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71 Applicant: **OY TAMPELLA AB**
PB 256
SF-33101 Tampere 10(FI)

72 Inventor: **Taipale, Kari**
Muurainkorventie 7 E 23
SF-33470 Ylöjärvi(FI)
Inventor: **Ojala, Timo**
Runkokatu 10 F 39
SF-33340 Tampere(FI)

74 Representative: **Smulders, Theodorus A.H.J.,**
Ir. et al
Vereenigde Octrooibureaux Nieuwe Parklaan
107
NL-2587 BP 's-Gravenhage(NL)

54 **Device for severing a web.**

57 Device for severing a web (12) in a paper or cardboard machine comprises a tape (9), means (2,5) for feeding the tape to a space (16) between a reel spool (15) and a reel drum (14), as well as means (10,11) for attaching the tape onto the surface of the reel spool (15) and for severing the web with the help of the tape (9) wound in a spiral-like fashion along the width of the reel spool (15) and for winding the free end of the web (12) following the severing point together with the tape around the reel spool. The means for attaching the tape (9) onto the surface of the reel spool comprise areas (10,11) on the reel spool (15) and on the tape (9) consisting of adherent material engageable with each other mechanically.

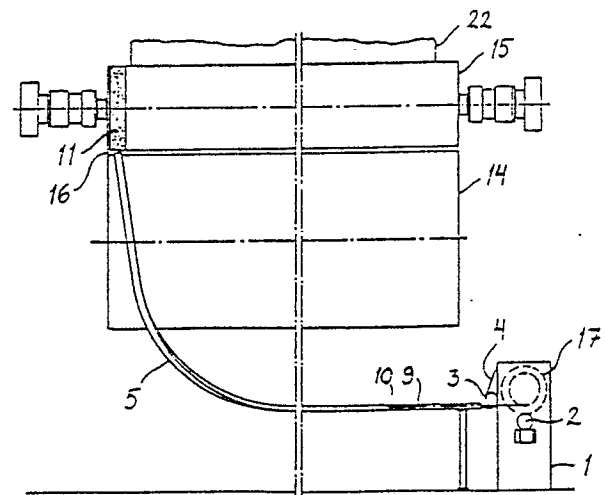


Fig. 2

Device for severing a web

The present invention relates to a device for severing a web, the device comprising a tape, means for feeding the tape to a space between a reel spool and a reel drum, as well as means for attaching the tape onto the surface of the reel spool and for severing the web with the help of the tape wound in a spiral-like fashion along the width of the reel spool and for winding the free end of the web following the severing point together with the tape around the reel spool.

A continuous web formed in a paper or cardboard machine is reeled at the end of the machine around a reel spool. As the reel has grown to its determined size, a new reeling operation of the web around a new reel spool must be started without interrupting the run. In this situation the web must be severed in a controllable manner and it is to be led onto a new, empty reel spool.

Among the methods of transfer, the envelope transfer is commonly used, being suitable on all grades, but it results as a rule in a great amount of refuse on the core and it can also cause harmful impacts on the reeling machine. Another method is the so-called gooseneck transfer, where the above-mentioned problems are not present, but it is suitable only for thin grades. The tape transfer is a third method and a device suitable for accomplishing the transfer is the object of the present invention. In the tape transfer the severing of the web and leading of the web onto a new reel spool is commonly carried out using a tape, which is introduced to a nip located between the reel spool and the reel drum near the ends thereof, whereafter the tape in course of its winding in a spiral-like fashion along the width of the reel spool simultaneously severs the web obliquely and guides the new end of the web following the severing point around the reel spool.

The several operations required by the method, some of them in an inconvenient and partly dangerous work environment, have constituted insofar the problems of the method. For eliminating this drawback several devices have been proposed, which take into account the occupational safety problems and which automatically feed the tape into the aforementioned nip. Such devices are disclosed e.g. in GB-Patent 1,135,945, SE-Patent 447,816 and in FI-publication 74,679 of accepted patent application. In the devices shown by the publications the end of the tape provided with an adhesive layer is inserted with the aid of a suitable auxiliary equipment between the reel spool and the reel drum, and the tape adheres to the surface of the reel spool with the help of the adhesive. The drawback in such devices is the tendency of the

end of the tape to stick on all solid surfaces, and it must therefore be protected in some fashion. Further, the adhesive easily soils the surface of the reel spool causing difficulties for example in the threading of the tail of a web and the reel spool must therefore be cleaned every now and then.

The purpose of the invention is to obviate the drawbacks, which are due to the aforementioned technique, and to provide a device by means of which the transfer of the web can be carried out automatically, controllably and without any methods soiling the spools and the paper. For achieving this purpose the device in accordance with the invention is mainly characterised in that the means for attaching the tape onto the surface of the reel spool comprise areas on the reel spool and on the tape consisting of adherent material engageable with each other mechanically. The above-mentioned feature makes it possible for the end of the tape to become fastened on the reel spool without any adhesive, but the attachment is as firm and fast as when using an adhesive. A tape consisting of hooks and a tape consisting of loops can be used as the adherent materials, which are distributed on the market by 3M under a trade name "Scotchmate", the former under No. 3526 and the latter under No. 3527.

According to a preferred embodiment of the invention the surface of the reel spool is coated with a zone of adherent material extending in the direction of the periphery of the spool. According to an advantageous embodiment the surface of the adherent material of the reel spool is approximately at the same level with the rest of the envelope surface of the reel spool. For accomplishing this embodiment the envelope surface of the spool can comprise a groove, onto which the adherent material is fixed. A device working well in the practice is provided, when the adherent material on the tape is material engageable with a surface comprising loose fibres. The surface of the adherent material on the tape may in this case comprise resilient thin plastic hooks (e.g. the aforementioned hook tape) and the adherent material on the reel spool is felt-like material comprising fibres (e.g. the aforementioned loop tape).

The invention will be described in the following in more detail with references to the accompanying drawings, wherein

Fig. 1 is a side view of the device of the invention, as seen in the direction of the ends of the spools located at the end of a paper or cardboard machine,

Fig. 2 is a front view of the device of the invention, as seen in the direction of the web,

Fig. 3 is a side view of a transfer profile used for guiding the tape,

Fig. 4 is a cross-sectional view along line IV-IV of the transfer profile of Fig 3,

Fig. 5 is a front view of the end of the reel spool of the invention, seen perpendicularly to the axis of rotation of the spool,

Fig. 6 shows the end of the tape in the device of the invention, and

Fig. 7 shows an alternative embodiment of the reel spool and reel drum in the device of the invention.

The device shown in the Figures comprises a reel drum 14 rotating on a support 13. A web, denoted by reference numeral 12, is wound via this drum to a paper roll 22. Above the reel drum 14 is situated a reel spool 15 for a new paper roll. The device includes further a transfer profile 5, to be described later on in more detail, for guiding a tape, which is used for severing the web, between the reel drum 14 and the aforementioned reel spool 15. This space is denoted with reference numeral 16 in Fig. 1.

The tape 9 to be fed is denoted with a broken line in Fig. 2. The tape is fed along the transfer profile 5 by means of a feeding mechanism 1, which comprises a feed device 2 metering the tape from a storage roll 17, a brake 3 preventing the free unwinding of the metered tape, and a tape cutter 4, which automatically cuts the tape 9 to a predetermined length after the severing of the web. The transfer profile 5 is situated largely below the web 12 and transversely to its direction of travel. The other end of the transfer profile extends at the ends of the reel drum 14 and the reel spool 15 beyond the edge of the web to the proximity of the space 16 between the reel drum 14 and the reel spool 15.

Figs. 5 and 6 show the construction of the tape 9 and the reel spool 15 in more detail. The envelope surface of the reel spool is provided with a area of adherent material by coating the surface of the reel spool 15 with a zone 11 of adherent material extending in the direction of the periphery of the spool. The zone of adherent material is located at the edge of the envelope of the spool and the surface of the adherent material contained in the zone is at the same level as the rest of the envelope surface of the reel spool. The adherent material is arranged in the surface of the reel spool 15 preferably by providing the envelope surface of the spool with a groove extending around the entire periphery of the spool in a direction perpendicular to the axis of rotation of the spool. The groove, to which the adherent material 11 is fixed, is designated with reference numeral 23 in Fig. 6. The end of the tape 9 shown in Fig. 6 comprises an area 10 of adherent material. The area is arranged

at the end of the tape by fastening a piece 10 of adherent material of suitable length and width. The width of the adherent material piece 10 may be equal to or smaller than the width of the adherent material zone 11 on the spool 15. The adherent materials 10 and 11 are so selected that they engage with each other mechanically, and these kinds of materials are in use elsewhere. Neither of the engaging surfaces of the adherent materials contains any adhesive which would cause sticking of the tape or the paper web or would bind dust. The adherent materials, however, adhere to each other equally to surfaces which are glued. Further, it is characteristic of the adherent materials that they relatively easily are loosened from each other in a direction perpendicular to their planes when subject to a tensile force, but the forces causing loosening in the direction of their engaging planes, i.e. the forces parallel to the surface of the spool 15 in operation, are many times greater. The surface of the adherent material 10 at the end of the tape 9 is constituted of resilient thin plastic hooks, the surface being capable of adhering to surface comprising fibres loose from each other, but on the other hand gliding well on hard surfaces. Consequently, the tape 9 does not tend to adhere other surfaces than those expressly provided with an adherent material. The engaging surface of the adherent material 11 on the spool 15 is constituted typically of a felt-like material containing thin fibres, the material allowing the good engagement of the adherent material 10 of the tape.

The device in accordance with the invention acts as follows: During preparations for the severing of the web 12 the tape 9 is fed forward a suitable length by means of the feed mechanism 1 along the transfer profile 5 towards the still open space or nip 16 between the reel drum 14 and the reel spool 15. The end of the transfer profile 5, at which the end of the tape 9 emerges, is situated in the direction of width of the spool 15 at the location of the adherent material zone 11 outside the edge of the web 12. The severing of the web is initiated by lowering the reel spool 15, which earlier has been accelerated to a peripheral speed equal to that of the reel drum 14, to contact with the web 12 on top of the reel drum 14 to a position shown by broken lines in Fig. 1. The devices for accelerating and guiding the reel spool are commonly known and they are therefore not disclosed in more detail herein.

As the nip 16 becomes closed, the end of the tape 9 comes between the reel spool 15 and the reel drum 14 and the adherent material areas 10 and 11 are engaged with each other. The tape 9 is thereafter wound in the conventional manner around the reel spool 15, is tensioned, becomes detached from the transfer profile 5 starting at its

free end, gets taut between the nip 16 and the feed device 2 severing off the web and guiding the end of the web following the severing point to the reel spool 15.

The invention makes it possible to feed the end of the tape 9 to a closed nip as well, where the reel spool 15 has the same peripheral speed as the reel drum 14. The adherent material 10 of the tape 9 is also in this case easily engaged with the adherent material 11 of the reel spool 15.

Fig. 7 shows an alternative embodiment of the reel spool and the reel drum. In this event the reel drum has a groove 24 extending around the entire periphery of the drum 14 perpendicularly to the axis of rotation of the drum. The bottom of the groove is situated deeper to the rest of the envelope surface of the reel drum. The surface of the adherent material zone 11 of the reel spool 15 is situated elevated to the rest of the envelope surface of the spool 15, is situated opposite to the groove 24 at the edge of the envelope of the spool 15 and also extends around the entire periphery of the spool perpendicularly to the axis of rotation of the spool. This arrangement makes also the complete closing of the nip 16 possible.

The construction of the transfer profile 5 is shown in more detail in Figs. 3 and 4. The construction is more closely described in another patent application filed by the applicant simultaneously with the present application. The transfer profile 5 is a closed elongate housing formed of a body 6 having a groove 20 for feeding the tape 9 in its longitudinal direction and flexible closing strips 8 fixed on the body and covering the groove 20. The groove 20 of the body is properly dimensioned according to the dimensions of the tape -adherent piece -combination. The closing strips are fastened on both sides of the groove and they are in an overlapping relationship. The closing strips are of a resilient material and enable the emergence of the tape 9 from between the strips as the web is severed off. The closing strips are also intended for protecting the transfer profile against dust.

On both sides of the transfer profile there is a distribution pipe 7 extending parallelly therewith. From the pipes distribution nozzles 21 are inserted at predetermined intervals to the groove 20 of the body, whereby the nozzles are open on the opposite lateral surfaces of the groove and on the bottom of the groove. The air nozzles are directed obliquely with respect to the direction of travel of the tape. When feeding the tape in the transfer profile, air is introduced through the distribution pipes 7 into the groove 20. The air prevents the wall contact of the tape within the groove by forming an air cushion between the surfaces and pushes simultaneously the end of the tape to the direction of transfer. The velocity of the air is

arranged to be lower than the feeding speed of the tape, e.g. the air velocity may be 10 to 50 m/s as the speed of the tape is 0.1 to 1.0 m/s. The piece 10 of adherent material fastened to the end of the tape forms at the same time a suitable flow resistance to the air and a suitable pressure difference, thus enhancing the feeding of the end of the tape.

The invention is by no means restricted to only the embodiment disclosed in the description hereinabove, but it can be modified within the scope of the invention represented by the accompanying claims. For example, some constructional features of Figs. 5 and 7 can be combined so that both the reel spool 15 and the reel drum 14 comprise opposite grooves 23 and 24 respectively. In the device in accordance with the invention accessory devices different from the above-mentioned transfer profile may also be used for feeding the tape. The areas provided on the surface of the reel spool and on the tape may also be materials engaging with each other mechanically, which are of other type than the above-mentioned plastic hook/felt-combination. Moreover, in the foregoing description less attention is paid to the rest of the accessory devices at the end of a papermachine, such as the devices for transferring a full paper roll and the devices for transferring a new reel spool, because they are accessory devices which are independent of the invention. Any devices commonly known in the art may be used as such devices, e.g. devices shown in SE-Patent 447,816.

Claims

1. Device for severing a web (12) in a paper or cardboard machine, the device comprising a tape (9), means (2,5) for feeding the tape to a space (16) between a reel spool (15) and a reel drum (14), as well as means (10,11) for attaching the tape onto the surface of the reel spool (15) and for severing the web with the help of the tape (9) wound in a spiral-like fashion along the width of the reel spool (15) and for winding the free end of the web (12) following the severing point together with the tape around the reel spool, **characterised** in that the means for attaching the tape (9) onto the surface of the reel spool comprise areas (10,11) on the reel spool (15) and on the tape (9) consisting of adherent material engageable with each other mechanically.

2. Device as claimed in claim 1, **characterised** in that the surface of the reel spool (15) is coated with a zone (11) of adherent material extending in the direction of the periphery of the spool.

3. Device as claimed in claim 2, **characterised** in that the zone (11) of adherent material ex-

tends around the entire periphery of the reel spool (15).

4. Device as claimed in any of the preceding claims, **characterised** in that the envelope surface of the reel spool (15) comprises a groove (23), onto which the adherent material (11) is fixed. 5

5. Device as claimed in claim 4, **characterised** in that the surface of the adherent material (11) of the reel spool is lower than or at the same level as the rest of the envelope surface of the reel spool. 10

6. Device as claimed in any of claims 1-3, **characterised** in that the envelope surface of the reel drum (14) comprises a groove (24) and the area (11) of adherent material of the reel spool (15) faces the groove (24) of the reel drum (14). 15

7. Device as claimed in any of the preceding claims, **characterised** in that the adherent material (10) on the tape (9) is material engageable with a surface comprising loose fibres. 20

8. Device as claimed in claim 7, **characterised** in that the surface of the adherent material (10) on the tape (9) comprises resilient thin hooks, preferably of plastics material, and the adherent material (11) on the reel spool (15) is felt-like material comprising fibres. 25

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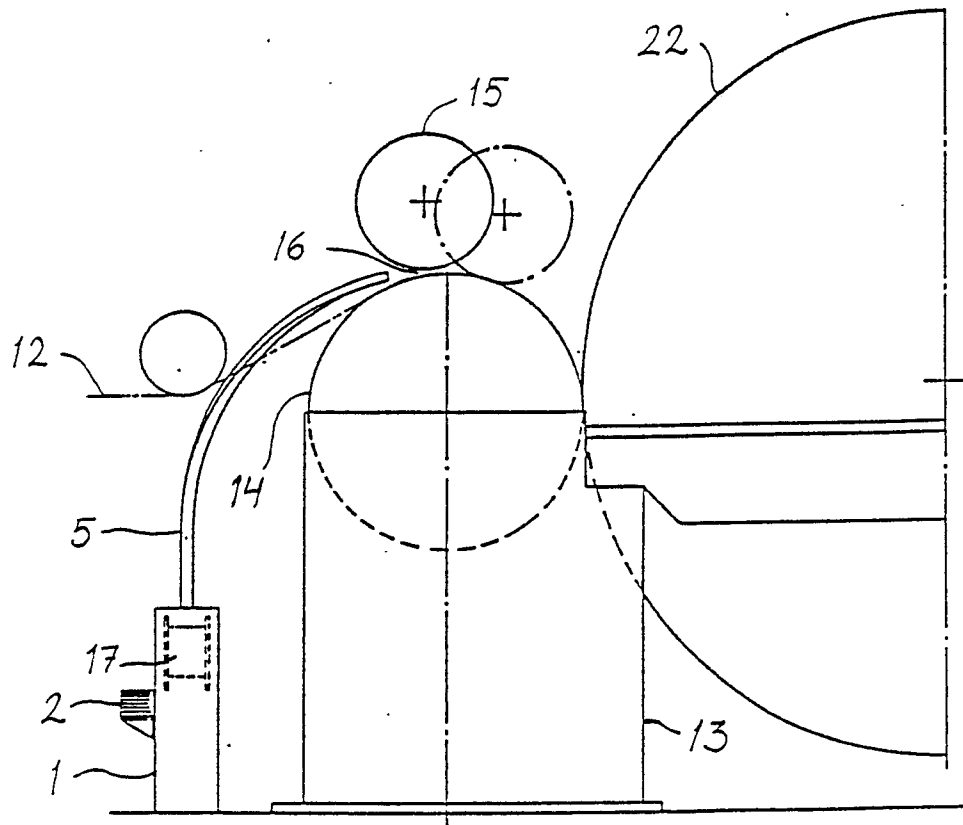


Fig. 1

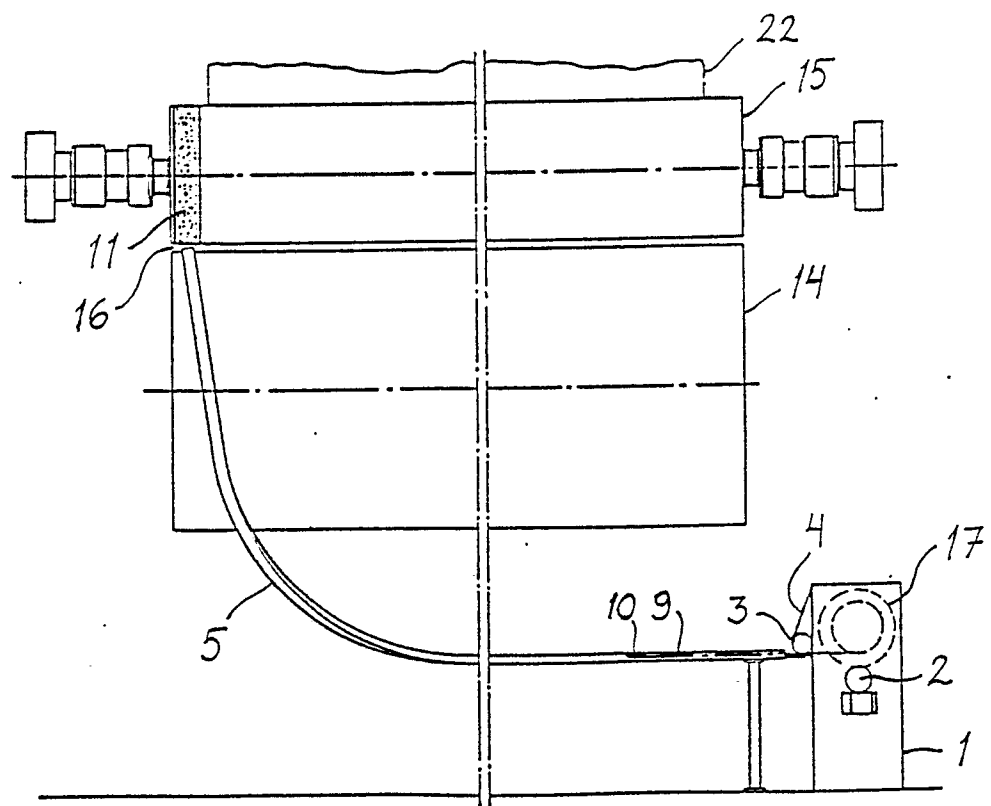


Fig. 2

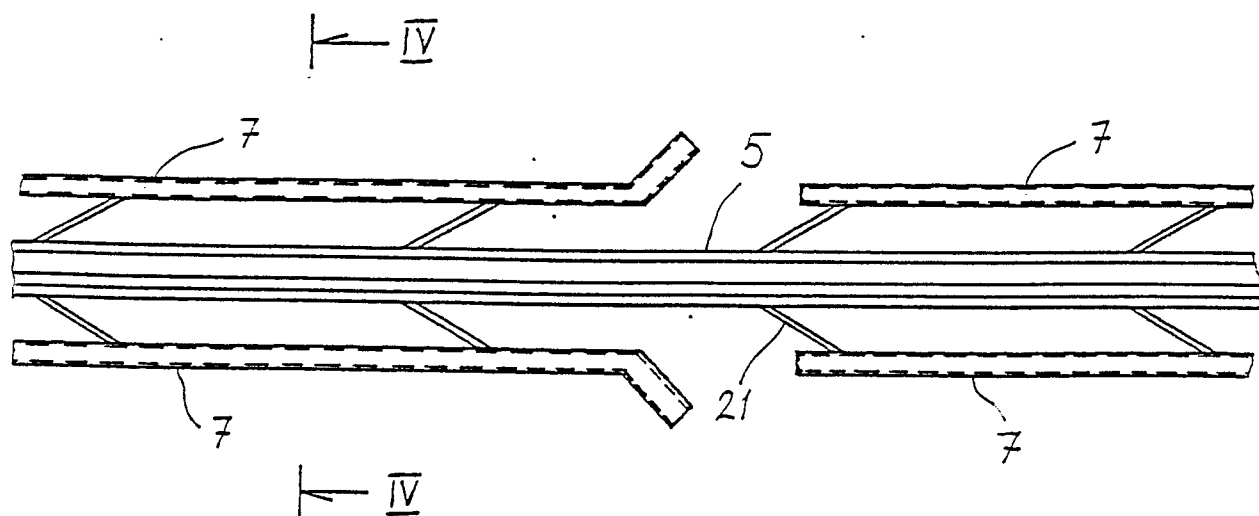


Fig. 3

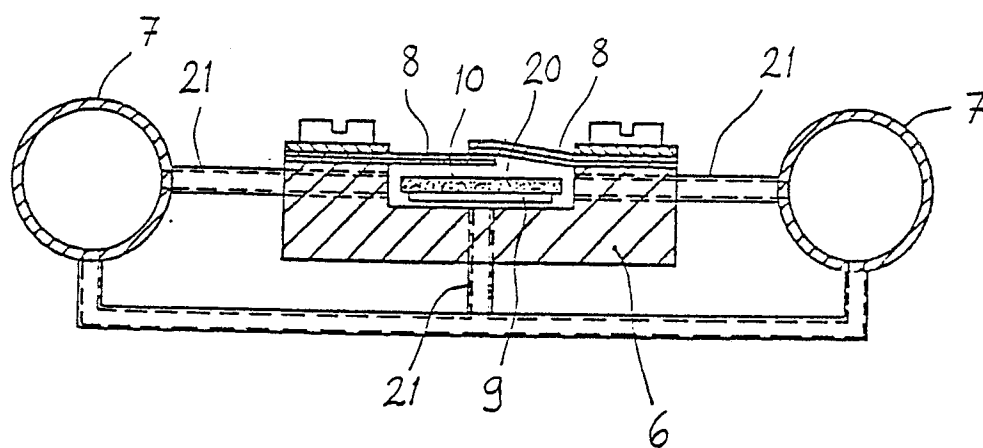


Fig. 4

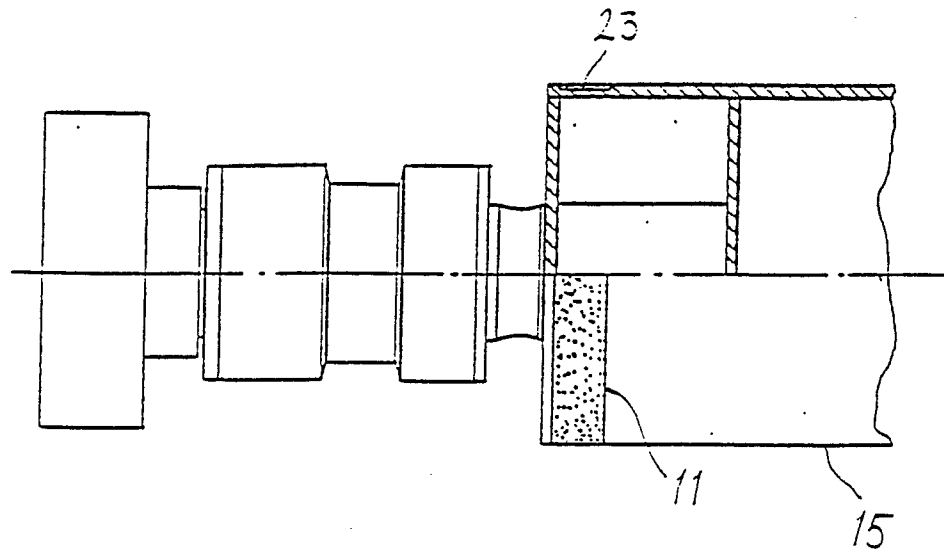


Fig. 5

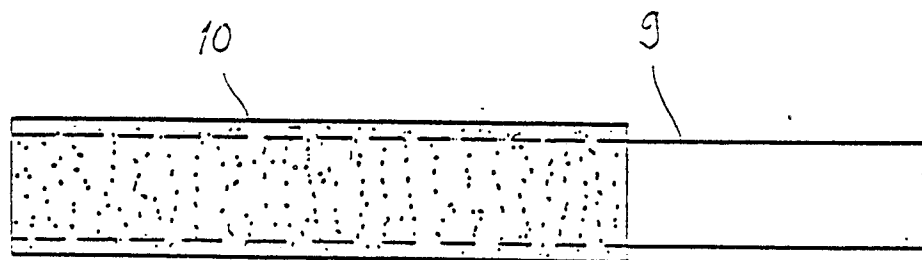


Fig. 6

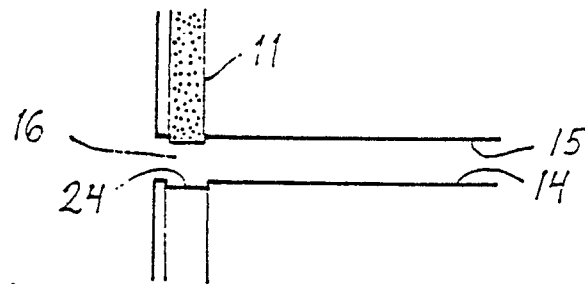


Fig. 7