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<div>(71) Applicant: Vyzkumny Ustav Textilnich Stroju</div> <div>Liberec a.s.</div> <div>461 19 Liberec (CZ)</div>	<div>(74) Representative: Musil, Dobroslav, Dipl.-Ing.</div> <div>Cejl 38</div> <div>602 00 Brno (CZ)</div>

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Microwave drier for fabrics

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The invention relates to a microwave drier for fabrics (5) comprising an active plate (20) and a reflecting plate (21) between which there is situated a drying area (A) for the passage of the fabric (5), the drier also comprising at least one microwave radiation generator, a carrier device for fabrics (5), means for supplying cool-

ing air to the microwave radiation generator, and delivery means (12) for air saturated by the liquid being removed by drying from the fabric (5), in which the active plate (20) and the reflecting plate (21) are situated at a mutual distance corresponding to an odd multiple of a half of the wavelength of the microwave radiation applied.

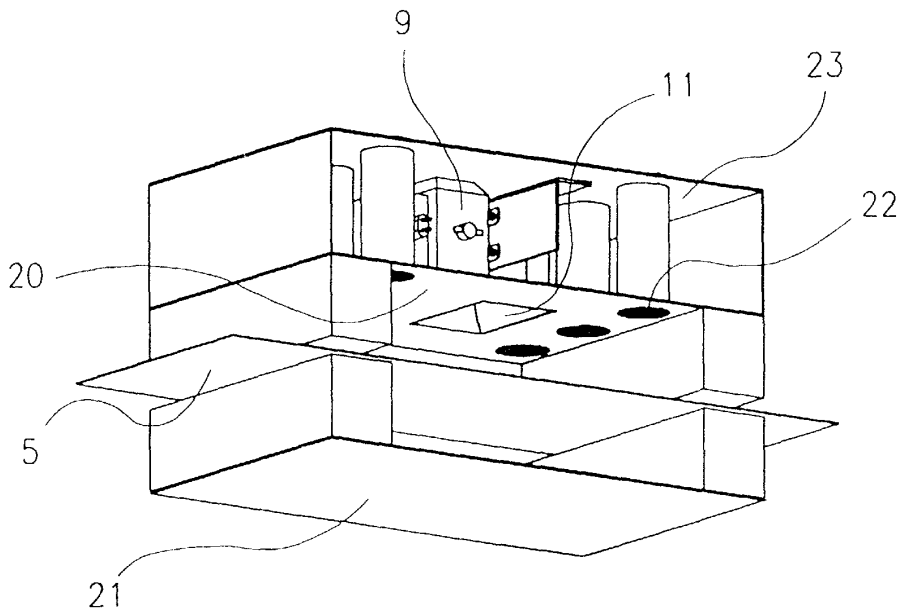


Fig. 4

Description

Field of the invention

[0001] The invention relates to a microwave drier for fabrics comprising an active plate and a reflecting plate between which there is situated a drying area for the passage of the fabric, the drier also comprising at least one microwave radiation generator, a carrier device for fabrics, means for supplying cooling air to the microwave radiation generator, and delivery means for air saturated by the liquid being removed by drying from the fabric.

Background art

[0002] There are known microwave driers for fabrics comprising an active plate and a reflecting plate parallel to each other and having an area there between for the passage of the fabric. The active plate is equipped with inputs of microwave radiation emitted by well-known generators such as megatrons seated in the construction of the drier. The reflecting plate of the drier serves to reflect the microwave radiation penetrated through the fabric in process of drying back on the fabric from its other side. The drier also contains means for supplying cooling air and delivery means for air saturated by the liquid being removed by drying from the fabric. The drier also contains protective means preventing microwave radiation from penetrating into the surroundings of the drier such as suitable attenuators or absorbers of the microwave radiation.

[0003] The drawback of the existing microwave driers consists in the insufficient energetic efficiency of the microwave drying of fabrics since the microwave energy is absorbed not only in the fabric but to a considerable extent in the walls of the drier.

[0004] The invention aims at increasing the energetic efficiency of the microwave drying of fabrics.

Principle of the invention

[0005] The goal of the invention has been reached by a microwave drier for fabrics whose principle consists in that the active plate and the reflecting plate are situated at a mutual distance corresponding to an odd multiple of a half of the wavelength of the microwave radiation applied.

[0006] This arrangement of the microwave drier for fabrics generates between the active plate and the reflecting plate a stationary wave having its maximum in the plane of the fabric being dried and with an intensity vector of the field produced by the microwave radiation oriented in parallel with the fabric being dried, thus improving the exploitation of the microwave radiation energy for the drying of fabrics.

[0007] From the point of view of the optimum drier design it is advantageous if the active plate and the reflect-

ing plate are situated at a mutual distance corresponding to three times the half of the wavelength of the microwave radiation applied.

[0008] From the point of view of a simple and efficient design of the microwave drier it is advantageous if the reflecting plate is continuous while the active plate is fitted with a system of holes out of which one section connects the drying area with the delivery system for the air saturated by the liquid being removed by drying from the fabric while the other section connects the drying area with the microwave radiation generators.

[0009] To permit the setting of the drier for creating the stationary wave it is advantageous if at least one plate out of the pair: active plate - reflecting plate is seated adjustably in relation to the other plate which permits for instance to set the whole drier according to the actual parameters or deviations of the applied microwave radiation source.

[0010] To optimize the fabric drying with efficient exploitation of the microwave radiation energy, especially in case of the fabric bowing, it is advantageous if the active plate and the reflecting plate are arranged as jointly adjustable relative to the feed plane of the fabric passing through the drying area.

[0011] In one preferred embodiment, the feed plane of the fabric passing through the drying area can be defined as a plane passing through the contact line of the feed rollers situated in front of the drying area and through the contact line of the delivery

Description of the drawings

[0012] The invention is schematically shown in the drawing in which Fig. 1 shows the arrangement of the microwave drier for fabrics, Fig. 2 the microwave drier for fabrics with removed part of its upper section, Fig. 3 a detail of the arrangement of the microwave drier for fabrics in the section in the view from above, and Fig. 4 a detail of the arrangement of the microwave drier for fabrics in the section in the view from below.

Examples of embodiment of the invention

[0013] The microwave drier for fabrics 5 comprises a frame 1 having seated thereon the other functional parts of the drier. The drier comprises a pair of spaced apart guidings 2 for chains 3 fitted with carrier members 4 for feeding the fabric 5 through the drying area A of the drier. Each lateral side of the drying area A is equipped with one system of guidings 2 and chains 3 while the upper and the lower part of the drying area A are defined respectively by an active plate 20 and by a reflecting plate 21 arranged mutually parallel and spaced apart.

[0014] The active plate 20 comprises through holes one part of which leads to delivery means 12 for air saturated by the liquid being removed by drying from the fabric 5. The delivery means 12 can consist for instance of tubes. The outlet apertures 13 of the delivery means

are connected with a system of parallel flat outlet channels 7 which are in their turn connected with a collecting duct 8 situated on one lateral wall of the drier and used to let the air saturated by the liquid being removed by drying from the fabric 5 outside the drier. The delivery means 12 are fitted with microwave radiation attenuators 22 for preventing the microwave radiation from penetrating into the surroundings of the drier. For the same reason, attenuators 10 of microwave radiation are arranged on the front and rear sides of the drier, i.e., on the sides of the inlet into, and outlet out of, the drying area A. The other part of the through holes in the active plate 20 is followed by waveguides 11 situated substantially perpendicular to the active plate 20 and used to bring into the drying area microwave radiation emitted by suitable generators such as magnetrons 9 seated in the upper part of the drier, for instance on the upper part of the active plate 20 in the shown example of embodiment, and coupled with the waveguides 11.

[0015] The reflecting plate 21 is continuous, i.e., without interruptions.

[0016] The lateral side of the drier opposite the collecting duct 8 is followed by an area for microwave radiation generators and for a supply 6 of cooling air for the microwave radiation generators.

[0017] The active plate 20 and the reflecting plate 21 are spaced apart at a distance corresponding to an odd multiple of a half of the wavelength of the microwave radiation applied in free space. To obtain optimum drying effect with relation to the design arrangement of the drier, it is advantageous if the mutual distance between the active plate 20 and the reflecting plate 21 corresponds to three times the half of the wavelength of the microwave radiation applied in free space.

[0018] In the shown example of embodiment, the active plate 20 is situated on the upper side of the drying area A while the reflecting plate 21 is situated on the lower side of the drying area A. In a not represented example of embodiment, the active plate 20 is situated on the lower side of the drying area A while the reflecting plate 21 is situated on the upper side of the drying area A.

[0019] The effect of the arrangement of the drier according to the invention is such that the microwave radiation emitted for instance by magnetrons 9 is led by waveguides 11 into the drying area A, passes through the fabric being dried, hits the reflecting plate 21, bounces back and returns to the fabric from its other side. A stationary wave reaching its maximum in the plane of the fabric 5 being dried is generated between the active plate 20 and the reflecting plate 21, and the intensity vector of the field generated by the microwave radiation is oriented in parallel with the fabric being dried. This improves the exploitation of the microwave radiation energy for drying fabrics 5.

[0020] The mutual distance between the active plate 20 and the reflecting plate 21 can be either constant or adjustable by rendering at least one of the plates 20, 21

adjustable to the other one 21, 20 which permits to set the two plates 20, 21 so as to obtain in each case the generation of a stationary wave in whose maximum the intensity vector of the field generated by the microwave radiation is oriented in parallel with the fabric 5. This is advantageous in particular for setting the drier in accordance with the real parameters of the applied microwave radiation source such as the magnetron 9 or magnetrons 9, etc. Said maximum of the stationary wave is generated at the mid-distance between the two plates 20, 21. The width of the area of the maximum of the stationary wave is in the order of centimeters and care must be taken to ensure that the fabric 5, or the feed plane of the fabric 5 passing through the drying area A as defined by the feed device of the fabric 5, is situated in said area. [0021] To permit in case of need the fabric 5 to be re-installed into the area of the maximum of the stationary wave, the active plate 20 with the means seated thereon and the reflecting plate 21 are in common adjustable in the direction of the arrow C relative to the feed plane R of the fabric 5 passing through the drying area A.

[0022] In the example of embodiment shown in Fig. 5, the feed device of the fabric 5 consists of a pair of feed rollers 23 situated in front of the drying area A and of a pair of delivery rollers 24 situated behind the drying area A. The fabric 5 passes through the contact line between the rotating feed rollers 23 and delivery rollers 24 (see the arrows B) so that the feed plane R of the fabric 5 passing through the drying area A is determined by the plane defined by the contact line of the feed rollers 23 and by the contact line of the delivery rollers 24.

[0023] In a not represented example of embodiment, the feed device of the fabric 5 is made as another suitable device consisting for instance of needle chains, clamp chains, etc., adequately adapted for use in the microwave drier of fabrics 5 which lies within the current knowledge of those skilled in the art.

[0024] The invention is not limited to the shown and/or described embodiments but can be within the current knowledge of those skilled in the art applied also to other arrangements here not expressly mentioned.

Industrial applicability

[0025] The invention can be applied in particular to the industrial drying of fabrics during their production process.

Claims

1. Microwave drier for fabrics comprising an active plate and a reflecting plate between which there is situated a drying area for the passage of the fabric, the drier also comprising at least one microwave radiation generator, a carrier device for fabrics, means for supplying cooling air to the microwave radiation generator, and delivery means for air sat-

urated by the liquid being removed by drying from the fabric, **characterized by** that the active plate (20) and the reflecting plate (21) are situated at a mutual distance corresponding to an odd multiple of a half of the wavelength of the microwave radiation applied. 5

2. Microwave drier as claimed in Claim 1, **characterized by** that the active plate (20) and the reflecting plate (21) are situated at a mutual distance corresponding to three times the half of the wavelength of the microwave radiation applied. 10
3. Microwave drier as claimed in any of Claims 1 or 2, **characterized by** that the reflecting plate (21) is full (continuous) without interruptions while the active plate (20) is fitted with a system of holes out of which one section connects the drying area (A) with the delivery system for the air saturated by the liquid being removed by drying from the fabric (5) while the other section connects the drying area (A) with the microwave radiation generators. 15 20
4. Microwave drier as claimed in any of Claims 1 to 3, **characterized by** that at least one of the of the pair: active plate (20) - reflecting plate (21) is seated adjustable relative to the other plate (21, 20). 25
5. Microwave drier as claimed in any of Claims 1 to 4, **characterized by** that the active plate (20) and the reflecting plate (21) are arranged jointly adjustable relative to the feed plane (R) of the fabric (5) passing through the drying area (A). 30
6. Microwave drier as claimed in Claim 5, **characterized by** that the feed plane (R) of the fabric (5) passing through the drying area (A) is determined by the plane defined by the contact line of the feed rollers (23) situated in front of the drying area (A) and by the contact line of the delivery rollers (24) and situated behind the drying area (A) where the feed rollers (23) and the delivery rollers (24) make up the feed device of the fabric (5). 35 40

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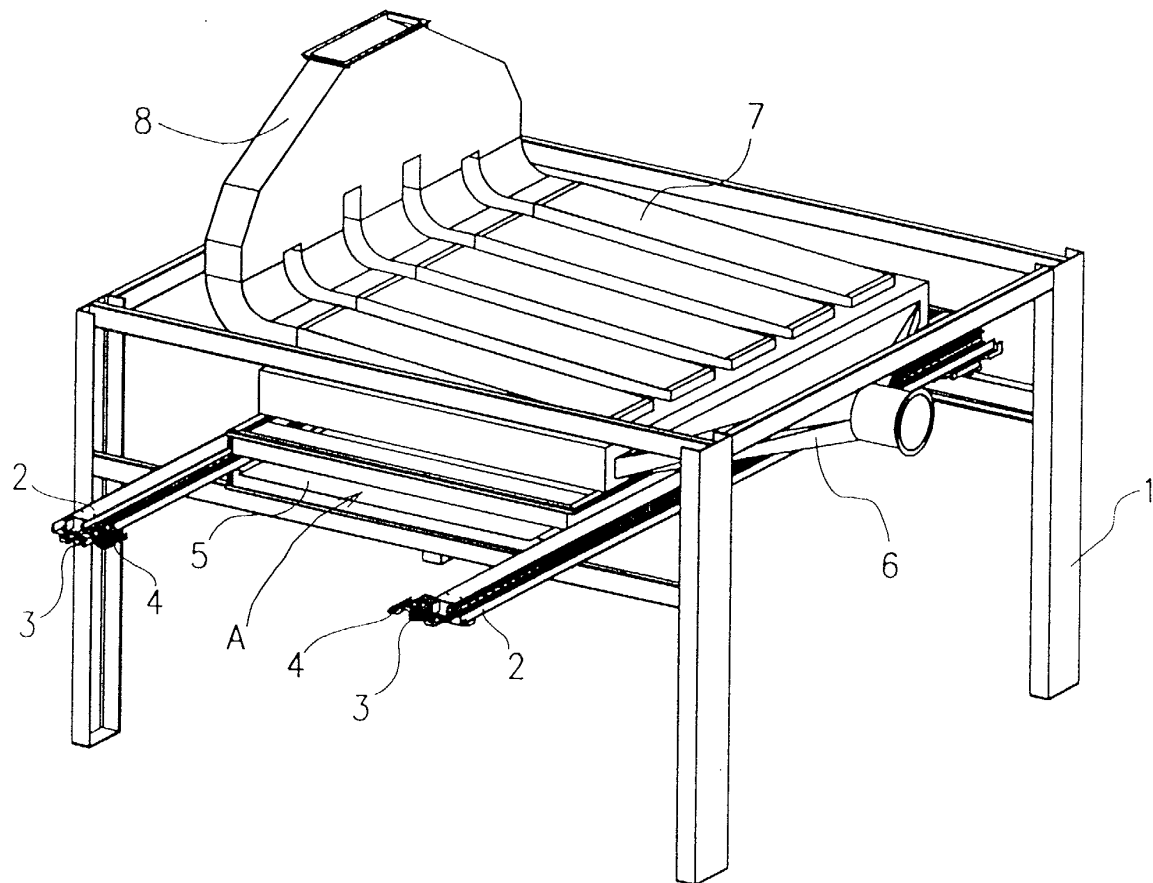


Fig. 1

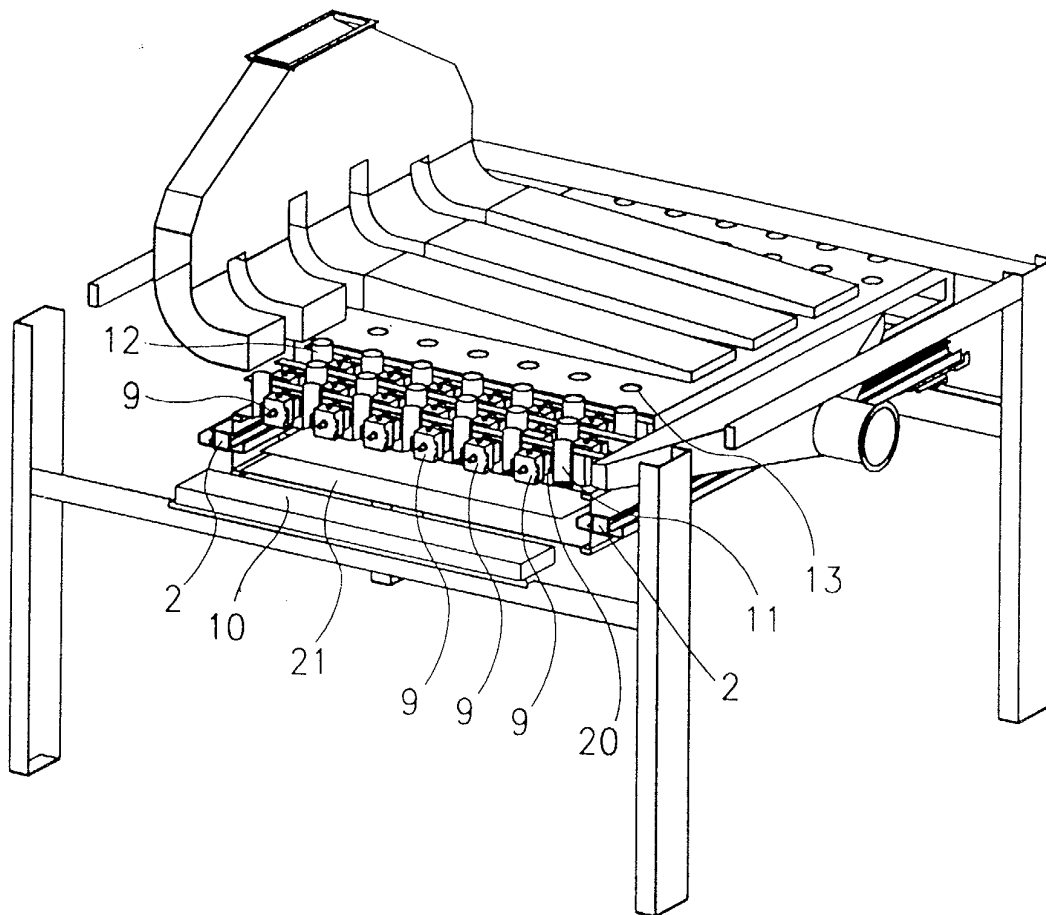


Fig. 2

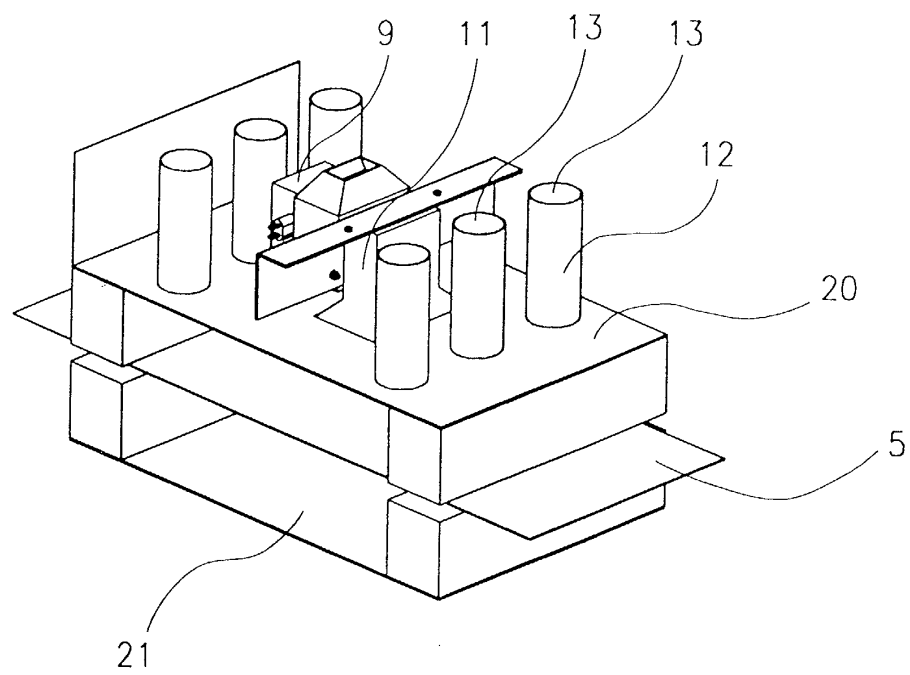


Fig. 3

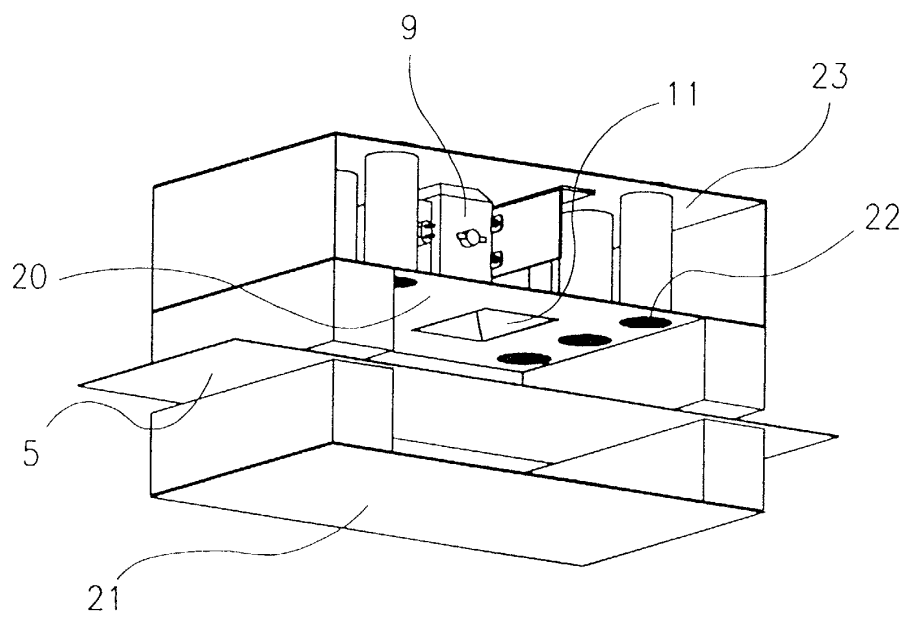


Fig. 4

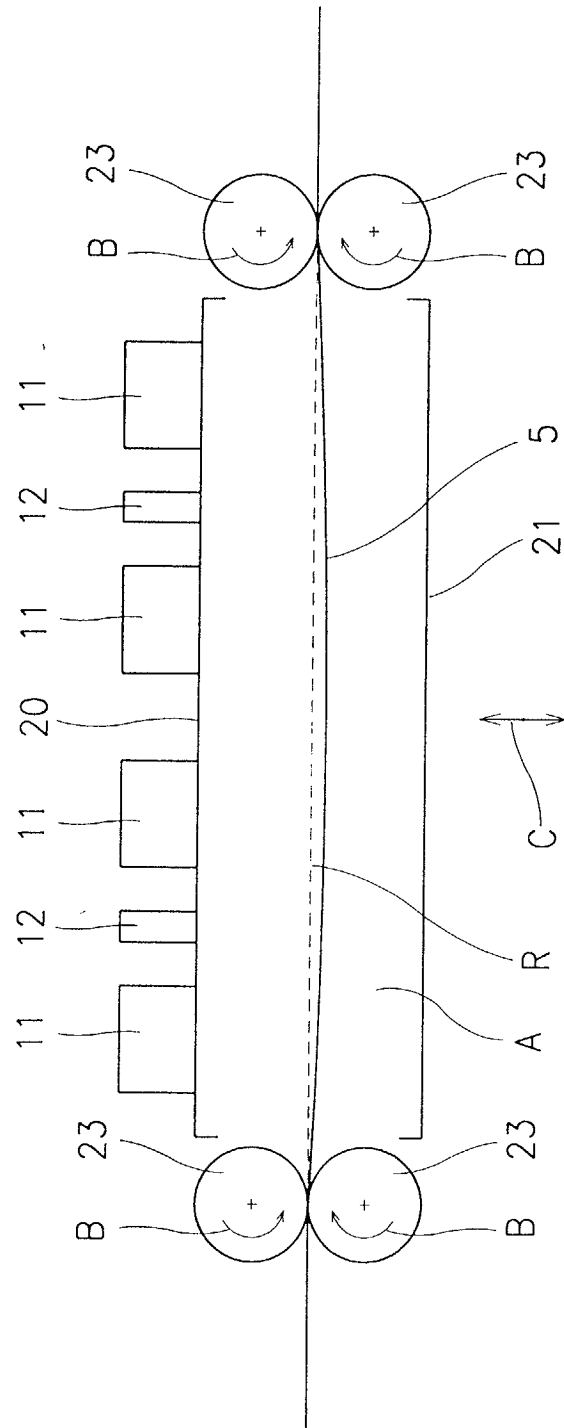


Fig. 5