Nov. 22, 1927. 1,649,839

H. A. MARSTON

ROTARY DRYING APPARATUS

Filed July 22, 1927

Fig. 1.

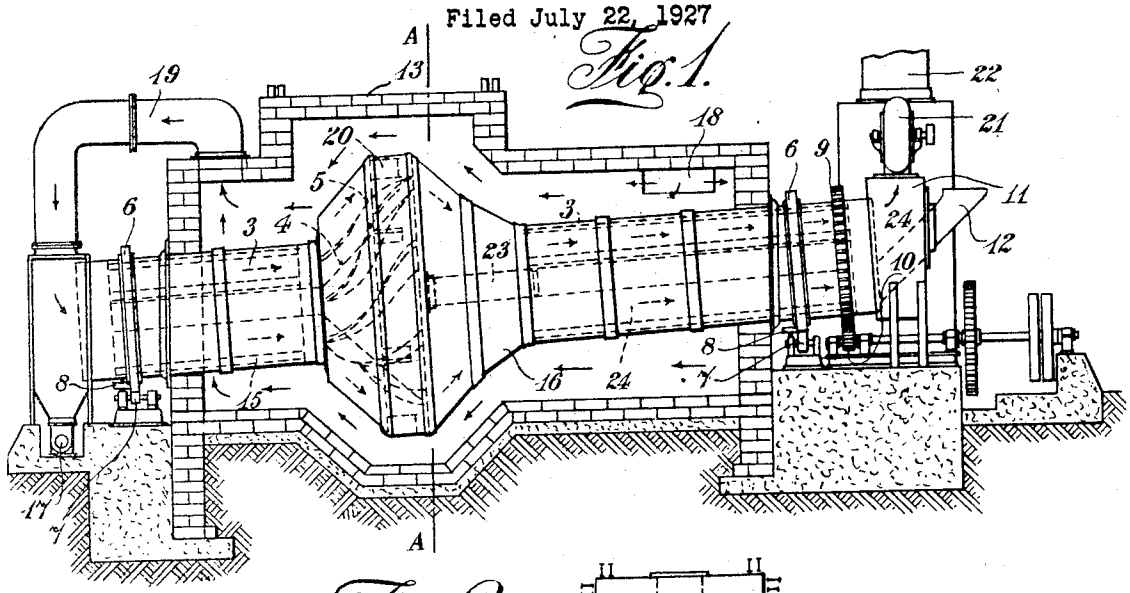


Fig. 2.

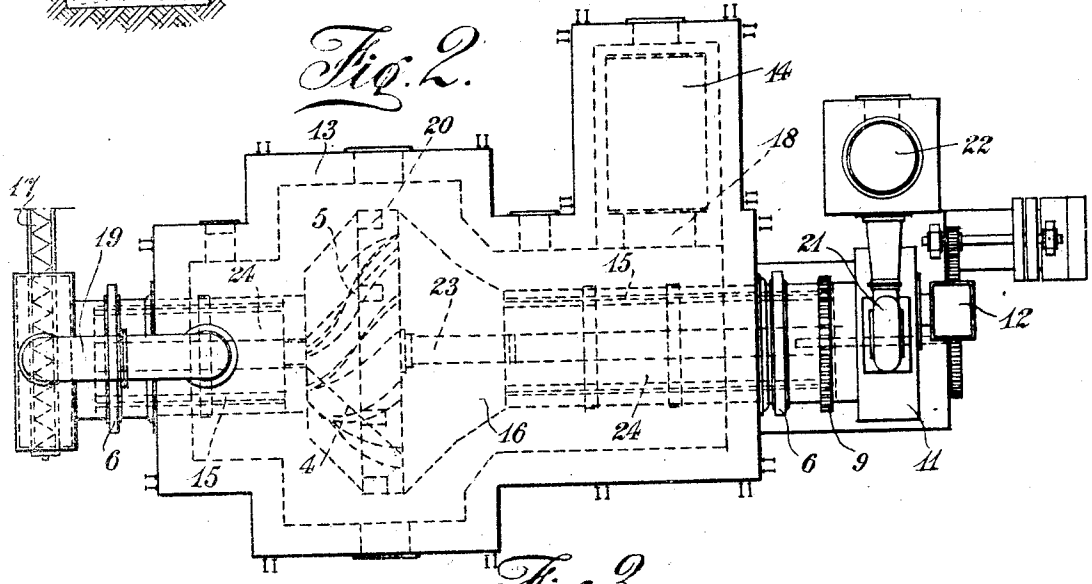
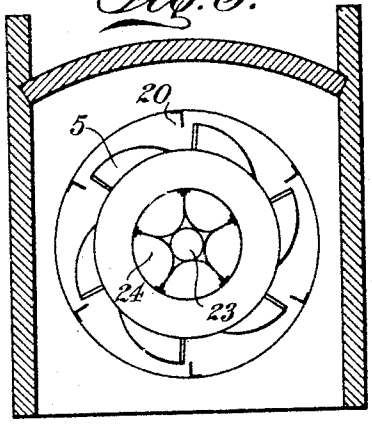


Fig. 3.



Inventor-
H. A. Marston
By
A774

Patented Nov. 22, 1927. 1,649,839

UNITED STATES PATENT OFFICE.

HORACE ARTHUR MARSTON, OF SUTTON, ENGLAND.

ROTARY DRYING APPARATUS.

Application filed July 22, 1927, Serial No. 207,823, and in Great Britain June 3, 1926.

Drying apparatus of the rotary drum type is already known in which the drum is divided into internal cells, but in such apparatus no means is provided whereby an intermediate mixing chamber intimately mixes and disintegrates the partially dried material by causing same to pass through the drier at a non-uniform rate.

The present invention remedies the above-mentioned defect. The invention has for its object to provide an apparatus of the rotary drum type and supported by rollers at both ends, the driving means being provided by an external toothed crown meshing with a driving gear wheel. The rotary drum is divided into cells by longitudinal partitions and is provided with one or more intermediate enlarged mixing and disintegrating chambers or portions, in which chamber or chambers an intimate mixing takes place between the hot gases and the material passing through the dryer.

In the accompanying drawing, which shows, by way of example, a form of construction of the invention,

Figure 1 illustrates a sectional elevation of the apparatus,

Figure 2 is a corresponding plan view, and

Figure 3 is an enlarged vertical cross-section on line A—A of Figure 1.

The apparatus comprises a drum or cylinder 3 having an enlarged section or sections formed with a central baffle 4 of frusto-conical or other suitable form having, if desired, spiral vanes or guides 5, the drum or cylinder being supported at both ends by rolling crowns 6 turning on rollers 7. A thrust roller 8 at either end, engages with the side flange of the rolling crown 6 and prevents any longitudinal movement of the drum, and an external toothed crown 9, driven by a pinion 10, provides for the rotation of the drum. The end of the drum or cylinder adjacent to the above rotating device 9, 10, is engaged in a hood 11 which supports the feed chute 12. The drum or cylinder 3 is enclosed in a masonry envelope 13. A furnace 14, which may operate with pulverized coal, heavy oil or gas, is provided at the side. The drum 3 is provided with dividing partitions 15 forming internal cells 24, and also one or more intermediate enlarged mixing chambers 16, and said drum is inclined from the horizontal to permit the forward flow of the material. The material, when discharged from the drum, is carried away by a screw conveyor or a chute 17.

The operation of the apparatus is as follows:—

The hot gases produced by the furnace 14 pass through an opening 18, then circulate, first all round the outside of the drum or cylinder 3 and between the latter and the masonry envelope 13 and then enter the inside of the drum by means of the flue 19 where they impinge on the material to be dried and drive off the moisture therefrom. The hot gases, after passing through the discharge end of the drier, are retarded and in part diverted to the interior surfaces of the enlarged sections by the baffle 4 and by the vanes 5, the retardation increasing the heat transfer between the gases and the material. The hot gases are also subjected to a rotary action by the rotation of the buckets or scoops 20. The form of the baffle 4 and the fanlike action of the buckets or scoops 20, will create eddies that will still further retard the flow of the hot gases through the drier and cause a still further reduction in the temperature of the hot gases. The deflected hot gases, after passing over the baffle 4, will expand in the enlarged portion of the intimate mixing chamber 16 and again give up further heat before passing through the feed end of the drier by way of the flue or fan 21 to the chimney 22, a portion of the hot gases also passing through the baffle 4, and the tube 23 to the fan 21. The material to be treated is fed in the undivided portion or hood 11 of the drum by the chute 12 and is divided in the internal cells 24 and travels forward, by reason of the inclination of the drum until it reaches the intermediate mixing chamber 16. The said chamber subjects the partially dried material to varying frictional forces due to its varying sectional area, such varying frictional forces tending to disintegrate any material which may have caked or become conglomerated. The forward flow of the material is interrupted in the intermediate mixing chamber or chambers 16 and the partially dried material is more intimately mixed. The said mixing chamber or chambers is fitted with a series of buckets or scoops 20, as hereinbefore stated, which carry the partially dried material round and discharge the same by cascading it on to the baffle 4, breaking up any material which may have caked or become congealed. The said baffle may, as before stated, consist

of a truncated cone and may have vanes 5 attached thereto, which vanes would assist in the disintegration of any caked material and also guide the flow of said material along the baffle 4. These vanes 5 may be so formed and arranged that the partially dried material is caused to follow a track, other than one parallel to the baffle, and be thus subjected to a longer period of heat impingement by the hot gases before discharge therefrom. The material direction by the baffle 4, passes into the next undivided portion of the drum 3 and is again divided in the internal cells 24 and carried forward, by reason of inclination of same, to the discharge end of the drier, being removed therefrom by means of a chute or convevor 17.

If more than one intermediate chamber 16 is used the operations above described may be repeated until the material reaches the discharge end of the drum or cylinder.

The discharge end of the drum or cylinder may be provided with an opening communicating with the air, so that fresh atmospheric air can be drawn through the discharge end of the drier, the baffle and the tube 23 and be delivered to the furnace grate in a preheated condition.

What I claim is:—

1. A rotary drying apparatus comprising a rotary drum having end portions of substantially uniform diameter and an intermediate portion forming an enlarged chamber, the end portions providing a central tubular formation, and radiating partitions to provide material conduits, the tube-like formation of one end portion terminating within the enlarged chamber in a conical baffle, the large end of which surrounds the central tube of the other end portion, the conical baffle being exteriorly provided with spiral blades.

2. A rotary drying apparatus comprising a rotary drum having end portions of uniform diameter and an intermediate portion providing an enlarged chamber, each of the end portions being formed to provide an approximately central tube, and partitions radiating therefrom to form material conduits, the central tube at the material discharge end of the drum being enlarged within the central chamber in the form of a conical baffle having an axial length less than the similar length of the chamber, the central tube at the material inlet portion of the drum extending to the enlarged end of the conical baffle, the material conduit extending from the inlet end of the drum delivering the material into the enlarged chamber in advance of the conical baffle.

In testimony whereof I have hereunto signed my name.

HORACE ARTHUR MARSTON.