Nov. 29, 1927. 1,650,872

C. HÜLSMEYER

SURFACE CONDENSER

Filed June 8, 1926 2 Sheets-Sheet 1

Fig. 1.

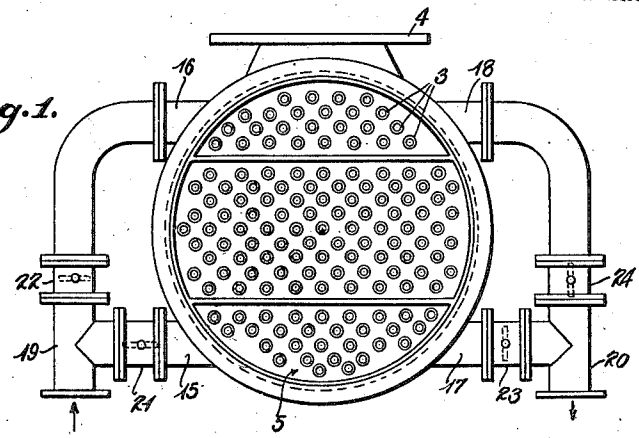


Fig. 2.

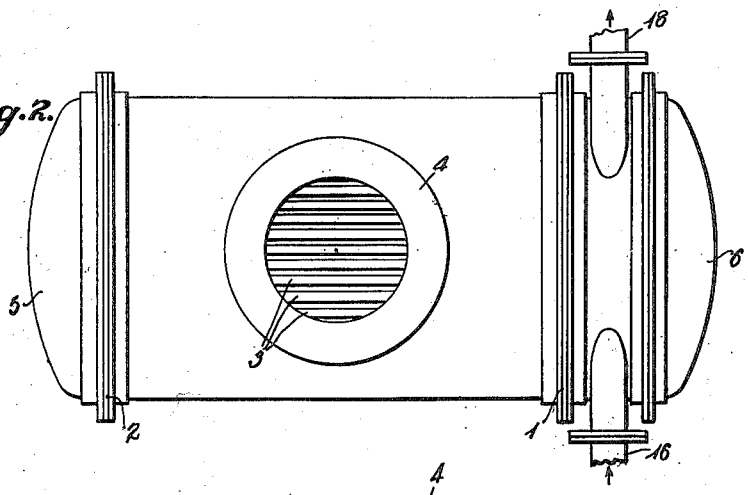
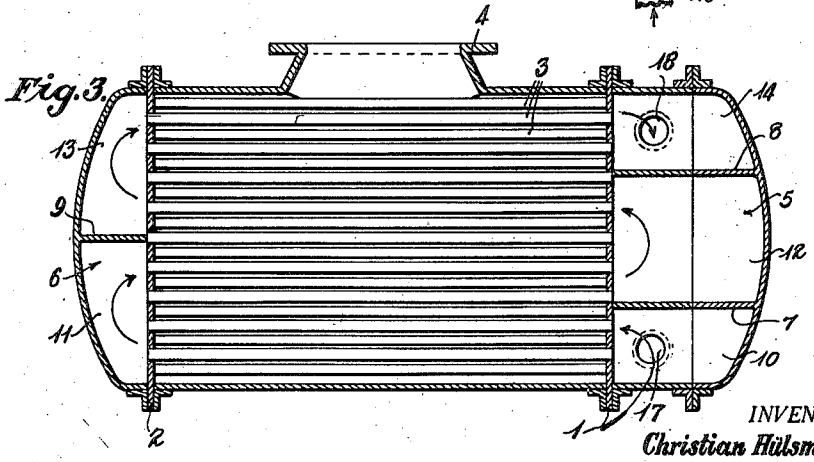


Fig. 3.



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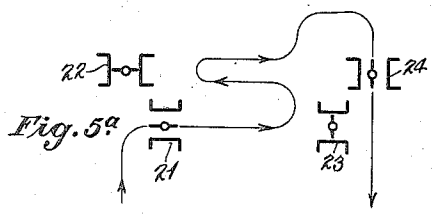


Fig. 5a

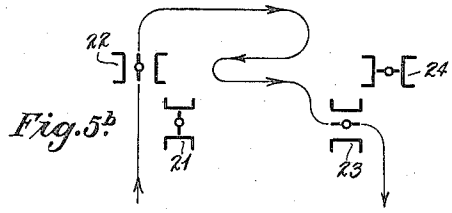


Fig. 5b

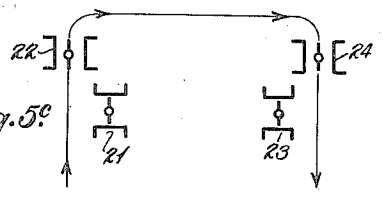


Fig. 5c

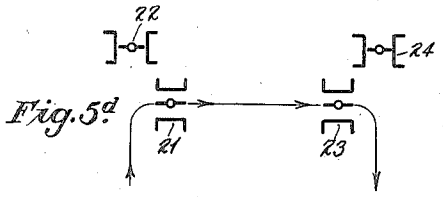


Fig. 5d

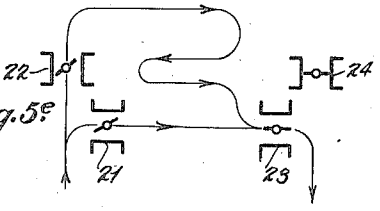


Fig. 5e

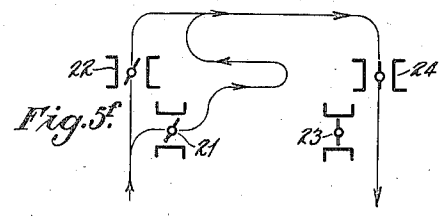


Fig. 5f

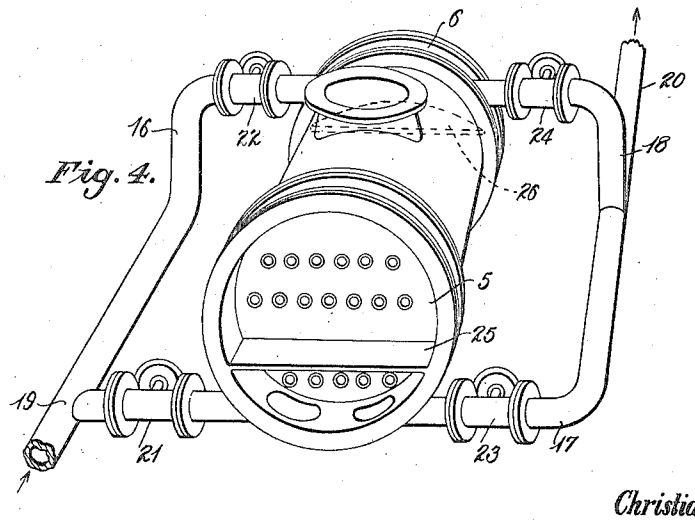


Fig. 4.

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Patented Nov. 29, 1927. 1,650,872

UNITED STATES PATENT OFFICE.

CHRISTIAN HÜLSMEYER, OF DUSSELDORF-GRAFENBERG, GERMANY.

SURFACE CONDENSER.

Application filed June 8, 1926, Serial No. 114,536, and in Germany November 9, 1925.

This invention concerns a surface condenser and has for its object to provide a device of this kind in which the direction of flow of the cooling water in the condenser can be changed.

The invention is illustrated by way of example in the accompanying drawing in which,

Fig. 1 is a cross section through one water chamber of a four compartment condenser showing the influent and effluent conduits in accordance with the present invention,

Fig. 2 is a plan view of the condenser,

Fig. 3 is a central longitudinal section thereof,

Fig. 4 is a perspective view of a three compartment condenser with the front cover removed, and

Figs. 5^a to 5^f are diagrams showing the various courses the cooling water can be made to take.

The surface condenser shown in Figs. 1 to 3 consists of a drum into the tube plates 1 and 2 of which are drawn the tubes 3. The steam engine or turbine is connected to the inlet connecting branch 4, and the steam enters here into the space surrounding the tubes 3. At the ends of the bundle of tubes are headers or water boxes 5 and 6, divided by partitions 7, 8, and 9 into compartments 10, 11, 12, 13, and 14. The inlet pipes 15 and 16 open into one side of compartments 10 and 14 respectively. The outlet pipes 17 and 18 open into the other side of compartments 10 and 14. The inlet pipes 15 and 16 branch from a single pipe 19 leading from the cool water pump. The outlet pipes 17 and 18 are joined to a single pipe 20 which returns the warm cooling water. The pipes 15, 16, 17, and 18 are provided with valves 21, 22, 23, and 24 respectively.

In the condenser shown in Fig. 4 the headers or water boxes 5 and 6 each have only one partition, 25 and 26 respectively, and the branches of the inlet and outlet pipes open into opposite ends of the condenser.

With either of the two condensers described there are six possible ways of running the water through the condenser as indicated in the diagrams Figs. 5^a to 5^f.

Case 1, Fig. 5^a.—Valves 21 and 24 are open and valves 22 and 23 closed. Cooling water enters compartment 10 through pipe 15 and flows in succession through compartments 11, 12, 13, and 14, and out through pipe 18.

Case 2, Fig. 5^b.—Valves 22 and 23 are open and valves 21 and 24 closed. Cooling water enters compartment 14 through pipe 16 and flows in succession through compartments 13, 12, 11, and 10 and out through pipe 17.

Case 3, Fig. 5^c.—Valves 22 and 24 are open and valves 21 and 23 closed. Cooling water enters compartment 14 through pipe 16 and flows directly across the same and out through pipe 18.

Case 4, Fig. 5^d.—Valves 21 and 23 are open and valves 22 and 24 closed. Cooling water enters compartment 10 through pipe 15 and flows directly across the same and out through pipe 17.

Case 5, Fig. 5^e.—Valves 21 and 22 are partially open, valve 23 full open, and valve 24 closed. A part of the cooling water flows through pipe 16 into compartment 14, thence in succession through compartments 13, 12, 11, and 10, and out through pipe 17, while a part of the water flows through pipe 15 directly across compartment 10 and out through pipe 17.

Case 6, Fig. 5^f.—Valves 21 and 22 are partly open, valve 24 full open, and valve 23 closed. A part of the cooling water flows through pipe 15 into compartment 10, thence in succession through compartments 11, 12, 13, and 14 and out through pipe 18, while a part of the water flows through pipe 16 directly across compartment 14 and out through pipe 18.

These various circuits may follow each other in any desired order, or may systematically follow in a definite sequence. In either case changing current characteristics are produced which increase the cooling action of the condenser, and above all stir up the sediment which settles out of the cooling water so that the same is carried out.

As is well known coarse impurities such as wood, leaves, and grass catch on the tube walls of condensers and interfere with the passage of water and decrease the cooling action. These coarse impurities, as well as the finer sediment in the tubes such as algæ and the like, are stirred up and removed by the change of flow.

Having described my invention,

I claim:

1. In a surface condenser divided into a series of compartments through which cooling water is adapted to flow in sequence, a forked cooling water inlet pipe connected

to the first and last compartments of the series, a forked outlet pipe also connected to said first and last compartments, and valves in each of the forks of said inlet and outlet pipes.

2. In a surface condenser having tubes, tube plates, and headers connecting said tubes, partitions in said headers dividing the same into compartments through which the cooling water is adapted to flow in sequence by way of said tubes, a forked cooling water inlet pipe connected to one side of the first and last compartments of the sequence, a forked outlet pipe connected to the opposite side of said first and last compartments, and valves in each of the forks of said inlet and outlet pipes.

3. In a surface condenser divided into a series of compartments through which the cooling water is adapted to flow in sequence, means for causing cooling water to flow through the series of compartments in normal or reverse direction, and means for changing the flow of the cooling water so that it flows directly across the first or last compartments of said series without running through the whole series.

In testimony whereof he affixes his signature.

CHRISTIAN HÜLSMEYER.