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J. B. VERNAY

DRYING DRUM

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Fig. 1

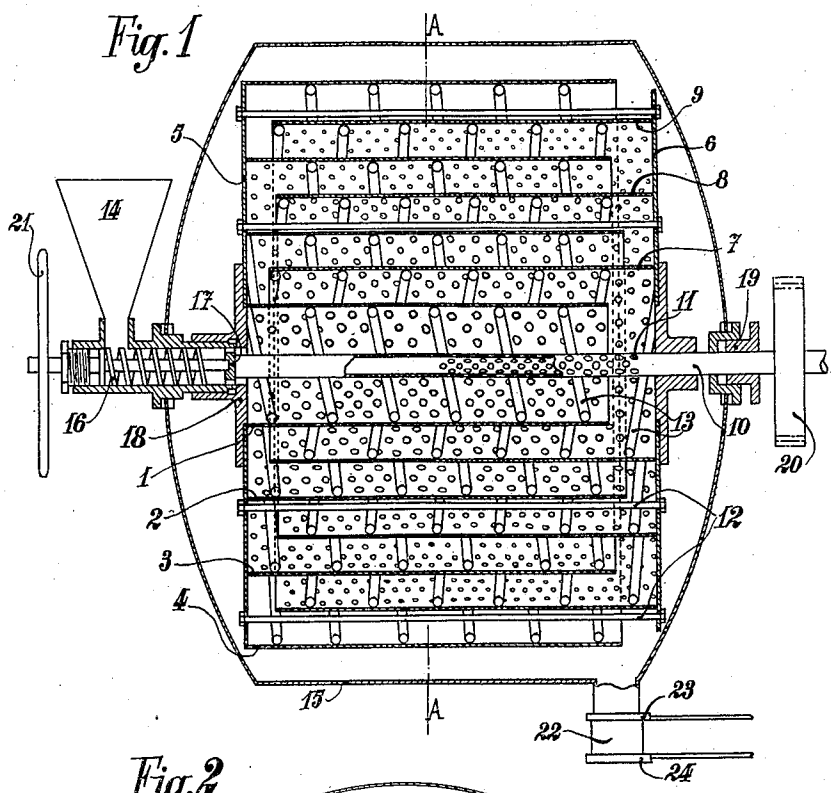
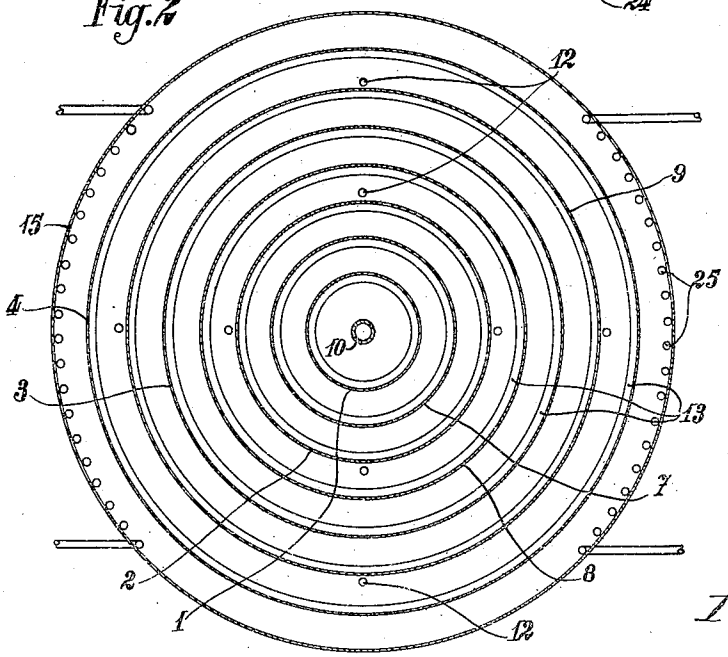


Fig. 2



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DRYING DRUM.

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This invention relates to drying drums for continuous operation. These machines have hitherto comprised an inclined rotating cylinder, the paste to be dried being introduced at the upper end of this cylinder and the dried powder being taken off at the lower one. Vacuum is generally used together with heat for effecting the drying. The length of such a machine must be great enough for insuring a complete drying and a suitably large output. This leads to cumbersome and costly installations. A powerful motor is used for rotating the cylinder and associated parts and a considerable amount of heat is lost by radiation.

According to the present invention the drying apparatus is formed by several hollow rotating cylinders, substantially co-axial with each other. The paste to be dried is introduced at one end of the cylinder having the smallest diameter and is discharged at the other end of this cylinder where it falls on the inner surface of the second cylinder and so on, down to the inner surface of the last cylinder from which it falls into a stationary device used for the outlet of the dried powder. The apparatus is reduced in length and the losses by radiation are very small.

In the annexed drawing:

Fig. 1 is an axial vertical section.

Fig. 2 is a cross-section on line A—A, Fig. 1.

The apparatus as shown comprises seven rotating co-axial cylinders. Cylinders 1, 2, 3 and 4 are fixed at one end to a circular plate 5 and annular spaces are left between their other ends and a second circular plate 6, to which cylinders 7, 8 and 9 are fixed. Annular spaces are also left between the free ends of cylinders 7, 8 and 9 and plate 5. Plates 5 and 6 are keyed on a hollow shaft 10 provided with radial holes 11. The bore of shaft 10 is connected to the vacuum pump (not shown) through a packing-gland or the like. For insuring a sufficient rigidity, stay-bolts 12 are used for connecting plates 5 and 6 together.

A tube or bar 13 is wound on the inner surface of each cylinder, thus forming a helical guide which is intended for feeding the paste towards the annular space at the outer end of the cylinder when the apparatus is rotated. Hence it follows that two successive cylinders have their feed windings or screws inverted.

Radial holes are provided in the walls of the cylinders 1, 2, 3, 7, 8 and 9. The diameter of these holes varies according to the diameter of the cylinder, the smallest cylinder 1 having the holes of greatest diameter. Cylinder 4 is imperforated.

The paste to be dried is introduced into a funnel 14 which is supported by the stationary casing 15 of the apparatus. A rotating screw 16 feeds this paste towards a perforated wall 17 on the opposite face of which rotates another perforated wall 18 which is integral with circular plate 5. This device is similar to a meat-chopping machine.

A packing gland 19 is provided around shaft 10 which is driven by a pulley 20. Feeding-screw 16 is driven by a pulley 21 and the paste insures by itself a tight closing of the apparatus.

A funnel 22 is placed under the last annular space, between plate 6 and cylinder 4. The outlet comprises two sliding valves 23 and 24 which permit the extraction of the dried matter without breaking the vacuum. Heating is provided by steam pipes 25.

The apparatus works as follows:

The paste or other material to be dried is introduced into funnel 14 whence it is fed to the chopping device 17—18 and then falls into the first cylinder 1. It travels on the inner surface of this cylinder under the action of the helical feeder 13 and falls on the inner surface of the second cylinder 7, etc. The dried material finally falls into funnel 22. The smaller pieces of material fall directly through the holes of the cylinders together with the already dried particles and their travel is shortened.

The apparatus may work with hot air by providing holes for the inlet and the outlet of the air.

What I claim is:

1. A drying apparatus comprising in combination a hollow rotating shaft provided with perforations; two circular plates on said shaft; co-axial cylinders fixed to the inner surface of said plates; and a tight casing for permitting drying to take place under vacuum, said shaft adapted to be connected with a vacuum pump.

2. A drying apparatus comprising a rotary set of nested, coaxial cylinders, a chopping device at the inlet end of the innermost cylinder in position for the chopped material to fall therefrom into that cylin-

der, and means for feeding the material to be dried to said device.

3. A drying apparatus comprising a rotary shaft, a pair of closure plates fixed thereto in spaced relation, a group of open-ended coaxial cylinders secured at one end to one plate and terminating short of the other plate, a group of open-ended coaxial cylinders nested within the first group and secured at one end to the second-named plate and terminating short of the first named plate so as to unite with the first group in providing a zig-zag passage-way for the material from cylinder to cylinder, a chopping device at the inlet end of the innermost cylinder in position for the chopped material to fall therefrom into that cylinder and embodying a member which is secured to the adjacent plate to rotate therewith, and means for feeding the material to be dried to said device.

4. A drying apparatus comprising a perforated rotary shaft adapted to be connected with a source of vacuum, a pair of closure plates fixed to said shaft in spaced relation, a group of open-ended coaxial cylinders secured at one end to one plate and terminating short of the other plate, a group of open-ended coaxial cylinders nested within the first group and secured at one end to the second-named plate and terminating short of the first-named plate so as to unite with the first group in providing a zig-zag passage-way for the material from cylinder to cylinder, an air-tight casing enclosing said cylinders and plates, and heating means inside said casing.

5. A drying apparatus comprising a perforated rotary shaft adapted to be connected with a source of vacuum, a pair of closure plates fixed to said shaft in spaced relation, a group of open-ended coaxial cylinders secured at one end to one plate and terminating short of the other plate, a group of open-ended coaxial cylinders nested within the first group and secured at one end to the second-named plate and terminating short of the first-named plate so as to unite with the first group in providing a zig-zag passage-way for the material from cylinder to cylinder, a chopping device at the inlet end of the innermost cylinder in position for the chopped material to fall therefrom into that cylinder, means for feeding the material to be dried to said device, an air-tight casing enclosing said cylinders and plates, and heating means inside said casing.

6. A drying apparatus comprising a set of nested, coaxial cylinders rotatable as a unit, and means for feeding the material to be dried through said cylinders from the innermost to the outermost in a zig-zag path; said cylinders having their walls perforated to permit the passage therethrough of dried particles of material and small pieces of material to be dried, the diameters of the perforations varying according to the diameters of the cylinders themselves, the smallest cylinder having the perforations of greatest diameter, and the largest cylinder being unperforated.

In testimony whereof I affix my signature.

JEAN BAPTISTE VERNAY.