

July 14, 1925.

F. LJUNGSTRÖM
LOCOMOTIVE CONDENSER

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1,546,294

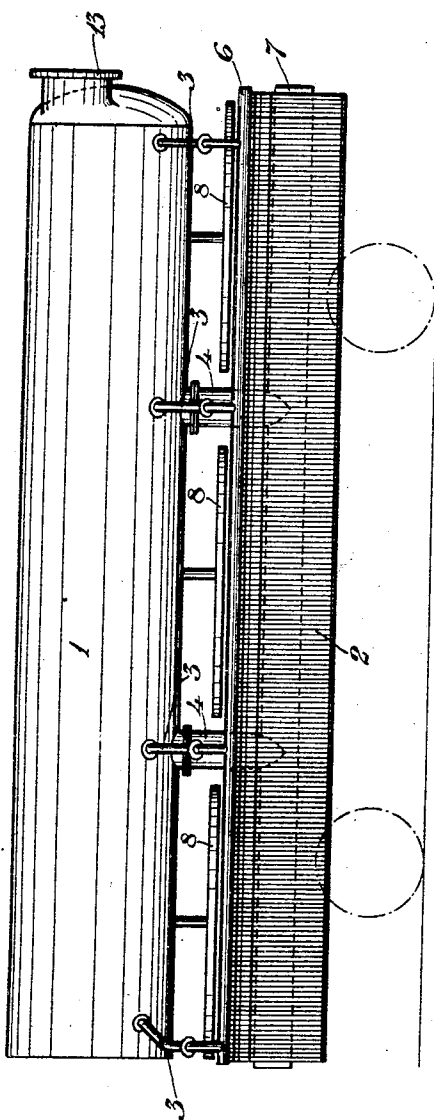


Fig. 1

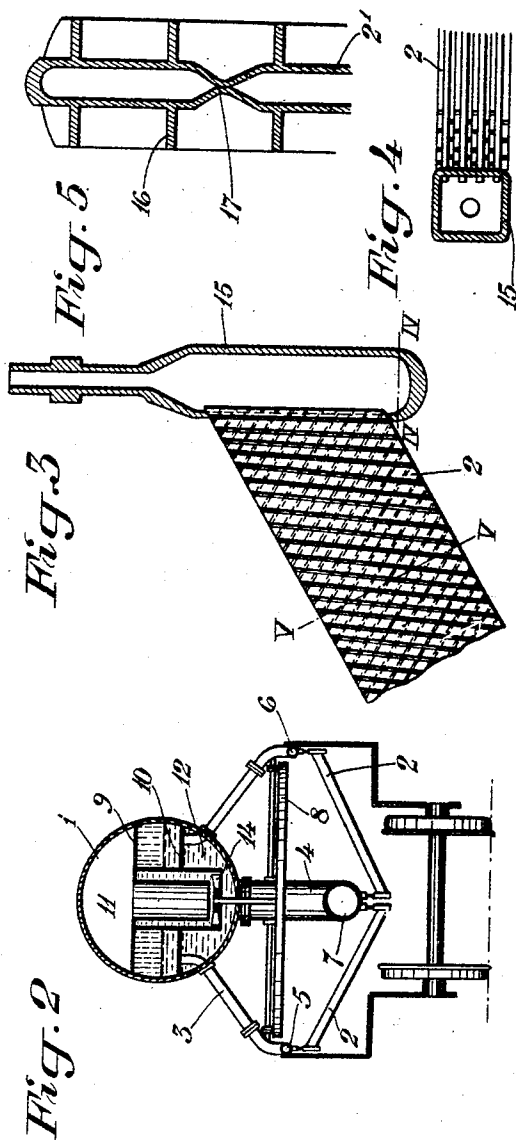


Fig. 2

Fig. 3

Fig. 4

Fig. 5

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LOCOMOTIVE CONDENSER.

Application filed November 21, 1921. Serial No. 516,831.

To all whom it may concern:

Be it known that I, FREDRIK LJUNGSTRÖM, a subject of the King of Sweden, residing at Brevik, Lidingon, Sweden, have invented certain new and useful Improvement in Locomotive Condensers, of which the following is a specification.

In locomotives it has hitherto been difficult to provide condensers serviceable for all loads.

The present invention has for its object to provide an effective form of a condenser device and consists substantially in a liquid-receptacle serving as a mixing condenser and containing water adapted to take up and give off heat alternately, and an air-cooled device consisting of closed elements through which and the receptacle water of condensation together with cooling water are caused to circulate by means of one or more pumps for the purpose of cooling, said elements being connected at the ends to two points of the liquid-receptacle, one or more fans being arranged which force the air between the elements.

In the annexed drawing:

Figs. 1 and 2 show diagrammatically a side view and a section respectively of an embodiment of the invention. Figs. 3, 4 and 5 show the shape of the cooling elements, Fig. 3 being a partial sectional elevation of a cooling element, Fig. 4 a cross section along the line IV—IV of Fig. 3 and Fig. 5 an enlarged sectional view taken on the line V—V of Fig. 3 of part of a cooling element.

Referring to Figs. 1 and 2, the condenser device consists of a receptacle 1 and an air-cooled part 2 which, in the embodiment shown, is located beneath the receptacle 1. The receptacle 1 contains a comparably great quantity of water or other liquid, in order that heat may be accumulated in the same in all cases where the steam engine gives off the greatest possible amount of energy, the heat raising the temperature of the water or other liquid in the receptacle. The water is discharged in the proximity of the upper surface of the water through the pipe 3 to the air-cooled device 2, and the water cooled in the latter is admitted at the bottom of the liquid-receptacle 1 through the pipes 4. The cooling elements, the construction of which will be described later on with reference to Figs. 3, 4 and 5,

are placed between upper collecting pipes 5 and 6 and a lower collecting pipe 7 at about right angles to the direction of movement of the vehicle.

To obtain sufficient circulation of the air the condenser is provided with fans 8 placed beneath the receptacle 1 and above the air-cooler 2 and forcing the air from below and upwards through the air-cooler.

The receptacle 1 is provided with a diaphragm 9 and is further divided by a partition 10 into two chambers, an upper chamber 11 in which the diaphragm 9 is located and a lower chamber 12. The steam entering the receptacle through the inlet opening 13 is condensed in known manner by the water flowing down in a finely divided state from the diaphragm 9, said water being heated thereby. The chamber 11 is connected through the pipes 3 with the upper collecting pipes 5 and 6 of the cooling elements, the heated water thus being cooled by passing through all the elements of the air-cooled device 2 and then entering the lower chamber 12 of the receptacle 1 through the inlet pipes 4. From the chamber 12 the water is pumped up to the diaphragm 9 by means of a pump 14 so as to again take up heat from the steam. The pump 14 causes a circulation of water through the receptacle 1, pipes 3, elements 2 and pipes 4 back to the receptacle. The pump 14 is driven, if desired, by the same shaft as any one of the fans 8.

The water in the receptacle 1, the temperature of which is raised by the steam and cooled by the air-cooler may vary rather considerably as to the temperature which depends, on the one hand upon the quantity of steam given off by the steam engine and, on the other hand, upon the quantity of water in the receptacle. Consequently, it is of advantage to use as large quantities of water as possible in the liquid-receptacle.

The air-cooler operates continuously independent of the steam entering the receptacle, and by this the advantage is gained that the mixing condenser need not be constructed for the greatest quantity of steam given off by the steam engine, especially in case of locomotives in which the engine does not always operate at full admission but at times for a long while is stopped or carried forward inoperative and consequently does not give any steam.

Preferably the receptacle is of lengthy form in the direction of movement of the locomotive, in order that the air-cooled device may be as long as possible.

5 According to Figs. 3, 4 and 5 the cooling elements 2 consist of flattened pipes inserted in groups into the square collecting pipe 15. The elements are provided with projecting ribs or flanges 16 in order to produce an
10 increased cooling surface. Fig. 5 shows in section an element drawn to an enlarged scale, both sides of the flattened pipe being provided with depressions 17 in contact with each other at their inwardly directed ver-
15 tices to prevent the sides from being squeezed together should the vacuum in the element be extremely high.

For the pipes 3 may be substituted flattened pipes placed at the side of one another
20 and forming a cooler of the same type as the cooler 2.

What is claimed as new and desired to be secured by Letters-Patent is:

1. A condenser device for locomotives and
25 similar vehicles comprising a receptacle serving as a mixing condenser and containing water adapted to take up and give off heat alternately, a re-cooling device consisting of closed elements, means for connecting
30 said elements at their ends to two points of the receptacle, means for causing water of condensation together with cooling water to circulate through said receptacle and elements, and means for causing air to pass
35 between said elements for the purpose of cooling said water of condensation and cooling water.

2. A condenser device for locomotives and
40 similar vehicles comprising a receptacle extending longitudinally of the locomotive and serving as a mixing condenser and containing water adapted to take up and give off heat alternately, a re-cooling device consisting of closed elements extending trans-

versely of the locomotive, means for connecting said elements at their ends to two
45 points of the receptacle, means for causing water of condensation together with cooling water to circulate through said receptacle and elements, and means for causing air to
50 pass between said elements for the purpose of cooling said water of condensation and cooling water.

3. A condenser device for locomotives and
55 similar vehicles comprising a receptacle serving as a mixing condenser and containing water adapted to take up and give off heat alternately, a re-cooling device consisting of closed elements, means for connecting
60 said elements at their ends to two points of the receptacle, a pump for causing water of condensation together with cooling water to circulate through said receptacle and elements, and a fan for causing air to pass
65 between said elements for the purpose of cooling said water of condensation and cooling water.

4. A condenser device for locomotives and
70 similar vehicles comprising a receptacle serving as a mixing condenser and containing water adapted to take up and give off heat alternately, a re-cooling device consisting of closed elements, said elements being
75 connected to the receptacle at their one end immediately beneath the water level in same and at their other ends near the bottom of
80 same, means for causing water of condensation together with cooling water to circulate through said receptacle and elements, and means for causing air to pass beneath said elements for the purpose of cooling said water of condensation and cooling water.

In testimony whereof I affix my signature in presence of two witnesses.

FREDRIK LJUNGSTRÖM.

Witnesses:

EUG. SWENSON.
ERIC HOLGA.