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APPARATUS FOR ABSORBING HEAT.

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1,275,231. Patented Aug. 13, 1918.

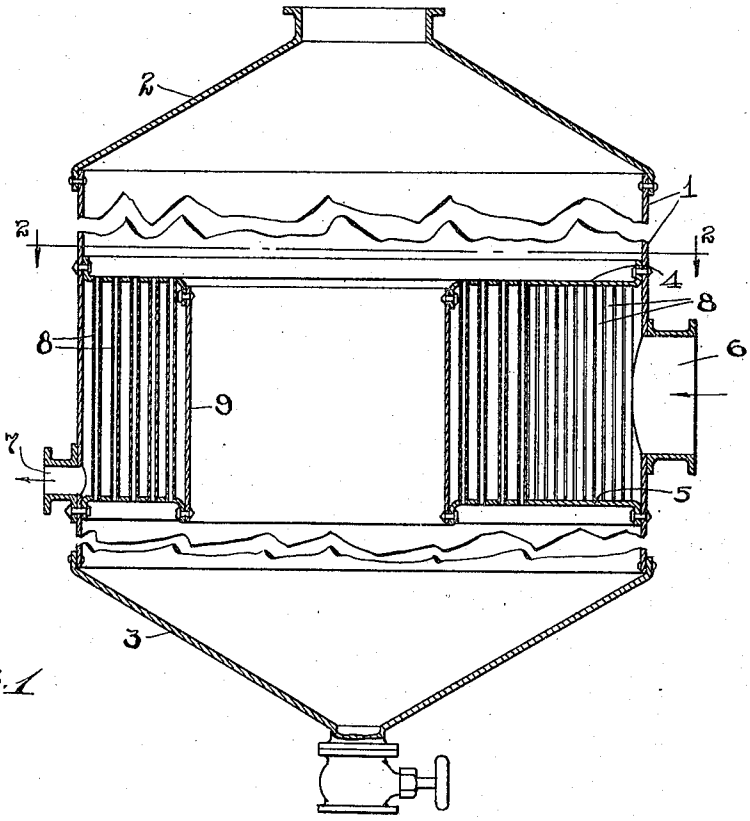


Fig. 1

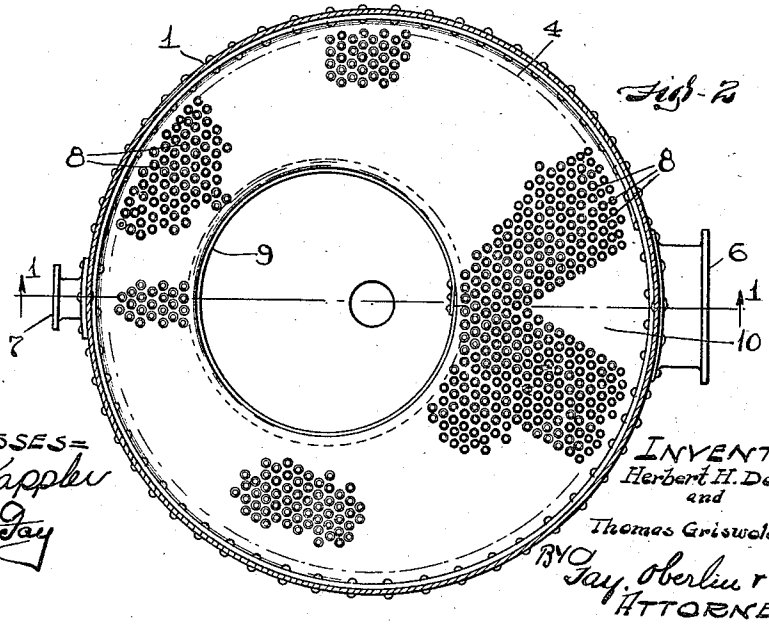


Fig. 2

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR ABSORBING HEAT.

1,275,231. Specification of Letters Patent. Patented Aug. 13, 1918.

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To all whom it may concern:

Be it known that we, HERBERT H. DOW and THOMAS GRISWOLD, Jr., both citizens of the United States, and residents of Midland, county of Midland, State of Michigan, have jointly invented a new and useful Improvement in Apparatus for Absorbing Heat, of which the following is a specification, the principle of the invention being herein explained and the best mode in which we have contemplated applying that principle, so as to distinguish it from other inventions.

The present improvements, relating as indicated to heat absorbing apparatus, have more particular regard to the construction of condensers, vacuum pans, and the like, where means require to be provided for the absorption of heat, either to condense the steam, for example in the case of a steam condenser, or to heat a liquid in the vaccum chamber, in the other instance. In any event, there is a medium to be heated, whether the purpose be directly thus to heat the same, or to cool the heating medium.

One object of the invention is to provide an apparatus of this general sort, which will utilize to the fullest extent, if possible within prescribed limits of size, the heat absorbing capacity of the medium being heated. A further object is to equalize the heating effect secured so that, particularly in the case of vacuum apparatus, the objectionable tendency for the liquid being heated to crystallize and so clog up portions of the apparatus, due to excessive heating of such portions, may be obviated. To the accomplishment of the foregoing and related ends, the invention then consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such described means constituting, however, one of various ways in which the principle of the invention may be used.

In said annexed drawing:—

Figure 1 is a central vertical section through a vacuum evaporating pan embodying our present improvements; and Fig. 2 is a transverse section of the same on the plane indicated by the line 2—2, Fig. 1.

The particular apparatus thus illustrated constitutes a so-called vacuum drum, which in its main features is of familiar construction, consisting as it does, of a chamber 1, of general cylindrical form, disposed with its axis vertical and having its respective upper and lower ends 2 and 3 of slightly tapered form. The apparatus of present interest consists of the means for heating the contents of such drum, the normal level of which, as indicated, lies at approximately midpoint of the drum. Such heating apparatus is located so as to lie below this level, and thus be submerged by the contents of the drum, which are to be heated and will now be briefly described.

In the form illustrated, such apparatus will be seen to be made up of two plates or transverse partitions 4 and 5 in the drum, which define a chamber of approximately circular cross-section. Incoming and outgoing openings 6 and 7 are provided in opposite sides of this chamber to permit a suitable heating medium, such as steam or hot air, to be passed therethrough, the incoming opening 6, where steam constitutes the heating medium, being of course larger than the outgoing opening 7, as illustrated in the drawing. Connected with corresponding openings in the respective partition plates, so as to provide for communication between the upper and lower portions of the drum, is a plurality of conduits 8, on the order of boiler tubes, disposed approximately vertically and designed for ascending currents of the medium being heated. There is also provided a relatively much larger, but similarly disposed conduit 9 for the descending current of such medium, such descending conduit or "down comer", as it is sometimes called, being located considerably nearer to the outgoing than to the incoming opening in the chamber walls, above referred to. Accordingly, the ascending conduits or "risers" which are distributed substantially uniformly throughout the remainder of said chamber located on the side of said descending conduit directed toward the incoming heating medium, present in the aggregate a larger surface to the heating current, than those located on the side of such conduit directed toward the outgoing heating medium.

In the foregoing description, in referring to the side of the descending conduit directed toward the incoming and outgoing heating medium respectively, the side may

be considered as consisting in effect of that half of the cylindrical surface of the conduit which is thus directed in each instance.

While the ascending conduits are distributed thus substantially uniformly throughout the portion of the chamber not occupied by the descending conduit, it should be noted that a triangular space 10, with sides converging inwardly, is left clear in said chamber adjacent the incoming opening. (See Fig. 2.) This is to assist in dividing and distributing the heating medium, causing the same to proceed in two separate paths around the descending conduit, these paths converging at the further side of such conduit and also gradually growing narrower, owing to the eccentric location of such descending conduit, with reference to the center of the chamber.

As a result of the foregoing construction, not only is a uniform distribution of the heating medium secured throughout the chamber bounded by the partition plates 4 and 5, but, as such medium cools and condenses, it is confined in a smaller and smaller space between the converging lateral walls of the eccentrically located "down-comer" and the adjacent walls of the chamber proper. Accordingly, the velocity of the current is maintained and a maximum rate of heat transfer secured throughout the apparatus and yet none of the ascending conduits, or "risers", is subjected to an undue heating effect, such as would tend to clog up such conduits in the fashion previously referred to. Formation of air pockets and irregular heating due thereto likewise are avoided.

Other modes of applying the principle of our invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

We therefore particularly point out and state as our invention:—

1. In apparatus of the character described, the combination with a chamber, through which the heating medium passes; of a plurality of conduits disposed approximately vertically in said chamber, and designed for ascending currents of the medium being heated; and a relatively larger, similarly disposed conduit designed for the descending current of such medium, the corresponding ends of all said conduits freely communicating with each other, and said ascending conduits located on the side of said descending conduit directed toward the incoming heating medium, presenting, in the aggregate, a larger surface to the heating medium than those located on the side of such conduit directed toward the outgoing heating medium.

2. In apparatus of the character described, the combination with a chamber of approximately circular cross section, having incoming and outgoing openings in opposite sides for the heating medium to pass therethrough; of a plurality of conduits disposed approximately vertically in said chamber and designed for ascending currents of the medium being heated, and a relatively larger, similarly disposed conduit for the descending current of such medium, the corresponding ends of said conduits freely connecting with each other, and said ascending conduits located between said descending conduit and such incoming opening, presenting, in the aggregate, a larger surface to the heating current than those located between said descending conduit and such outgoing opening.

3. In apparatus of the character described, the combination with a chamber of approximately circular cross section, having incoming and outgoing openings in opposite sides for the heating medium to pass therethrough; of a plurality of conduits disposed approximately vertically in said chamber and designed for ascending currents of the medium being heated, and a relatively larger, similarly disposed conduit for the descending current of such medium, the corresponding ends of said conduits freely connecting with each other, said descending conduit being located nearer such outgoing than said incoming opening, and said ascending conduits being distributed substantially uniformly throughout the remainder of said chamber.

4. In apparatus of the character described, the combination with a chamber of approximately circular cross section, having incoming and outgoing openings in opposite sides for the heating medium to pass therethrough; of a plurality of conduits disposed approximately vertically in said chamber and designed for ascending currents of the medium being heated, and a relatively larger, similarly disposed conduit for the descending current of such medium, the corresponding ends of said conduits freely connecting with each other, said descending conduit being located nearer such outgoing than said incoming opening, and said ascending conduits being distributed substantially uniformly throughout the remainder of said chamber, save immediately adjacent such incoming opening, where a space is left clear.

5. In apparatus of the character described, the combination with a chamber of approximately circular cross section, having incoming and outgoing openings in opposite sides for the heating medium to pass therethrough; of a plurality of conduits disposed approximately vertically in said chamber and designed for ascending currents of the

medium being heated, and a relatively larger, similarly disposed conduit for the descending current of such medium, the corresponding ends of said conduits freely connecting with each other, said descending conduit being located nearer such outgoing than said incoming opening, and said ascending conduits being distributed substantially uniformly throughout the remainder of said chamber, save immediately adjacent such incoming opening where a triangular space with sides converging inwardly, is left clear.

6. A vacuum evaporating pan, having incoming and outgoing openings, and two approximately wedge-shaped paths in the heating belt for the passage of the heating medium therethrough, such paths diverging from such incoming opening and uniting again at such outgoing opening, substantially as described.

Signed by us, this 2nd day of June, 1916.

HERBERT H. DOW.
THOMAS GRISWOLD, JR.

Attested by—
E. W. NEWLAND,
E. E. BAINES.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."