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DRYING PLANT FOR GAS
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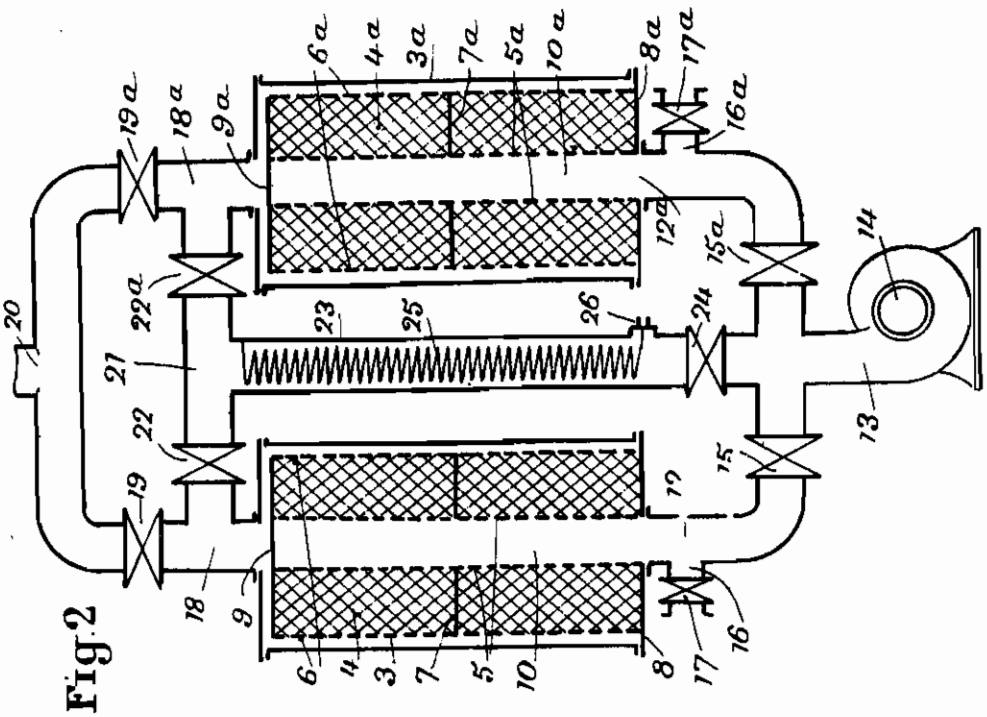

Fig. 2

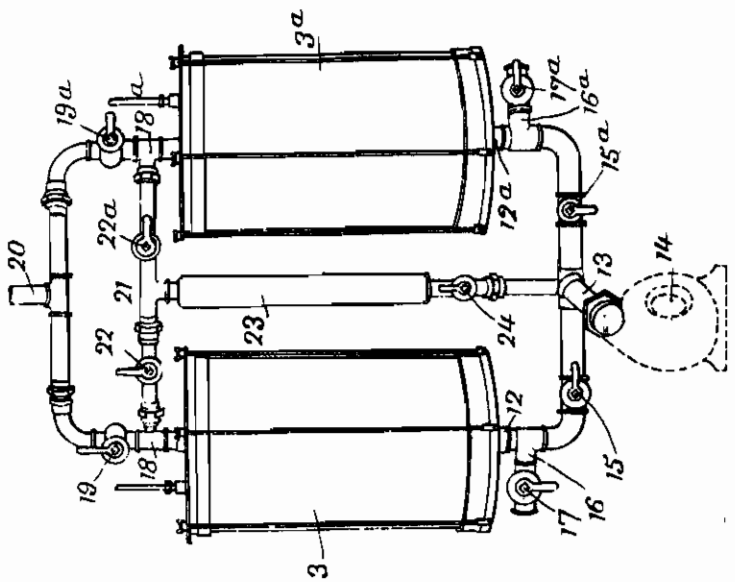

Fig. 1

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DRYING PLANT FOR GAS

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This invention relates to the drying of gaseous fluids such as any gas, or air for any purposes.

The devices for drying gaseous fluids by means of substances such as silica-gel, activated alumina, carbagel (dissimulated calcium carbide) etc., have to be arranged in such a manner as to allow the dehydrating substances to be regenerated when having been satiated with water without it being necessary to effect any dismounting of any part of the apparatus, in order as well to save time as to avoid any injury of the dehydrating substances.

The apparatus used in such a purpose are to be so provided as to allow the passage of cold gases containing vapours of water or of any liquid substance, which has to be absorbed by the dehydrating substances contained in the apparatus. After a total or partial satiating of said substances, same are submitted to a heating, generally speaking, obtained by causing said substances to be crossed by a current of hot air, and the absorbing substance is then ready for being anew utilized. Above operations are indefinitely resumed.

For some of the products so used, the temperature of regeneration is very high and may attain for instance 300° C., so that the alternances of heating and of cooling cause the apparatus which contains the dehydrating substances to be subjected to very important variations of temperature which result in an injure of the walls of the metal apparatus. Said metal walls moreover chemically act upon some of the dehydrating substances so that said apparatus receive a duration more or less reduced so that the drying operations of gases are very expensive, whilst in some instances the dried gases loose their purity.

The inventor noticed that the apparatus constructed of ceramic substances, and more particularly of asbest cement, are particularly resisting in the conditions of work which have just been described.

Moreover, the asbest cement allows the construction of any dimensions of apparatus measuring up to several meters in diameter or in height, the vessels perfectly resist to any chemical action and are not sensible to repeated effects of expansion and contraction caused by frequent changes of temperature, and the Inventor has recognized that they give any satisfaction for this especial application.

It is further noticed that the asbest cement is a very good heat insulating substance, which is a very important particular for the operation of regeneration.

The plant according to this invention thus comprises, in combination with a tank or vessel of any convenient dimensions made of a ceramic substance, and more particularly of asbest cement, and containing a convenient dehydrating substance, a piping device which allows the circulation, through the absorbing substance contained in the apparatus, of either a fluid to be dried or in an inverted direction, of a gas such as for instance air brought to a convenient temperature for the regeneration of the dehydrating substances, with a view to allow said regeneration to be obtained without any handling of said substances, and without the apparatus being anyhow injured by the treatment.

In the accompanying drawings which show as an example of an embodiment of the plant according to this invention a constructional form of a plant for drying air:

Fig. 1 is a perspective view of the drying plant allowing a continuous drying of air to be obtained.

Fig. 2 is a diagrammatical axial cross section of said plant.

As shown in the drawings, and more particularly in Fig. 1, the device comprises any number of drying elements eomprising each a drying vessel such as 1, 2. Each of said elements is constituted by a tower 3, or 3*a* (Fig. 2) of asbest cement, containing an absorbing substance diagrammatically shown in 4, 4*a* (in Fig. 2). Said substance 4, 4*a* is contained in an annular recipient having vertical circular foraminated walls 5, 6, said recipients which are piled up in the tower 3, being separated by full horizontal wall, such as 7, whilst the lower one directly rests upon the body 8 of the tower 3. The row of such annular recipients is closed at the upper end by a cover 9. This arrangement thus provides inside every tower 3, or 3*a* a central canal 10 or 10*a*, obturated at its upper end by the cover 9, or 9*a*, and an annular canal 11, or 11*a* located round said annular recipient and limited by the circular wall of tower 3 or 3*a*.

The canal 10 or 10*a* is connected at its lower end with a pipe 12 or 12*a* connected with the delivery side 13 of a centrifugal pump 14 which is actuated by any convenient motor not shown in the drawing. Valves 15 and 15*a* are located in said pipes 12 or 12*a* allowing the canals 10 or 10*a* to be put into communication with said pump 14.

Fixtures 16, 16*a*, respectively with valves 17, 17*a* are provided on pipes 12, 12*a*, thus allowing

said pipes to be put in communication with the open air.

The towers 3, 3a are in communication with their upper ends with pipes 18, 18a which communicate through valves 19, 19a, with a common delivery pipe 20.

The pipes 18, 18a are connected with each other by a transversal canal 21 provided with valves 22, 22a said canal being in communication with a vertical chamber 23, the lower end of which is in communication through a valve 24 with the delivery side of the centrifugal pump 14. A heating electric resistance 25 is located inside said chamber 23 and may be connected by means of the commutator 26 with any supply of electric current not shown in the drawing.

The operation is as follows:

For obtaining dry air the tower 3, for instance, is brought in communication through its valve 15 with the delivery side 13 of centrifugal pump 14. Valves 15a, 17 and 24, are closed. At the upper end of the device, valves 22, 22a, 19a, are closed, valve 19 being open.

The air forced by the pump 14 enters canal 10 and passes through the perforated wall 5 for circulating inside the absorbing substance 4 contained in the piled up recipients. Such air is thus dried and is collected in the annular canal 11 and is forced into the delivery pipe 20.

Once the dehydrating substance 4 contained in the tower 3 having been satiated, the valves 15a and 19a are opened, in order to allow the air to pass through the tower 3a for being dried, valves 15, 17a and 19, being closed, valves 24, 22, and 17, being opened. The dry air is thus delivered through pipe 20 by tower 3a, whilst the air forced by the pump 14 is in part derived by valve 24 into chamber 23. Said air is heated in the contact of the heating electric resistance 25, and passes through valve 22 into tower 3 and passes through the satiated substance 4 thus regenerating same before collecting into canal 10 and being sent into the open air through fixture 16 and valve 17. It is to be noticed that the regenerating air passes through the substance 4 in a direction opposed to the normal direction of the gas or fluid to be dried.

Once the substance 4 contained in the tower 3 conveniently regenerated, the substance 4a contained in the tower 3a, having, during this time, been satiated, the currents of air are inverted in said towers 3 and 3a by conveniently manoeuvring the several valves, thus allowing the air to be dried by circulating into tower 3, whilst the dehydrating substance contained in the tower 3a is regenerated by the circulation of hot air.

It is of course possible to use any desired number of towers such as 3 and 3a with one and the same delivery pump, such as the centrifugal pump 14, the electric resistance such as 25 having any desired shape and arrangement.

It is obvious also that the heating of regenerating air could be effected by means of any source of heat.

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