Feb. 2, 1937. P. HÖSEL 2,069,653

SURFACE TYPE CONDENSER ARRANGEMENT

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Fig. 1.

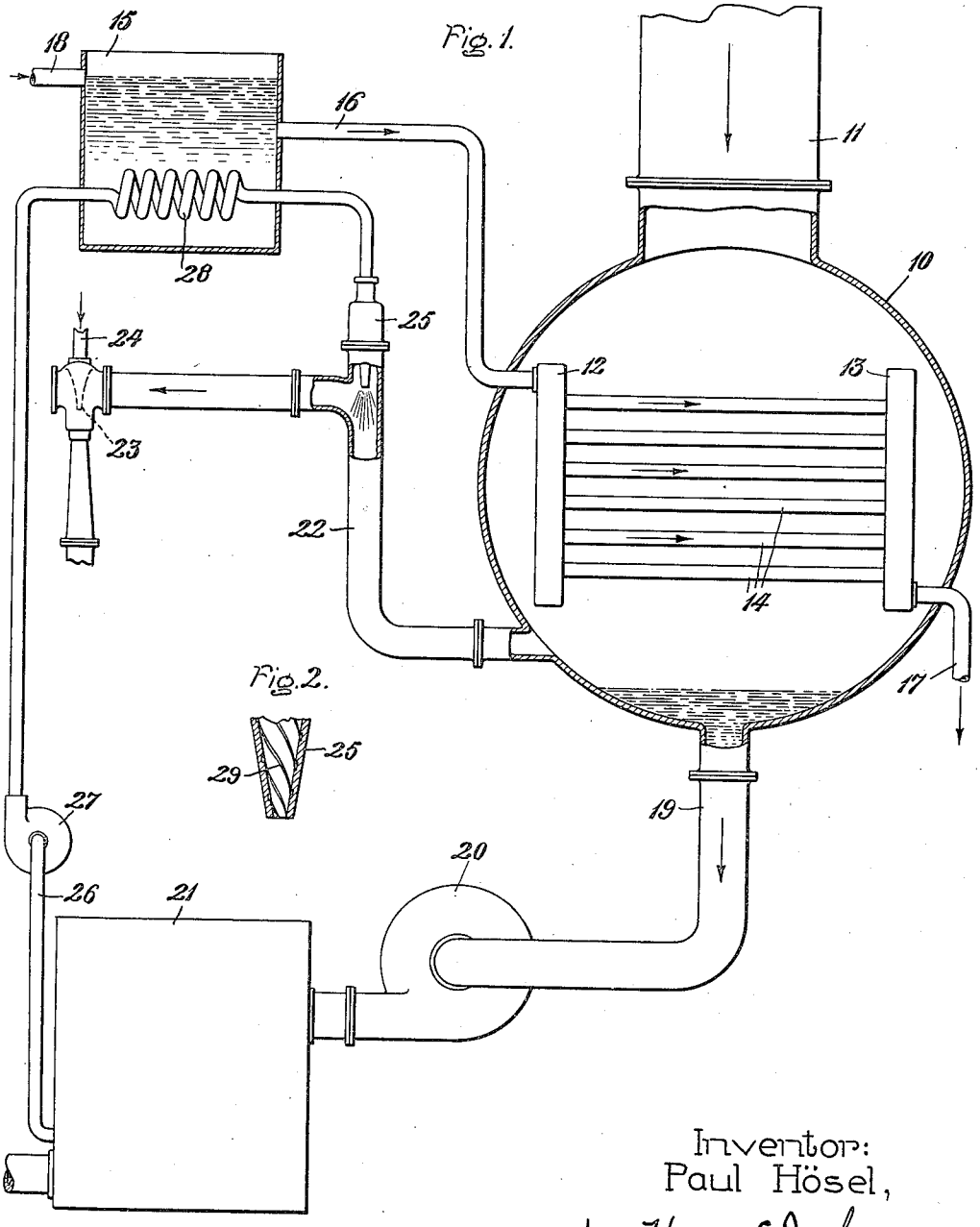


Fig. 2.

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SURFACE TYPE CONDENSER ARRANGEMENT

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2 Claims. (Cl. 257—40)

The present invention relates to surface type condenser arrangements, such as are used in connection with steam turbines for condensing the exhaust steam of such turbines, more specifically to the type of surface type condenser arrangements which are provided with means including a fluid or water jet ejector for removing non-condensables therefrom, although it is not necessarily limited thereto. In arrangements of the above type some of the steam or like condensables is carried away with the non-condensables and lost.

The object of the present invention is to provide an improved construction and arrangement of the above type condenser arrangements in which condensables, such as steam in the case of a steam condenser carried away with the non-condensables such as air, are regained.

For a consideration of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto in connection with the accompanying drawing.

In the drawing, Fig. 1 is a somewhat diagrammatic view of an arrangement embodying my invention, and Fig. 2 is a detailed view of a nozzle of Fig. 1.

The arrangement comprises a condenser having an outer shell 10 connected to an exhaust conduit 11 of a steam turbine. Disposed within the shell 10 are two headers 12 and 13 connected by a plurality of conduits 14. Cooling medium, in the present instance water, is passed from a cooling tank 15 through a conduit 16 into the header 12, whence it flows through the tubes 14 into the header 13 and is discharged therefrom through a conduit 17. The tank 15 is connected to a suitable source of water by a conduit 18. With this arrangement, steam flowing from the exhaust conduit 11 into the condenser is condensed therein and the condensate is discharged through a conduit 19 connected to a lower portion of the condenser and a condensate pump 20 into a water tank or hot well 21. The non-condensables, such as air, contained in the steam are removed from the interior of the shell 10 by means including a conduit 22 connected to a lower portion of the shell 10 and a jet ejector 23. The jet ejector has an inlet 24 for receiving a stream of water. The stream of water flowing through the jet ejector creates suction in the conduit 22 which in turn causes the non-condensables in the condenser to be discharged through the conduit 22. The non-condensables in this kind of arrangement carry along steam or like vapor which is condensed by the water or like medium forced through the ejector and thereby lost.

In accordance with my invention I provide means for condensing steam or like vapor escaping into the conduit 22. This means in accordance with my invention comprises a jet 25 connected to a portion of the conduit 22. More specifically the jet 25 is connected to a portion of the conduit 22 which is located at a level above the connection between the conduit 22 and the condenser shell 10. Condensate, in the present instance water, is forced through the jet 25 by means including a conduit 26 connected to the feed water tank 21 and including a pump 27 and a cooling coil 28. The cooling coil 28 in accordance with my invention is cooled in the tank 15 containing cooling medium, in the present instance water, to be circulated through the conduit 14 of the condenser. With this arrangement, condensate, in the present instance water, is sprayed into a portion of the conduit 22 and thereby causes condensation of steam carried into the conduit 22.

It is important to note that the provision of the cooling tube 28 reduces the temperature of the condensate to be forced through the jet 25 so that the temperature of the condensate sprayed into the conduit 22 is below the temperature of the condensate within the condenser. This is important in order to obtain effective condensation within the conduit 22. The condensation within the conduit 22 is further improved by rifling the inner surface of the jet 25. The jet, as clearly shown in Fig. 2, has an inner surface provided with somewhat helically-shaped grooves 29 which effect rotary motion of condensate discharged by the jet so as to completely fill the interior of the conduit portion 22 connected to the device 25.

With my invention I have provided an improved construction and arrangement for surface type condensers in which condensables carried away with non-condensables are effectively regained. Such arrangement is particularly important in connection with power plants in that it reduces loss of condensables or, from another viewpoint, reduces the necessary amount of fresh feed water or like fluid.

Having described the method of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The combination of a surface type condenser for condensing vapor containing air and other non-condensables, means for delivering cooling medium to the condenser, means including a conduit having an upright portion with a lower portion connected to the condenser and means connected to said conduit for removing non-condensables from the condenser, and means including a pump, a cooling element and a nozzle connected to the conduit for spraying cooled condensate into the conduit to remove vapor from non-condensables in said conduit whereby the vapor is condensed in said conduit and returned together with the injected condensate directly to the condenser.

2. The combination of a surface type condenser for condensing vapor containing air and other non-condensables, means including a tank for supplying cooling medium to the condenser, means including a conduit having an upright portion connected at its lower end to the condenser and a jet ejector connected to the conduit for removing non-condensables from the condenser, and means for reducing the loss of vapor removed from the condenser together with the non-condensables, said means including a cooling coil disposed in said tank, a pump and means for spraying condensate into the upright portion of said conduit, said upright portion being located at a level above the level of the connection between said conduit and the condenser and arranged to discharge condensate sprayed into it together with condensables directly to the condenser.

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