Nov. 18, 1924.

D. W. R. MORGAN

1,516,236

JET CONDENSER

Filed Dec. 3, 1920

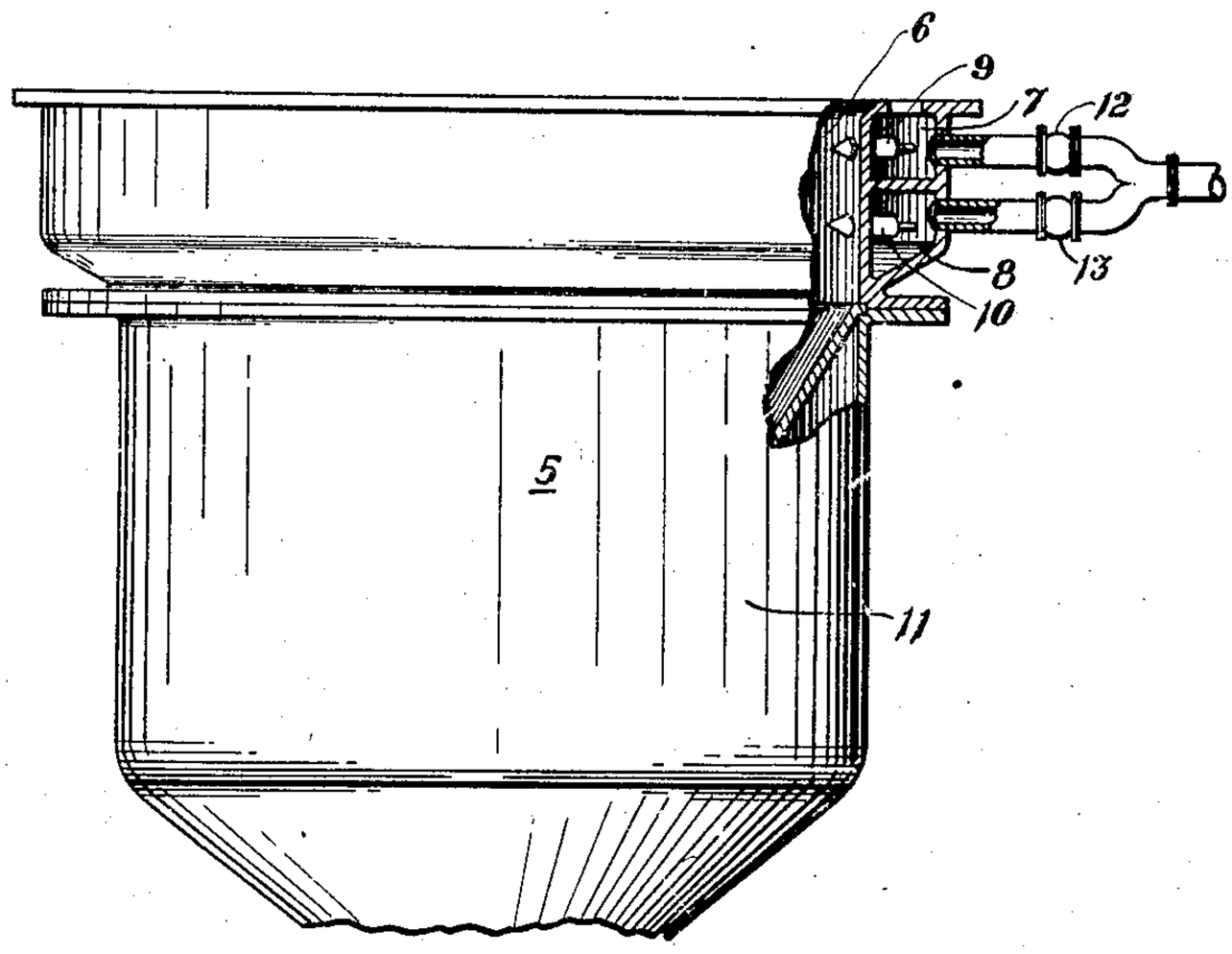

Fig. 1.

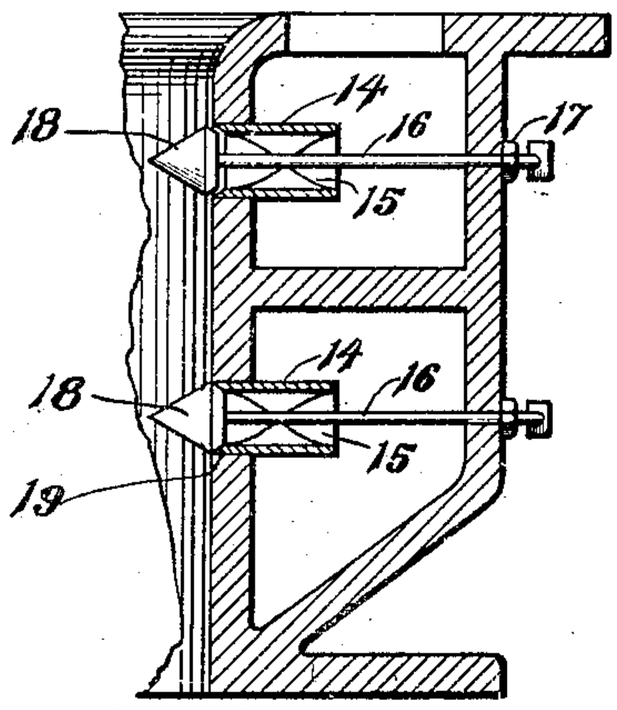

Fig. 2.

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Patented Nov. 18, 1924. 1,516,236

UNITED STATES PATENT OFFICE.

DAVID W. R. MORGAN, OF SWARTHMORE, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

JET CONDENSER.

Application filed December 3, 1920. Serial No. 428,060.

To all whom it may concern:

Be it known that I, DAVID W. R. MORGAN, a citizen of the United States, and a resident of Swarthmore, in the county of Delaware and State of Pennsylvania, have invented a new and useful Improvement in Jet Condensers, of which the following is a specification.

My invention relates to jet condensers and more particularly to a water box construction therefor wherein substantially continuous operation may be secured, even though the cooling water be extremely dirty and tend to foul the nozzles.

In the accompanying drawing, Fig. 1 is a side view, partially in section and partially in elevation of a jet condenser embodying one form of my invention, and Fig. 2 is an enlarged detailed sectional view of a portion of the device shown in Fig. 1 and illustrative of the details thereof.

It is well known that jet condensers are usually provided with a water box surrounding the upper portion thereof, this water box being provided with a plurality of inwardly projecting nozzles which provide the sprays for the condensation of steam or other condensible vapors. These nozzles must necessarily be somewhat large in number and have rather small discharge openings in order to provide a uniform spray throughout the interior of the inlet chamber and, where using cooling water of dirty, trashy nature, these nozzles tend to clog, thus seriously interfering with the operation of the entire power unit.

In accordance with my invention, I provide two entirely distinct water boxes, one surmounting the other and each provided with its individual set of spray nozzles, by suitable control means, either box may be withdrawn from operation at will and, by suitable modification of the spray nozzles, they may then be cleaned without interfering with the vacuum or with the operation of the power generating unit.

Referring to the drawing for a more detailed understanding of my invention, I show a jet condenser at 5 in Fig. 1, this condenser comprising an inlet chamber 6 surrounded by an upper water box 7 and a lower water box 8, these water boxes being wholly independent of each other, the box 7 being provided with spray nozzles 9 and the box 8 with spray nozzles 10.

The inlet chamber 6 discharges into a mixing chamber 11 and the condensed and non-condensible vapors are removed therefrom in any desired manner, as, for example, by the apparatus shown and described in my copending application Serial No. 428,059, filed Dec. 3, 1920, and assigned to the Westinghouse Electric & Mfg. Company.

Cooling fluid may be supplied to the water box 7 through a valve 12, and similarly, cooling fluid may be supplied to the water box 8 through a valve 13 so that either or both of the water boxes may be placed in operation as desired.

Each nozzle is preferably of the specific type indicated in Fig. 2 and comprises an outer shell 14 provided with a discharge opening therethrough, this discharge opening preferably having spiral blades 15 therefor in order to impart a whirling motion to the water flowing therethrough, consequently setting up a more finely divided spray. A central opening is provided through the blades 15 and a rod 16 extends to the exterior of the water box where it is provided with a locking device 17 to determine its longitudinal position, this locking device preferably taking the form of a simple locking nut. The rod 16, carries at its inner end, a sealing member 18, preferably a plug so shaped as to assist in the formation of the spray when it is removed from the spray nozzle, but further being adapted to seal the spray opening when brought up against the spray nozzle, as shown at 19 in Fig. 2.

In operation, if it be desired to operate one of the water boxes, the sealing members associated with the nozzles thereof are moved inwardly by adjusting the associated locking nuts 17 and water is then supplied to the cooling box in question for operation in the usual manner.

If it be desired to withdraw a water box from service, the water is first turned off therefrom and the nozzles thereof are then sealed by drawing the associated plugs 18 outwardly, thus maintaining vacuum within the condenser. The nozzles may then be thoroughly cleaned by any desired means through the usual hand holes and in this manner continuity of operation is secured.

The conical sealing members 18 do not in any way interfere with the spray in the normal operation of the device since they are

disposed in what is known as void space, and in fact, by suitable shaping thereof, they may actually improve the character and distribution of the spray.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited but is susceptible of various other changes and modifications, without departing from the spirit thereof and I desre, therefore, that only such limitations shall be placed thereupon as are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. The combination with a jet condenser, of two distinct and adjacent water boxes therefor and means for at will introducing or withdrawing said water boxes from service.

2. The combination with a jet condenser, of two distinct and adjacent water boxes therefor and means for at will introducing or withdrawing said water boxes from service without impairing the vacuum within the condenser.

3. The combination with a jet condenser of two annular water boxes surrounding the upper portion thereof, one of said water boxes overlapping the other and each of said water boxes being provided with its individual set of spray nozzles.

4. The combination with a jet condenser of a plurality of annual water boxes surrounding the upper portion thereof, means for independently supplying said water boxes with cooling fluid, and each water box being provided with its individual set of spray nozzles.

5. The combination with a jet condenser, of two distinct water boxes surrounding the upper portion of the condenser and means for introducing or withdrawing at will said water boxes from service.

6. The combination with a jet condenser, of two distinct water boxes disposed to deliver water into the upper portion thereof and means for withdrawing either of said water boxes from service without destroying the vacuum within the condenser.

7. The combination with a jet condenser, of two distinct water boxes at the upper portion thereof, and means for controlling at will the flow of water through each of said water boxes individually.

8. In a jet condenser, a water box provided with an inwardly extending nozzle, comprising a shell member provided with an inwardly disposed opening, a sealing plug normally disposed within the condenser beyond said opening and operating means extending from said sealing plug to the exterior of the condenser whereby said plug may be brought up against the opening in the nozzle for the closure thereof and for the maintenance of vacuum within the condenser.

9. In a jet condenser, the combination with a water box having an inwardly projecting spray nozzle, of a sealing plug normally disposed within the condenser and beyond said spray nozzle, an operating member for said plug passing centrally through said spray nozzle, and means whereby said sealing plug may be brought against the opening in said spray nozzle for the closure thereof and for the maintenance of vacuum within the condenser.

10. The combination with a jet condenser of an annular water box surrounding the upper portion thereof, a plurality of inwardly projecting spray nozzles mounted on the inner wall of said water box, sealing plugs for said spray nozzles normally disposed within the condenser and beyond the said spray nozzles, operating means for said sealing plugs projecting to the outside of the condenser whereby said sealing plugs may be brought up against the opening in said nozzles for the closure thereof and for the maintenance of vacuum within the condenser.

11. In a jet condenser, the combination with an annular water box surrounding the upper portion of the condenser of a plurality of inwardly projecting spray nozzles disposed on the inner wall thereof, means within each spray nozzle for causing it to project a hollow conical spray within the condenser, a sealing plug for each nozzle normally disposed within the hollow center of the associate spray, and operating means for said sealing means projecting through the center of each spray nozzle and to the exterior of the condenser, whereby said sealing members may be brought up against the opening in the associated spray nozzles for the closure thereof and for the maintenance of vacuum within the condenser.

12. The combination with a jet condenser of an annular water box surrounding the upper portion thereof, said water box being provided with a plurality of spray nozzles on the inner wall thereof, each spray nozzle being provided with a helical baffle for the production of a whirling, hollow, conical spray, a sealing plug for each nozzle normally disposed within the hollow center of the associated spray, and an operating member of each sealing plug extending through the center of the associated nozzle and baffles and to the exterior of the condenser, whereby said sealing plugs may at will be drawn up against the opening in the associated spray nozzle for the closure thereof and the maintenance of vacuum within the condenser.

13. The combination with a jet condenser of two annular water boxes surrounding

the upper portion thereof, each of said water boxes being provided with spray nozzles on the inner wall thereof, means for at will closing any of said spray nozzles and means for independently supplying cooling fluid to said water boxes.

14. The combination of a jet condenser, of two annular water boxes surrounding the upper portion thereof, means for independently supplying cooling fluid to said water boxes, spray nozzles disposed on the inner wall of said water boxes, sealing plugs for the opening in each of said spray nozzles and means exterior to the condenser for moving said sealing plugs into and away from the opening on the associated spray nozzles.

15. The combination with a jet condenser, of two annular water boxes surrounding the upper portion thereof, means for independently supplying cooling fluid to said water boxes, a plurality of spray nozzles on the inner wall of each water box, means associated with each spray nozzle whereby it delivers a hollow conical spray, a sealing plug normally disposed within the hollow center of each spray and an operating member carrying said sealing plug and projecting through the associated nozzle to the exterior of the condenser whereby the sealing plug may be moved into the discharge opening of the associated spray nozzle for the closure thereof and for the maintenance of vacuum within the condenser.

In testimony whereof, I have hereunto subscribed my name this 30th day of November, 1920.

D. W. R. MORGAN.