June 3, 1969 R. FRANCESCHI 3,447,246

DRIER FOR LEATHER

Filed March 27, 1967 Sheet 1 of 3

Fig. 1.

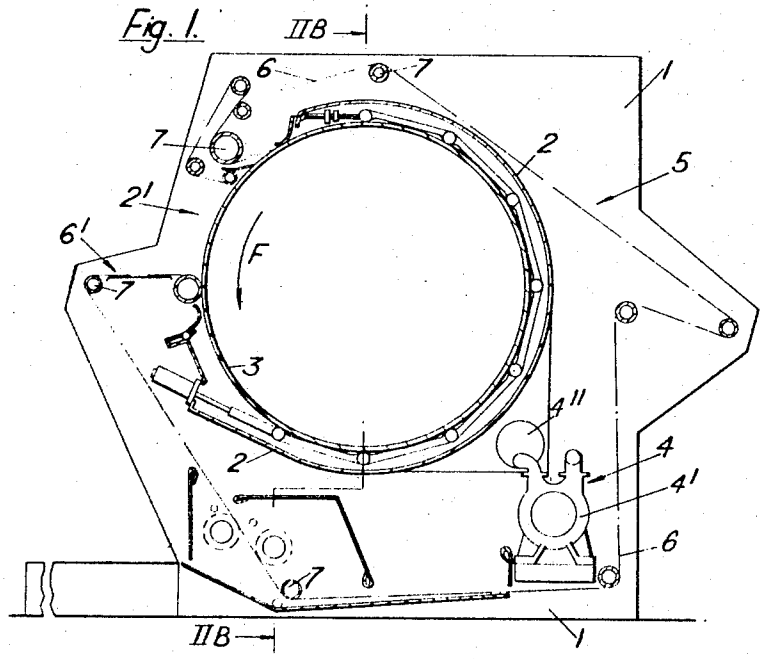


Fig. 2A.

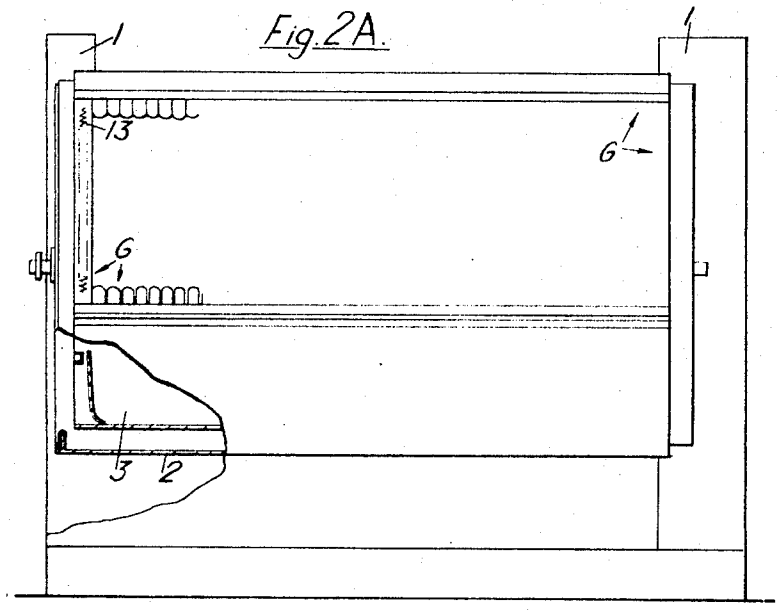


Fig. 2B.

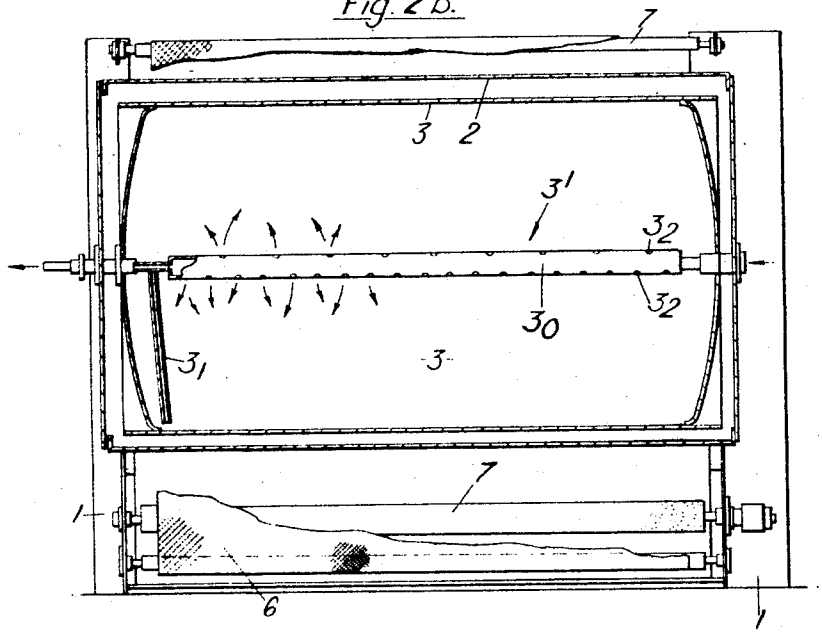


Fig. 3.

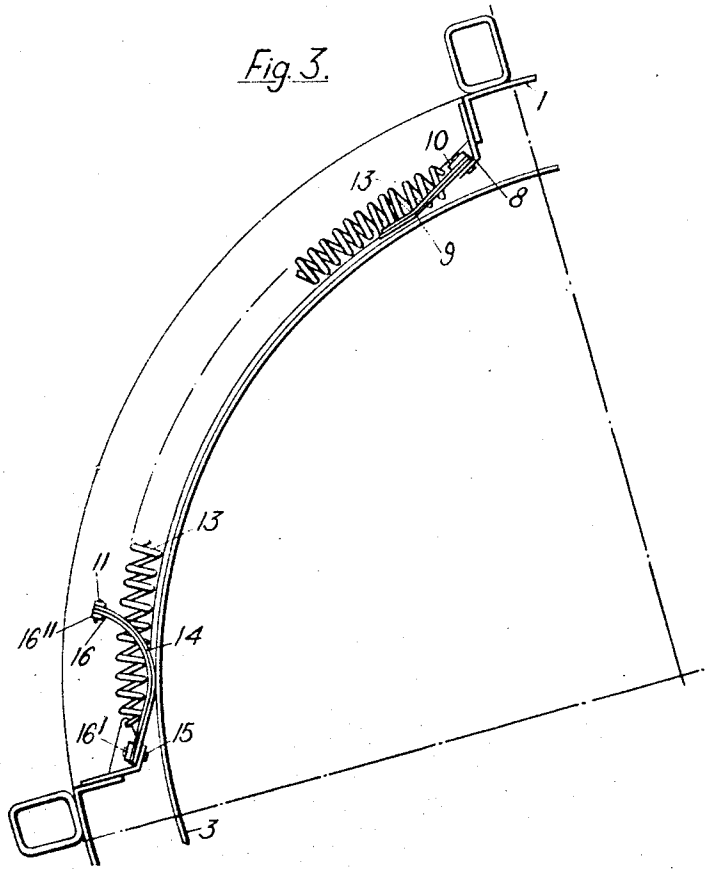
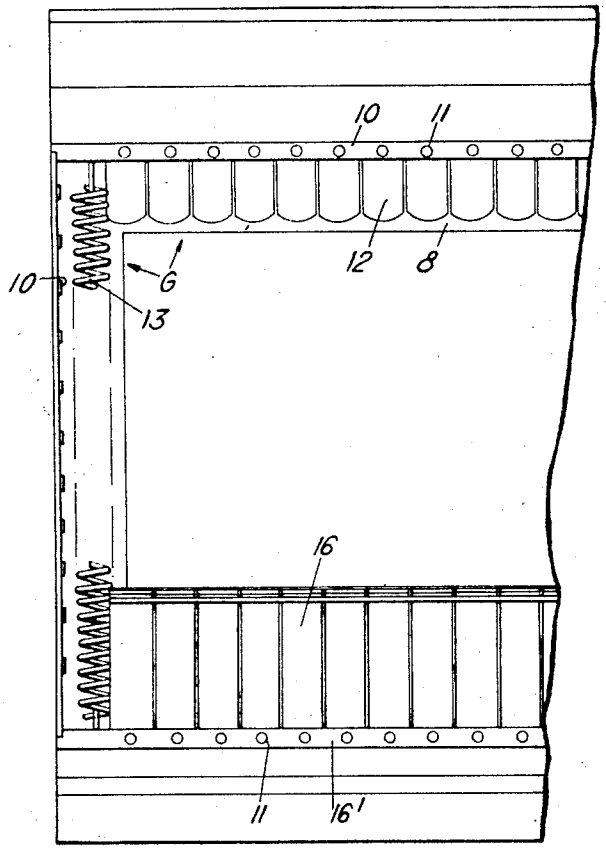


Fig. 4.



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DRIER FOR LEATHER

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U.S. Cl. 34—92 7 Claims

ABSTRACT OF THE DISCLOSURE

Vacuum drier for leather having a cylinder heated from inside and partly rotating in a casing in which the vacuum is created. The leather to be treated adheres to said cylinder. A frame shaped elastic gasket seals together the cylinder and the casing and a flexible band feeds the leather to the cylinder from outside the casing and keeps it adhering thereto inside said casing.

BACKGROUND OF THE INVENTION

The present invention relates to driers and particularly to driers for different type sheet materials such as for leather, using the simultaneous heating and vacuum action, and in which the material to be dried is treated while adhering to a rotating curved surface.

The known driers of this type allow important improvements and advantages as compared to the more widely spread driers having a plane treatment surface, but as far as the vacuum seal efficiency is concerned they show some drawbacks.

SUMMARY OF THE INVENTION

A most important object of the present invention is to eliminate said drawbacks providing a drier for sheet materials, the drier including a rotating metal cylinder partly contained in a casing in which the vacuum is created, elastic seals between said casing and the cylinder located in correspondence with an opening in the casing at which said cylinder appears, means for heating the cylinder surface and means for conveying the material to be treated and keeping it adhering to the cylinder, and wherein the improvement comprises elastic seals in the form of a frame which is applied at one of its edges against the edges of the casing opening and bears elastically against the cylinder itself at its other edge.

Preferably, said other edge elastic pressure acting against the cylinder is ensured both by the action of the vacuum prevailing in the casing and the spring means, at least some of which in the form of separate elements disposed side by side and each acting independently of the adjacent elements.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in greater detail with reference to the accompanying drawings, which show for the purposes of example a preferred embodiment and in which:

FIG. 1 is a diagrammatic cross-section of the drier according to the invention;

FIG. 2A is a front view of the said drier with some parts in section and others removed from convenience of illustration;

FIG. 2B is an axial section of the drier of FIGS. 1 and 2A;

FIG. 3 is a detail of FIG. 1 on a larger scale; and

FIG. 4 is a detail of FIG. 2 on a larger scale.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drier forming the object of the invention comprises, within an outer containing structure **1**, a cylindrical

casing **2**, a cylinder **3**, a mechanical assembly **4** for producing the vacuum and connected to the casing **2**, means **3'** for heating the cylinder **3** and means **5** for conveying the material to be treated.

The cylindrical casing **2** is fixed to the outer structure **1**, on the sides of which, on the other hand, the cylinder **3** is rotatably mounted by means of strong ball or roller bearings (not shown in the drawings). The assembly **4** for producing the vacuum is of known type and comprises a vacuum pump **4'** with its motor, a vacuum chamber with condenser **4''** and connecting piping between these two elements and between the chamber **4''** and the inside of the casing **2**. The means **3'** for heating the cylinder **3** comprise a tube 3_0 mounted axially in the cylinder **3** and adapted to feed steam against the inner surface of the said cylinder. The tube 3_0 is supplied with conventionally generated steam from one side or end of the cylinder (that on the right in FIG. 2A) through a duct inside the shaft on which the said cylinder rotates. On the other side, the condensate formed inside the cylinder is discharged through a similar duct, the condensate being withdrawn through a conduit **3** acting as a siphon. As shown in FIG. 2B, the feed of the steam into the interior of the cylinder **3** is effected through a plurality of holes 3_2 formed in the tube 3_0. The tube 3_0 and the conduit 3_1 are fixed, while, as has been said, the cylinder **3** rotates.

The means for conveying the material comprise an endless flexible band or belt **6** winding round rollers **7** (one of which is a driving roller) and round part of the cylinder **3**. A substantially horizontal portion **6'** of the belt **6** permits easy loading of the material at the lower part of the opening **2'** of the casing **2** at which the cylinder **3** appears, the cylinder being rotatables anticlockwise in the case under examination as shown by the arrow F.

The casing **2**, in which the vacuum is produced by the assembly **4**, is provided with means for effecting sealing against the surface of the cylinder **3** in correspondence with the opening **2'** in the said casing. In the case illustrated, these means comprise a single packing or sealing element G of yielding synthetic material in the form of a rectangular frame with sides of equal width, which is applied at its outer edge against the inwardly bent edges of the opening **2'** and bears elastically at its inner edge against the surface of the cylinder **3**, against which surface it is kept adhering by the vacuum produced in the casing **2** between the said casing and the cylinder, and by spring means.

More particularly, the outer edge of that side **9** of the packing or sealing element G which corresponds to the upper horizontal edge **8** at which the material to be dried emerges is fixed to the said upper edge **8** by means of a flat, straight strip **10** with a width limited to less than half that of the side **9** of the seal, the said strip extending over the entire length of the opening **2'** and being fixed to the edge **8** by means of bolts **11**. A plurality of leaf-type flexion springs **12** are mounted in correspondence with the strip **10** between the said strip **10** and the side **9** of the seal G. At the two vertical edges of the opening **2'**, the application of the sealing element G is achieved similarly with strips **10'** and bolts **11**, with the sole difference that, instead of the fixing strips being straight, they are curved and parallel to the surface of the cylinder **3**, as will readily be understood. In place of the leaf-type flexion springs **12**, a spiral spring **13** is used for each side, being disposed curved to follow the surface of the cylinder **3** (see FIG. 3).

The mounting of the last side **14** of the seal G, the side which produces tightness at the lower horizontal edge **15** at which the material to be dried enters, must be effected in such manner as to avoid the seal G being dragged along between the cylinder **3** and the casing **2**.

To this end, the side **14** of the seal is mounted so that it adheres to a plurality of leaf-type flexion springs **16** similar to the spring **12** hereinbefore described, but curved in circular arcs. The side **14** of the seal thus assumes a curved configuration in the direction of its width, having its convexity facing the inside of the drier. The plurality of springs **16** are fixed to the edge **15** of the opening **2'** of the casing **2** by means of a strip **16'** and bolts **11** and together with the outer edge of the side **14** of the seal, the inner edge of which is secured in turn to the free edge of the springs **16** by means of a corresponding plurality of strips **16''** and bolts **11'** (FIG. 3).

The drier described operates in the following manner: the material to be dried, consisting of one or more pieces of leather, or of other material in sheet form, in pieces or in a continuous band or strip, for example a fabric, is fed to the apparatus by loading it on to the horizontal portion **6'** of the belt **6** (which is in continuous movement) at the lower part of the opening **2'** of the casing **2**. The material is thus carried along towards the inside of the drier. Inside the casing **2**, the material is caused to adhere to the hot outer surface of the cylinder **3** (which is rotating continuously) by the belt **6**, the cylinder transmitting to the material in close contact the heat received by it internally; the action of the vacuum obtaining in the casing **2** takes place at the same time. The conveyor belt **6** and the cylinder **3** move at the same peripheral speed so that there is no stretching or tension in the material. While the heat causes the evolution of steam from the material, the vacuum removes this steam and the drying of the material occurs with great speed. The speed at which the cylinder **3** rotates and that at which the conveyor belt **6** moves forward are controlled in such manner in relation to the initial moisture content of the material to be treated as to cause the said material to have attained the desired degree of drying on removal. Removal is effected without any particular difficulty at the upper part of the opening **2'** of the casing **2** and may be facilitated by the presence of suitable collection surfaces. The operation of the drier is continuous and has many advantages. In fact, it enables drying of the work-pieces to be carried out in series, without persons working at the drier ever having to move away from their working stations; it makes it possible to eliminate the imprisonment of the work-pieces between two plates which, in addition to being difficult to construct, cause compression effects on the work-pieces due to the difference in pressure; it eliminates the complex lifting and safety devices for one of the said plates which have been required heretofore; it ensures a lower cost of producing the drier; it improves the uniformity of temperature over the surface supporting the work-pieces, which is difficult to obtain over the flat plates of the known driers; it enables the dimensions of the drier to be substantially reduced and the structure thereof to be simplified. Moreover, the continuity of the process which can be carried out with the drier of the invention entails further and obvious advantages from the point of view of commercial organisation and therefore from the economic aspect. In the drier of the invention, considerable importance attaches to the effective tightness of the seal G of the casing **2** for the purposes of achieving a high vacuum in the said casing. It therefore seems useful to examine the behaviour thereof while the drier is in operation.

It will be seen immediately that under these conditions the straight upper side **9** of the seal G is urged into contact with the cylinder **3** until it adheres in air-tight manner thereto, not only because of the effect of the vacuum prevailing in the casing **2**, but also by the action of the springs **12**. The fixed arrangement of these springs and the possibility of independent action thereof ensure perfect tightness at every point of the side **9**, even on the passage of the material being treated and irrespective of any defects there may be in the shape of the cylinder and of the seal and, above all, irrespective of any variations in the thickness of the material being treated. The two curved vertical sides of the seal are kept adhering to the cylinder **3** by the action of springs **13**, which is exerted uniformly over their entire length, and also again, it will be understood, by the effect of the vacuum. As regards the tightness of the lower side of the opening, this is also ensured by the suitable mounting which has been described of the side **14** of the said seal, which prevents any possible dragging along of the seal and moreover ensures, in combination with the vacuum in the casing **2**, an elastic pressure differing from point to point, as in the case of the upper side **9**, against the cylinder **3** and the material to be treated which is applied over it.

The tests carried out with the arrangement illustrated have demonstrated the high efficiency of the seals produced between the cylinder and the casing and have given very high outputs of the drier owing to the effective and powerful action of the particularly high vacuum obtainable, in combination with the heat, during the drying of the material, in particular leather.

It is understood that the invention is not limited in any way to the embodiment illustrated or to the details thereof, but that variants thereof and modifications therein may be provided, all of which are to come within the scope of the present invention.

I claim:

1. A drier for drying sheet materials such as leather, comprising: a casing having an opening defined by respective spaced apart edges of said casing, a hollow cylinder rotatable within said casing with the surface of said cylinder moving past said opening in close proximity to said edges, a conveyor means for feeding a material to be dried to the surface of said cylinder at one of said edges, said conveyor means extending within said casing and along the surface of said cylinder from said one edge to an opposite said edge of the casing, a vacuum means and a heating means respectively for creating a vacuum within the interior of said cylinder and for heating said cylinder, a sealing means extending along said edges for sealing the space between said edges and the surface of said cylinder, said sealing means being attached to said casing along said edges thereof and yieldably bearing against said cylinder surface, resilient means urging said sealing means against said cylinder surface.

2. The drier of claim **1**, said opening being rectangular and defined by a pair of opposed spaced apart edges extending along the axial extent of said cylinder and a pair of opposed spaced apart arcuate edges extending circumferentially along the cylinder surface, said sealing means comprising a rectangular frame conforming to the shape of said opening, said frame comprising an integral piece of yieldable synthetic material.

3. The drier of claim **2**, said casing edges including flanges directed radially towards the cylinder, an outer edge portion of said frame being fixedly attached to said flanges and an inner edge portion of said frame yieldably bearing against said cylinder surface.

4. The drier of claim **2**, said resilient means comprising a plurality of separately acting spring elements disposed side by side along said frame whereby said frame is adapted to conform to irregularities along said cylinder surface and irregularities in the thickness of a material being carried therealong.

5. The drier of claim **4**, said spring elements being leaf-type flexion springs having one end thereof attached to said casing and the other end thereof bearing against said frame.

6. The drier of claim **5**, said leaf-type springs extending along one of the axially extending said edges corresponding to the outlet end of said opening, other leaf-type springs extending along the other of the axially extending casing edges corresponding to the inlet end of said opening, said other springs being fixed at both ends thereof to said casing and having an intermediate bowed extent thereof bearing convexly against said frame.

7. The drier of claim 6, including a spiral spring extending arcuately along each said arcuate edge with opposite ends thereof being attached to said casing and with the coils thereof bearing radially inwardly against the corresponding portions of said frame.

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U.S. Cl. X.R.

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