

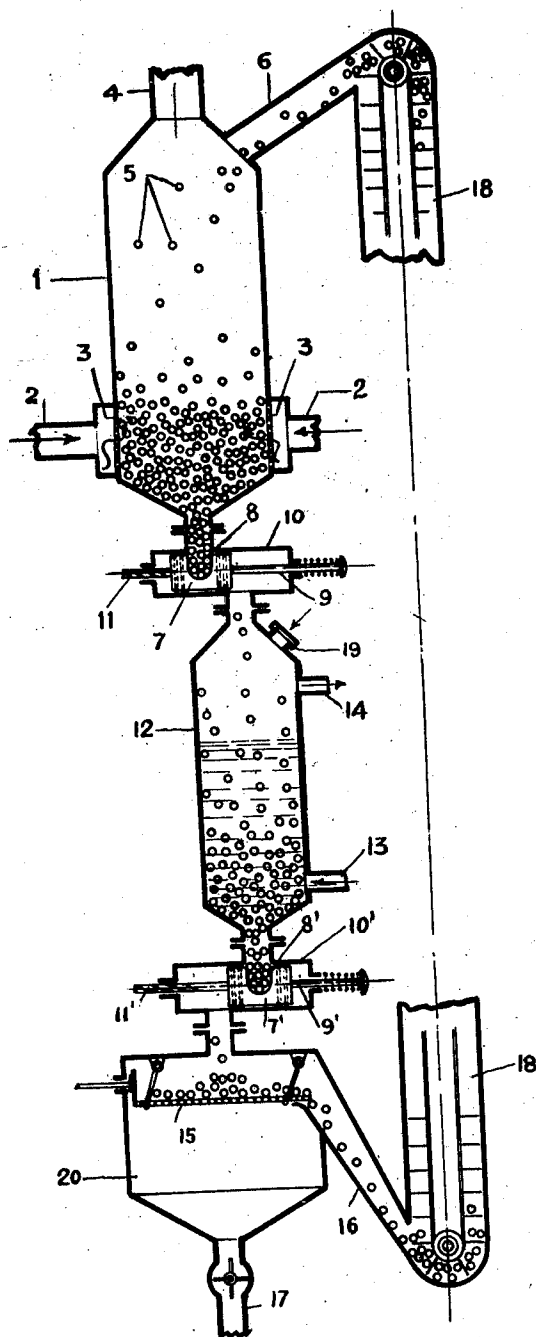
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APPARATUS FOR THE TRANSMISSION OF HEAT AND COLD

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APPARATUS FOR THE TRANSMISSION OF HEAT AND COLD.

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This invention relates to heat exchanging devices of the type in which heat is transferred through the medium of movable solid bodies such as metal balls.

5 The object of the invention is to more efficiently utilize the heat, and the invention which is applicable to not only heating but cooling consists in causing the metal balls to be plunged directly into the liquid or solid substance to be heated or cooled, the heat exchange taking place by direct contact within stationary receptacles.

Reference should be had to the accompanying drawing, which forms a part of this specification, which shows a vertical sectional middle view representing one form of apparatus in which the invention may be carried into effect as an apparatus for distilling liquids.

20 In this figure, 1 is a receptacle supplied with a funnel-shaped bottom within which enter by means of conduits 2 hot gases under their own pressure or by means of suction created by an artificial draught; 3 are screens adapted to retain any solid bodies that happen to pass along with such hot gases. The hot gas passes across the receptacle 1 in an upward direction and leaves it by the chimney 4 and delivers its heat to the balls 5 which are admitted to the receptacle 1 through the conduit 6 and traverse the receptacle 1 by gravity in a downward direction contrary to the direction of the gas current. The receptacle 1, which
35 may be called the heat-absorbing receptacle, is supplied with a funnel-shaped bottom and with a discharge device by the operation of which the balls are intermittently discharged in a regulated quantity. This discharge device consists of a piston 7 with a cavity 8 in its surface in connection with a piston rod 9 and with a cylinder 10. The piston does not only reciprocate within the cylinder 10 but can also rotate around its axis. For this
45 purpose the piston carries on one side a threaded spindle 11 which engages a corresponding tapped nut arranged in the cover of the cylinder, so that during the axial displacement of the piston the same is
50 obliged to effect at the same time a rotary motion around its axis. At each stroke the cavity 8 of the piston 7 is loaded with a quantity of balls which are discharged after the displacement of the piston in the receptacle 12. The receptacle 12 contains the liquid to be evaporated and in this receptacle

the balls come into touch with this liquid and deliver their heat to it. The liquid to be heated is introduced at 13 while 14 is an opening for the discharge of vapor which
60 may be formed within the receptacle 12 by the delivery of heat. Also the receptacle 12 has a funnel-shaped bottom similar to that of the receptacle 1 and is also provided with a discharge device of identical form to that
65 fitted between the receptacles 1 and 12. The same consists of a piston 7' with cavity 8', piston rod 9' and cylinder 10'; 11' is again a threaded spindle which fits in a tapped nut arranged in the cylinder cover in order to
70 rotate the piston around its axis when displaced longitudinally. This latter discharge device is adapted to collect besides the means of conveyance also the heated liquid between them. The same is intermittently operated
75 so that the material from the receptacle 12 is withdrawn intermittently in regulated quantities and introduced by its own weight within the receptacle 20. The receptacle 20 is
80 adapted to receive not only the conveyance means but also the heated liquid or solid material conducted with it. This material discharged from the receptacle 12 into the receptacle 20 drops upon a shaking screen
85 15, by which the conveying balls are separated from the liquid to which they have imparted their heat. The liquid passes away by means of the conduit 17 to wherever it is to be utilized or it may be re-conducted by suitable means to the receptacle 12 to receive
90 further heating. The balls that have given up their heat are led away from the grid 15 by the chute 16 to the lower end of a bucket elevator 18 which raises them to the upper end of a sloping conduit 6, down
95 which they pass and are re-admitted to the receptacle 1 to be again heated.

The conveyor balls can be made of any suitable material, but they are preferably
100 made from metal; there may also be employed hollow metal balls filled with water. In this case care must be taken that the temperature of the water within the balls does not surpass 100 degrees C. 19 is a feed
105 opening on the receptacle 12 serving for the introduction of solid material within the receptacle 12. In this case the material will be conveniently fed by its own weight from a hopper supplied with an automatic feed
110 regulator.

Having now particularly described and ascertained the nature of my said invention

and in what manner the same is to be performed, I declare that what I claim is:—

A heat exchange device comprising in combination, a heating chamber adapted to be interposed in a heating system and provided with a frusto-conical bottom having a central outlet, another similarly shaped liquid containing chamber in communication with the heating chamber, direct contact heat conducting means including a plurality of metal balls, receiving means situated beneath the liquid containing chamber and in communication therewith, means interposed between the chambers and between

the liquid containing chamber and the receiving means for controlling the transfer of a predetermined amount of balls from chamber to chamber and from said liquid containing chamber to said receiving means, means in communication with the receiving means for controlling the passage of liquid therefrom, screening means for the balls, and means for conveying the balls from the receiving means to the heating chamber so as to effect a continuous operation.

In testimony whereof I have signed my name to this specification.

CELEDONIO VICENTE PEREDA.