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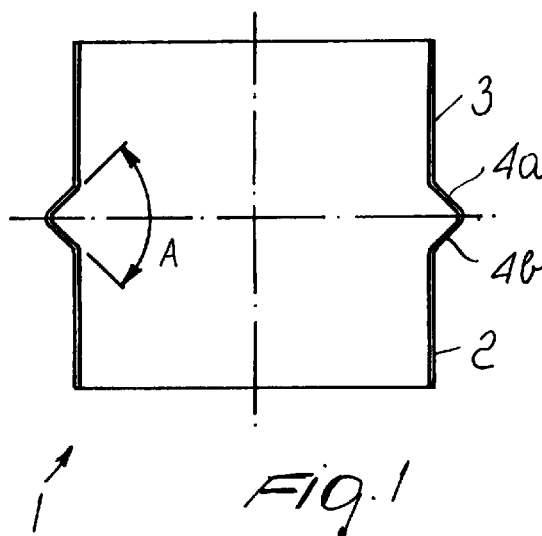
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(54) **Tubular bellows joint for dry-cleaning machines**

(57) A tubular bellows joint (1) for dry-cleaning machines which is made of a material which is resistant to perchloroethylene and is constituted by two tubular segments (2,3) which are connected by at least two elements (4a,4b) which are shaped like a diverging frustum whose inclination is adapted to hinder stagnation of fluff or the like.



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Description

[0001] The present invention relates to a tubular bellows joint for dry-cleaning machines.

[0002] Conventional dry-cleaning machines comprise a washing drum and an air drying tunnel which are mutually connected by one or more joints which convey the hot air that arrives from the drying tunnel to the drum and one or more joints which convey the solvent-saturated air that flows out of the drum to the drying tunnel.

[0003] A basket for containing the materials to be washed (clothes, fabrics and cut cloths or cloth swatches, etcetera) is mounted and rotationally actuated inside the drum, and at the end of the washing cycles it is known to rotate the drum at high speed in order to eliminate by spin-drying the residual solvent from the washed materials.

[0004] For machines which use solvents such as perchloroethylene, spin drying occurs at low speed as this solvent is eliminated rapidly and with small quantities of heat, and the support of the basket in the washing drum can be rigid.

[0005] In dry-cleaning machines which instead use hydrocarbons as solvents, it is instead usual to spin-dry at a rather high speed, owing to the need to eliminate the solvent as much as possible for safety reasons and owing to considerable difficulties in elimination from the point of view of the duration and the amount of heat that are required: in this case the support of the basket in the washing drum can no longer be rigid.

[0006] Accordingly, in hydrocarbon-using machines the connection of the washing drum to the air drying tunnel is provided by virtue of bellows joints which are made of materials such as rubber: the bellows joints are usually constituted by radiused concave and convex annular profiles which have substantially semicircular cross-sections.

[0007] The standards currently in force in some countries require the solvent concentration to be reduced considerably; this leads to consider the need to spin-dry at high speeds even in perchloroethylene-using machines.

[0008] Accordingly, it becomes necessary, even for perchloroethylene-using machines, to connect the washing drum to the air drying tunnel by virtue of joints which allow mutual movements, but this cannot be achieved with the same bellows joints used in hydrocarbon-using machines.

[0009] Perchloroethylene in fact attacks the rubber-like material that constitutes conventional bellows joints or in certain cases impregnates it. In addition to this, a layer of fluff or downy material tends to deposit in the convex region of the annular profiles, becoming impregnated with solvent and remaining impregnated therewith even at the end of the washing cycle: polluting solvent traces therefore end up in the piping of the dry-cleaning machine at the very regions where the solvent detectors are installed, giving incorrect readout values.

[0010] The aim of the present invention is to obviate the above cited drawbacks of conventional devices, i.e., to provide a tubular bellows joint for dry-cleaning machines which does not deteriorate in the presence of perchloroethylene and does not have regions where fluff or the like can deposit.

[0011] Within the scope of this aim, an object of the present invention is to provide a tubular bellows joint with a structure which is simple, relatively easy to provide in practice, safe in use, effective in operation and having a relatively low cost.

[0012] This aim, this object and others which will become more apparent hereinafter are achieved by a tubular bellows joint for dry-cleaning machines, characterized in that it is made of a material which is resistant to perchloroethylene and it is constituted by two tubular segments which are connected by at least two elements which are shaped like a diverging frustum whose inclination is adapted to hinder stagnation of fluff or the like.

[0013] Further particularities of the invention will become apparent from the detailed description of a preferred but not exclusive embodiment of a tubular bellows joint for dry-cleaning machines according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a sectional side view, taken along a diametrical plane, of a tubular bellows joint for dry-cleaning machines according to the present invention;

Figure 2 is a sectional side view, taken along a diametrical plane, of a joint according to the present invention in another embodiment intended to withstand external overpressures;

Figure 3 is a sectional side view, taken along a diametrical plane, of a joint according to the present invention in another embodiment intended to withstand internal overpressures.

[0014] With particular reference to the above Figures, the reference numeral 1 designates a tubular bellows joint for dry-cleaning machines according to the invention.

[0015] The joint 1 is made of a material such as elastic plastics which cannot be attacked by perchloroethylene and is constituted by two tubular segments 2 and 3 which are connected by at least one pair of elements 4a and 4b which are shaped like a diverging frustum whose inclination is meant to hinder the stagnation of fluff or the like. Figures 2 and 3 illustrate joints constituted by two pairs elements 4a, 4b, 5a, 5b; the two tubular segments 2 and 3 are meant to be rigidly coupled to openings which lead respectively to the washing drum and to the air drying duct of the dry-cleaning machine.

[0016] The number of pairs of frustum-shaped elements of the joint may be any according to the freedom of relative motion to be allowed to the two tubular segments 2 and 3.

[0017] The elements 4a, 4b and 5a, 5b of each pair form an angle of 60 to 150 degrees between them; the wider the angle, the less likely the stagnation of fluff or the like.

[0018] The joint is produced by molding, preferably using a linear copolymer of vinylidene fluoride and hexafluoropropylene with a high fluorine percentage, of the type known by the trade-name Viton.

[0019] As an alternative, the material can be polytetrafluoroethylene of the type known by the trade-name Teflon.

[0020] At the crests and/or troughs of the pairs of elements 4a, 4b, 5a, 5b there are metallic stiffening hoops 6, 7 and/or 8, 9, 10 which avoid deformations of the joint in case of external and/or internal overpressures.

[0021] Conveniently, the metal hoops 6, 7, 8, 9, 10 are embedded in the thickness of the material that constitutes the joint (see Figures 2 and 3, in which there are alternative hoops for external or internal overpressures: in order to obviate both internal and external overpressures, both the hoops 6, 7 and the hoops 8, 9, 10 are provided in an embodiment which is not illustrated in the Figure).

[0022] The operation of the joint according to the invention is evident: the presence of the pairs of frustum-shaped elements allows the tubular segments to perform relative movements which compensate for the oscillations due to the rotation of the basket in the drum even at high speeds.

[0023] It has thus been observed that the joint according to the invention achieves the intended aim and object and in particular that it cannot be attacked by perchloroethylene and that it avoids stagnations of fluff which, by becoming impregnated with solvent, might alter the detected values of solvent concentration.

[0024] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0025] All the details may furthermore be replaced with other technically equivalent ones.

[0026] In practice, the materials used, as well as the shapes and the dimensions, may be any according to the requirements without thereby abandoning the scope of the protection of the claims that follow.

[0027] The disclosures in Italian Utility Model Application No. BO98U000143 from which this application claims priority are incorporated herein by reference.

[0028] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A tubular bellows joint for dry-cleaning machines, characterized in that it is made of a material resistant to perchloroethylene and it is constituted by two tubular segments which are connected by at least two elements which are shaped like a diverging frustum whose inclination is adapted to hinder stagnation of fluff or the like.
2. The joint according to claim 1, characterized in that said material resistant to perchloroethylene is elastic plastics.
3. The joint according to claim 1, characterized in that the diverging frustum-shaped elements of said pair form between them an angle of 60 to 150 degrees.
4. The joint according to claim 2, characterized in that said material is a fluorine-based polymer of the type known by the trade-name Viton.
5. The joint according to claim 1, characterized in that metal stiffening hoops are provided at the crest and/or at the troughs of said at least one pair of frustum-shaped elements, said hoops being adapted to avoid deformations in case of external and/or internal overpressures.
6. The joint according to claim 5, characterized in that said metal hoops are embedded in the thickness of the material said tubular segments are made of.
7. The joint according to claim 2, characterized in that said material is polytetrafluoroethylene of the type known by the trade-name Teflon.

