

United States Patent

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[56]

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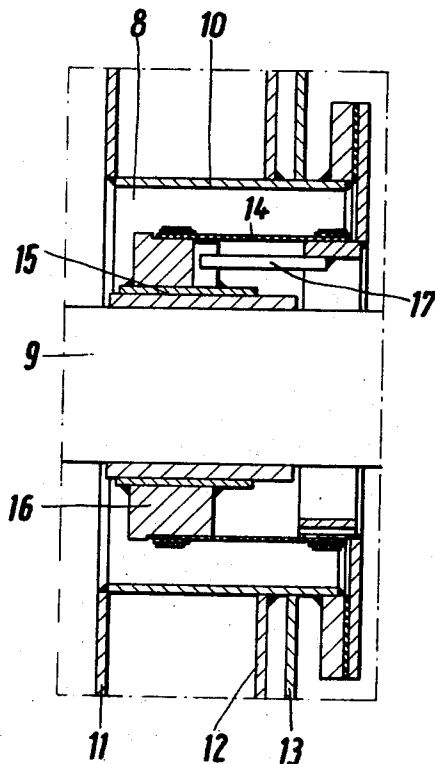
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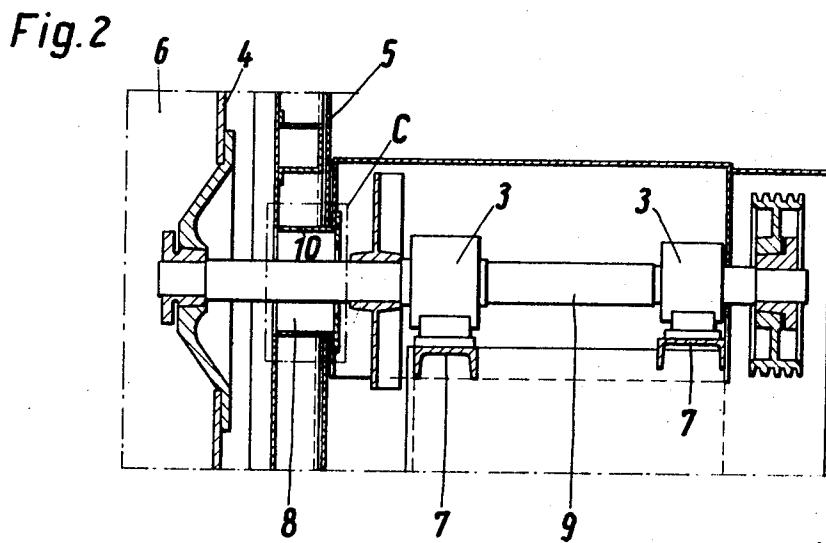
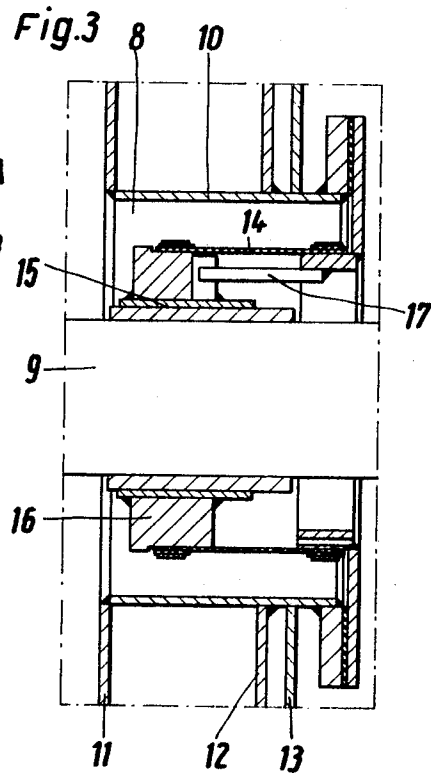
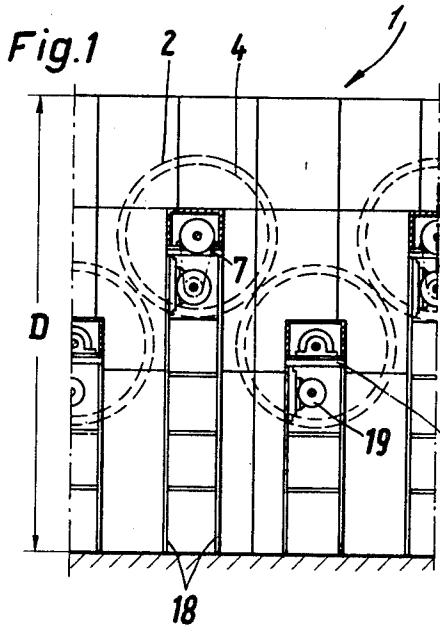
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[54] **APPARATUS FOR DRYING AND STEAMING MATERIAL CONVEYED ON ROLLS OR DRUMS**
11 Claims, 3 Drawing Figs.

[52] U.S. Cl..... **34/121**
[51] Int. Cl..... **F26b 25/08**
[50] Field of Search.....**34/110-123;**
165/87-92, 120, 1, 67; 308/36.1; 415/113

ABSTRACT: The present disclosure is directed to an apparatus for drying and steaming material which is conveyed on rolls and/or drums wherein the bearings for the fans are separated from the wall of the treatment chamber and/or the housing of the apparatus.





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APPARATUS FOR DRYING AND STEAMING MATERIAL CONVEYED ON ROLLS OR DRUMS

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for drying and steaming material which is guided between rolls and/or drums and which is treated by a treatment medium which is applied to the material by means of fans which are associated with the treatment apparatus.

According to the prior art, fans are attached directly to the housing of the various drying apparatus. Since fans, even if they are perfectly balanced, produce vibration in operation, at least some of the supporting walls of the housing of the apparatus must be very rugged to ensure the necessary reliability with respect to the fan suspension and to provide a device which is sturdy enough so that possible damage to the material being processed as a result of vibration of the apparatus during operation is substantially avoided. Another disadvantage of the known fan suspensions is that in many cases the housing and/or the treatment chamber must be made of high-grade alloyed steel or aluminum to ensure a sufficient corrosion-resistance construction when a moist atmosphere or hot steam is used as the treatment medium. This type of construction also avoids a knockout of the attachment elements of the fans which is of particular danger if aluminum is used. In this case, a combination of aluminum sheet and reinforcement elements of steel cannot be used because there is the danger of localized corrosion at the contact points between the aluminum and the steel, said corrosion rendering the apparatus unserviceable after a relatively short period of time. Also, the variation in expansion when heating the apparatus up to about 250° C. does not allow a combination of elements made of such materials.

The above-mentioned disadvantages are particularly significant with respect to sieve drum steamers provided with staggered sieve drums. A precondition of the staggered drum arrangement is a relatively large overall height of the apparatus, i.e. a height of up to about several meters. The apparatus thus becomes more expensive since the respective sidewall of the treatment chamber must be stabilized at least up to the bearings of the uppermost fans which are generally attached at the level of the shafts of the sieve drums of the upper row.

SUMMARY OF THE INVENTION

An object of the present invention is to avoid the prior art disadvantages in the conveyance of material between rolls and/or sieve drums.

Another object of the present invention is to provide an improved apparatus for mounting the fans which permits a thinner wall construction of the treatment chamber and/or the treatment housing.

A further object of the present invention is to provide an improved apparatus for drying and steaming textile materials wherein the undesirable influence of the fan vibration on the treatment chamber is substantially eliminated.

Other objects and further scope of applicability of the present invention will become apparent from the detailed description given hereinafter; it should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the arts from this detailed description.

Pursuant to the present invention, it has been found that the above-mentioned disadvantages may be eliminated and a much improved apparatus for the drying and steaming of textile materials may be obtained by arranging the fan bearings separately from the wall of the housing and/or the treatment chamber. This arrangement offers the decisive advantage that the walls of the treatment chamber can be dimensioned in accordance with their intended purpose, that is, with only that thickness required by the particular atmosphere used in the

treatment chamber. Thus, according to the present invention, the entire housing may now be made of a light metal, for example, aluminum, which provides corrosion protection as well as a lighter weight device. Furthermore, the undesirable influence of the fan vibration on the treatment chamber of the apparatus is eliminated.

The fans may be arranged and/or supported individually or jointly in a closed frame outside the treatment chamber. With the separate arrangement of the fan support and housing and/or treatment chamber of the apparatus according to the present invention, a possible relative displacement between the separate units will occur in operation if the treatment chamber is heated to an elevated temperature, for example, to about 250° C. According to the present invention, a special elastic seal is provided for this situation, said seal compensating for the relative displacements between the treatment chamber and the fans. The seal advantageously consists of an elastic hose coupling, one end of which is connected as firmly as possible in a steam-type manner with the edge of the opening in the wall of the treatment chamber, and the other end of which is movably connected, also in a steam-type manner with the fan shaft. The latter connection is preferably effected by a sealing friction bearing. In principle, any material which complies with the requirements for elasticity, steam-tightness and corrosion resistance is suitable for use as the hose coupling.

According to the present invention, tests have shown that a hose coupling of polytetrafluoroethylene which has gained importance in the friction-bearing technique under the trade name of Teflon is very well suited for this purpose.

The aforedescribed elastic seal can compensate for relative motions in any dimension between the fans which, according to the invention, are supported separately and the treatment chamber of the apparatus. In some cases, the fans are accommodated in a bearing block. In this case, it is advisable to distribute the relative motions uniformly from the center of the bearing block towards the sides in order to keep the maximum displacements at the ends as small as possible. These maximum displacements can be reduced by preliminary displacements in the reverse direction.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only and thus are not limitative of the present invention and wherein,

FIG. 1 shows a detail and a side view of a sieve drum steamer utilizing staggered sieve drums according to the present invention;

FIG. 2 is a section A—B according to FIG. 1, said figure showing a detail of the longitudinal section and the separate support and/or suspension of the fans according to the invention; and

FIG. 3 is an enlarged view of detail C according to FIG. 2, said figure showing the seal according to the present invention between the treatment chamber of the apparatus and the fan support.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, wherein like reference numerals are used throughout the various views to designate light parts, the apparatus for the present invention comprises according to FIG. 1, a sieve drum steamer 1 containing staggered drums 2. For this reason, the overall height D is relatively great. According to the present invention a bearing 3 for a fan 4 is suspended separately from a wall 5 of the treatment chamber 6 of the sieve drum steamer 1. According to the embodiment of the present invention shown in FIG. 2, the fan bearings 3 are provided on a U-rail 7, each of which is anchored, for example, to the floor independently of the wall 5. Generally, a fan motor 19 is also attached to a frame 18 which supports the bearings 3 of the fans 4.

With the separate arrangement of the fan bearings, according to the present invention, it is necessary to provide an elastic seal in the openings 8 for fan shafts 9 between the shafts 9 and the wall 5 of the treatment chamber 6. If the treatment chamber 6 expands during operation due to increased temperatures, it must be possible to automatically compensate the resulting relative displacement between the fan shafts 9 remaining in their original position and the openings 8 of the treatment chamber 6, in order to avoid operating trouble of the apparatus.

An example of the elastic seal required according to the present invention is shown in detail in FIG. 3. An opening 8 in the wall 5 of the treatment chamber 6 for the fan shaft 9 is advantageously bordered by a cylindrical bushing 10. This bushing is expediently welded steamtight to some or all parts 11, 12 and 13 of the wall 5. In order to obtain a steamtight and also elastic seal between the shaft 9 and the bushing 10, an elastic hose coupling 14 is, according to the present invention, connected with the bush 10 and with the shaft 9.

Since one of the two connections must be movable, it is, in this case advisable to provide a steamtight friction bearing (sealing assembly) 15 between the shaft 9 and one end of the hose coupling 14. An outer ring 16 of the friction bearing 15, which ring is connected with the hose coupling 14, is secured against turning by means of a pin 17. The hose coupling 14 may consist of any material which complies with the requirements for elasticity, steam-tightness and corrosion resistance. According to the present invention, it has been found that a hose coupling of polytetrafluoroethylene which is also known under the trade name Teflon is especially suitable for this purpose.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be apparent to one skilled in the art are intended to be included.

What is claimed is:

1. An apparatus for drying and steaming materials which comprises a treatment chamber, at least one conveying means rotatably disposed in said treatment chamber, fan means associated with the conveying means for circulating the treat-

ment medium, said fan means being provided with a fan shaft which extends into the treatment chamber, wall means having an axially disposed opening into said chamber to accommodate said fan shaft, means for supporting the fan shaft disposed independent of the walls of the treatment chamber, and an elastic sealing assembly for providing a seal between said fan shaft and said wall means of the treatment chamber which comprises an elastic coupling fixedly attached to the walls of the treatment chamber and movably attached to the fan shaft by a friction bearing, said friction bearing being secured against turning by a pin which is fixedly attached to said bearing and the wall of the treatment chamber, thereby compensating for any relative displacement between the fan shaft and the opening in the wall means.

2. The apparatus of claim 1 wherein the fan means are individually supported, separate from the housing, on bearing means disposed outside of the treatment chamber in a closed frame.

3. The apparatus of claim 1 wherein the fan means are jointly supported, separate from the housing, on bearing means disposed outside of the treatment chamber in a closed frame.

4. The apparatus of claim 1 wherein the elastic sealing means is polytetrafluoroethylene.

5. The apparatus of claim 1, wherein the conveying means are drum means.

6. The apparatus of claim 5 wherein the treatment chamber contains a plurality of drum means which are staggered with respect to each other.

7. The apparatus of claim 5 wherein the drum means are cylindrical sieve drums.

8. The apparatus of claim 2 wherein the bearing means are supported on U-rail means which are anchored to the floor independent of the walls of the treatment chamber.

9. The apparatus of claim 1 wherein the concentric opening around the fan shaft is provided with a cylindrical bushing secured to portions of the wall of the treatment chamber.

10. The apparatus of claim 9 wherein the elastic coupling connects the bushing with the fan shaft.

11. The apparatus of claim 1 wherein the friction bearing contains an outer ring.

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