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(54) Magazine for tubes of a textile machine

(57) The invention relates to a magazine for tubes (3) of a textile machine comprising a plurality of operating units situated next to each other and fitted with winding devices, an attending device (5) adapted at least to replace wound bobbins by empty tubes (3), and a conveyer (2) for tubes (3) situated along the machine length in parallel with the row of the winding devices, and a

device for moving the tubes (3) from their magazine to the conveyer (2) related to one end of the conveyer. The magazine (2) for tubes (3) consists of at least one additional tube conveyer (6) whose front end has related thereto a device for bringing the tubes (3) from the additional tube conveyer (6) to the main tube conveyer (2) for tubes (3).

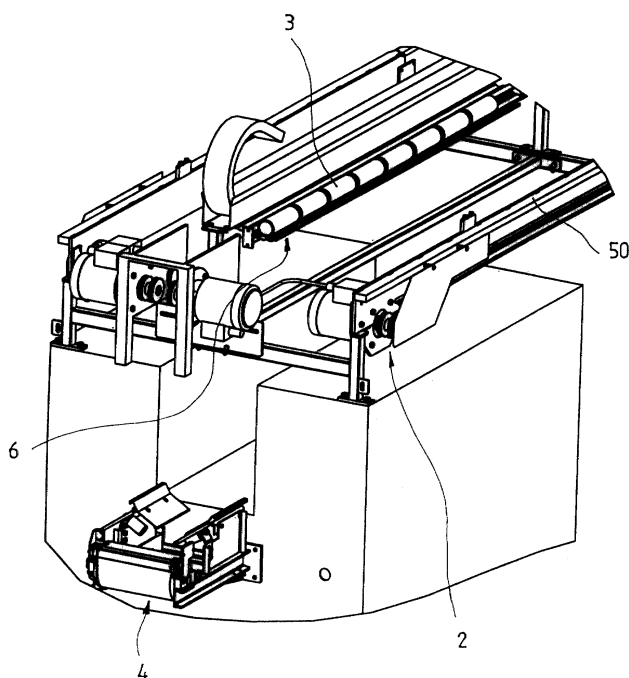


Fig. 1

Description

Technical field

[0001] The invention relates to a magazine for tubes of a textile machine comprising a plurality of operating units situated next to each other and fitted with winding devices, an attending device adapted at least to replace wound bobbins by empty tubes, and a tube conveyer situated along the machine length in parallel with the row of the winding devices, and a device for moving the tubes from their magazine to the conveyer related to one end of the conveyer.

Background art

[0002] For automatic replacement of wound bobbins on textile machines, it is necessary to ensure the supply of tubes into the attending device adapted to move along the row of operating units.

[0003] To comply with this task, well-known textile machines comprise an attending device with its own tube magazine, for instance as described in CZ 191 015 where the magazine contains a number of cylindrical tubes seated therein in oriented arrangement and released therefrom one by one for the depositing mechanism of the attending device. The drawback of this solution consists in particular in increased weight and dimensions of the attending device, difficult access for the operator for inserting the tubes into the magazine, and impossibility of using cones. Another drawback consists in the troubles of the tube releasing due to their accumulation.

[0004] In the course of development, the tube magazines situated on the attending device have been replaced by the magazine for at least one tube situated on the operating unit of the machine in combination with a tube conveyer moving along the machine length such as described for instance in CZ 246 547 or CZ 233 522 (GB 2,223,033). The drawback of the solution consists in that it is considerably complicated and therefore rather unreliable. The tubes are carried and transported on pins of the conveyer and slide on the tubes situated in the magazines. In absence of the tube in a magazine, the tube falls from the conveyer pin into the magazine. However, if the tube fails to fall as far as the bottom of the magazine and jams, the conveyer suffers breakdown.

[0005] Another well-known system of tube supply to the operating units is disclosed in CZ 241 392 and CZ 262 416.

[0006] In them, the system of the operating units is overhung by a trough type tube container fitted with a number of carriers connected with a step motor and serving to shift the tube on an empty place from its respective preceding place. Besides the complicated construction of the device, its drawback consists especially in the low speed at which the tubes are supplied to their

required operative positions. Since, when the place that has become empty lies at the end of the machine, all the tubes on the machine must be moved step by step, there is a real risk that at the next tube exchange no empty tube will be available on the operating unit in question.

[0007] For this reason, a method of supplying empty tubes to the winding stations of a textile machine has been developed and described in CZ 280 674 in which each tube is individually fed to the operating unit at which the doffing of a full bobbin takes place.

[0008] Except the variant of an attending device fitted with its own tube magazine, all the other devices need a tube magazine located at one machine end and comprising a case fitted with an endless tube transport means made in CZ 280 674 as containers situated over each other and coupled with a drive as well as a device for placing the tubes on a tube conveyer adapted to handle both cylindrical tubes and conical tubes. The magazine operates reliably but its drawback consists in too great a built-over surface.

[0009] The same drawback is found in other case-type tube magazines such as described for instance in US 4,865,260 whose magazine comprises an endless chain fitted with pins adapted to receive cylindrical or conical tubes.

[0010] In another well-known magazine disclosed in DE 44 40 015 A1 (patent application CZ PV 3273-94), the tubes are placed unordered but with mutually parallel axes. Between the place of their take-over and the magazine, they get arranged and are then taken over and transferred onto the tube conveyer. Like the preceding case-type conveyers, also this one increases the built-over surface, and besides, does not permit the use of cones.

[0011] The increase in the built-over surface involves problems in connection with the need to increase the volume of the tube magazine, dictated by the increase in the machine productivity, since the price of the built-over surface reduces the economic effect of the machines.

[0012] The invention intends to eliminate the drawbacks of the present state of art.

Principle of the invention

[0013] The drawbacks of the background art have been eliminated by the tube magazine of a textile machine whose principle consists in that the tube magazine consists of at least one additional tube conveyer whose front end has related thereto a device for bringing the tubes from the additional tube conveyer to the main tube conveyer.

[0014] The advantage of this solution consists in maintaining the tube supply precision and especially in a substantial reduction of the built-in area of the machine as compared with well-known spinning machines fitted with a tube magazine standing on the floor.

[0015] It is advantageous if the additional tube conveyor is parallel with the main tube conveyor which simplifies both the design and the manufacture of the tube magazine.

[0016] Empty tubes can be loaded on the tube conveyor manually or by means of a tube supply device which is preferably connected with the front end of the additional tube conveyor.

[0017] According to further subclaims, the tube supply device consists of a case-type tube magazine or of a slanting tube conveyor which enable the operator to lay tubes from the floor of the spinning shop and manage to transport tubes simply and reliably to the additional tube conveyor.

[0018] From the point of view of the construction and maintenance, it is advantageous if the additional tube conveyor is seated over the central part of the machine.

[0019] In all the above variants and their combinations, it is advantageous if the additional tube conveyor consists of a pair of endless belts situated next to each other whose mutual distance is in case of cylindrical tubes inferior to the diameter of the tubes to be transported.

[0020] For the cone transport, the additional tube conveyor consists of a pair of endless belts situated next to each other whose mutual distance is inferior to the greatest diameter of the cones to be transported, and at the same time equal or superior to the smallest diameter of the cones to be transported.

Description of the drawings

[0021] Examples of embodiment of the tube magazine according to the invention are schematically shown in the enclosed drawings in which Fig. 1 is an axonometric view of a textile machine with a tube magazine, Fig. 2 a view of the machine end (a cross section of the machine), and Fig. 3 a view of the machine with operating units arranged next to each other with a partial section in the upper part.

Examples of embodiment of the invention

[0022] A magazine for tubes 3 of a textile machine will be described in more details on the example of an automatic rotor spinning machine equipped with a plurality of operating units arranged next to each other and comprising a place 1 for a sliver can and a spinning unit 10 situated over it. Each operating unit also contains well-known not represented means for yarn draw-off and for monitoring the yarn quality and a not illustrated yarn winding device. Situated on each side of the spinning machine is one main conveyor 2 for tubes 3 arranged along the machine length in parallel with the row of winding devices of the side in question of the machine. The main conveyor 2 for tubes 3 is in one of well-known methods coupled with a drive. In the shown example of embodiment, the main conveyor 2 for tubes 3 consists

of a pair of endless belts 20 whose mutual distance is small enough to prevent the tubes 3 being transported, whether the cylindrical ones or the cones, from falling through between the endless belts 20. In a not illustrated example of embodiment, the main conveyor 2 for tubes 3 is made in another suitable manner.

[0023] The automatic rotor spinning machine is along the whole of its length fitted with a belt conveyor 4 for supplying wound bobbins from winding devices of the machine to one end of the machine where the wound bobbins are in one of the well-known methods taken from the belt conveyor 4 and in a suitable way placed for instance in pallets. In the shown example of embodiment, the belt conveyor 4 for the removal of wound bobbins is situated in the middle part of a double-sided automatic rotor spinning machine.

[0024] The automatic rotor spinning machine is also in a well-known way fitted with a system of guides 50 for at least one automatic attending device 5 adapted to travel on the guides 50 along the operating units of at least one machine side and to stop at any chosen operating unit. The automatic attending device 5 attends to the operating unit involving (the attendance of) the spinning unit 10 and its related yarn draw-off mechanism, for instance in the spinning process resumption after a yarn rupture, and (the attendance of) the winding mechanisms, i.e., the replacement of a wound bobbin by an empty tube and setting the wound bobbin on the belt conveyor 4 for removal of wound bobbins, etc. In the shown example of embodiment, the automatic rotor spinning machine is on each of its sides fitted with at least one independent attending device 5. In a not illustrated example of embodiment, the machine is further fitted with at least one independent device for attending to the spinning units and with at least one independent attending device for attending to the yarn winding devices. In another not illustrated example of embodiment, the spinning machine is fitted with at least one device for attending to the yarn winding devices, etc.

[0025] The automatic rotor spinning machine is equipped with at least one additional tube conveyor 6 for tubes 3 acting as a magazine of tubes 3 for each of the main conveyers 2 for tubes 3. The additional tube conveyor 6 for tubes 3 is preferably parallel with the main conveyor 2 for tubes 3 and is in a suitable manner connected with a drive. In the shown example of embodiment, the automatic rotor spinning machine comprises a pair of additional tube conveyers 6 for tubes 3 each of which serves as a tube magazine 3 for one main conveyor 2 for tubes 3, i.e., one additional conveyor 6 for tubes 3 for one main conveyor 2 for tubes 3. In this example of embodiment, the two additional conveyers 6 for tubes 3 are preferably situated over the central part of the automatic rotor spinning machine, i.e., over the belt conveyor 4 serving for the removal of wound bobbins. The front end of each additional conveyor 6 for tubes 3 has related thereto a not illustrated suitable device for bringing the tubes 3 from the additional conveyor

6 for tubes 3 to its related main conveyer 2 for tubes 3. The front end of each additional conveyer 6 for tubes 3 is also coupled with a not illustrated device for bringing the tubes 3 on the additional conveyer 6 for tubes 3 which can be made for instance as a case-type tube magazine or as a slanting tube conveyer, etc. However, the device for bringing the tubes 3 on the additional conveyer 6 for tubes 3 also can be fully omitted, and its function can be substituted for by the activity of the machine operator.

[0026] In the shown example of embodiment, the additional conveyer 6 for tubes 3 is made as a pair of endless belts 60 arranged next to each other whose mutual distance depends on the shape of the tubes 3 to be conveyed. If the tubes 3 to be conveyed are cylindrical tubes 3, the mutual distance between the two belts 60 is inferior to the diameter of the cylindrical tubes 3 so that the cylindrical tubes 3 are prevented from falling through between the belts 60 and need no help to rest on them. If the tubes 3 are cones 3, the mutual distance between the two belts 60 is inferior to the greatest diameter of the conveyed cones 3 and at the same time superior or equal to the smallest diameter of the conveyed cones 3 so that the cones 3 are prevented from falling through between the belts 60 and need no help to rest on them. In a not illustrated example of embodiment, the additional conveyer 6 for tubes 3 is made in another suitable manner.

[0027] In addition to being coupled with the drive, the additional conveyer 6 for tubes 3 and the main conveyer 2 for tubes 3 are coupled with a control device controlling the activity of each of the conveyers 2, 6 for tubes 3 which can consist for instance of the control device of the automatic rotor spinning machine or of another suitable device.

[0028] The magazine for tubes 3 according to the invention operates as follows:

[0029] The additional conveyer 6 for tubes 3 receives, beginning at its front end, empty tubes 3 that are led to it and there one by one deposited. In this phase the additional conveyer 6 for tubes 3 moves in the direction from its front end to its rear end. The additional conveyer 6 for tubes 3 thus gets filled with empty tubes 3. When a full bobbin is to be replaced by an empty tube 3, the device for moving the tubes 3 from the additional conveyer 6 for tubes 3 to the main conveyer 2 for tubes 3 moves the tube 3 situated at the front end of the additional conveyer 6 for tubes 3 on the main conveyer 2 for tubes 3, and the main conveyer 2 for tubes 3 brings said tube 3 to the attending device 5. A new tube 3 is placed on the emptied place of the additional conveyer 6 for tubes 3. If a number of tubes 3 is to be brought from the additional conveyer 6 for tubes 3 on the main conveyer 2 for tubes 3 immediately after each other, the procedure consists in that the device for moving the tubes 3 from the additional conveyer 6 for tubes 3 to the main conveyer 2 for tubes 3 moves one by one the tubes 3 and places them one by one on the main conveyer 2 for

tubes 3. After each taking of one tube 3, the additional conveyer 6 for tubes 3 moves back each time by one tube 3, i.e., the additional conveyer 6 for tubes 3 moves in the direction from its rear end to its front end thus setting at the front end of the additional conveyer 6 for tubes 3 the next tube 3 which thus gets into reach of the device for moving the tubes 3 from the additional conveyer 6 for tubes 3 on the main conveyer 2 for tubes 3. Due to the successive taking (withdrawal) of the tubes 3, the additional conveyer 6 for tubes 3 gets emptied from its rear end. As soon as there is no need of moving further tubes 3 from the additional conveyer 6 for tubes 3 on the main conveyer 2 for tubes 3, the additional conveyer 6 for tubes 3 receives new tubes which are deposited at the front end of the additional conveyer 6 for tubes 3. After each depositing of one new tube 3, the additional conveyer 6 for tubes 3 moves in the direction from its front end to its rear end. In view of the relatively great machine length, the additional conveyer 6 for tubes 3 can hold a great number of tubes 3 so that the machine has at all times a very quickly and effectively accessible supply of tubes 3 for a sufficiently long time of its activity.

Claims

1. A magazine for tubes of a textile machine comprising a plurality of operating units situated next to each other and fitted with winding devices, an attending device adapted at least to replace wound bobbins by empty tubes, and a tube conveyer situated along the machine length in parallel with the row of the winding devices, and a device for moving the tubes from their magazine to the conveyer related to one end of the conveyer, **characterized by** that the tube magazine (3) consists of at least one additional tube conveyer (6) whose front end has related thereto a device for bringing the tubes (3) from the additional tube conveyer (6) to the main tube conveyer (2) for tubes (3).
2. A magazine for tubes as claimed in Claim 1, **characterized by** that the additional conveyer (6) for tubes (3) is parallel with the main conveyer (2) for tubes (3).
3. A magazine for tubes as claimed in Claim 1 or 2, **characterized by** that the front end of the additional conveyer (6) is connected with a supply device for tubes (3).
4. A magazine for tubes as claimed in Claim 3, **characterized by** that the supply device for tubes (3) consists of a case-type tube magazine for tubes (3).
5. A magazine for tubes as claimed in Claim 3, **characterized by** that the the supply device for tubes (3) consists of a slanting conveyer for tubes (3).

6. A magazine for tubes as claimed in any of Claims 1 to 5, **characterized by** that the additional conveyor (6) for tubes (3) is seated over the central part of the machine.

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7. A magazine for tubes as claimed in any of Claims 1 to 6, **characterized by** that the additional conveyor (6) for tubes (3) consists of a pair of endless belts (60) situated next to each other whose mutual distance is inferior to the diameter of the tubes (3) to be transported.

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8. A magazine for cones as claimed in any of Claims 1 to 6, **characterized by** that the additional conveyor (6) for tubes (3) consists of a pair of endless belts (60) situated next to each other whose mutual distance is inferior to the greatest diameter of the tubes (3) to be transported and at the same time superior or equal to the smallest diameter of the cones (3) to be transported.

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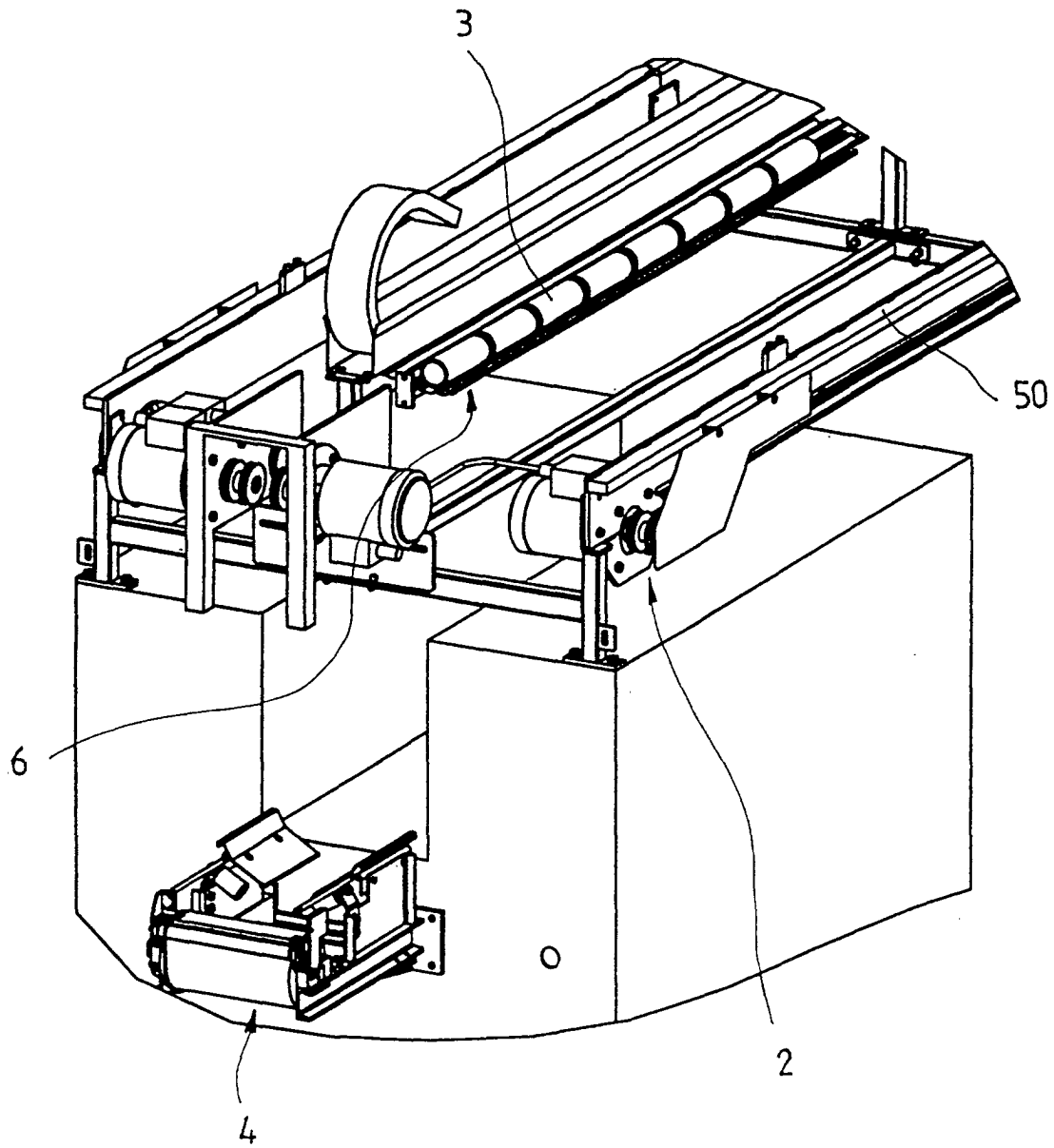


Fig. 1

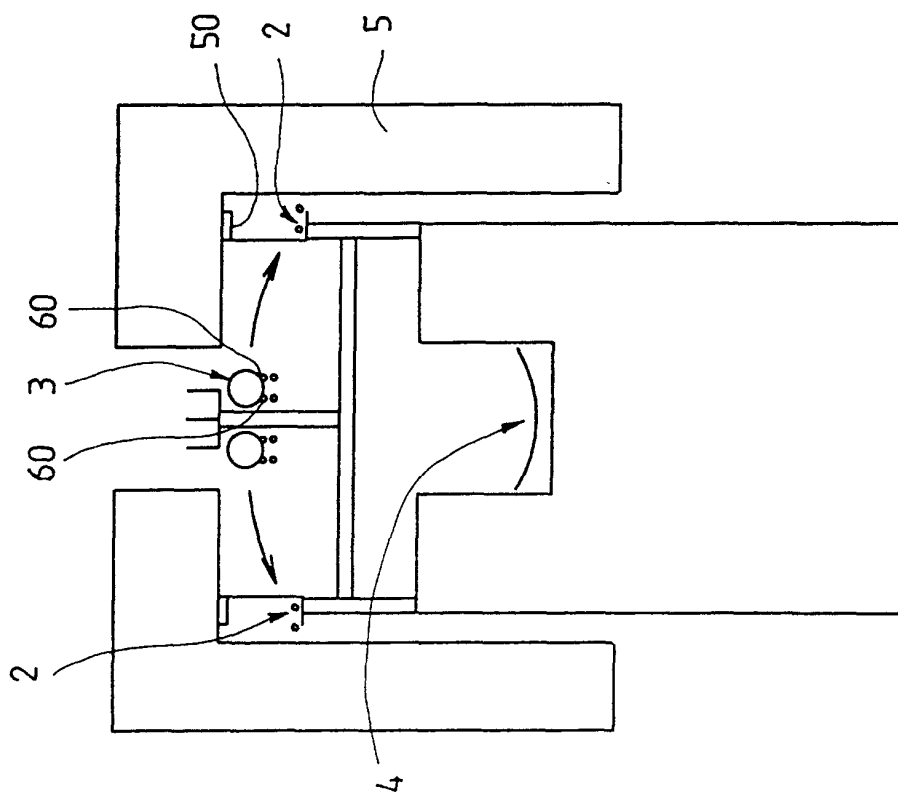


Fig. 2

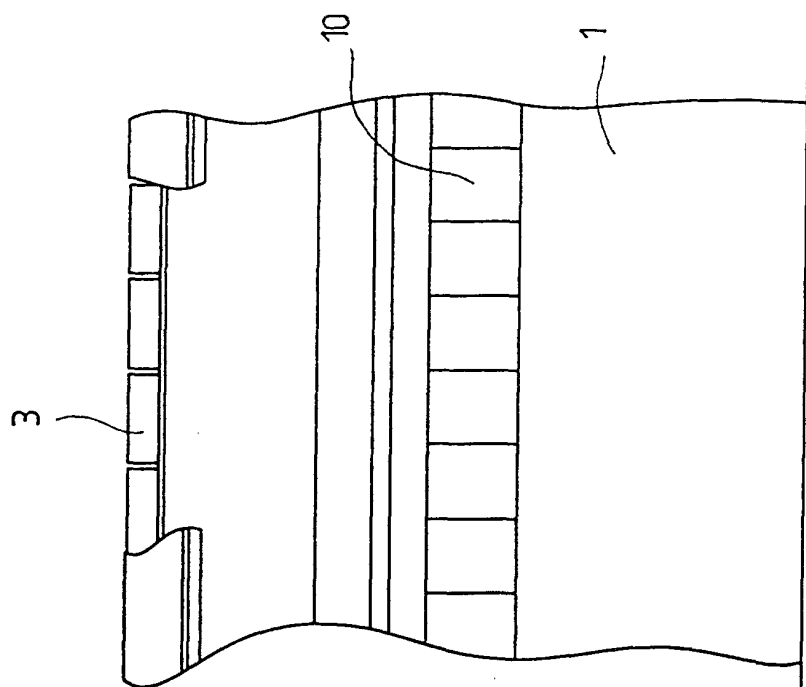


Fig. 3