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(54) Method and apparatus for processing a mineral wool path.

(57) A method and an apparatus in the in the manufacture of mineral wool products from a path of mineral wool (1) by split cutting the mineral wool path (1) into two or several layers (6, 7) by split cuts which are parallel to the plane of the mineral wool path (1), which method and apparatus are useful in reducing the spreading of dust from the mineral wool products thereby provided, by vacuum exhausting loose fibres and other particles by means of vacuum means (9) introduced in between the layers (6, 7) formed by the split cutting, whereby the split surfaces (27, 28) just formed are vacuum cleaned, whereupon the layers (6, 7) are moved together again.

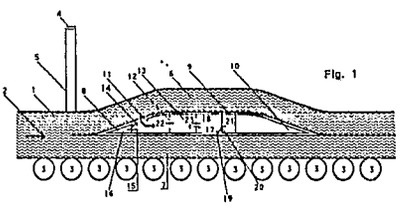

Fig. 1

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Description

Method and apparatus for processing a mineral wool path.

The present invention relates to a method in the manufacture of mineral wool products from a mineral wool path by splitting the mineral wool path into two or several layers by means of split cuts extending parallelly to the plane of the mineral wool path, which method is useful for reducing the spreading of dust from the ready products by exhausting loose fibres and other particles therefrom.

When handling of mineral wool products large or small amounts of dust are formed, which dust includes fibres, among other things. There is a general aim to minimize the amount of dust, including fibrous dust, to which working people are exposed, and the present invention is intended to solve this problem.

The invention is based on studies of the mechanisms which cause appearance of dust and also the mechanisms which can be used to prevent spreading of dust. These studies have shown that the air-borne dust which is produced when handling mineral wool mainly comprises thin, short mineral fibres. The studies also have shown that the air-borne fibres and other particles, which are produced, emanate from the surfaces of the mineral wool products.

There are three mechanisms which, separately or in combination, can keep a fibre in a mineral wool product and can prevent the fibre from becoming air-borne. Said mechanisms are:

- bindning
- fastening
- mechanical locking.

The binding is effected by means of a binding substance. The binder generally is a thermosetting resin which, in the shape of small drops, is distributed in the mineral wool products. If such a binder drop sticks to a fibre said fibre is prevented from becoming air-borne.

The fastening can be effected by means of a dust binding oil, which, in the form of a thin layer, covers large portions of the fibre surfaces. Two fibres which are in contact with each other, and one fibre of which has an oil film on its surface, get fastened to each other and said fastening generally is sufficient to prevent the fibre from becoming air-borne.

Investigations also have proved, however, that another type of fastening is of importance, namely an electrostatic fastening. The process of manufacturing mineral wool products includes a hardening stage in which the product and the binder of the product are heated to about 200°C, whereby the binder is finally hardened. During the hardening stage the product also becomes completely dried, and since the hardening stage is combined with a heavy gas flow through the products the fibres may become electrostatically charged. During the subsequent cutting and packing etc. of the mineral wool product said electrostatic charge is maintained and fibres which have become charged tend to be retained in the product. Upon storing and transporting of the product, however, becomes discharged and subsequently the fibres, which were once electrostatically fastened, then can become air-borne.

The third mechanism for keeping the fibres in the mineral wool mass is the mechanical one. A sufficiently long fibre will always be in contact with a large number of other fibres and said fibre will be kept in the product solely by means of friction and will be prevented from becoming air-borne.

The investigations also have shown that some fibres are so imperfectly fastened in the product, or not at all fastened, that they can easily be removed from the product in that the product is moved past a suction nozzle or a suction slot having a sufficient suction capacity. Other fibres and particles are so strongly fastened in the product that they can normally not at all be removed from the product. In between said two groups of fibres and particles there is a group of fibres and particles which can certainly not easily be removed from the product but which can still become air-borne, in particular after the electrostatic force has disappeared.

Different methods have been suggested for removing loose particles and fibres from the surfaces of mineral wool products. All such methods relate to processing of outer surfaces, i.e. surfaces which are facing the ambient air. Some types of processing, however, form surfaces of other type. When a mineral wool path is split into several parallelly moving mineral wool paths by means of vertical, longitudinal cuts the cut surfaces thereby formed are, on the contrary, facing each other. For such surfaces there is no obvious solution of the dust removal problem. Cut surfaces formed when the products are split are especially complicated to process.

A high efficiency in a mineral wool line causes high path speeds. This, in turn, necessitates high effiency of for instance cutting machines, i.e. the apparatus by means of which the path is divided by cuts extending perpendicularly to the longitudinal direction of the path. In order to reduce the advancing speeds of the paths it has in some cases been necessary to produce mineral wool paths having a double or even threefold thickness, which paths are later divided into paths having the correct thickness by means of so called split cuts. The split cuts are made by means of band saws or similar apparatus which provide horizontal cuts in the advancing mineral wool path.

It was formely believed that the dust which appears in said split cuts are formed by the use of dented saw blades. When starting to use non-dented saw blades, so called band knives, is has, however, shown that there is still appearing quite an amount of loose fibres and other particles in the split cut. Since it is a pre-requisite for a rational handling that the layers formed by the split cuts are handled in common since the layers are generally not separated until the products are to be used, there is a problem in removing dust etc., for instance by

vacuum cleaning, from said surfaces.

This problem is solved by the invention. Thus, the invention relates to a method and an apparatus of reducing the spreading of dust from the ready products in the manufacture of mineral wool products whereby a mineral wool path is split cut into two or more layers by means of split cuts which are parallel to the plane of the mineral wool path, and this is made by vacuum exhausting loose fibres and other particles from the cut surfaces. The invention is characterized in that vacuum cleaning means are introduced between the two layers formed by the cutting process, and said vacuum cleaning means vacuum clean the cut surfaces just formed, whereupon the layers are moved together again.

The vacuum cleaning of the cut surfaces is made more effective in that the surfaces are processed thereby facilitating the releasing of fibres and particles. A particularly suitable method of processing the cut surfaces is to blow air jets onto said surfaces.

Another method which has proved to be useful, and which is based on the observation that particles, especially fibres, of a surface are electrostatically charged, is a process of reducing the static charge of the particles. This is made by increasing the moisture, or by treating the surfaced with ionized radiation.

When the layers formed by the split cuts are moved apart, whereby two surfaces are exposed, said two surfaces are preferably processed in common or directly following each other.

After the loose fibres and other particles have been removed from the cut surfaces said surfaces are most prefebaly treated with dust binding substance.

Now the invention is to be described more closely in connection to the accompanying drawings 1-3, in which figure 1 shows a vacuum cleaning apparatus which is introduced in a split cut of a mineral wool path. Figure 2 shows a source of radiation in combination with a vacuum cleaning apparatus according to figure 1, and figure 3 shows another embodiment of the vacuum cleaning apparatus of figure 1.

In figure 1 numeral 1 stands for a mineral wool path which is moved in the direction of the arrow 2 on a roll conveyor 3. A band saw 4 rotating of wheels 5 splits the mineral wool path 1 into two layers 6, 7. A wedge 8 separates the two layers 6 and 7 thereby providing a space therebetween. In said space a vacuum cleaning means 9 is introduced, which means is in the form of an extended part of the wedge 8. The vacuum cleaning means 9 is ended by a tapering part 10, at the downstream side of which the two layers 6 and 7 are moved together. In the vacuum cleaning means 9 there is a suction opening 11, which over an opening 12 communicates with a suction channel 13. When the upper layer moves over the suction opening 11 a large amount of the fibres and other particles which are loosely present on the lower surface of said layer is removed. A part of the air which is exhausted passes through the mineral wool. Since said air flows out through the surface to be cleaned the air facilitates the releasing of fibres which are not strongly bound to the surface. This is also facilitated by an air jet 14 coming from an opening 15 of a suction box 16 which in this case is enclosed in the wedge 8. Similarly there is an opening 17 in the lower part of the vacuum cleaning means 9, which opening 17 over another opening 18 communicates with the suction channel 13. By the flow or air thereby provided at the upper surface of the lower mineral wool layer 7 loose fibres and other particles are removed from said surface. This removal is facilitated by means of an air jet 19 coming from a blower box 21 over an opening 20. For distributing the suction effect between the two openings 11 and 17 there are valves 22 and 23 in the openings 12 and 18.

In figure 2 there is shown how a source of radiation 24 is mounted downstream the wedge 8 for emitting radiation to the lower surface 27 of the upper layer 6 and the upper layer 28 of the lower layer 7 via openings 25 and 26 resp.

An air jet 31 coming from a blower box 29 via an opening 30 is directed to the lower surface 27 of the upper layer 6. A suction slot 32 which over an opening 33 acts on the lower surface 27 of the upper layer 6 communicates with a suction box 35. The air flow which is thereby induced from along the said surface 27 removes loose fibres and other particles from said surface 27. This removal is facilitated by the air jet 31.

Figure 3 shows a grid 39 which is mounted downstream a blower box 36 which via an opening 37 sends an air jet 38 against the upper surface 28 of the lower mineral wool layer 7. The upper mineral wool layer 6 moves over the grid 39. A similar grid 40 is mounted over the lower mineral wool layer 7. Over a nozzle 41 a dust binding substance is sprayed onto the lower surface 27 of the upper layer 6 and the upper surface 28 of the lower layer 7. Excess of aerosol, that is drops of the dust binding substance which have not become fastened on the surfaces, are transferred to a suction pipe 43 over an opening 42. Also the sides of the mineral wool layers 6 and 7 which are opposed to the nozzle 41 can be vacuum cleaned. The degree of ventilation is set by means of a valve 44. Downstream the suction pipe 43 there is a space 45 in which heater means 46 heat the surfaces 27 and 28 so that the solvent of the dust binding substance evaporates. The space 45 communicates with the suction pipe 43 over an opening 47. The degree of ventilation is set by means of a valve 48. After the dust binding substance has become dried the two layers 6 and 7 are moved together at 49.

The above described embodiments are only illustrating examples and the invention is restricted only by the wording of the appended claims.

Reference numerals

Figure 1

1 mineral wool path
2 (arrow)
3 roll conveyor
4 band saw
5 wheel
6 mineral wool layer

7 mineral wool layer
8 wedge
9 vacuum cleaning apparatus
10 tapering part
11 suction opening
12 opening
13 suction channel
14 air jet
15 opening
16 blower box
17 opening
18 opening
19 air jet
20 opening
21 blower box
22 valve
23 valve

Figure 2
24 source of radiation
25 opening
26 opening
27 lower surface
28 upper surface
29 blower box
30 opening
31 air jet
32 suction slot
33 opening
34 opening
35 suction box

Figure 3
36 blower box
37 opening
38 air jet
39 grid
40 grid
41 nozzle
42 opening
43 suction pipe
44 valve
45 space
46 source of heat
47 opening
48 valve
49 (combination point)

Claims

1. Method in the manufacture of mineral wool products from a path of mineral wool (1) by split cutting the mineral wool path (1) into two or several layers (6, 7) by cuts which are parallel to the plane of the mineral wool path (1), which method is useful in reducing the spreading of dust from the ready mineral wool products, by vacuum exhausting loose fibres and other particles, **characterized** in that a suction means (9) is introduced between the layers (6, 7) formed by the split cutting operation, the cut surfaces (27, 28) just formed are vacuum cleaned, and the layers (6, 7) are thereafter moved together again.

2. Method according to claim 1, **characterized** in that the cut surfaces (27, 28) are processed in connection to the vacuum cleaning for facilitating the releasing of fibres and particles.

3. Method according to claim 2, **characterized** in that the processing is made by a blowing action (36-40).

4. Method according to claims 1-3, **characterized** in that the splitted surfaces (26, 27) are treated in advance of the vacuum cleaning so that a static charge of particles in the surface is removed, for instance in that the moisture is increased, or in that the surfaces are treated with ionizing radiation.

5. Method according to claims 1-4, **characterized** in that the two split surfaces (27, 28), which are formed by the split cutting, are processed concurrently.

6. Method according to claims 1-5, **characterized** in that the split surfaces are treated with a dust binding substance (41-43) after having been vacuum cleaned.

7. Apparatus for executing the method according to any of the preceding claims in the manufacture of mineral wool products from a path of mineral wool (1) by split cutting the mineral wool path (1) into two or several layers (6, 7) by cuts which are parallel to the plane of the mineral wool path (1), which apparatus is useful in reducing the spreading of dust from the mineral wool products thereby provided, by vacuum exhausting loose fibres and other particles, **characterized** in that the apparatus comprises suction means (9) adapted to be introduced between the layers (6, 7) formed by the split cutting and intended for vacuum cleaning the split surfaces (27, 28) just formed and before said layers (6, 7) are moved together again.

8. Apparatus according to claim 7, **characterized** in that the suction means includes a vacuum cleaning apparatus (9) comprising and opening (11, 17) which communicates with a suction channel (13) over another opening (12, 18), and in that the apparatus further comprises a means (14, 19) for forming an air jet ejected from an opening (15, 20) of a blower box (16, 21), and valve means (22, 23) for distributing the suction effect.

9. Apparatus according to claims 7-8, **characterized** in that it comprises a source (24) of radiation adapted to irradiate the lower and upper surfaces (27, 28) of the mineral wool layers (6, 7).

10. Apparatus according to claims 7-9, **characterized** in that it comprises means for applying a dust binding substance on the lower and upper surfaces (27, 28) of the mineral wool layers (6, 7).

Fig. 1

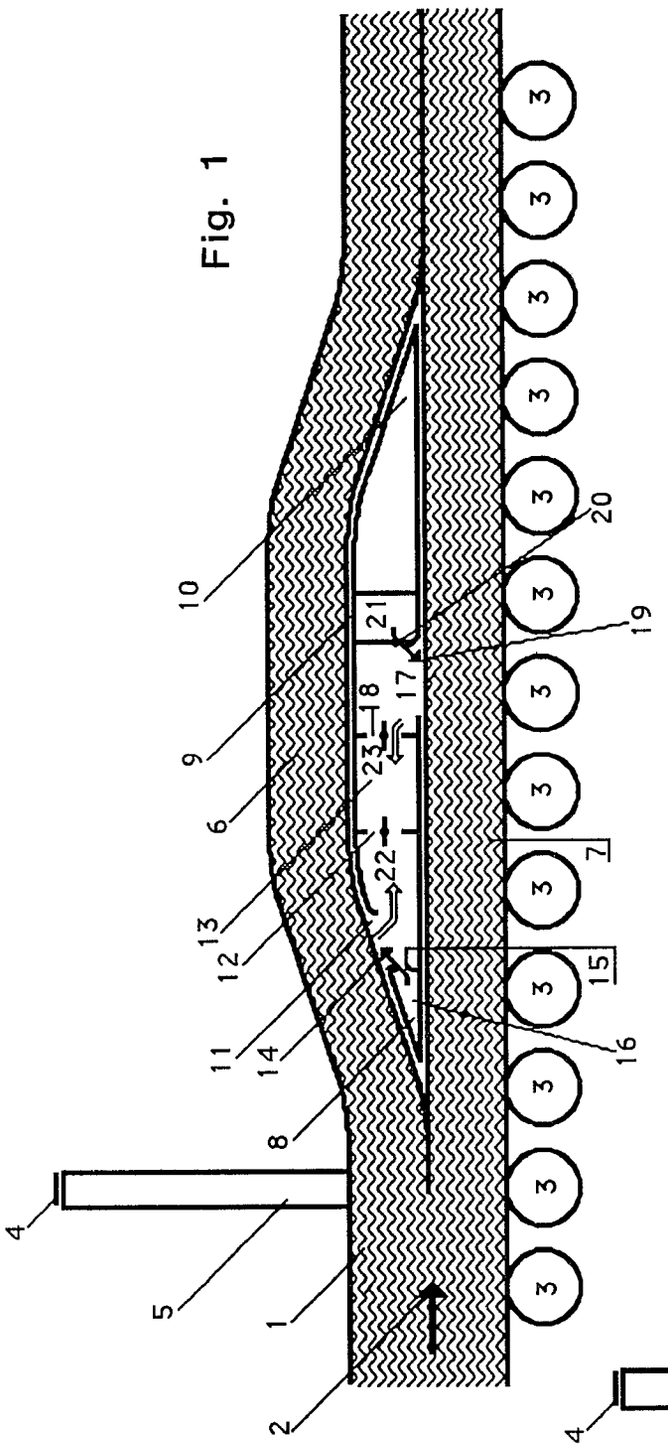
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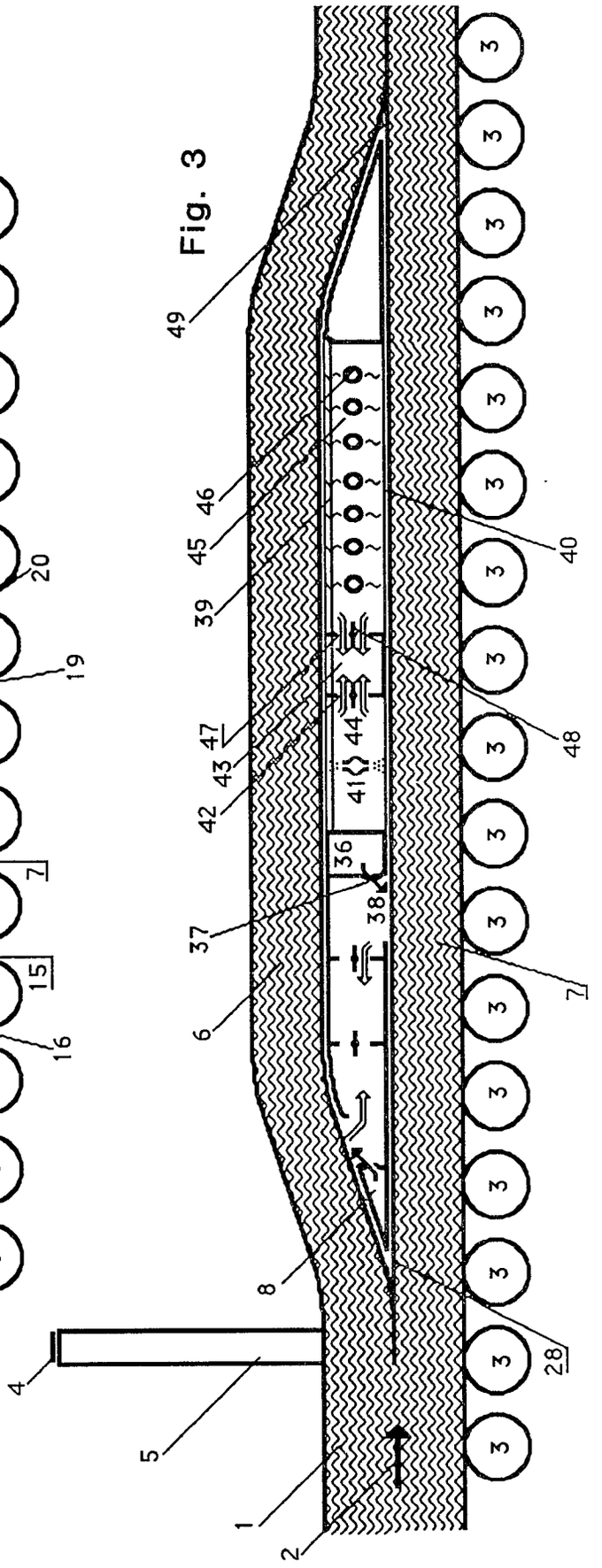
Fig. 3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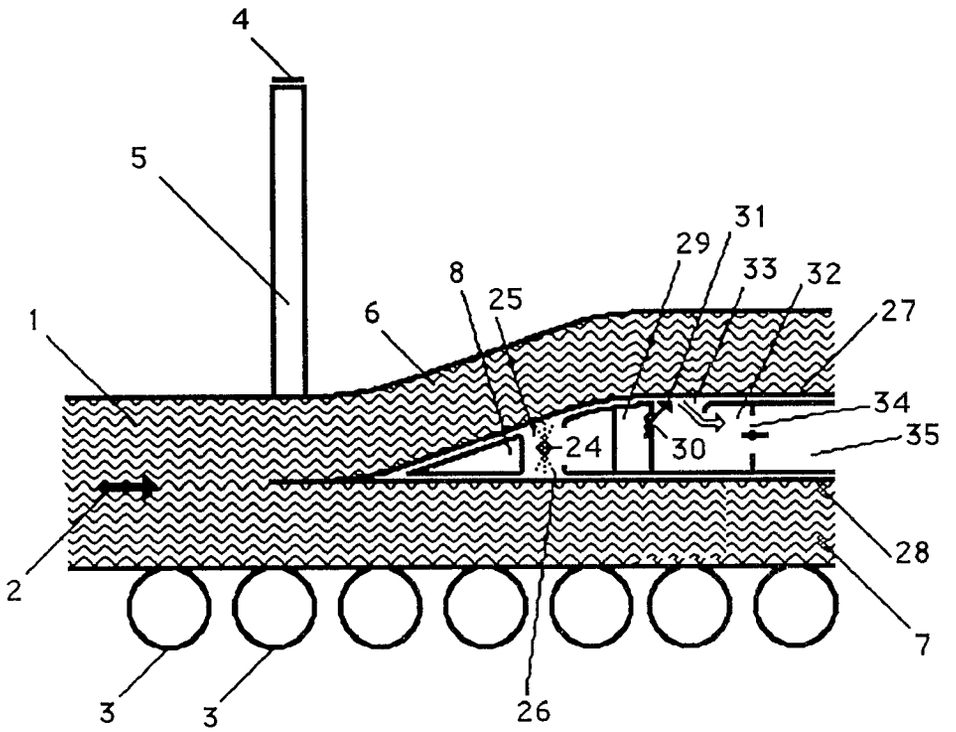

Fig. 2