Nov. 20, 1923. 1,474,940

P. R. PERKINS

DRIER

Filed June 24, 1921

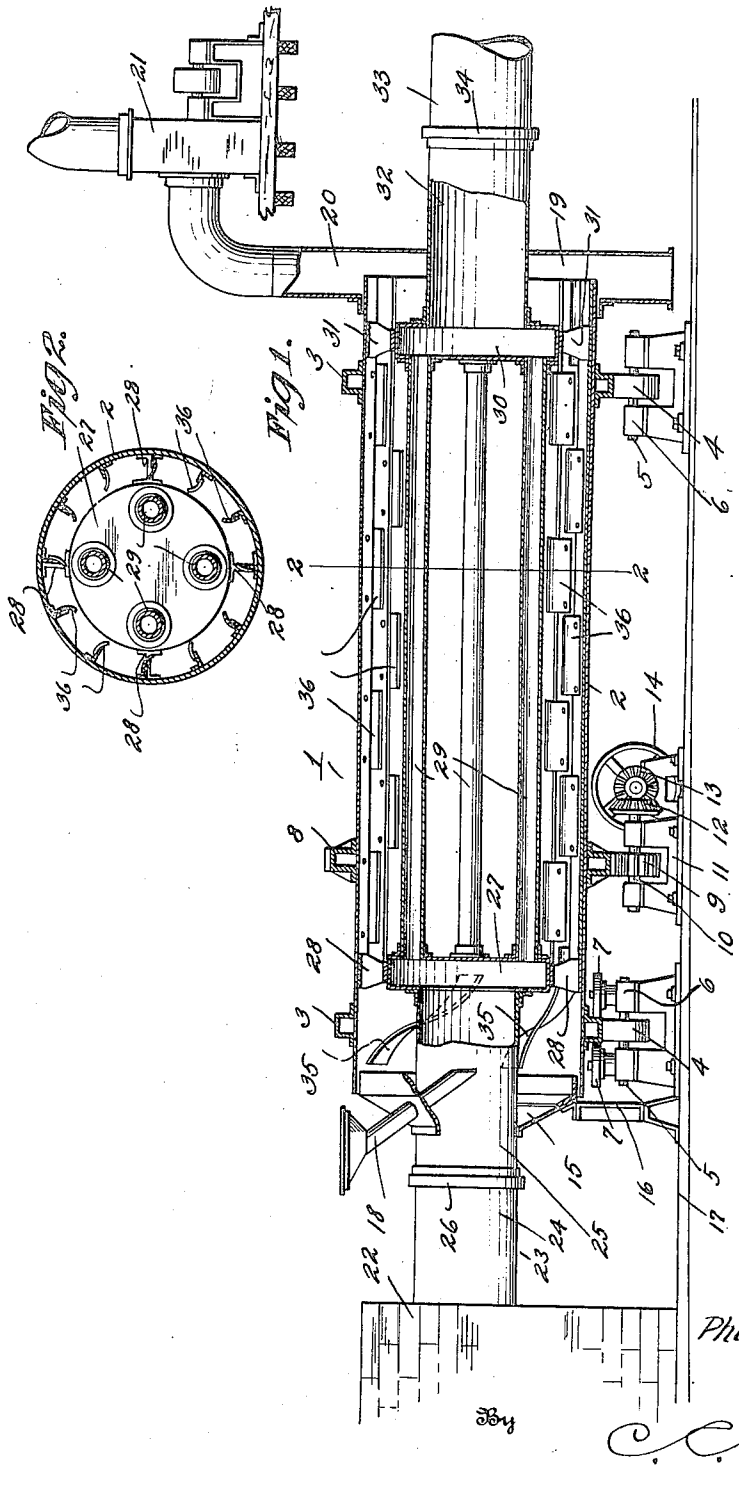


Fig. 2.

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DRIER.

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To all whom it may concern:

Be it known that PHILIP R. PERKINS, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, has invented certain new and useful Improvements in Driers, of which the following is a specification.

This invention relates to improvements in mechanical drying apparatus, and has for its object to provide a drier in which mechanism is provided for producing an improved path of heat circulation through the interior of the drier shell, in order that the heat passing through the drier will come into indirect contact only with the material to be dried, and to thereby prevent burning or scorching of the material.

In carrying out the invention, use is made of a mechanical drier which includes the usual rotatably mounted shell, having means provided at opposite ends thereof for introducing material to be dried therein and to effect the discharge of the material after the latter has been dried, one end of the shell being in communication with a source of heat which includes a longitudinally extending delivery tube and an aligned exhaust tube, the shell ends of said tubes being connected with headers or enlarged castings supported within the shell, and in the provision of a plurality of longitudinally extending heat flues situated to extend longitudinally of the shell and having the opposite ends thereof disposed to enter the headers, the arrangement of parts being such that heat will enter the shell by way of the delivery tube, will be circulated through one of the headers and then passed longitudinally substantially throughout the length of the shell and discharged into the second header, and thence out of the drier by way of the exhaust tube, this method of heat circulation, therefore, enables the products passing through the shell of the apparatus to be subjected to the heat of the gases passing through the flues and headers and yet prevented from coming into direct contact with such heated gases.

For a further understanding of the invention, reference is to be had to the following description and to the accompanying drawing, in which similar characters of reference denote like and corresponding parts throughout the several views thereof.

In said drawing:

Figure 1 is a vertical longitudinal sectional view taken through the improved drying apparatus comprising the present invention, and,

Figure 2 is a vertical transverse sectional view taken along the line 2—2 of Figure 1.

Referring more particularly to the details of the invention, the numeral 1 designates the improved drying apparatus in its entirety. In its preferred form, this apparatus includes the usual rotatably mounted, longitudinally extending and slightly inclined shell 2, which is preferably of metallic construction and is supported for rotation by having the opposite ends thereof provided with annular tires 3, which are adapted to engage with spaced sets of rollers 4, provided upon horizontal shafts 5, which are supported for rotation within bearings provided in roller beds 6, the latter being provided with spaced thrust rollers 7, which are situated to engage the sides of the tires 3 and to prevent undue longitudinal movement on the part of the shell. The rollers 4 and 7 thereby serve to support the shell 2 for rotation in a manner customary to machines of this nature. The rotation of the shell 2 is also positively effected in the usual manner. Thus, an annular gear ring 8 is secured to the outer portion of the shell 2 and is disposed to mesh with a spur gear 9 provided upon an axle 10, which is mounted in suitable bearings provided in a bed 11. One end of the axle 10 is equipped with a beveled gear 12, which is adapted to mesh with a beveled pinion 13, the shaft of the latter being equipped with a pulley or the like 14, whereby motion may be imparted to the gearing to positively rotate the drying shell.

Ordinarily, the receiving end of the shell 2 is provided with a stationary vapor bonnet 15, which is suitably supported in a stationary manner at one end of the shell by means of a frame 16 carried by the base 17 upon which the apparatus 1 is carried. In this instance the vapor bonnet is equipped with the usual feed spout 18 by means of which material to be dried is fed into the in-

terior of the shell. By the location of the spout 18, it will be apparent that the vapor bonnet should be stationarily supported. The opposite end of the shell is in open communication with a stationarily mounted discharge hood 19, into which the material discharged from the shell 2 may drop for purposes of collection and handling, the said hood being also in communication with a conduit 20 which leads to a mechanically driven fan 21, the said fan serving in the usual manner to carry off the vapors, which result from the drying of materials within the shell and to thereby enable the relative humidity within the shell to be controlled in such manner as to facilitate drying operations.

In order to provide an improved circulation of heat through the apparatus, the latter is adapted to be used in conjunction with a suitable source of heat 22, such as a furnace or other equivalent apparatus. In the present instance, a furnace has been shown from which a delivery tube 23 extends, the said tube including a stationary section 24 and a rotatable section 25, the said sections being united by means of a rotatable joint construction 26. The rotatable section 25 of the delivery tube extends longitudinally and axially through the vapor bonnet 15 and into one end of the shell 2, said section terminating in a header 27, which is mounted within the shell and is suitably connected with the latter for rotation, and in spaced relation from the inner walls thereof, by means of brackets 28. It will be seen that by the brackets 28, the header 27 and the rotatable section 25 of the delivery tube will be caused to rotate in unison with the movement of the shell. Connected with the header 27 are the ends of a plurality of longitudinally extending tubes or heat flues 29, which are disposed substantially throughout the length of the shell and are situated concentrically of the axis thereof, the said flues being disposed in relatively spaced relationship, and it will be seen that by reason of their connection with the header 27, heated gases will flow from the source of heat 22, through the delivery tube and thence through the heat flues. The other ends of the flues 29 are connected with a second header 30, which is also mounted within the shell 2 and is supported by brackets 31 corresponding to the brackets 28. This header is in communication with an exhaust tube which includes a rotatable section 32 and a relatively stationary section 33, a joint connection 34 being provided between the sections of the exhaust tube. Since the rotatable section 32 is directly connected with the header 30, it follows that by the rotation of the shell 2, motion will be imparted to the section 32.

In operation, the material to be dried is fed into the apparatus by way of the feed spout 18 or an equivalent apparatus. This wet or moist material then drops into the interior of the shell and is caught by spiral blades 35 provided upon the interior walls of the shell, in order that the material will be conveyed rearwardly and at the same time lifted and agitated so as to be thrown around the heated section 25 of the delivery tube and also about the walls of the header 27. After leaving the blades 35, the material is engaged by means of a plurality of lifting blades 36, which are disposed in staggered relationship upon the interior walls of the shell, and operate to churn and lift the material when the shell is being rotated. By lifting the material, the latter is caused to be dropped upon the surfaces of the relatively spaced flues 29 so as to percolate between the interstices existing between said flues, the rotation of the shell and the flues enabling the material to be thoroughly mixed or cascaded and subjected to the radiant heat emitted from the surfaces of the flues. By this construction, it will be seen that the material will be thoroughly agitated and completely exposed in a uniform and practical manner to the heated surfaces provided within the apparatus, in order that the moisture contained within the materials may be evaporated and withdrawn from the materials and the shell 2 by the action of the fan 21. This fan serves to quickly and efficiently remove moisture from the interior of the shell and thus serves to lower the humidity within the latter and to thereby increase the effectiveness of the machine in quickly and uniformly drying materials passing therethrough.

What is claimed is:

1. In a drier, a rotatably mounted shell, a source of heat supply, a delivery tube extending from said source of heat supply and situated to enter one end of said shell in a longitudinal direction, an exhaust tube leading out of the other end of said shell, said tubes including stationary sections situated exteriorly of said shell and rotatable sections situated to enter said shell, relatively spaced longitudinally extending heat flues mounted to rotate in unison with said shell and having the opposite ends thereof connected with the inner ends of the rotatable sections of said tubes, a plurality of lifting blades fixed in staggered relation upon the interior wall of the shell and directed to and spaced from the flues, and means for exhausting vapors from said shell.

2. In a drier, a rotatably mounted shell, a source of heat supply including a delivery tube, an exhaust tube, said tubes including stationary sections disposed exteriorly of said shell and rotatable sections disposed to enter said shell, spaced headers rotatably mounted in conjunction with said shell and

in open communication with the inner ends of the rotatable sections of said tubes, said headers being fixed to said tube sections, relatively spaced longitudinally extending flues having the opposite ends thereof connected with said headers, whereby upon the rotation of said shell, said flues, headers and the rotatable sections of said tubes will rotate unitarily and means for introducing material into and discharging the same from said shell.

In testimony whereof I affix my signature.

PHILIP R. PERKINS.