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(54) **Procedure and unit for the production of a polyester fibre based band with a sublimed metal coating**

(57) Procedure for the production of a polyester fibre based band with a coating made of sublimed metal to be used for the realisation of blends for wad, felt and weaving and knitting yarn, said procedure foreseeing the steps of: opening and cleaning of polyester fibres coated in sublimed metal; mixing of said fibres coated in sublimed metal with flakes of polyester fibre; carding of the blend thus obtained.

Said procedure is realised thanks to a unit comprising a cleaning machine, a carding machine and means suitable for transferring the fibres which come out of said cleaning machine to said carding machine mixing them with a suitable amount of other fibres, wherein the needles present on the reels of the cleaning machine and on the bands of the carding machine are coated with, or completely made of, non-metallic material.

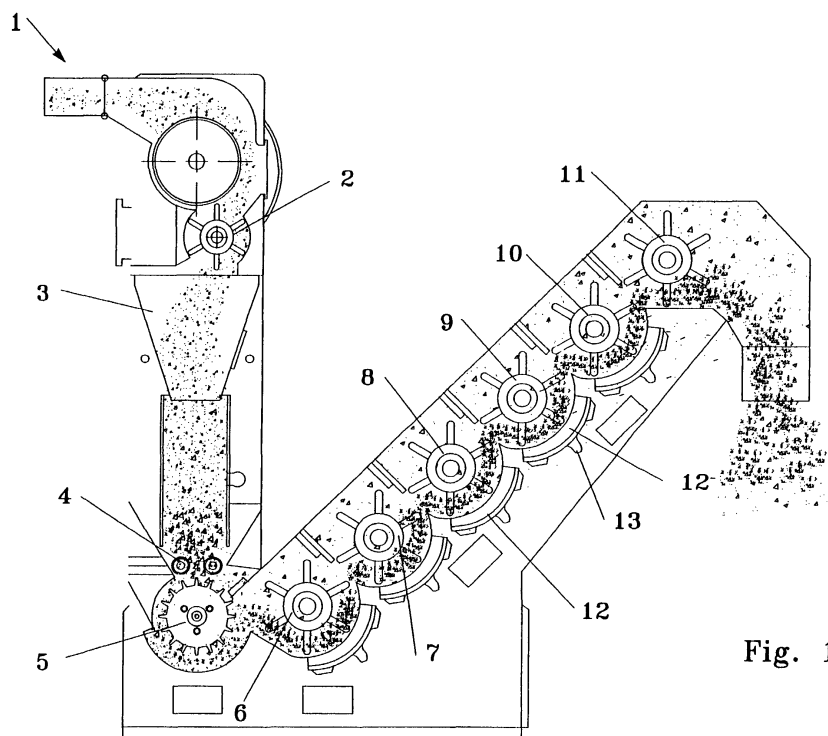


Fig. 1

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Description

[0001] The present invention proposes a procedure and the relative unit for the production of a polyester fibre based band and polyester fibres coated with sublimed metal, to be used for the production of blends for wad, felt and weaving and knitting yarn.

[0002] The procedure according to the invention foresees a first step of opening the layers of the bale and the tangled flakes with a cleaning of the raw material, in a cleaning machine in which the fibres are subjected to the action of a plurality of needles coated in non-metallic material, in particular in rubber, and to the action of air jets.

[0003] When they leave the cleaner the fibres are mixed with an appropriate quantity of brand new polyester fibres and are treated in a carding machine, also with needles coated in non-metallic material.

[0004] A band of soft and easily treatable non-twisted material is obtained which has substantial heat insulating characteristics and which can be used for the production of wad, felt and yarn.

[0005] The invention also regards the unit for the production of said band, a unit which comprises at least one cleaning machine and a carding machine with needles made from or coated in non-metallic material, in particular rubber.

[0006] Different insulating materials which are used in the knitwear sector for the production of stuffing, yarn and like are known.

[0007] In particular wads consisting of polyester fibres, which are spun or else used as stuffing for jackets, overalls and like, are known.

[0008] To improve the heat insulating characteristics of clothes realised using these wads as stuffing, so-called "needled wad" is often used.

[0009] It concerns a fabric consisting of two sheets of aluminium between which is inserted a layer of wad consisting of polyester fibres. The wad layer creates an air cushion which creates an insulation against the dispersion of heat by convection and conduction, whereas the outer sheets made of aluminium ensure the necessary heat insulation against dispersion by radiation.

[0010] It is, however, a solution with limited possibilities of use, which can, for example, be applied to the production of motorbike overalls, since the presence of two sheets of aluminium makes it difficult to apply to normal articles of clothing.

[0011] Polyester wads with which a certain amount of metallic granules, in particular aluminium, are mixed in order to improve the heat insulating characteristics of the wad, are also known.

[0012] This product, however, has insulating characteristics which are not totally satisfactory and, due to the presence of the metallic granules, it does not offer, to the touch, the soft sensation required.

[0013] Now, the present invention fits into this sector, proposing a procedure and the relative unit for the pro-

duction of a polyester fibre based band with sublimed metal coating, to be used to produce blends for wad and felt, as well as weaving and knitting yarn which assure somewhat better heat insulating characteristics with respect to those of the prior art, which are easy to treat and which have, to the touch, the softness required.

[0014] Polyester fibres coated with a very fine layer of sublimed metal are already known, used in the production of insulating panels for buildings, whereas their use has never been foreseen in the sector of textile products, due to the hardness of these fibres and to the consequent difficulty in treating them, as well as to the impossibility of obtaining sufficiently soft end materials.

[0015] The present invention now offers the solution to this problem with a process which foresees subjecting these coated fibres to three fundamental operations:

- opening the layers extracted from the bale, with an intimate mixing of the different fibres of the yarn;
- opening the tangled flakes to attain the cleaning of the raw material through the elimination of foreign and undesired substances present therein;
- mixing these fibres with a suitable quantity of brand new polyester fibres and subsequently carding thereof to form a band of fibres without any applied twisting, since the reciprocal adherence between the fibres is enough to provide the necessary cohesion and uniformity.

[0016] The invention also regards the appropriately modified machines for carrying out said procedure.

[0017] The present invention shall now be described in detail, as a non-limiting example, with reference to the attached figures wherein:

- figure 1 schematically illustrates a cleaning machine used in the procedure according to the invention;
- figure 2 schematically illustrates a carding machine used in the procedure according to the invention;
- figure 3 illustrates in section the detail of a needle with a coating made of non-metallic material, used in the unit according to the invention.

[0018] With reference to figure 1, a cleaning machine used in the first step of treatment of the fibres with the procedure according to the invention is illustrated.

[0019] The procedure foresees the use of polyester fibres coated with a thin layer of sublimed metal, in particular aluminium, which are then mixed, in a second step, with brand new polyester fibres.

[0020] The sublimed polyester bales exhibit the features of being a very compact, generally hard mass of material, also containing variable amounts of foreign substances which must be eliminated.

[0021] The fibres generally have a variable length of between 1 and 3-4 centimetres.

[0022] This material, during a first step of the proce-

ture, is treated in a cleaning machine which has been suitably modified for the purpose.

[0023] A machine of this type, illustrated schematically in figure 1, comprises a feeding device of the known type 1 upon which the layers extracted from the bales are placed, which are first engaged by a carding reel 2 which opens the material carrying out a first operation of dust elimination.

[0024] The fibres then move on to a lower beating reel which continues the dismemberment operation of the fibres which are then left to fall into a hopper 3.

[0025] On the base of the hopper a pair of rollers 4 directs the fibres towards a toothed wheel 5 which sends the fibres, in a substantially uniform layer, towards a plurality of beating reels indicated with the reference numerals from 6 to 11.

[0026] The reels 6-11 slide in contact with the same number of metallic grills 12 each connected to a sucking device 13.

[0027] The reels 6-11 move at an increasing speed from the first to the last, and the relationship between the rotation speeds is around 1/3.

[0028] A feature of the invention is that of foreseeing the needles usually foreseen on the reels made not of metal but with a metallic core coated in a material such as rubber or like, or else they are made entirely of non-metallic material.

[0029] An example of a needle is illustrated in figure 3, where reference numeral 20 indicates the metallic body of the needle, whereas reference numeral 21 indicates the coating or active part, made of rubber.

[0030] The use of non-metallic needles allows the formation of electrostatic charge during the treatment of the fibres coated in sublimed aluminium to be avoided, a necessary condition to be able to obtain an effective untangling of the fibrous mass.

[0031] During this so-called "opening" step the fibres are opened and completely cleaned.

[0032] The air sucked in by the devices 13 removes the foreign substances from the fibres, sucking them through the grills 12.

[0033] The fibres thus treated are gathered and then introduced into a carding unit, after having been mixed with an appropriate amount of brand new polyester fibres.

[0034] The carding unit is illustrated in figure 2.

[0035] The fibres coated in sublimed metal deriving from the previous step, mixed with the brand new polyester fibres are introduced into a hopper 14.

[0036] The proportion between the coated fibres and the brand new ones preferably varies between 30/70 and 40/60 in weight.

[0037] The fibres are mixed by a pair of rollers 15 and are fed to a reel 17, from which they are directed towards further feeding devices indicated as a whole with 18, which introduce them, in the form of a mat with a suitable thickness, inside the carding machine indicated as a whole with 19.

[0038] This also has the needles of the bands and the elastic gaskets coated in non-metallic material.

[0039] When it leaves the carding machine, therefore, a perfect mixture of the fibres is attained with the formation of a band which constitutes the starting point for the realisation of new blends for wad, felt or weaving and knitting yarn.

[0040] The band thus obtained has substantially better thermal characteristics than the corresponding products which are currently known. Tests carried out have allowed us to ascertain an improvement in the heat insulating characteristics to a degree varying between 30% and 50%.

[0041] Fabrics and materials for stuffing realised with the product obtained with the procedure of the invention reduce the radiant transfer of energy, improving the thermal characteristics of the garments.

[0042] Basically, the fabrics will have better insulation whilst still remaining transpirable, anallergic and odour-free.

[0043] Moreover, fabrics and stuffing realised with the material produced with the procedure of the invention can be washed in a washing machine, dyed, do not create static and resist the formation of mildew when exposed to dampness.

[0044] The aforementioned fabrics and the stuffing realised with the material produced with the procedure of the invention can, moreover, be coated with synthetic resins, i.e. coupled with membranes or films, in order to obtain a finished product having characteristics of heat insulation, impermeability, transpirability and wind-resistance.

[0045] A man skilled in the art will be able to foresee different modifications and variants which, however, must be deemed to be included in the scope of the present invention.

Claims

1. Procedure for the production of a polyester fibre based band with a coating made of sublimed metal to be used for the realisation of blends for wad, felt and weaving and knitting yarn, **characterised in that** it foresees the following steps:
 - opening and cleaning of polyester fibres coated in sublimed metal;
 - mixing of said fibres coated in sublimed metal with flakes of polyester fibre;
 - carding of the blend thus obtained.
2. Procedure according to claim 1, **characterised in that** said step of opening and cleaning the fibres takes place in a cleaning machine in which the fibres are engaged by needles coated in non-metallic material.

3. Procedure according to claim 2, **characterised in that** at the end of said opening and cleaning step the blend of coated fibres and brand new fibres is carded in a carding machine in which the needles are coated in non-metallic material. 5
4. Procedure according to claim 3, **characterised in that** the relationship between the fibres coated in sublimed metal and the brand new polyester fibres present in the blend varies between 40/60 and 30/70. 10
5. Procedure according to each of the previous claims, **characterised in that** in said cleaning step the fibres are subjected to the action of a plurality of reels which rotate at an increasing speed, with the relationship between the speeds of the first and last reel being around 1/3. 15
6. Band for realising blends for wad, felt and weaving and knitting yarn, **characterised in that** it consists of polyester fibres coated in sublimed metal, mixed with brand new polyester fibres. 20
7. Band for realising blends according to claim 6, **characterised in that** said metal for coating the fibres is aluminium. 25
8. Band for realising blends according to claim 6, **characterised in that** the fibres coated in sublimed metal enter the blend making up 30% to 40% in weight. 30
9. Unit for carrying out the procedure according to any of the claims from 1 to 5, comprising a cleaning machine, a carding machine and means suitable for transferring the fibres which come out of said cleaning machine to said carding machine mixing them with a suitable amount of other fibres, **characterised in that** the needles present on the reels of the cleaning machine and on the bands of the carding machine are coated with, or completely made of, non-metallic material. 35 40
10. Unit according to claim 9, wherein said needles comprise a metallic core and a rubber coating. 45
11. Unit according to claims 9 and 10, **characterised in that** said cleaning machine is equipped with a plurality of reels which work in contact with grills connected to air-sucking devices, wherein each of said reels rotates at a greater speed than the previous one. 50
12. Unit according to claim 11, **characterised in that** the last of said reels rotates at a speed which is around triple the rotational speed of the first of said reels. 55

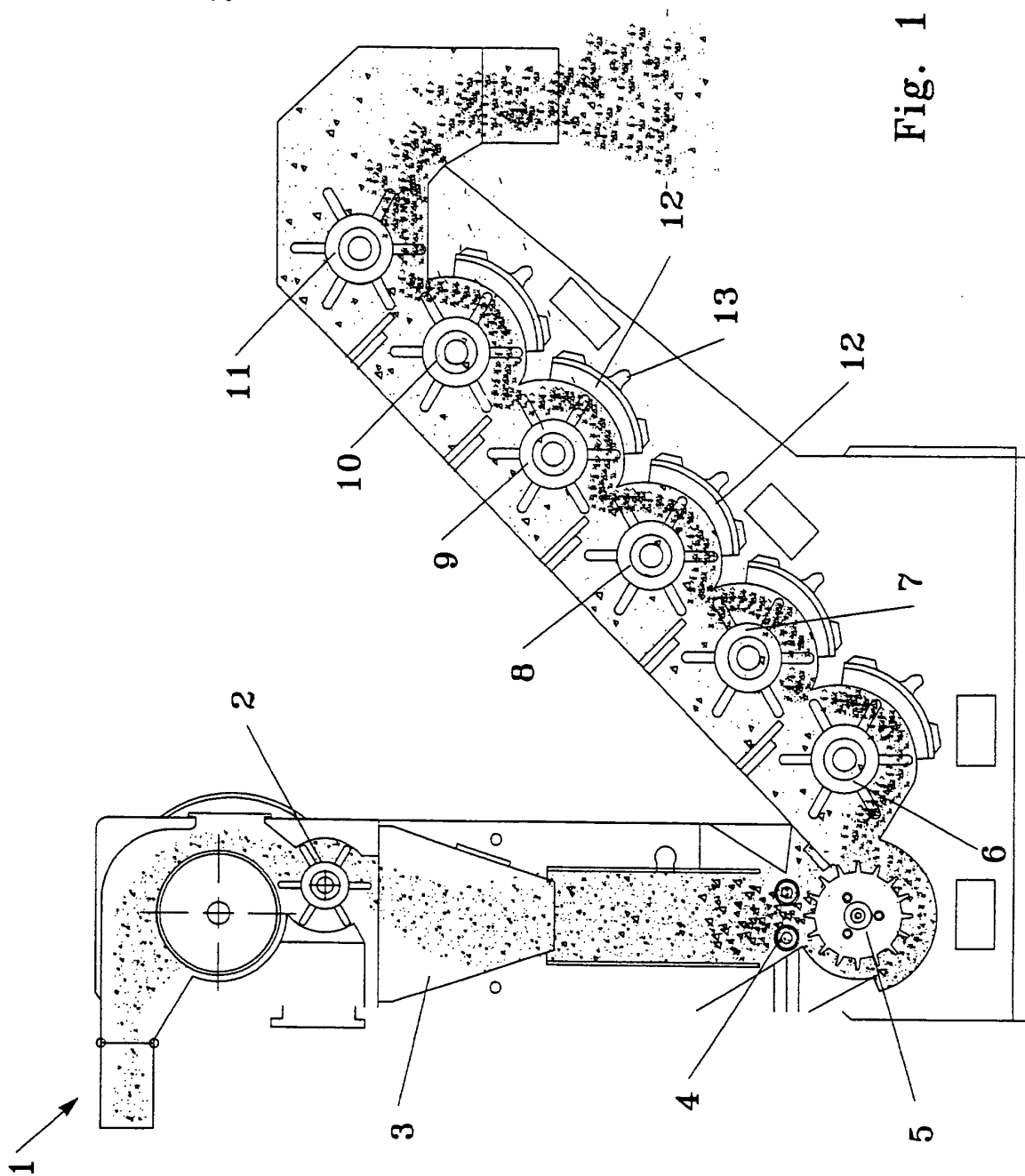


Fig. 1

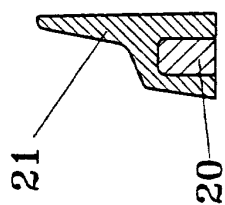
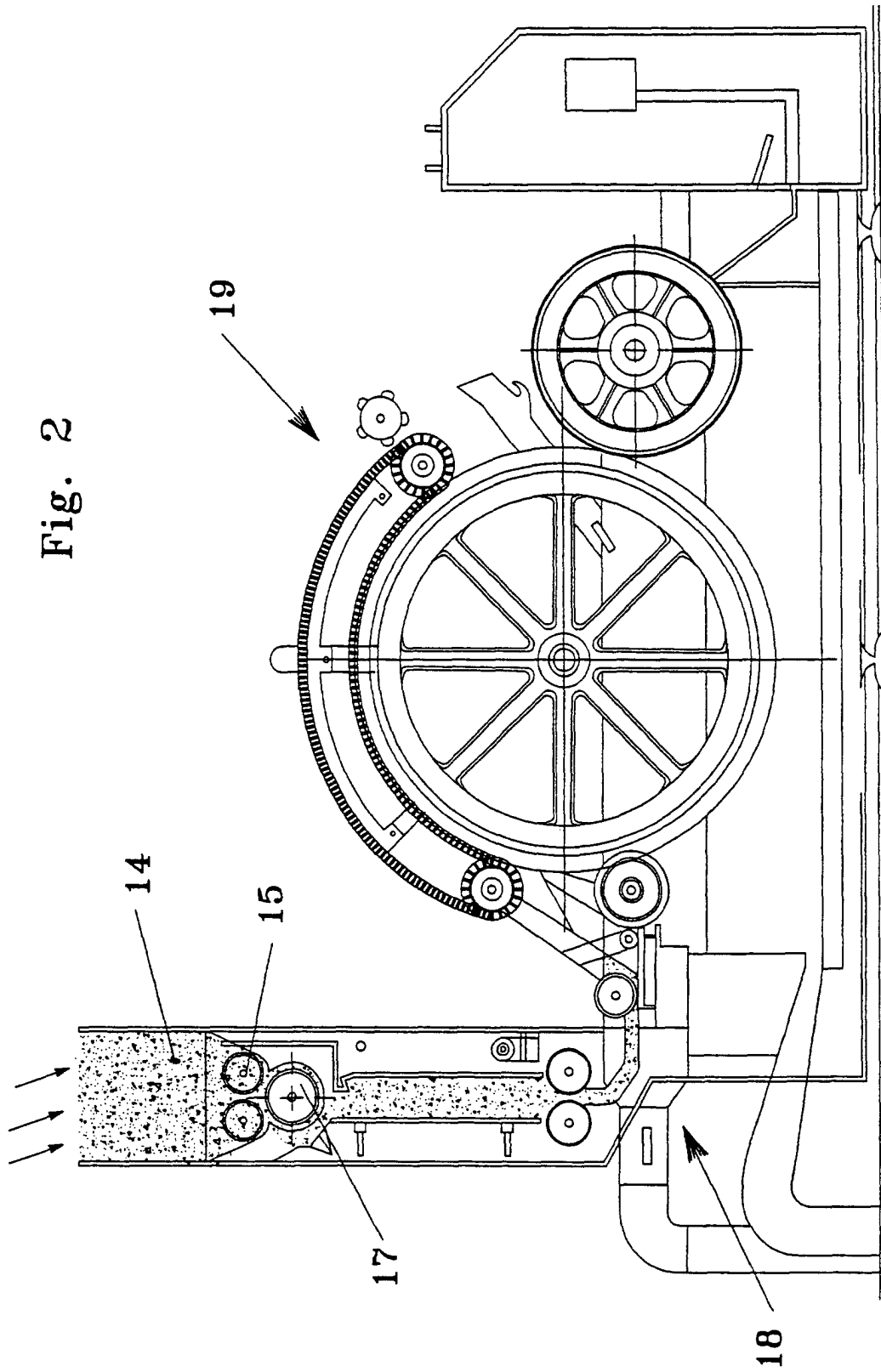


Fig. 3





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EUROPEAN SEARCH REPORT

Application Number
EP 01 20 4642

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		22 March 2002	D'Souza, J
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background D : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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