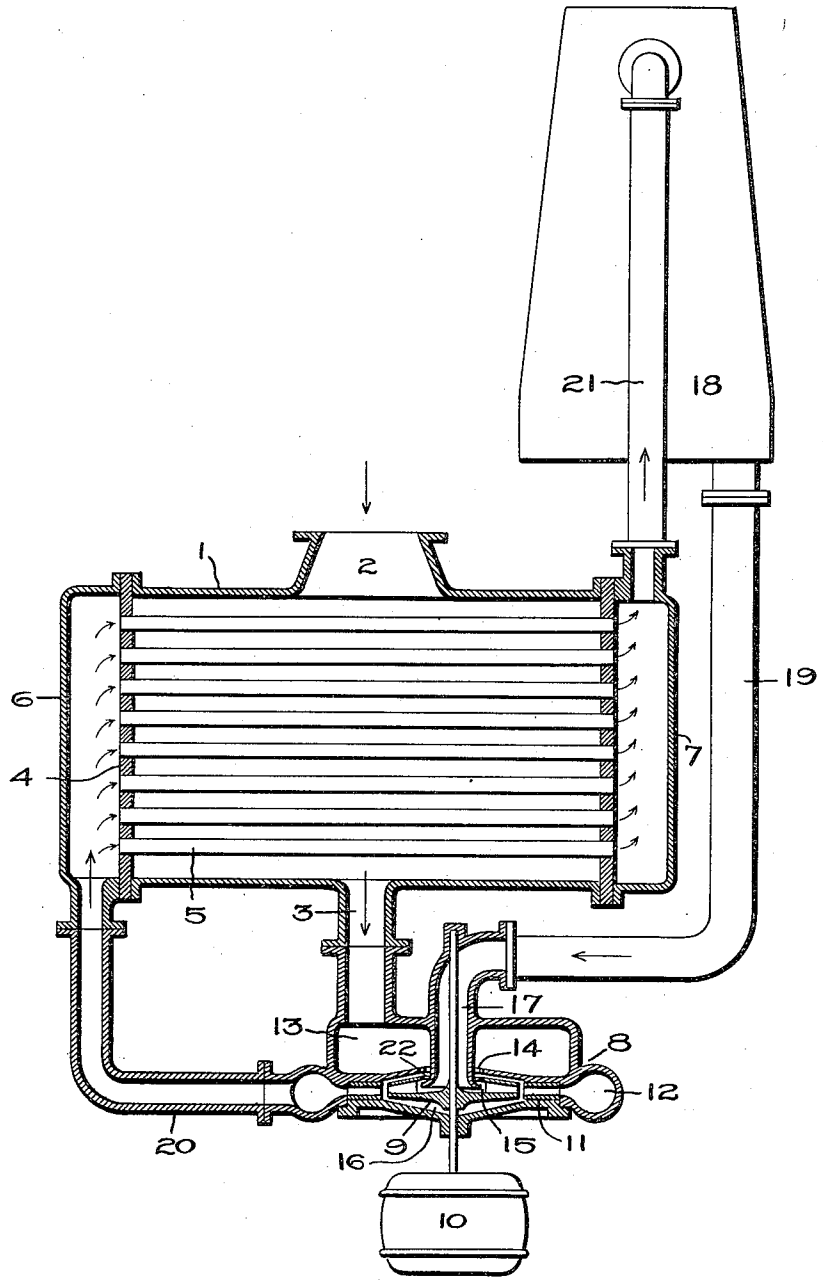
No. 886,661. PATENTED MAY 5, 1908.

J. STUMPF.

SURFACE CONDENSER SYSTEM.

APPLICATION FILED FEB. 10, 1908.



Witnesses:

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by Albert G. Davis Atty

UNITED STATES PATENT OFFICE.

JOHANN STUMPF, OF CHARLOTTENBURG, GERMANY.

SURFACE-CONDENSER SYSTEM.

No. 886,661. Specification of Letters Patent. Patented May 5, 1908.

Application filed February 10, 1908. Serial No. 415,037.

To all whom it may concern:

Be it known that I, JOHANN STUMPF, a subject of the Emperor of Germany, residing at Charlottenburg, Germany, have invented certain new and useful Improvements in Means for Obtaining a Vacuum in Surface-Condenser Systems, of which the following is a specification.

My invention relates to surface condenser systems, and has for its object to improve them whereby a single pump may be utilized to remove the water of condensation, steam and air from the condenser, and also to circulate the cooling water through the tubes.

In the accompanying drawing, which illustrates one of the embodiments of my invention, is shown a surface condenser system.

1 indicates the casing of a surface condenser having an inlet 2 for the steam exhausting from a turbine or other steam-consuming device, and an outlet 3 for the escape of water of condensation, uncondensed steam and air. In the casing are tube sheets 4 that support the tubes 5 through which the circulating water is forced. Chambered heads 6 and 7 are provided on opposite sides of the condenser.

Situated below the condenser is a centrifugal pump 8, the bladed impeller 9 of which is driven by a motor 10. The motor may be propelled by electricity, steam or other agency. Surrounding the impeller is an annular member 11 having vanes which direct the outward passage of fluid into the annular discharge chamber 12. In the pump casing and above the impeller is a receiving chamber 13 that is in direct communication with the outlet from the condenser, and through the passage or opening 14 with the chamber 15 in the impeller, and also with the chamber 16 containing the impeller. Extending downwardly through the receiving chamber 13 and into the chamber 15 is a conduit 17 through which cold water flows from the cooling tower or other receptacle 18 by the pipe 19. The lower end of the conduit 17 is flared after passing through the opening 14 so as to effectively discharge the cold water directly to the blades of the impeller.

The mixture from the discharge chamber 12 passes by the pipe 20 into the chamber in the head 6 from which it flows through the tubes into the chamber in the head 7. From the latter the warm water flows by the pipe 21 into the upper end of the cooling tower or other receptacle 18. The tower is located above the pump and condenser so that the circulating water will enter the pump with considerable velocity and in the same direction as the escaping steam and air, and in this manner increase its effective action and also reduce the load on the driving motor. By reason of this arrangement the remaining exhaust steam after leaving the condenser comes in direct contact with the cold cooling water before it passes into the tubes of the condenser proper. The cooling water under pressure flows from the conduit 17 into the chamber 16 of the impeller as a free jet. By virtue of the velocity of flow of the cooling water the gas pressure prevailing in the chamber 16 will be as low as that in chamber 13 or even lower. By the suction effect of the jet of cooling water as well as that of the centrifugal pump, the mixture of steam and air is sucked out of the chamber 13 through the orifice 22 into the chamber 15, during which action the steam is condensed by contact with the cooling water and the air passes into said water. This mixture then enters the impeller buckets and by them has its pressure increased to an amount sufficient to force it through the condenser.

It is to be particularly noted that the cooling water passes into the centrifugal pump in the same direction as the escaping steam and air from the condensing chamber, and that the pressure-energy of the water is transformed into the energy of flow by the pump, thereby adapting it as it flows through the suction chamber of the pump to carry with it injector-wise the air and steam from said chamber. This action results in the creation of a high vacuum and the air will readily pass out with the water. It is also to be noted that the effectiveness of the pump is increased and its work reduced by reason of the injector action of the inflowing cooling water and by reason of the balancing of the water columns, and further that the pump has to lift a uniform mixture.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

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

1. In combination, a surface condenser, a centrifugal pump having a suction chamber, an impeller for the pump, a conduit which opens into the vapor space of the condenser and conveys the liquid of condensation, vapor and air to the suction chamber of the pump, a means for supplying liquid to the suction chamber of the pump under pressure wherein the pressure is converted into velocity and the fluid permitted to mix with the liquid of condensation, vapor and air prior to being discharged by the impeller, and a conduit receiving the mixture discharged from the pump and conveying it to the condenser for condensing the vapor therein.

2. In combination, a surface condenser, a centrifugal pump having a suction chamber, a receiving chamber in the pump communicating with the interior of the condenser, a conduit which extends from an exterior point through the chamber and conveys cooling water under pressure to the suction chamber of the pump, and a passage around the conduit which conveys the air and remaining steam from the receiving chamber into the cooling water.

3. In combination, a surface condenser, a cooling tower, and a single pump which removes liquid of condensation, air, and remaining vapor from the condenser chamber, mixes them with cooled water from the tower, and discharges the mixture through the condenser to the tower.

In witness whereof I have hereunto set my hand this 2 day of December 1907.

JOHANN STUMPF.

Witnesses:

GOTTFRIED KERKAU,

ERNST RISLER.