M. P. P. GLOESS.

DRYING PLANT.

APPLICATION FILED SEPT. 26, 1918.

1,322,428.

Patented Nov. 18, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

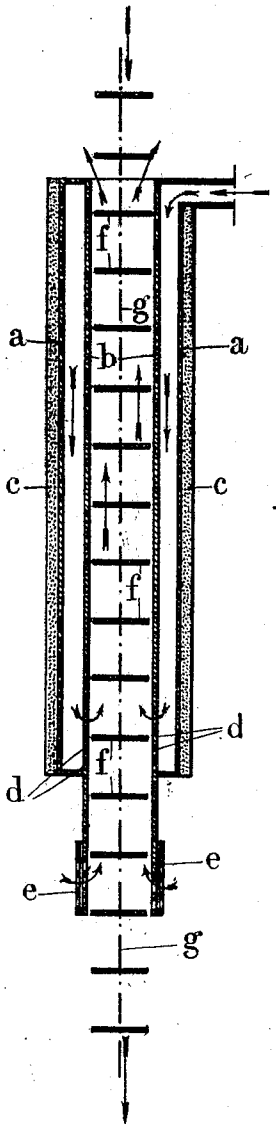


Fig. 2.

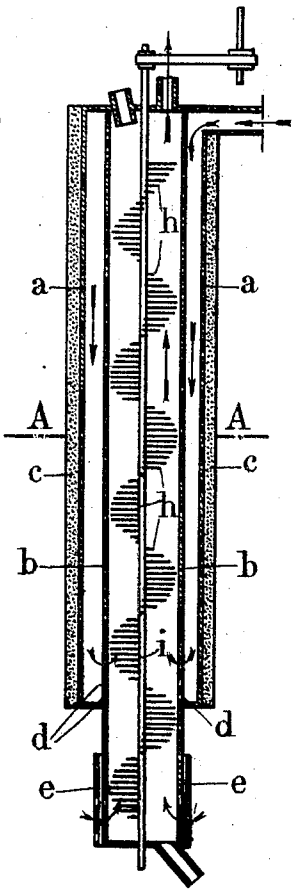
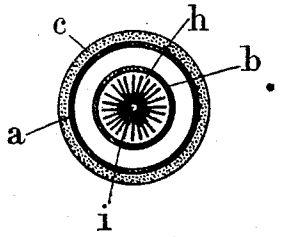


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 1a.

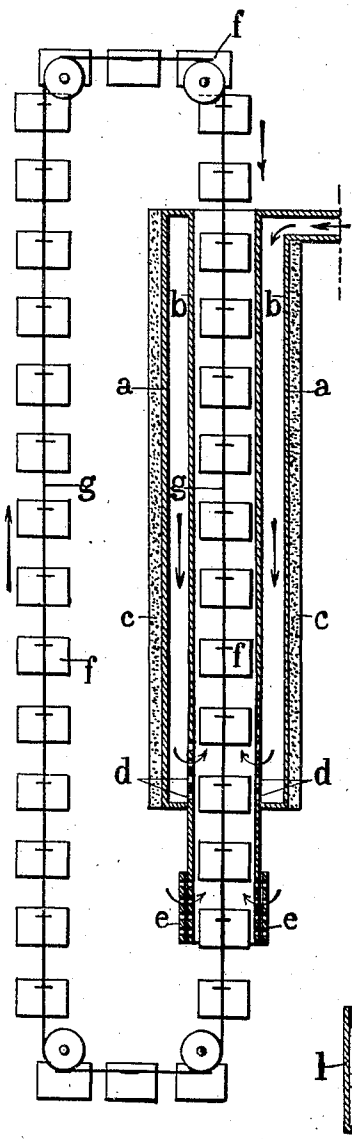


Fig. 4.

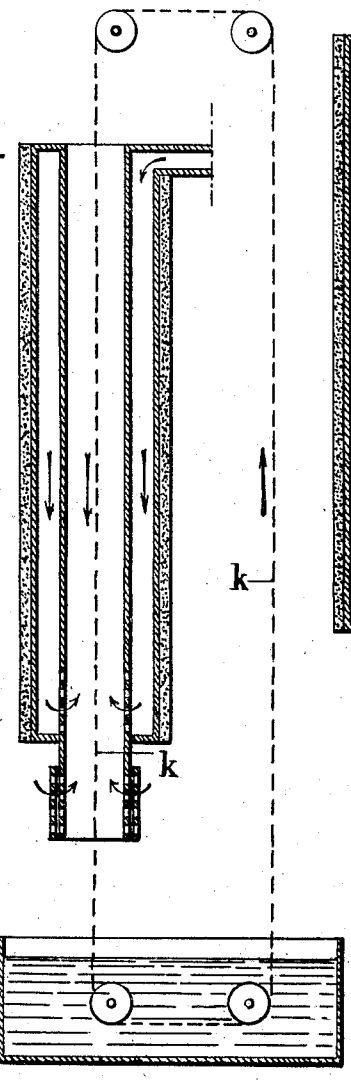


Fig. 5.

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MARIE PIERRE PAUL GLOESS, OF ST.-MANDÉ, FRANCE.

DRYING PLANT.

1,322,428. Specification of Letters Patent. Patented Nov. 18, 1919.

Application filed September 26, 1918. Serial No. 255,879.

To all whom it may concern:

Be it known that I, MARIE PIERRE PAUL GLOESS, of 5 Rue Renault, St.-Mandé, France, chemist, have invented Improvements in Drying Plants, of which the following is a full, clear, and exact description.

In the greater part of the known drying art, no account is taken of the difference of density of the air charged with water vapor and of dry air. In these driers, the moist air collecting at the upper part of the apparatus and the dry air remaining on the contrary at the lower part, notwithstanding the fans employed which only imperfectly fulfil their purpose, it results that the material to be dried traverses alternately zones of dry air and moist air. Under these conditions the complete drying of the material can only be obtained after a very long time.

It should further be remarked that this unscientific method of drying requires a considerably greater consumption of heat than would be called for in a perfect system of drying.

This invention has for its object to provide an improved vertical drier which permits a scientific and systematic drying of the materials to be treated.

This improved drier is characterized essentially by the method of circulation of the air or of the hot gases employed to remove the moisture from the materials to be dried.

This drier comprises for this purpose two coaxial conduits preferably cylindrical and communicating with each other at their lower parts. In one of these conduits there circulates from above downward the material to be dried, and in the other conduit there circulates from above downward the hot air before its entrance into the first conduit, this hot air then traveling from below upward in this latter conduit *i. e.* in the opposite direction to that in which the material moves.

By this arrangement of the apparatus and by this method of circulation of the air and of the hot gases, the following results are obtained.

1. The hot gases arriving at the upper part of the apparatus transmit heat through the thin wall of the interior conduit to the material to be dried. From this fact, these gases cool and, becoming heavier, descend and pass into the conduit containing the material to be dried.

2. The hot gases in coming into contact with this material become charged with water vapor and from this fact become lighter; they then ascend in the conduit. The hot gases can be mixed as desired with cold air in order to be brought to the temperature necessary for the drying of the material.

3. By reason of this exterial descending circulation of the hotter gases and the internal ascending circulation of the gases of a lower temperature, not only is the condensation of the vapors prevented but the evacuation of the vapors is insured and accelerated, since the vapor formed in its ascending current meets a wall the temperature of which is higher and higher toward the upper part.

4. By reason of this circulation the most moist material is in indirect contact with the hottest gases, and this material dries systematically, the driest material coming into direct contact with the driest gases.

5. Finally this scientific circulation of the gases and of the vapors renders useless the application of fans, and avoids injurious eddies of gas and vapors by a systematic and economical method of drying.

The accompanying drawing shows by way of example several methods of constructing my improved drier.

Figure 1 shows in vertical section a drier arranged according to the invention and in which the central conduit serves for the circulation of the material to be dried.

Fig. 1ª is a view showing more clearly the arrangement of the endless chain to which the material transporting baskets are fixed.

Fig. 2 shows a modification of this type of drier.

Fig. 3 is a horizontal section on the line A—A of Fig. 2.

Fig. 4 shows transporting means by endless band.

Fig. 5 shows the arrangement of a condenser by which gases leaving the apparatus can be condensed.

As shown in Fig. 1 of the drawing, my improved drier comprises two coaxial conduits *a* and *b*, which are preferably cylindrical. The external conduit *a* is covered with an insulating material *c* for preventing loss of heat. This conduit *a* is shorter than the internal conduit *b* and is closed at its lower part. The hot gases circulate in the annular

space included between the walls of the conduits *a* and *b* and they pass into the conduit *b* through suitable apertures *d* formed in the latter. This conduit *b*, formed of thin sheet metal *e. g.* sheet iron, is open at both ends and comprises at its lower part a perforated sleeve *e* that permits the admission of cold air to be regulated.

The material to be dried is transported from above downward in the internal conduit *b* by the aid of baskets or buckets *f* formed of sheet metal or other suitable material, fixed on an endless chain *g* as shown more clearly in Fig. 1[a].

The operation of the drier thus arranged has been indicated above.

The material to be dried can be transported in the central conduit from above downward by its own weight. At the same time, as this material would fall too rapidly by this method and would not have time to dry, its movement may be retarded by baffles *h* fixed horizontally on a central shaft *i* turning at a relatively high speed. These baffles are preferably arranged helically on the central shaft, as shown in Figs. 2 and 3, so as to retard still more the fall of the materials to be dried.

In all cases the vapors issuing from the apparatus can be condensed by an air- or water-condenser *j* (Fig. 5) or by any other suitable apparatus.

In the case where the material to be dried is liquid or semi-liquid, it will be transported by an endless band *k* Fig. 4 of metal or other suitable material which, before its entrance into the drier, is covered, coated or impregnated with the material to be dried contained in box 1 and from which the dried material is detached as it passes out of the drier.

The above arrangements are only given by way of example. The forms, dimensions and detail arrangements can be varied according to the particular cases without departing from the nature of the invention.

Claims:

1. A vertical drier comprising two vertical co-axial conduits, one serving exclusively for the circulation of hot gases, the other simultaneously for the circulation of the material to be dried and for the hot gases, and means for establishing a circulation of said gases, first from above downward to the exterior of the conduit of the material to be dried in the same direction as the latter in order that they thus effect by radiation through the walls of the conduit an indirect heating of the contents of the conduit of the material to be dried, further to cause them to penetrate and circulate in said conduit from below upward in an inverse sense of the material to be dried in order to thus produce a methodical drying of the material to be dried.

2. A vertical drier comprising two vertical co-axial conduits, one serving for the circulation of hot gases, the other for the circulation of the material to be dried, a tubulure placed at the upper end of the exterior conduit to bring the hot gases into said conduit, a casing made of insulating material surrounding the latter in order to prevent the loss of heat, the center conduit provided with openings at the lower part thereof for allowing the hot gases circulating from above downward in the outer conduit to enter into the center conduit, and means for transporting the material to be dried and for the admission of cold air in the said center conduit.

3. A vertical drier comprising two vertical cylindrical and co-axial conduits serving one for the circulation of the hot gases, the other for the circulation of the material to be dried; a tubulure arranged at the upper part of the outer conduit for leading the hot gases into the said conduit, a casing made of insulating material surrounding the latter, the center conduit provided with openings at the lower part thereof for allowing the hot gases to enter the latter, a perforated sleeve surrounding the base of the central conduit, said base being provided with perforations for allowing the admission of the cold air into the apparatus and the regulation of this air, an endless arrangement circulating in the apparatus, and transporting the material to be dried.

4. A vertical drier comprising two vertical co-axial conduits, one serving for the circulation of the hot gases, the other for the circulation of the material to be dried; a tubular member arranged at the upper part of the outer conduit for leading the hot gases into the said conduit, a casing of insulating material surrounding the latter, the central conduit provided with openings at the lower part thereof for allowing the hot gases to enter the latter, a perforated sleeve surrounding the base of the central conduit, said base being provided with perforations for allowing the admission of cold air into the apparatus and the regulation of this air, and baskets fixed on an endless chain circulating in the apparatus for transporting the material to be dried.

The foregoing specification of my improvements in drying plant, signed by me this fourth day of September, 1918.

MARIE PIERRE PAUL GLOESS.

Witnesses:

JOHN F. SIMONS,
FRANÇOIS WEBER.