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HEAT EXCHANGER

Filed Oct. 28, 1927

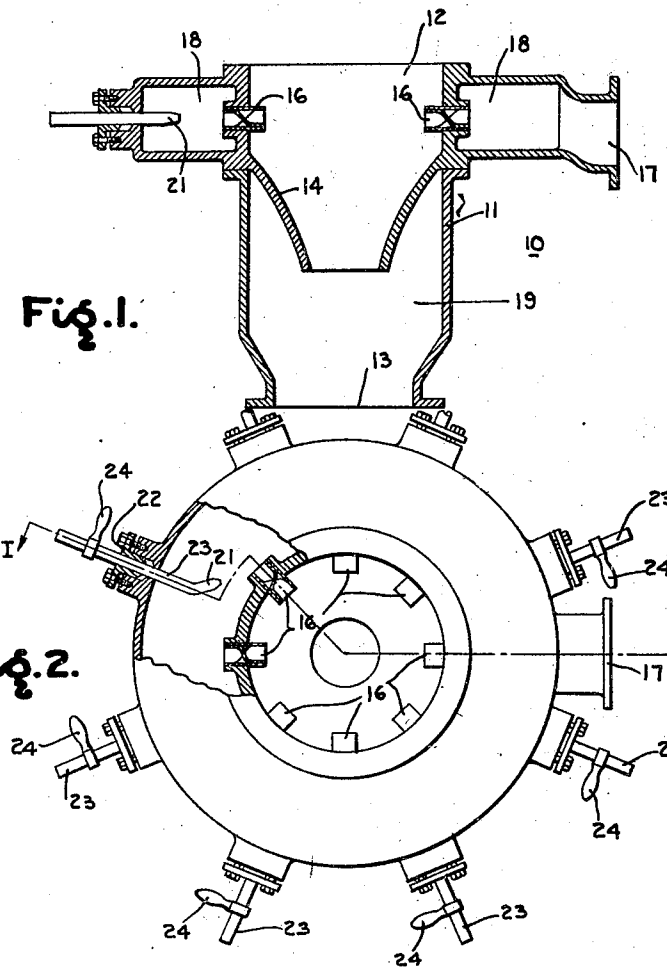



Fig. 1.




Fig. 2.

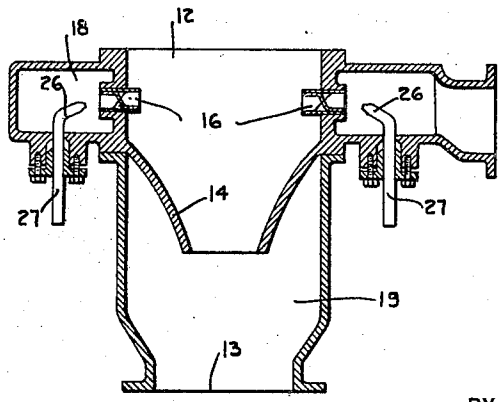



Fig. 3.

WITNESSES:

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# UNITED STATES PATENT OFFICE

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## HEAT EXCHANGER

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My invention relates to heat exchangers of the open type, such as jet condensers or jet heaters, and it has for an object, to improve the performance of apparatus of this character.

In the operation of apparatus of the type described, it often occurs that the available injection water is contaminated with débris, such as leaves, city refuse, etc., with the result that the injection nozzles frequently become obstructed to such an extent as to impair the efficiency of the apparatus. For example, in jet condenser installations the nozzles may become so badly clogged that it is impossible to hold a vacuum. Hence it may be necessary to shut down such a unit for cleaning at a time when it is particularly needed.

Heretofore various means, such, for instance, as hand holes on the nozzle chamber adjacent the nozzles, have been provided to facilitate cleaning, but with all of these arrangements so far as I am aware, it is necessary to shut down the unit during the cleaning period, however brief that may be.

More particularly, therefore, an object of my invention is to provide a device of the type described with means for temporarily dislodging débris from the respective nozzles so that the device may continue to function efficiently until such time as it may be convenient to shut it down for cleaning.

Apparatus embodying the features of my invention is shown in the accompanying drawings in which:

Fig. 1 is a sectional elevation of a jet condenser, taken on the line I—I of Fig. 2;

Fig. 2 is a plan view of the condenser shown in Fig. 1, showing part of the nozzle chamber in section; and,

Fig. 3 is a sectional elevation of a jet condenser embodying a modified form of my invention.

According to my invention, a heat exchanger of the type described is provided with fluid pressure means, such, for example, as auxiliary nozzles, which are directed toward the main nozzles and are connected to a suitable source of fluid under pressure. By means of this arrangement, débris may be removed from the main nozzles by passing a fluid under a relatively high pressure through the auxiliary nozzles.

Referring now to the drawings for a better understanding of my invention, I show a heat exchanger, such as a jet condenser, indicated generally at 10, and comprising a body portion 11 which is provided with an inlet for motive fluid, such as exhaust steam, at 12, and an outlet for condensate aggregate at 13. Disposed within the body portion 11 is an inverted conical web member 14, and about the walls of the body portion 11, and above the conical member 14, are a suitable number of injection nozzles 16. Cooling media, such as cooling water, is passed through the inlet 17 to the nozzle chamber 18, from whence it passes through the nozzle 16 and rains down in a sheet over the upper surface of the inverted cone 14 to the separating chamber 19, from whence the condensate aggregate is discharged through the outlet 13.

The apparatus thus far described is well understood and is, therefore, only briefly referred to. However, in the operation of a device of this type, it occurs that leaves and various other forms of débris will find their way through the inlet 17 to the nozzle chamber 18 and will frequently obstruct the nozzles 16 so as to greatly retard the passage of circulating media therethrough. Obviously this decreases the capacity of a heat exchanger of this type and often interferes with the performance of such an exchanger to the extent that the unit must be taken out of service for cleaning at times when it is quite important that it be kept in service.

In order to overcome the difficulty of having to shut down such a unit for cleaning at times when this is not convenient, I provide a suitable number of auxiliary nozzles 21. These nozzles 21 are preferably rotatably mounted in the nozzle chamber in any suitable manner, as by means of bushings, or the like, 22, which are disposed in the outer walls of the nozzle chamber 18. The nozzles 21 are preferably formed on the end of a tubular member 23, which passes through the bushing 22, the nozzle 21 being inclined with

respect to the tubular portion 23 so that upon rotation of the latter, by means of the handle 24 the nozzle 21 may be directed to a plurality of the nozzles 16. Preferably, the nozzles 21 are disposed substantially midway between the nozzles 16, so that one nozzle 21 may serve two of the nozzles 16, although, of course, it will be understood that this is merely representative of a form of my invention and that various other arrangements may be provided. The handle 24 is also disposed so as to indicate the position of the nozzle 21 within the nozzle chamber 18. In this way, it is possible for an operator to properly adjust the nozzle 21 so as to direct a stream of fluid toward either of the nozzles 16.

In the operation of my invention, I pass some fluid, such as water, under a relatively high pressure through the nozzles 21, the impact of this high pressure fluid, which is directed at the respective nozzles 16, is sufficient to dislodge any débris which may be obstructing the flow of water through the respective nozzles and, by operating the handle 24, it is thus possible to clean the various injection nozzles 16 and to keep the condenser operating at a good efficiency until such time as it is convenient to shut the unit down for cleaning.

The apparatus shown in Fig. 3 is similar in all respects to that described with reference to Figs. 1 and 2, with the exception that a nozzle 26 is provided for each of the nozzles 16, and that the tubular members 27, which are connected to the nozzles 26, are passed through a lower wall of the nozzle chamber 18. The arrangement shown in Fig. 3 has the advantage that it permits a simultaneous cleaning of all of the nozzles 16 and that no adjustment of the nozzles 26 is required.

Also, by passing the tubular connections 27, for the respective nozzles 26, through a lower wall of the nozzle chamber, the overall dimensions of the exchanger are reduced to a minimum and thus, provision is made for close clearances which may occur in some installations. Obviously, this latter advantage may be gained by passing the connections 27 through the upper wall of this chamber, or by passing some of the connections through the upper, and others through the lower wall of the nozzle chamber.

While I have shown my invention in two forms, 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 desire, 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 heat exchanger comprising a condensing chamber, a nozzle chamber, and nozzles therebetween, of other nozzles movably mounted in said nozzle chamber for directing relatively high pressure fluid toward said first-mentioned nozzles, and means for directing one or more of said other nozzles at more than one of said first-mentioned nozzles.

2. The combination with a heat exchanger comprising a condensing chamber, a nozzle chamber, and nozzles therebetween, of a rotatably mounted nozzle in said nozzle chamber and adapted upon rotation to be directed at more than one of said first-mentioned nozzles.

3. A device according to claim 2 in which means are provided outside of said nozzle chamber for rotating the rotatable nozzle.

4. A device according to claim 2, and means outside the nozzle chamber for rotating the rotatable nozzle, said means being adapted to indicate the position of said rotatable nozzle.

5. In a device of the class described comprising a condensing and mixing chamber, a supply chamber, and injection nozzles for injecting cooling media from the supply chamber into the mixing and condensing chamber, of means in said supply chamber for directing a stream of fluid under relatively high pressure toward said injection nozzles for cleaning the latter.

6. In a device of the class described comprising a condensing and mixing chamber, a supply chamber, and injection nozzles for injecting cooling media from the supply chamber into the mixing and condensing chamber, of one or more nozzles in said nozzle chamber for directing fluid under relatively high pressure toward said first-mentioned nozzles for cleaning the latter.

In testimony whereof, I have hereunto subscribed my name this 17th day of October, 1927.

JOHN P. RATHBUN.