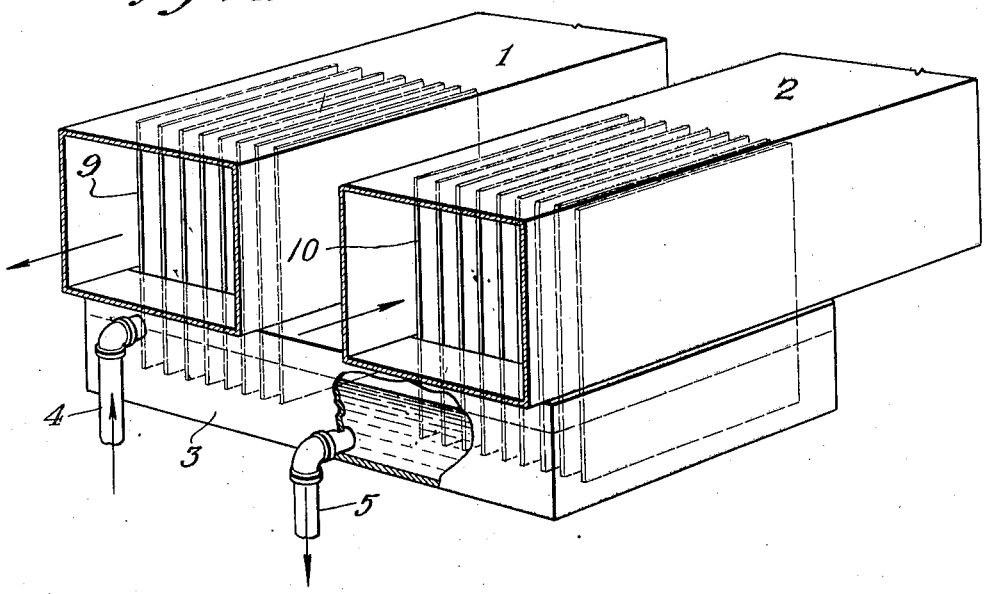
Dec. 31, 1929. T. E. MURRAY 1,741,726

AIR CONDITIONING APPARATUS

Filed Feb. 10, 1926

Fig. 2.



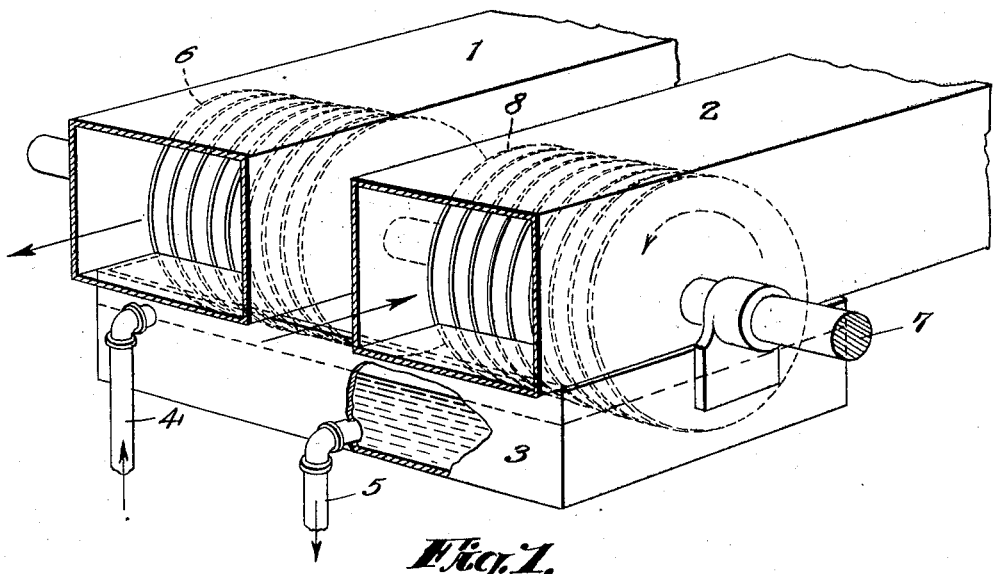


Fig. 1.

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UNITED STATES PATENT OFFICE

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AIR-CONDITIONING APPARATUS

Application filed February 10, 1926. Serial No. 87,231.

My invention aims to provide a certain improved type of apparatus of great simplicity and efficiency.

The accompanying drawings illustrate embodiments of the invention.

Fig. 1 is a schematic perspective view of an apparatus which serves at once for extracting dust and cinders from flue gases and heating air or other gaseous medium and conditioning the air;

Fig. 2 is a perspective of a modified apparatus similar to that of Fig. 1.

In a previous Patent No. 1,548,158 of August 4, 1925, I have described a heat exchanger using heat conducting members arranged to be reciprocated bodily from one position to another, absorbing heat from gas in one position and giving up its heat to air in another position.

In the embodiments of the present invention illustrated, the heat conducting member is bodily immovable; though it may have rotary or similar movement about a central axis.

Referring first to Fig. 1, there is a conduit 1 through which flue gases pass and an adjacent conduit 2 through which air passes to be heated and conditioned. The two conduits pass over the top of a water tank 3 with the usual inlet and outlet pipes 4 and 5 for supplying fresh water and carrying off the overflow above a certain level. In the conduit 1 there is a series of discs 6 arranged close together on a shaft 7, substantially filling the cross-section of the conduit except for the spaces between the discs, so that the gas must pass through such spaces. The lower portions of such discs enter the water in the tank 3. In the conduit 2 there is a similar series of discs 8 also entering the water in the tank and so arranged that the air must pass through the spaces between the discs. The shaft 7 is rotated at a rather slow speed carrying the discs with it.

The discs 6 take up moisture from the tank so as to catch the dust and cinders in the gas. As the discs rotate the dust and cinders are washed off in the tank below and accumulate therein; the heavier material goes to the bottom and can be drained off from time to time. The lighter material goes out through the overflow. The water in the tank is also circulated slowly so that it is heated by the discs 6 as the upper portions of the latter move continuously down into the water. The water in turn gives up heat to the discs 8 at their lower parts, and as these move continuously upward into the path of the air, the latter is heated or warmed thereby. The discs 8 also carry up into the air conduit a certain quantity of moisture from the tank below, and this is taken up by the air to moisten or condition it.

In the drawing previously described the discs for transmitting heat or other condition are bodily immovable (that is, their axes do not move and they always occupy the same space), though their wetted or conditioned portions are continuously moving from one medium to another by rotation about an axis. For the transference of heat alone, they may be absolutely immovable as in the case illustrated in Fig. 2. Here the conduits 1 and 2 for gases and air and the water tank 3 with its inlet and outlet pipes 4 and 5 are the same as in Fig. 1. Instead of the discs 6 of Fig. 1, I propose to use thin sheets or plates 9 placed close together and preferably made of copper, brass or other highly conductive metal. The set of spaced plates 9 practically fills the cross-section of the conduit 1 so that the gas must pass in thin streams through the spaces between the plates. The lower portions of the plates enter the water in the tank 3. In the conduit 2 there is a similar series of plates 10. The plates may be supported in any one of various ways, as, for example, by welding them along their upper edges to the tops of the conduits 1 and 2. The water is heated or cooled through the plates 9 and transmits its temperature condition to the plates 10 which in turn transmit it to the second stream of gas or air.

Baffles may be arranged in various ways between the two gases or between these gases and the liquid. Where the plates are so large or so thin as to be quite flexible, spacers may be arranged between them in the line of flow of the gases to hold the discs in correct relative position. The invention may be applied

to various fluids besides the water, gas and air above referred to, and it may be applied to the transferring of other conditions besides heat.

A useful application of the invention is in cooling the supply of air which is circulated through electric generators or similar machinery.

Wipers above the water level (which is maintained substantially constant in any usual way) may be arranged between the discs to remove most of the liquid from the rising portions thereof. Similar wipers may be arranged to direct the air current. Means may be provided for spraying or otherwise applying liquid to the discs so as to keep them wet, the water not absorbed by the gas being collected in a tank below.

The discs instead of being solid may be annular, mounted on spiders, and with the gas passing between the discs and through the open center thereof. Instead of flat circular discs and annular plates, equivalent members of various other shapes and constructions may be arranged to move continuously in one direction to effect the transference of heat or other condition.

Instead of transferring the heat directly through a single body of the liquid, it may be transferred from this to a second body of liquid or other medium and thence to the air or other gaseous body to be conditioned; such indirect methods being advisable, for example, where the first body of liquid is contaminated by dirt or acids or the like, so as not to be directly usable. The first body of liquid would need only to be replenished from time to time to eliminate the dirt and to compensate for evaporation.

The discs may be covered with cloth or other fibers or reticulated material to provide an increased surface or may be roughened in various other ways to the same effect.

Various modifications may be made by those skilled in the art and the machine may be adapted to various other uses than those described, without departing from the invention as defined in the following claims.

What I claim is:

1. An apparatus of the character described comprising a single liquid-containing receptacle, conduits for different gases and thin metal conductors located partly in the liquid and partly in the respective gases for transmitting heat from one of the gases through the liquid while in said receptacle to the other gas.

2. An apparatus of the character described comprising a single liquid-containing receptacle, conduits for different gases and thin bodily immovable conductive members arranged partly in the liquid and partly in the respective gases to transmit heat from one of the gases through the liquid while in said receptacle to the other gas.

3. An apparatus of the character described comprising a liquid-containing receptacle, conduits for different gases and rotating discs arranged partly in the liquid and partly in the respective gases to transmit heat from one of said gases through the liquid to the other.

4. An apparatus of the character described comprising a single liquid-containing receptacle, conduits for different gases, one of which is heated, a set of bodily immovable members partly in one of said conduits and partly in the liquid for transmitting heat from said heated gas to the liquid and means in contact with the liquid and the other gas for transmitting heat from the liquid while in said receptacle to the other gas.

5. An apparatus of the character described comprising a single liquid-containing receptacle, conduits for different gases, one of which is heated, a set of bodily immovable members partly in one of said conduits and partly in the liquid and a second set of bodily immovable members partly in the other conduit and partly in the liquid for transmitting heat from the first and heated gas to the second through the liquid while in said receptacle.

6. An apparatus of the character described comprising a liquid-containing receptacle, conduits for different gases, one of which is heated, a set of rotating discs partly in one of said conduits and partly in the liquid for transmitting heat from the heated gas to the liquid, and a second set of rotating discs partly in the second conduit and partly in the liquid for transmitting heat from the liquid to the second gas.

In witness whereof I have hereunto signed my name.

THOMAS E. MURRAY.