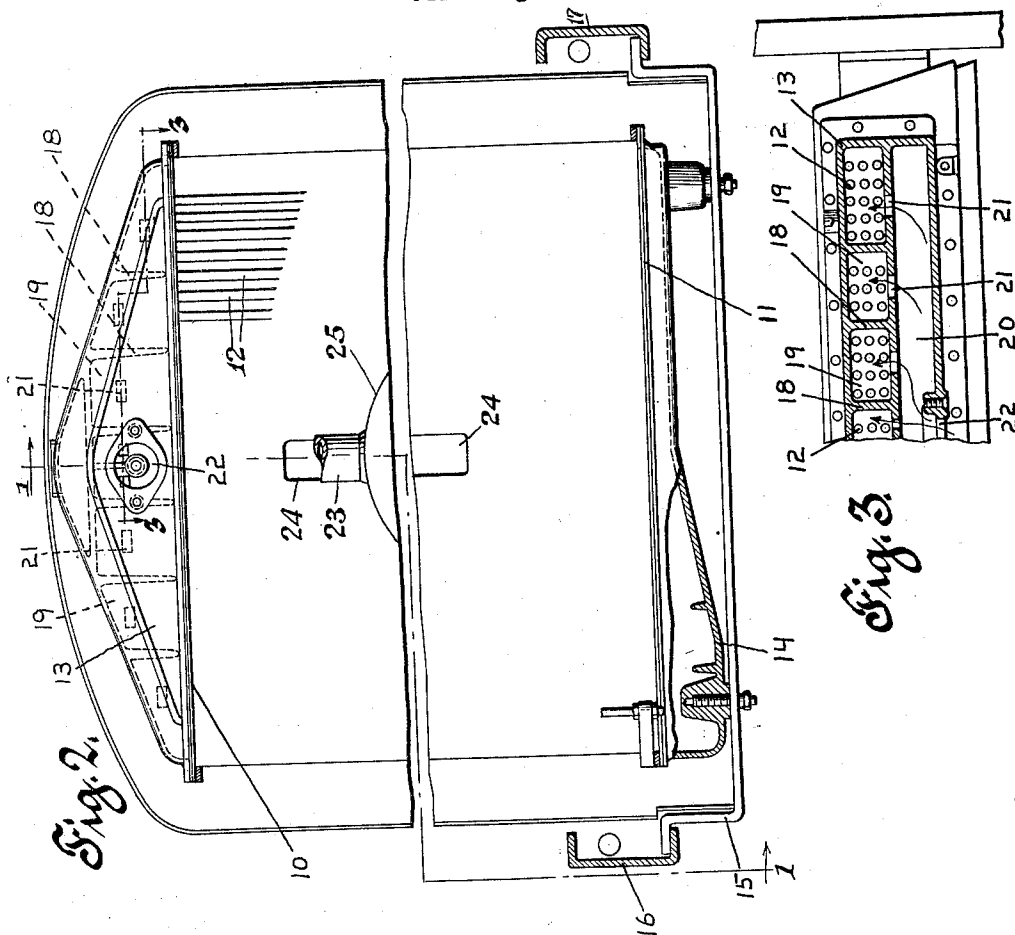
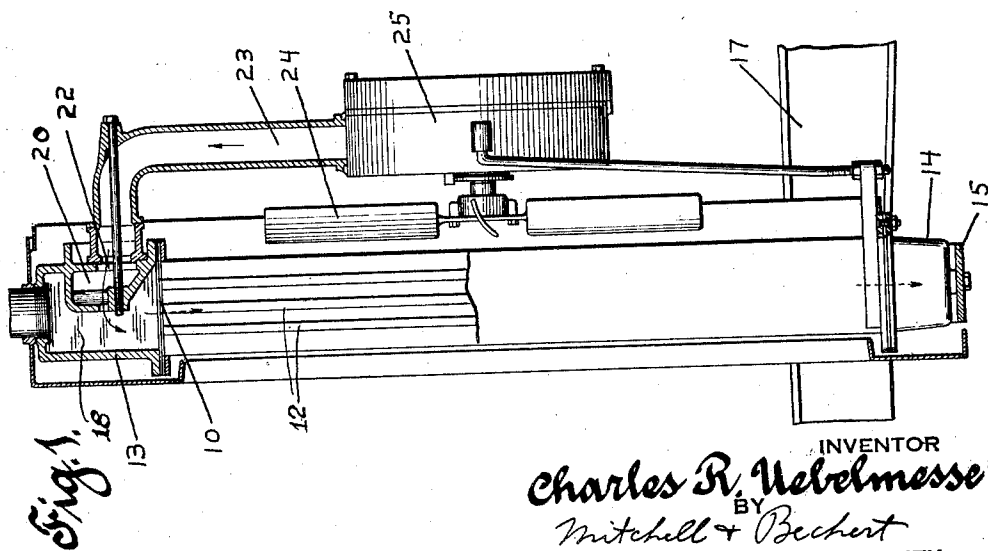
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CONDENSER

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CONDENSER

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My invention relates to a condenser and more particularly to an air-cooled tubular surface condenser for use with steam automobiles.

If steam can partially short-circuit some of the tubes of a tubular surface condenser, i. e., if any of the tubes do not receive their share of the exhaust steam, the efficiency of the condenser is lowered. Not only will greater condenser surface be required to effect condensation, thus decreasing the surface efficiency, but the temperature of the discharge water will be unduly lowered by reason of the excessive cooling of that part of the condensate which passes through the partially short-circuited tubes, thus further decreasing the efficiency. These losses in efficiency can be obviated by making suitable provision to promote an even steam distribution so that there will be no short-circuiting of condensing surfaces.

It is the principal object of the present invention to provide a simple form of air-cooled tubular surface condenser of high efficiency for steam automobiles.

Briefly stated, in a preferred form of the invention I provide my condenser with a steam head divided into a plurality of compartments, each compartment furnishing steam to a plurality of condenser tubes, and I provide a manifold for the distribution of the steam through suitable orifices to the various compartments.

In the drawings which show, for illustrative purposes only, a preferred form of the invention—

Fig. 1 is a central vertical section of a condenser, parts being shown in elevation;

Fig. 2 is a rear elevation of the condenser which has been partially broken away so as to show the interior of one of the heads;

Fig. 3 is a transverse section taken upon the plane of the line 3—3 in Fig. 2.

While the invention will be described in connection with an air-cooled tubular surface condenser for steam automobiles, it is to be understood that the invention is of broader application and may be embodied in other forms of condensers where it is

desired to provide for the uniform distribution of the steam.

In said illustrative drawings, 10—11 indicate the tube plates of a condenser which are drilled to receive tubes passing from one plate to the other. The tubes are not shown in Figs. 1 and 2, but the ends of the tubes are shown at 12 in Fig. 3. These tubes are preferably vertical and are preferably made of thin brass tubing or of other metal having a high thermal conductivity. The heads 13 and 14 are bolted or otherwise connected to the outside of the tube plates 10—11. The lower head 14 is supported by a supporting member 15 which is attached to the side frames 16—17 of an automobile at the front end of the automobile.

The upper or steam head 13 has a plurality of webs 18—18 extending nearly to the tube plate 10, thus forming a series of compartments 19—19. Extending across the full width of the steam head 13 and adjacent to the compartments 19—19 is the horizontal manifold 20. The interior of the manifold 20 is connected with the interiors of the compartments 19—19 by means of the orifices 21—21. The manifold 20 has an inlet opening 22 preferably midway between its ends. The manifold 20 is preferably within the steam head 13, and may or may not be integral with the steam head.

Exhaust steam from the main engine or turbine and from the steam operated auxiliaries passes through the pipe 23 and enters the manifold 20 through the opening 22. From the manifold 20, the steam passes through the orifices 21—21 to the compartments 19—19. The manifold distributes steam over the whole width of the condenser and there is a substantially even distribution of steam between the tubes 12—12 which open into the compartments 19—19.

Positioned behind the tubes 12—12 is a fan 24 which is operated preferably by a turbine 25. The fan 24, together with any forward motion of the automobile, causes air to pass over the surfaces of the tubes 12—12 with considerable velocity. The air cools the tubes 12—12 and condenses the steam therein. The condensate collects in

the lower head 14 and passes therefrom to a hot-well through an opening not shown in the drawings.

It will be seen that I have provided a very simple and effective means for distributing steam uniformly to the condenser tubes of a steam automobile, thus securing a high surface efficiency for the condenser and enabling the return of the condensate to the boiler at a high temperature.

While the invention has been described in considerable detail and one specific form shown in the drawings, it is to be understood that the invention may be otherwise embodied and employed in connection with condensers of various types other than that herein shown.

I claim:

1. An air-cooled surface condenser for steam automobiles adapted to be attached to the front end thereof, comprising a plurality of vertical tubes connected at their upper and lower ends to upper and lower tube plates, a removable steam head connected to said upper tube plate and having a plurality of compartments therein, a lower head connected to said lower tube plate to receive the condensate from said tubes, a manifold having a steam inlet and having outlets to each of said compartments, a turbine, a fan connected to said turbine and positioned directly behind said tubes, and a pipe connecting said turbine and said steam head, said turbine and said fan being supported in part from said steam head by means of said pipe.

2. An air-cooled surface condenser for steam automobiles adapted to be attached to the front end thereof, comprising a plurality of vertical tubes connected at their upper and lower ends to upper and lower tube plates, a steam head connected to said upper tube plate, a lower head connected to said lower tube plate to receive the condensate from said tubes, and a steam-operated fan positioned directly behind said tubes, said steam head having a plurality of webs extending nearly to said upper tube plate and forming a plurality of compartments in said steam head, said steam head having also a manifold therein, said manifold having a steam inlet and having outlets to each of said compartments, said steam head being bolted to said upper tube plate so that said steam head can be removed as a unit from said upper tube plate.

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