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(54) **Method and device for providing the back of a web of carpet, artificial turf and the like with a coating consisting of a hot melt**

(57) Method for providing the back of a web of carpet, artificial turf and the like with a coating. The web of carpet first passes through a preheating station, and after the carpet has been brought to temperature the web of carpet is fed to the coating station, the web of carpet first being compressed to a desired thickness. After that the web of carpet runs in the compressed state along the spray aperture of a spray head of a hot melt unit, where a hot melt such as a Vestoplast is applied as a coating to the back of the hot web of carpet. The compression of the web of carpet is then removed, and the web of carpet is then conveyed through an after-heating station. Both in the preheating station and in the after-heating station air is forced or sucked through the carpet transversely to the plane of the carpet. In the device for applying the coating the gap which determines how far the carpet is compressed is adjustable.

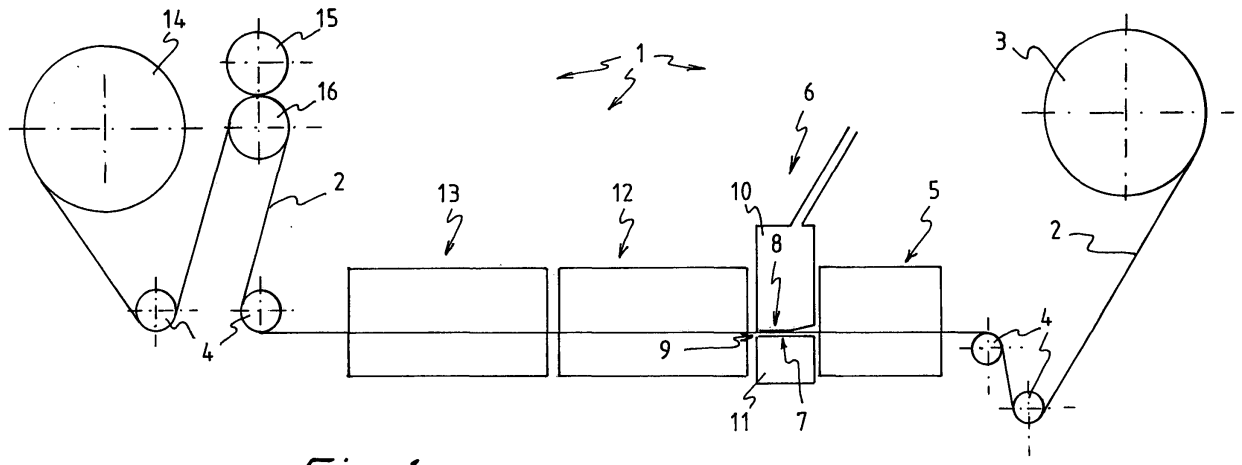

Fig:1

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Description

[0001] The invention relates to a method for providing the back of a web of carpet, artificial turf and the like with a coating, which carpet consists of a woven fabric or tufted fabric on which the loop-shaped yam ends, or pile, are provided in a known manner standing upright, cut or uncut, on the tufted fabric, and also relates to a device for applying a coating to the back of a web of carpet by means of a hot melt unit, which device consists of a number of stations through which the web of carpet can be conveyed by means of movement means.

[0002] Rolls of carpet serving to cover a floor of a room, and artificial turf serving as the surface for a number of games, such as hockey, football etc., are generally known, which rolls of carpet and artificial turf consist of a woven fabric or tufted fabric on which the loop-shaped yam ends, or pile, are provided in a known manner standing upright, cut or uncut, on the surface of the tufted fabric. In order to ensure that the yam ends, which often consist of several thin threads, are bound into each other and securely anchored on the tufted fabric, the back of the carpet is always provided with a coating. Until now a latex-based agent, with which the back of the carpet is coated, was generally used. After the coating has hardened, the yam ends are joined to the tufted fabric near the point where they stick through the tufted fabric. It is very important here for the thread ends to remain resilient, so that even after frequent crushing through foot traffic on the carpet, the thread ends recover to the original form, with the result that in areas where there is heavy foot traffic the carpet does not acquire a different appearance from that in areas with less foot traffic.

[0003] However, a number of products, such as hot melts, have now appeared on the market, and these can very expediently be used as coatings for the back of carpets, and have great advantages compared with the known latex coatings. The energy consumption for the application of a latex coating is many times higher than that for the application of a hot melt, owing to the fact that the latex applied contains a quantity of water which has to be removed by evaporation after application. This means that the application of a hot melt is many times cheaper than the application of a latex coating. Furthermore, a hot melt is less environmentally polluting because when carpet is burned the residual value of carpet with a hot melt coating is less than 3% and is therefore many times lower than when carpet with a latex coating is burned, so that destroying carpet with a hot melt coating incurs less cost than a piece of carpet with a latex coating.

[0004] It is important when using a hot melt as a coating to ensure that when the coating has been applied to the back of the carpet the extent of crushing of the carpet remains within a desired standard after the carpet has been crushed by a large amount of local foot traffic.

[0005] The object of the invention is to provide a method and a device by which the back of a web of carpet can be provided with a coating, which coating is a hot melt or the like, it being important for a carpet provided with such a coating to retain the desired resilience during a minimum desired period.

[0006] This object of the invention is achieved by a method in which the web of carpet is fed continuously by means of movement means to a device consisting of a preheating station, a coating station and an after-heating station, in which method the web of carpet first passes through the preheating station, where a part of the web of carpet is heated by means of heating means to a desired temperature over the full width of the carpet, in which the part of the web of carpet brought to temperature is then fed to the coating station, in which the web of carpet is first compressed to a desired thickness, after which the web of carpet is conveyed in the compressed state along the spray aperture of a spray head of a hot melt unit, with which hot melt unit a hot melt such as a Vestoplast, or another substance consisting of one or more components which serves as a coating, is applied at a desired temperature - at which temperature the hot melt has the desired fluidity - by means of the spray head over the desired width to the back of the hot web of carpet, so that the back or underside of the hot web of carpet is covered with a layer of the desired coating, in which the compression of the web of carpet is then removed when the web of carpet leaves the coating station, and in which the web of carpet is then conveyed through an after-heating station, where the carpet is kept at a desired temperature, after which the web of carpet is cooled.

[0007] It is ensured by these measures that the desired thickness of the layer of coating which has been applied can be determined very well, since said thickness depends on the degree of crushing of the web of carpet. It has been found that for the adhesion of the coating to the tufted fabric and the pile it is very important to ensure that before the coating is applied to the web of carpet the latter is already brought to a desired temperature, so that the hot coating to be applied does not cool down to such an extent that the viscosity changes, but that the coating which has been applied remains at approximately the same temperature, and thus retains the same fluidity, since it has been found that the coating which has been applied must be given sufficient time to remain fluid after it has been applied, so that it can subsequently flow out over the tufted fabric and the thread ends, for which purpose the web of carpet must also be kept at a certain desired temperature for a certain time after it has left the coating station. Owing to the fact that the yarns used are made up of a large number of thin threads, the threads will tend to be fluffy, so that if the threads are not sufficiently stiffened and fixed to the tufted fabric on the underside, the thread ends will easily become crushed and flattened if they are frequently subjected to pressure on the top side, as happens when there is foot traffic over the carpet. It has been found, however, that the thread ends, consisting of a bundle of very thin threads, are reinforced to such an extent that the pile of the carpet shows

very great resilience.

[0008] In a preferred embodiment of the method according to the invention, the method is such that both in the preheating station and in the after-heating station air is forced or sucked through the carpet transversely to the direction of feed of the carpet. In this way it is ensured that through the air flow in a relatively small space, heat sources such as infrared lamps or quartz lamps can be used, in which case the web of carpet can be brought very quickly to the desired high temperature, often lying between 130°C and 150°C, over the full depth, and a uniform temperature is obtained over the full depth of the web of carpet and, furthermore, the web of carpet is prevented from being heated at some places by the radiation from one of the heat sources to a temperature above which burning could occur at those places. This also ensures that in the preheating station the web of carpet is brought much more quickly to the same desired temperature gradually over the full depth, and is not heated more on the top or bottom side before the web of carpet goes into the coating station. In the after-heating station it is therefore ensured that the web of carpet remains at the desired high temperature for a certain desired period of time over the full depth of the carpet, so that the coating which has been applied is given time to penetrate to a desired depth into the carpet.

[0009] The object of the invention to apply a coating consisting of a hot melt to a web of carpet can be achieved with a device in that the device consists of a preheating station, a coating station and an after-heating station, in which the coating station consists of a hot melt unit and a gap, with a top wall and a bottom wall in the case of which the distance between the top wall and the bottom wall, or the passage height of the gap, is adjustable and the hot melt unit comprises a spray head or slot die, which spray head consists of a metal mould provided with a slot or slit which opens on the underside into an outflow aperture for the hot melt, which outflow aperture has a length corresponding to the width of the web of carpet to be treated, which outflow aperture opens into one of the two walls of the gap, and the other wall of the gap situated opposite the outflow aperture of the spray head is formed by a pressure bar or pressure plate, so that between the outflow aperture of the spray head and the plate a gap is formed, through which gap the web of carpet has to be fed, the distance between the two walls of the gap being adjustable to a desired distance by means of adjusting means, so that the through-feed height through the gap can be adjusted to the desired height.

[0010] With this device it is ensured that a web of carpet passing the spray head can be compressed in such a way that the quantity of coating which is applied corresponds to the desired quantity. It is important for the penetration not to be too great, in other words the coating should not penetrate too deeply into the carpet and no coating residues should ultimately be left lying on the surface of the back of the web of carpet.

[0011] The invention will be explained in greater detail below with reference to the drawing, in which:

Fig. 1 shows diagrammatically an arrangement of a device for applying a hot melt coating according to the invention;

Fig. 2 shows diagrammatically in section the preheating station, the coating station and the after-heating station;

Figs 3 and 4 show two possible embodiments of the coating station;

Fig. 5 shows in plan view the web of carpet being passed through the coating station.

[0012] Figure 1 shows diagrammatically a device 1, which serves to apply a hot melt coating to a web of carpet 2. The device 1 comprises a roll 3 on which the untreated web of carpet 2 is rolled. The web of carpet 2 is then guided by means of two guide rollers 4 to the preheating station 5, where the web of carpet 2 is brought to the desired temperature. After being brought to the desired temperature, the web of carpet 2 is subsequently fed to the coating station 6. In the coating station 6 the web of carpet is passed through a gap 7, which is bounded on the two sides by a wall 8 and 9, the wall 8 on the top side being formed by the spray head 10 of the hot melt unit (not shown here) and the other wall 9 on the underside being formed by a vertically adjustable pressure bar 11. In the coating station 6 the hot melt is applied to the back of the web of carpet 2 by means of the spray head 10, which on the underside has a narrow outflow aperture whose length corresponds to the width of the web of carpet. The distance between the two walls 8 and 9 of the gap 7 is set beforehand by means of the vertically adjustable pressure bar 11, so that the web of carpet is compressed to a certain depth. This is important because the outflow aperture of the spray head must be closed in such a way that the desired quantity of hot melt is left behind on the carpet, and an undesirable quantity of hot melt cannot therefore leak out. Thereafter, the web of carpet is guided through an after-heating station 12, where the web of carpet 2 provided with hot melt is still kept at a certain desired temperature during the throughput time, so that the hot melt has time to penetrate into the back of the carpet. The web of carpet 2 is then conveyed through a cooling station 13, where the web of carpet 2 is cooled to such a temperature that the web of carpet 2 can subsequently be rolled by way of a number of guide rollers 4 onto a roll 14. The web of carpet 2 is drawn through the device at the desired speed by means of two drive rollers 15, 16, which are driven by drive means (not shown here).

[0013] Figure 2 shows more diagrammatically a cross section of the part of the device consisting of the preheating station 5, the coating station 6 and the after-heating station 12. The web of carpet 2 is first guided into the preheating station, where the air is heated by means of a number of infrared lamps 17 and the heated air is then sucked through the web of carpet 2 by means of an ex-

traction box 18, which is provided below the web of carpet 2. The extracted air is recirculated to the top side of the web of carpet 2 (shown here by an arrow 19), so that the air circulates via a closed system, with the result that as little heat as possible is lost. The web of carpet is subsequently fed to the coating station 6. The coating station 6 is shown diagrammatically in section, the web of carpet being passed through a gap 7, and the path towards the gap 7 being funnel-shaped, so that the carpet is compressed gradually. The gap is bounded on the top side by the spray head 10, which consists of two parts, so that it is possible to adjust the feed of the hot melt to the outflow aperture 20 by way of a slot 21 by increasing or reducing the width of the slot 21. The outflow aperture 19 of the spray head 10 is wedge-shaped, so that the hot melt is in contact longer with the web of carpet 2. On the underside the slot is bounded by a pressure bar 11 which is vertically adjustable, so that the gap 7 through which the web of carpet 2 runs can be made broader or narrower. After the web of carpet 2 has passed the outflow aperture 19, the carpet still remains compressed for a short time, so that the hot melt which has been applied is spread out.

[0014] The web of carpet 2 is then fed to the after-heating station 12, where during its throughput time the web of carpet is held at temperature by means of a closed system, and by means of a second extraction box 22, which is placed underneath the web of carpet so that a vacuum is created, because on account of the coating which has been applied the web of carpet now allows hardly any air through, the air which is sucked through and around the web of carpet is recirculated (shown diagrammatically here by an arrow 23), while the air and the web of carpet 2 are heated on the top side by a number of infrared lamps 17, with the result that the hot melt, which is still slightly fluid, is drawn deeper into the carpet.

[0015] Figures 3 and 4 show in cross section two possible embodiments for guiding the web of carpet, artificial turf or the like, consisting of a woven fabric or tufted fabric 24, on which loop-shaped thread ends 25 or pile are provided in a known manner standing upright, cut or uncut, on the tufted fabric, in a compressed state along the outflow aperture 20 of the spray head 10. In Figure 3 the web of carpet 2 is guided through an adjustable gap 7, which is bounded on the underside by a vertically adjustable bar 11, while in Figure 4 the web of carpet is guided by means of a pressure roller 25 in the compressed state along the outflow aperture 20 of the spray head 10, and a small pressure bar 26 serves to keep the web of carpet still compressed after it has passed the outflow aperture 20 of the spray head 10, so that the layer of coating which has been applied is ultimately the desired thickness and is pressed more or less into the back of the carpet and the excess wiped off.

[0016] Figure 5 shows in plan view only the coating station 6, in which the web of carpet 2 is being guided through the gap 7, bounded on the top side by the spray head 10 of the hot melt unit and on the underside by the pressure bar 11.

Claims

1. Method for providing the back of a web of carpet, artificial turf and the like with a coating, which carpet consists of a woven fabric or tufted fabric on which the loop-shaped yam ends, or pile, are provided in a known manner standing upright, cut or uncut, on the tufted fabric, **characterized in that** the web of carpet is fed continuously by means of movement means to a device consisting of a preheating station, a coating station and an after-heating station, in which method the web of carpet first passes through the preheating station, where a part of the web of carpet is heated by means of heating means to a desired temperature over the full width of the carpet, **in that** the part of the web of carpet brought to temperature is then fed to the coating station, in which the web of carpet is first compressed to a desired thickness, after which the web of carpet is conveyed in the compressed state along the spray aperture of a spray head of a hot melt unit, with which hot melt unit a hot melt such as a Vestoplast, or another substance consisting of one or more components which serves as a coating, is applied at a desired temperature - at which temperature the hot melt has the desired fluidity - by means of the spray head over the desired width to the back of the hot web of carpet, so that the back or underside of the hot web of carpet is covered with a layer of the desired coating, **in that** the compression of the web of carpet is then removed when the web of carpet leaves the coating station, and **in that** the web of carpet is then conveyed through an after-heating station, where the carpet is kept at a desired temperature, after which the web of carpet is cooled.

2. Method according to Claim 1, **characterized in that** both in the preheating station and in the after-heating station air is forced or sucked through the carpet transversely to the plane of the carpet.

3. Method according to Claim 1 or 2, **characterized in that** both in the preheating station and in the after-heating station air at a certain desired temperature is forced or sucked through the carpet transversely to the direction of feed of the carpet, and other heat sources such as infrared lamps or quartz lamps are also used.

4. Device for applying a coating to the back of a web of carpet, artificial turf or the like by means of a hot melt unit, which device consists of a number of stations through which the web of carpet can be conveyed by means of movement means, **characterized in that** the device consists of a preheating sta-

tion, a coating station and an after-heating station, in which the coating station consists of a hot melt unit and a gap, with a top wall and a bottom wall in the case of which the distance between the top wall and the bottom wall, or the passage height of the gap, is adjustable and the hot melt unit comprises a spray head or slot die, which spray head consists of a metal mould with an outflow aperture for the hot melt, which outflow aperture has a length corresponding to the width of the web of carpet to be treated, which outflow aperture opens into one of the two walls of the gap, and the other wall of the gap situated opposite the outflow aperture of the spray head is formed by a pressure bar or pressure plate, so that between the outflow aperture of the spray head and the plate a gap is formed, through which gap the web of carpet has to be fed, the distance between the two walls of the gap being adjustable to a desired distance by means of adjusting means, so that the through-feed height through the gap can be adjusted to the desired height.

5. Device according to Claim 4, **characterized in that** the web of carpet remains compressed after the web has passed the outflow aperture of the hot melt.

6. Device according to one of Claims 4 or 5, **characterized in that** the feed towards the gap is funnel-shaped.

7. Device according to one of Claims 4, 5 or 6, **characterized in that** the outflow aperture of the spray head is wedge-shaped.

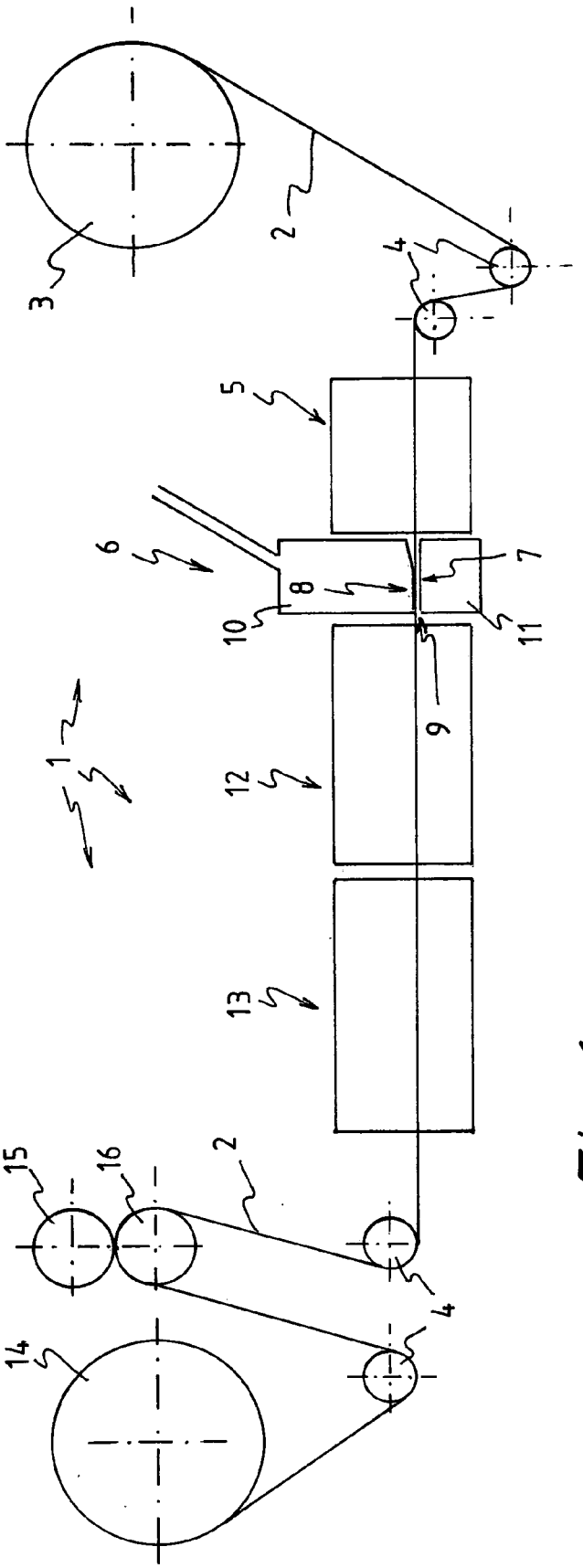

Fig:1

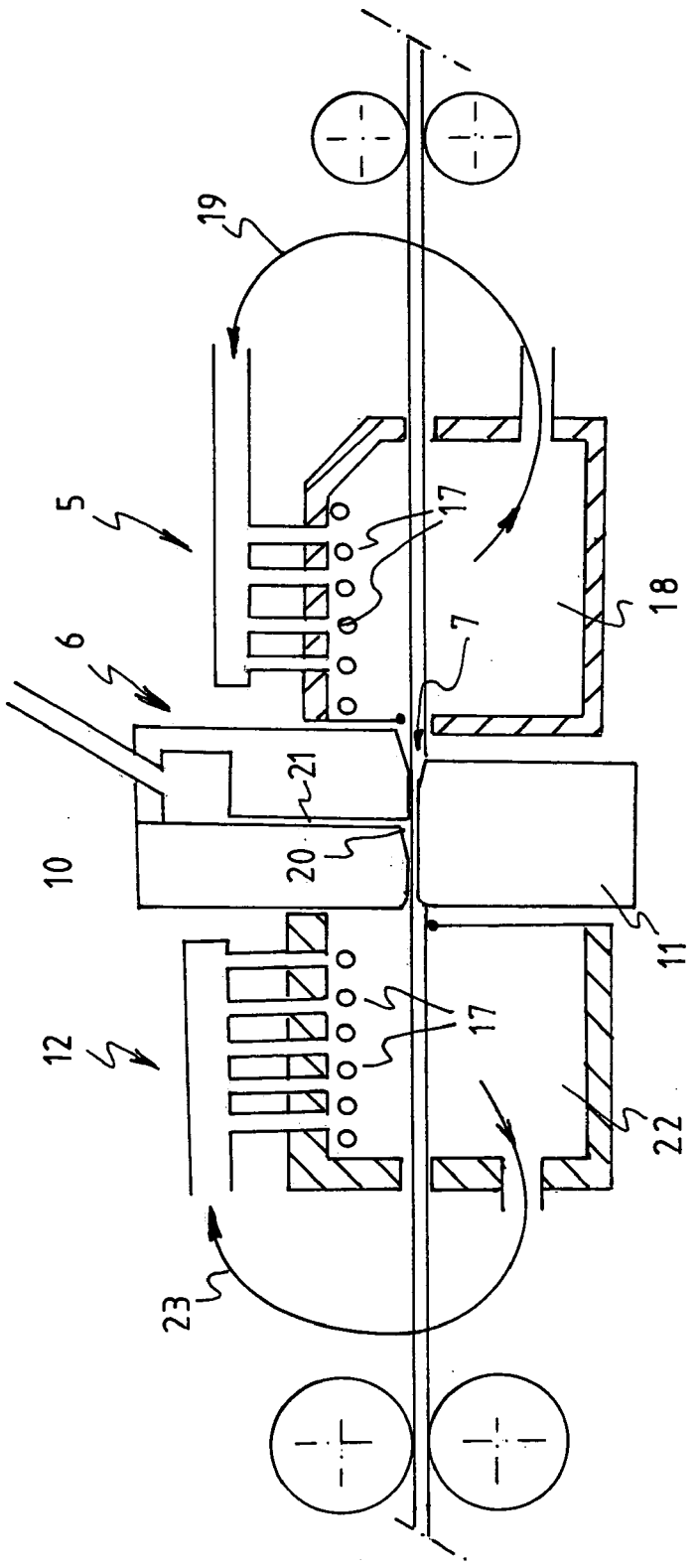

Fig: 2

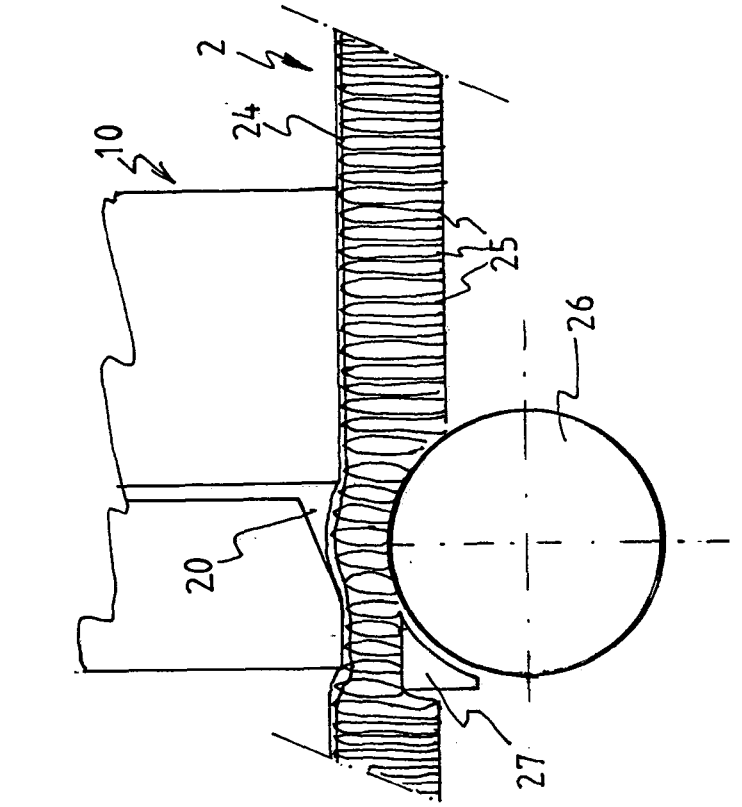

Fig: 4

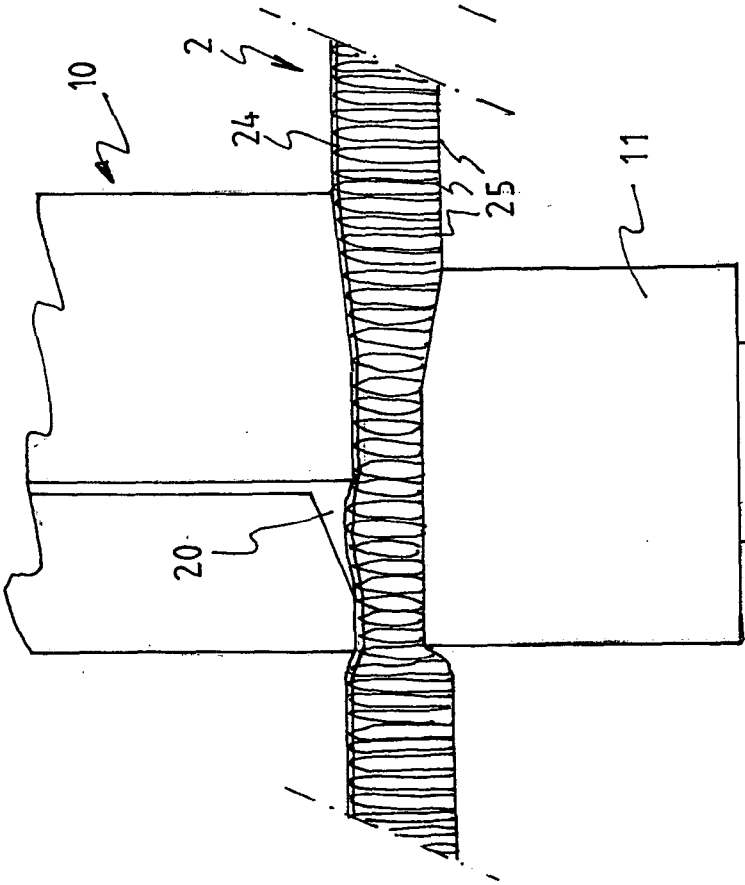

Fig: 3

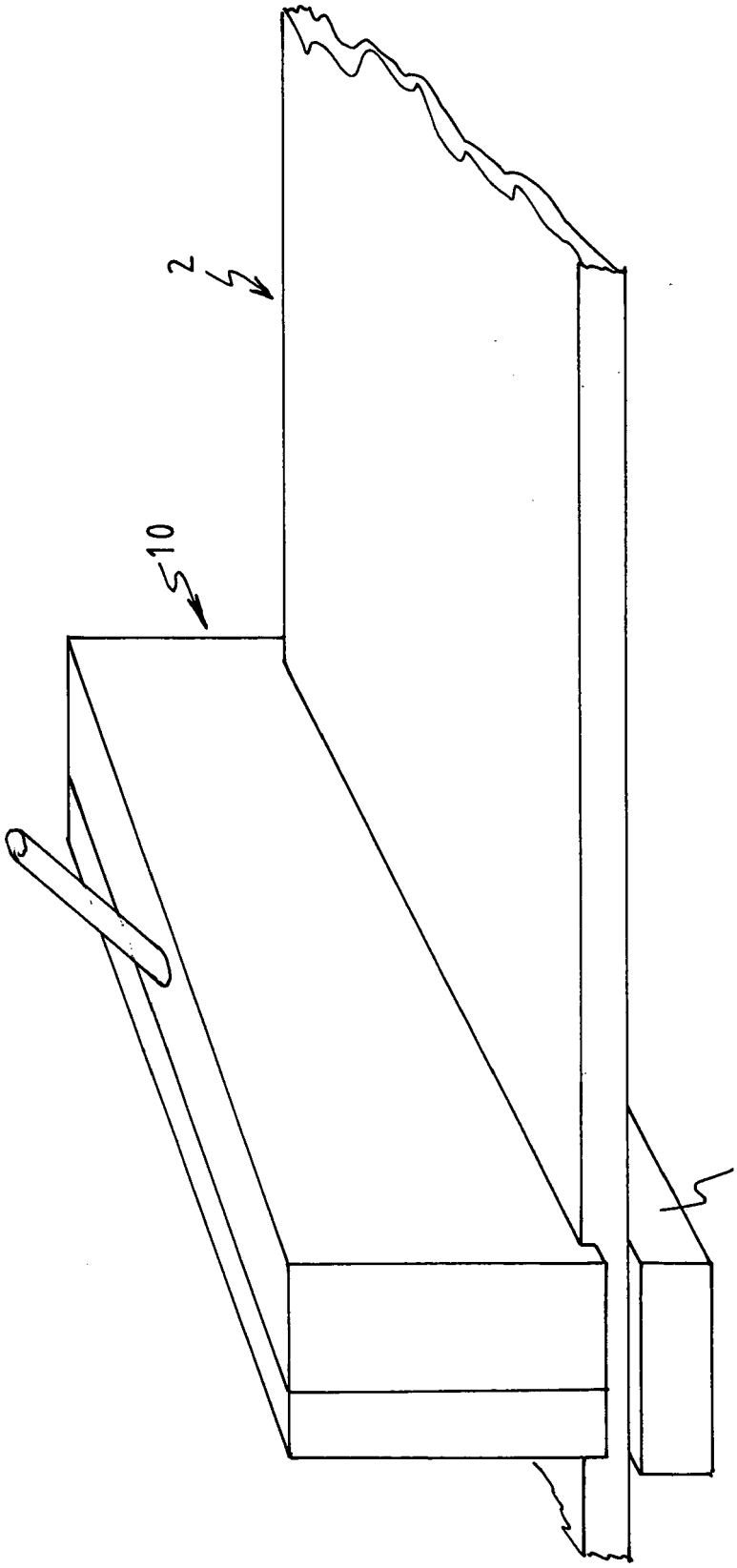

Fig.5

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EUROPEAN SEARCH REPORT

Application Number
EP 06 07 6522

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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
Munich	9 October 2006	Devriese, Karel

CATEGORY OF CITED DOCUMENTS

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