

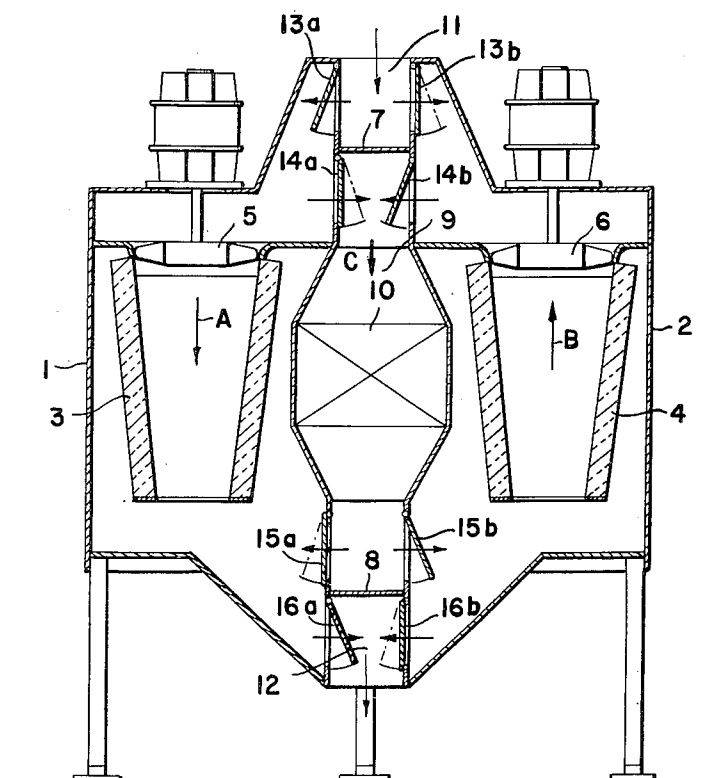
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APPARATUS FOR THE CONTINUOUS COOLING OR DRYING OF GAS

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APPARATUS FOR THE CONTINUOUS
COOLING OR DRYING OF GAS

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This invention relates to an apparatus for the continuous cooling or drying of gas, for instance air, and has for its primary object to provide a simplified and dependable apparatus which comprises two equal intermittently operating cooling or drying elements each mounted in a casing, two reversible fans each co-operating with one of the cooling or drying elements, each of said fans preferably being fitted in a casing, and two pairs of valve means operable by said fans, one pair of said valve means being mounted in front of and the other pair behind the two fans, as viewed in the direction in which the gas current to be treated flows into the apparatus, said valve means being adapted alternatively to connect the two casings surrounding the elements with the gas current to be treated in such a way, that the gas which is to be cooled or dried respectively is caused by the fan to flow through one of the valve means fitted in front of the two fans, through one of the casings and said fan, and through the corresponding cooling or drying element, and through one of the valve means fitted behind the two fans to the point where the cooled or dried gas, as the case may be, is to be used, while another gas, for instance air, which may be heated, for instance by means of an electric heating element common to both the cooling or drying elements, by means of the other fan is caused to flow, preferably in a completely or partly closed circuit in the opposite direction to the current of gas which is to be treated, flows into the apparatus, said other gas flowing through the other casing, the other cooling or drying element and the other fan and through the other two valve means in order to melt the ice which may have formed on the last mentioned cooling element or, as the case may be, to dehydrate the last mentioned drying element.

Each valve means preferably consists of at least two flap valves which are operated by the suction or pressure action respectively of the fans.

The invention will hereinafter be further explained in connection with the embodiment for continuous cooling of air illustrated diagrammatically in the accompanying drawing which is a longitudinal sectional view of a gas drying apparatus constructed in accordance with this invention.

The device comprises two equal cooling elements 3, 4, each mounted in a casing 1 and 2 respectively. In each casing a reversible propeller fan 5 and 6 respectively is mounted above each cooling element 3 and 4, said fans co-oper-

ating with each respective cooling element in such a way that if for instance, the fan 5 produces an air current flowing in the direction of the arrow A, the other fan 6 produces an air current flowing in the direction of the arrow B and vice versa. For this purpose the blades of the two fans may either have the same screw direction or one of them have a left-hand thread and the other a right-hand thread. In the first case the fans rotate in opposite directions, in the second case in the same direction. The casings 1 and 2 are arranged beside, and built together with a passage 9 being closed by partition walls 7, 8, said passage having an electric heating element 10. The passage 9 is extended above the partition wall 7 to an air inlet 11 and below the partition wall 8 to an air outlet 12.

Above and beneath the partition wall 7 the passage 9 is provided with a pair of flap valves 13a, 13b and 14a, 14b respectively, which may be brought to an open position by swinging in the directions illustrated by the arrows. Similar flap valves 15a, 15b and 16a, 16b respectively, are fitted above and below the partition wall 8. All flap valves are set in their open or closed positions, as the case may be, by means of the suction or pressure action of the fans.

The cooling elements 3, 4 operate intermittently, the air which is to be cooled being alternately supplied to these two cooling elements. This intermittent operation is made possible through the two valve devices consisting of the flap valves 13a, 13b, 14a, 14b and 15a, 15b, 16a, 16b respectively, which at the same time make possible heating of the cooling element which is not in operation, by the heating element 10 and contained in the passage 9 and in the casing of the cooling element which is not in operation, in order to melt ice which may have formed on said cooling element.

Should for instance, as illustrated in the drawing, continuously supplied air first be cooled by the cooling element 3, the fan 5 causes air to be drawn through the inlet 11 and through the valve 13a opened by suction of the fan 15 into the casing 1 and then forces this air in the direction shown by the arrow A to the cooling element 3. After passing this cooling element, the cooled air is conveyed through the valve 16a opened by the pressure action of the fan 5 and through the outlet 12 to the point where the cooled air is to be used. Simultaneously the air contained in the passage 9 and in the casing 2 is caused to circulate through said casing in the direction of the arrow B, causing the valve

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14b to be opened and allowing the air to circulate through the passage 9 in the direction of the arrow C and back again to the valve 15b of casing 2, said valve 15b being opened by the air pressure. The circulating air, heated by means of the heating element 10 causes ice that may have formed on the cooling element 4 to melt.

During the described cycle the valves 13b, 14a, 15a and 16b are kept closed by means of the suction and pressure action respectively of the fans. 10

Should the air be cooled by means of the cooling element 3 and the cooling element 3 simultaneously be heated it is only necessary to reverse the direction of rotation of the fans 5 and 6.

The described and illustrated device may also be used for drying air. In this case the cooling elements 3, 4 are exchanged for drying elements, for instance, moisture absorbers consisting of silica gel at the same time as a certain quantity of the circulated air is continuously discharged, during the drying operation (for instance through the part of the passage located, between the valves 14a and 14b) and replaced by a corresponding quantity of dry air, introduced for instance through the part of the passage located between the valves 15a and 15b.

Having now particularly described the nature of my invention and the manner of its operation what I claim is:

1. An apparatus for the continuous drying of gas comprising two equal intermittently operating drying elements, a casing for each element, two reversible fans each co-operating with one of the drying elements, and two pairs of valve means operable by said fans, one pair of said valve means being mounted in front of and the other pair behind the two fans, as viewed in the direction in which the gas current to be treated flows into the apparatus, said valve means being adapted alternately to connect the two casings surrounding the elements with the gas current to be treated in such a way, that the gas which is to be dried is caused by the fan to flow through one of the valve means fitted in front of the two fans, through one of the casings and said fan, and through the corresponding drying element, and through one of the valve means fitted behind the two fans to the point where the dried gas, is to be used, while another gas, for instance air, which may be heated by means

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of an electric heating element common to both the drying elements, by means of the other fan is caused to flow in the opposite direction to the current of gas which is to be treated flows into the apparatus, said other gas flowing through the other casing, the other drying element and the other fan and through the other two valve means in order to dehydrate the last-mentioned drying element.

2. An apparatus as claimed in claim 1, characterised in that each valve device consists of at least two flap valves controlled by the suction or pressure action respectively of the fans.

3. An apparatus for the continuous treatment of a gaseous fluid comprising two equal intermittently operating dehumidifying elements, a casing for each element, two reversible fan means one disposed adjacent to each element and co-operating therewith so as to deliver a flow of fluid to be treated through the respective elements in opposite directions, a duct for the passage of fluid therethrough formed with an inlet and an outlet for the admission and discharge of the fluid to be treated, heating means in said passage duct, a pair of valve means disposed adjacent to one side of said casings, and a second pair of valve means disposed adjacent to the other side of said casings, each of said pairs of valve means including a pressure operated and a suction operated valve means, the said valve means connecting the casings with the passage duct so as to establish a flow path for fluid through one of the casings in one direction and a second flow path for fluid in opposite direction through the other casing and the heating means and vice versa in response to a reversal of the fan means.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
511,217	Schneider	Dec. 19, 1893
2,049,413	Cannon	Aug. 4, 1936
2,141,715	Hilger	Dec. 27, 1938
2,225,706	Montgomery	Dec. 24, 1940
2,496,143	Backström	Jan. 31, 1950