



⑪ Publication number:

0 548 419 A1

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EUROPEAN PATENT APPLICATION

②¹ Application number: 91311844.4

⑤¹ Int. Cl.⁵: **F26B 13/20**, B65H 23/24

②② Date of filing: 20.12.91

④³ Date of publication of application:
30.06.93 Bulletin 93/26

⑧ Designated Contracting States:
CH DE ES LI

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⑤4 Improved air turn.

57 An air turn comprises air bars (12) supported on a body (10) at spaced points (16, 17) so that the air bars lie in an arcuate path to define a web travel path about the turn. The air bars (12) have Coanda nozzles to create a web-supporting air cushion. The supports at the jacking points (16, 17) are individually adjustable to enable the air bars (12) to be bent slightly to a convex arcuate shape as seen tangen-

tially to the turn. Dampers (54) in inlets (48, 50, 52) control the air supply individually to zones (33, 35, 37) along the air bars. Baffles (58) regulate the air flow to exhaust zones (56) between the air bars to create higher and lower pressure zones supporting the web.

These measures each reduce the risk of the web creasing or folding.

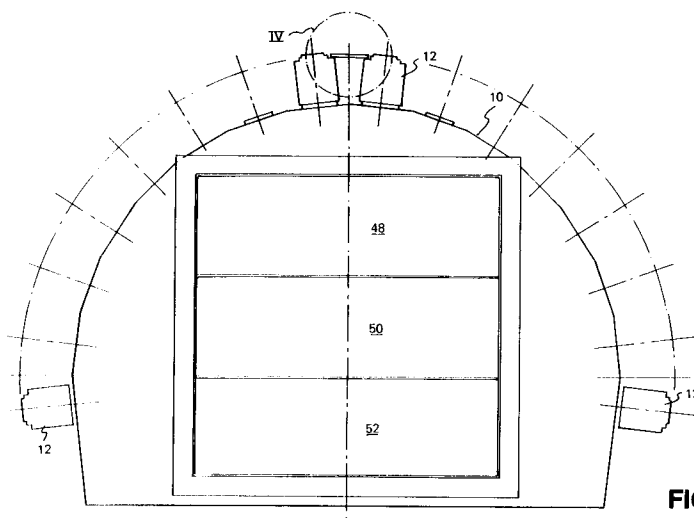


FIG. 1

The present invention relates to air turns.

In a process line drying a continuous web it is often necessary to change the direction in which the web travels without the web making contact with a roller or curved guide. One method by which this is achieved is by the use of an air turn in which several air flotation nozzles are mounted around a circular chamber or around a portion of a circular chamber, around which the web is floated. The present invention relates to improvements to such a device in order to remove or eliminate creasing of the web, particularly where wide webs are being used. It is thought that such creasing is due to irregularities of the pressure differential across the web owing to a number of factors, such as mechanical imperfections and/or lack of flatness of the web.

The air nozzle is usually in the form of a so-called air bar which is an elongate box provided with a slit-like nozzle through which air is projected in order to maintain an air cushion for supporting the web.

One aspect of the invention resides in an air turn having air nozzles mounted along an arcuate path or turn such that the nozzles are convex arcuate as seen tangentially to the web travel path defined by the air turn.

Another aspect of the invention is an air turn having air nozzles mounted along an arcuate path by adjustable supports spaced apart transversely of the web travel path, enabling the nozzle profile to be adjusted. Thus, for example, the nozzles can be set with a convex arcuate configuration, as seen tangentially to the web travel path.

A further aspect of the invention consists in an air turn having air nozzles mounted along an arcuate path and provided with several zones transversely of the web travel path defined by the air turn, and means enabling independent control of the air supply to each zone, thereby enabling different web-to-nozzle spacing to be established at different positions transversely of the web travel path.

Yet another aspect of the invention is an air turn having air nozzles mounted along an arcuate path and spaced apart in the direction of the web travel path defined by the air turn, and means for regulating the air flow at exhaust zones formed between the nozzles to create higher and lower pressure zones providing the web support.

The invention is further described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is an end elevational view of an air turn in accordance with the invention;

Fig. 2 is a diagrammatic longitudinal section of the air turn;

Fig. 3 is an enlarged sectional view of the detail marked III in Fig. 2;

Fig. 4 is an enlarged sectional view of the detail marked IV in Fig. 1; and

Fig. 5 is a plan view of the detail shown in Fig. 4.

The drawings show an air turn designed for turning a web through approximately 180° without touching the web. The air turn comprises a body 10 on which are mounted a series of air bars 12 only some of which are shown in Fig. 1.

An air bar for float treatment apparatus is described in British Patent Specification No. 1,443,679. Such an air bar comprises an elongate pad plate whose opposite longitudinal edges are rounded and air discharge slots are provided alongside said rounded edges such that the discharged air flows over the rounded edges and on to the flat surface of the pad plate due to the Coanda effect, whereby to maintain a web-supporting air cushion on said pad plate. If the web is to be heated, e.g. to dry a surface coating thereon, the air to be discharged is heated.

As can be seen in Fig. 1 the air bars 12 extend transversely to the web travel path, the web 14 being shown in Fig. 4.

The air bars 12 are supported on the body 10 at spaced jacking points 16 and 17. One of the inner jacking points 16 is shown in more detail in Fig. 3. The bottom wall 18 of the air bar 12 is spaced from the arcuate peripheral wall 20 of the body 10. A jacking screw 22 is clamped by means of a lock nut 24 to a mounting plate 25 on the base wall 18 of the air bar 12 and is received in a nut 26 welded to a support flange 28 for the peripheral wall 20 of the body. After slackening nut 24 the jacking screw 22 can be turned until the desired spacing is obtained and then the lock nut 24 can be retightened.

Fig. 2 shows, by way of example, four jacking points 16, 17 which can be individually adjusted as just described. By means of such adjustment, the air bars 12 can be given an individual curvature and for example can be bent to a convex shape which however is so slight as to be imperceptible in Fig. 2 of the drawings.

Access to the inner jacking points 16 can only be had when the web is removed and the air turn is shut down. However, the outside jacking points 17, which are constructed in substantially the same way as the jacking point 16 shown in Fig. 3, are accessible at all times and can be adjusted while the web is running.

The longitudinal air discharge slots (not shown) of the air bars 12 are fed from the interior 30 of the air bars. The body 10 is divided into a number of zones or chambers 32, 34, 36 transversely to the path of web travel by means of

interior partitions 38 and 40 as shown in Fig. 2. Individual openings 42 in the peripheral wall 20 place the chambers 32, 34 and 36 in communication with openings 43 of corresponding zones 33, 35, 37 of the air bars 12 and such zones in the air bars may likewise be separated from one another by partitions 44,46. In the case of three air bar zones or sections, as shown, four jacking points 16, 17 are suitable. Preferably, the number of jacking points is increased if there are more than three air bar sections or in the case of very long air bars. Fewer jacking points can be used for shorter air bars.

As shown in Fig. 3, sealing arrangements 45 between the air bars 12 and the body wall 20 seal the openings 42 to the corresponding openings 43. A duct 48 (Figs. 1 and 2) delivers air to the chamber 32, a duct 50 to the chamber 34 and a duct 52 to the chamber 36. The ducts 48, 50, 52 contain individually adjusted dampers 54. A common square section duct (not shown) communicates with the individual ducts 48, 50, 52 upstream of the dampers 54. The air supply can come from a fan (not shown) and the air may be heated. By individual adjustment of the dampers 54, the pressure of the air supplied to individual zones of the air bars is adjusted. Such adjustment enables the height of the web above the air bars or rather the spacing of the web from the air bars to be varied at different positions transversely of the web 14.

The spent air discharged from the air bars flows to spaces 56 between the air bars 12 as shown diagrammatically in Fig. 4. The spaces 56 are partially closed off by means of adjustable baffles 58 which are clamped by mounting flats 59 to flanges of angle bars 60 attached to the air bars 12. Openings 62 are formed between the individual baffles 58 as shown in Fig. 5. The baffles 58 can be adjusted in number and can be moved axially along the air bars so that the openings 62 for the escape of spent air are adjusted. This enables the pressure between the web and the air bars to be regulated in order to create higher and lower pressure zones.

By adopting one or more of the above measures adjustments can be made to compensate for non-uniformity or irregularities in the pressure differential across the web. That is to say, the web to nozzle spacing can be adjusted transversely of the web by bending the air bars to a convex shape and/or by adjusting the air pressure longitudinally of the air bars and/or by adjusting the air pressures in the air cushions themselves. By these measures, the risk of creasing or folding of the web, especially in the case of wide webs, e.g. up to 9 m wide, may be reduced.

Claims

1. An air turn having air nozzles (12) mounted along an arcuate path and provided with several zones (33,35,37) transversely of the web travel path defined by the air turn, and means (54) enabling independent control of the air supply to each zone (33,35,37), thereby enabling different web-to-nozzle spacing to be established at different positions transversely of the web travel path.
2. An air turn as claimed in claim 1, in which the means to enable independent control comprise dampers (54) which are disposed in respective air ducts (48,50,52) leading to the respective zones (33,35,37) and are individually adjustable.
3. An air turn as claimed in claim 1 or 2, further comprising means (58) for regulating the air flow at exhaust zones formed between the nozzles to create higher and lower pressure zones providing the web support.
4. An air turn having air nozzles (12) mounted along an arcuate path and spaced apart in the direction of the web travel path defined by the air turn, and means for regulating the air flow at exhaust zones formed between the nozzles (12) to create higher and lower pressure zones providing the web support.
5. An air turn as claimed in claim 4, in which the means for regulating comprise adjustable baffles (58) which are axially adjustable along the entries to the spaces (56) between the air nozzles (12) and are optimal in number.
6. An air turn having air nozzles (12) mounted along an arcuate path or turn such that the nozzles (12) are convex arcuate as seen tangentially to the web travel path defined by the air turn.
7. An air turn having air nozzles (12) mounted along an arcuate path by supports (16,17) spaced apart transversely of the web travel path, at least one of said supports being adjustable, enabling the nozzle profile to be adjusted.
8. An air turn as claimed in claim 7, in which the or each adjustable support (16,17) comprises a jacking screw (22).
9. An air turn as claimed in claim 7 or 8, in which the supports (16,17) include adjustable sup-

ports at the ends of the air nozzles (12) so as to be adjustable while the web is travelling around the air turn.

10. An air turn as claimed in any of claims 3 to 9, in which the air nozzles (12) are provided with several zones (32,34,36) transversely of the web travel path and means are provided to enable independent control of the air supply to each zone.

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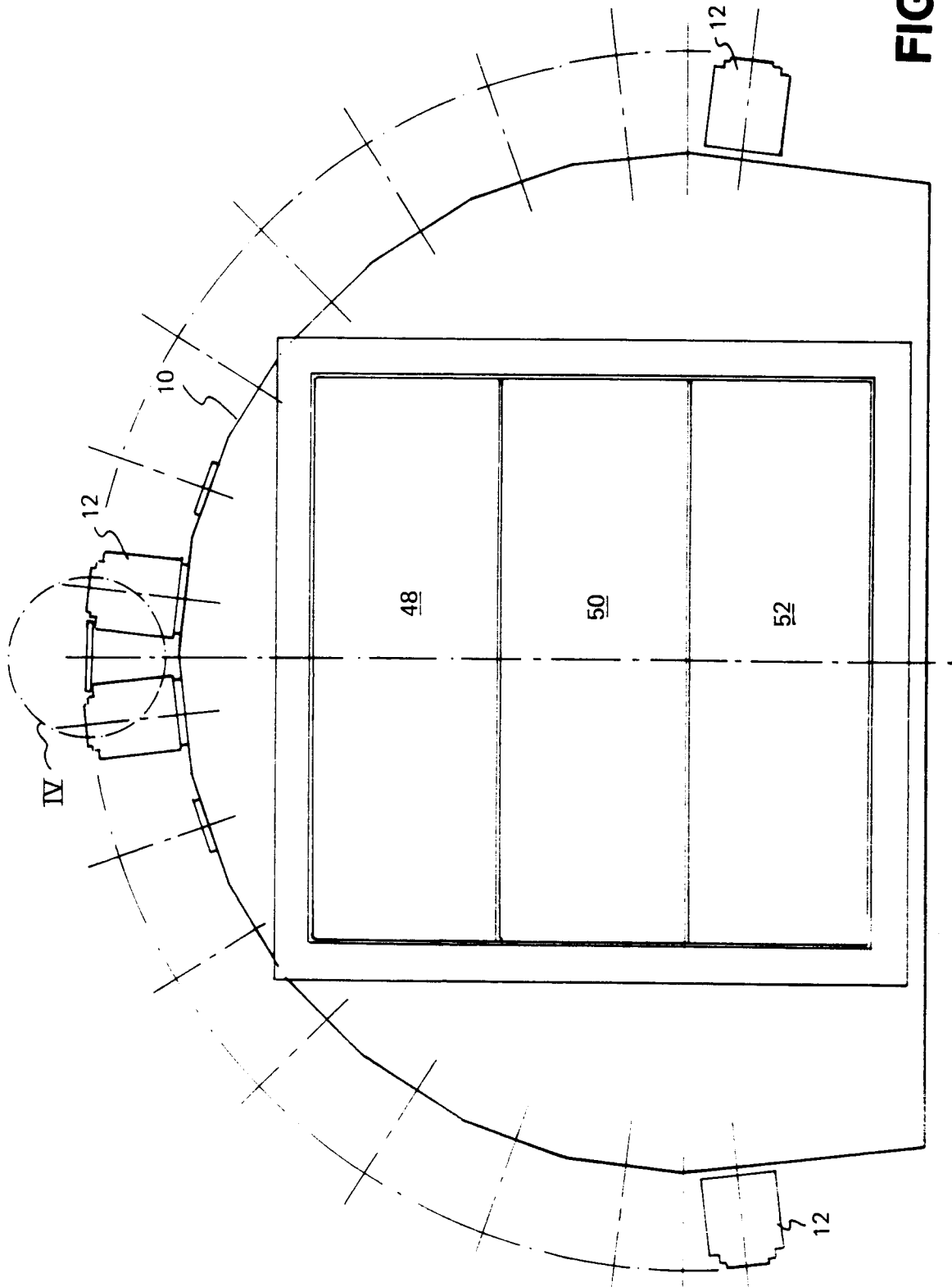


FIG. 1

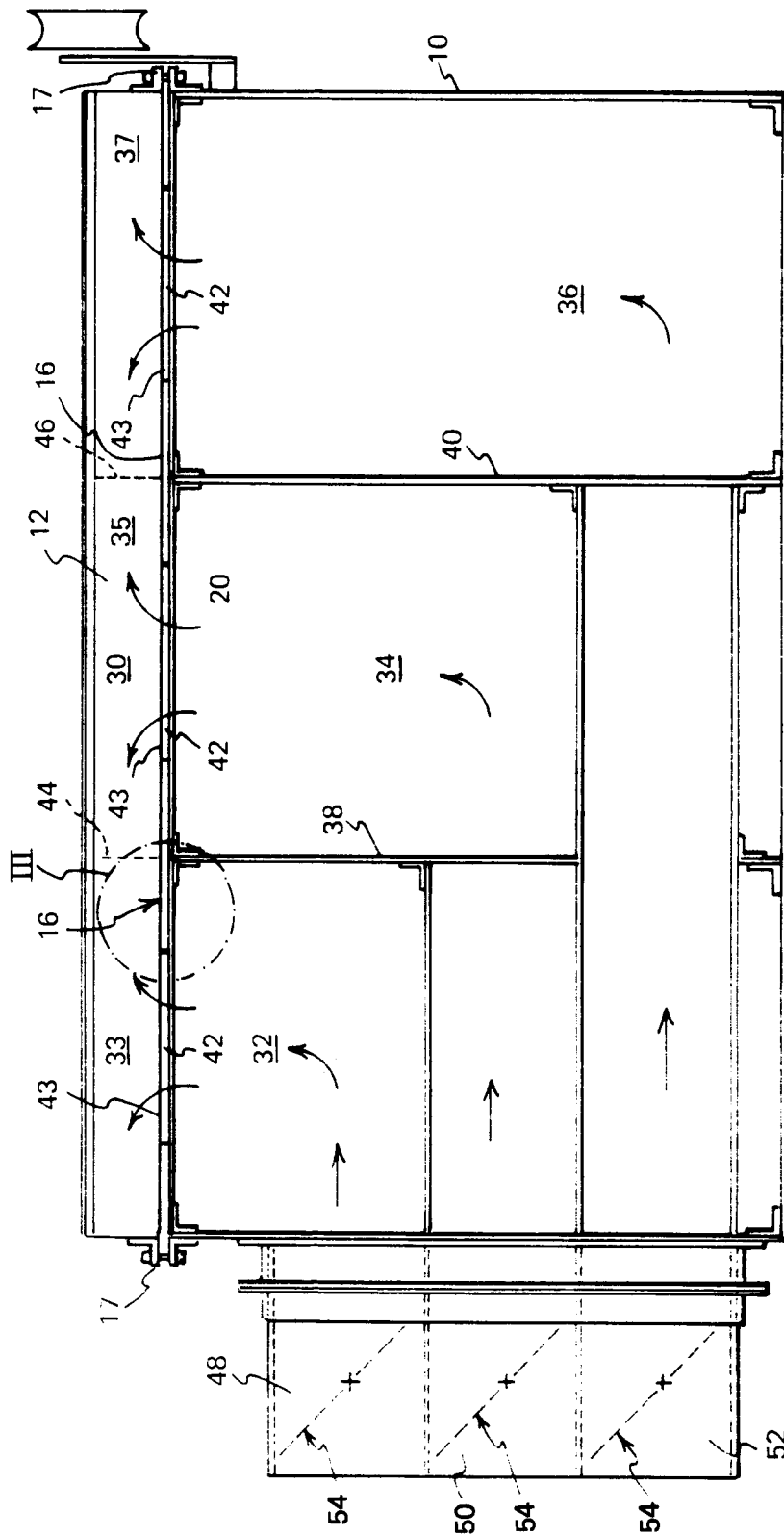


FIG. 2

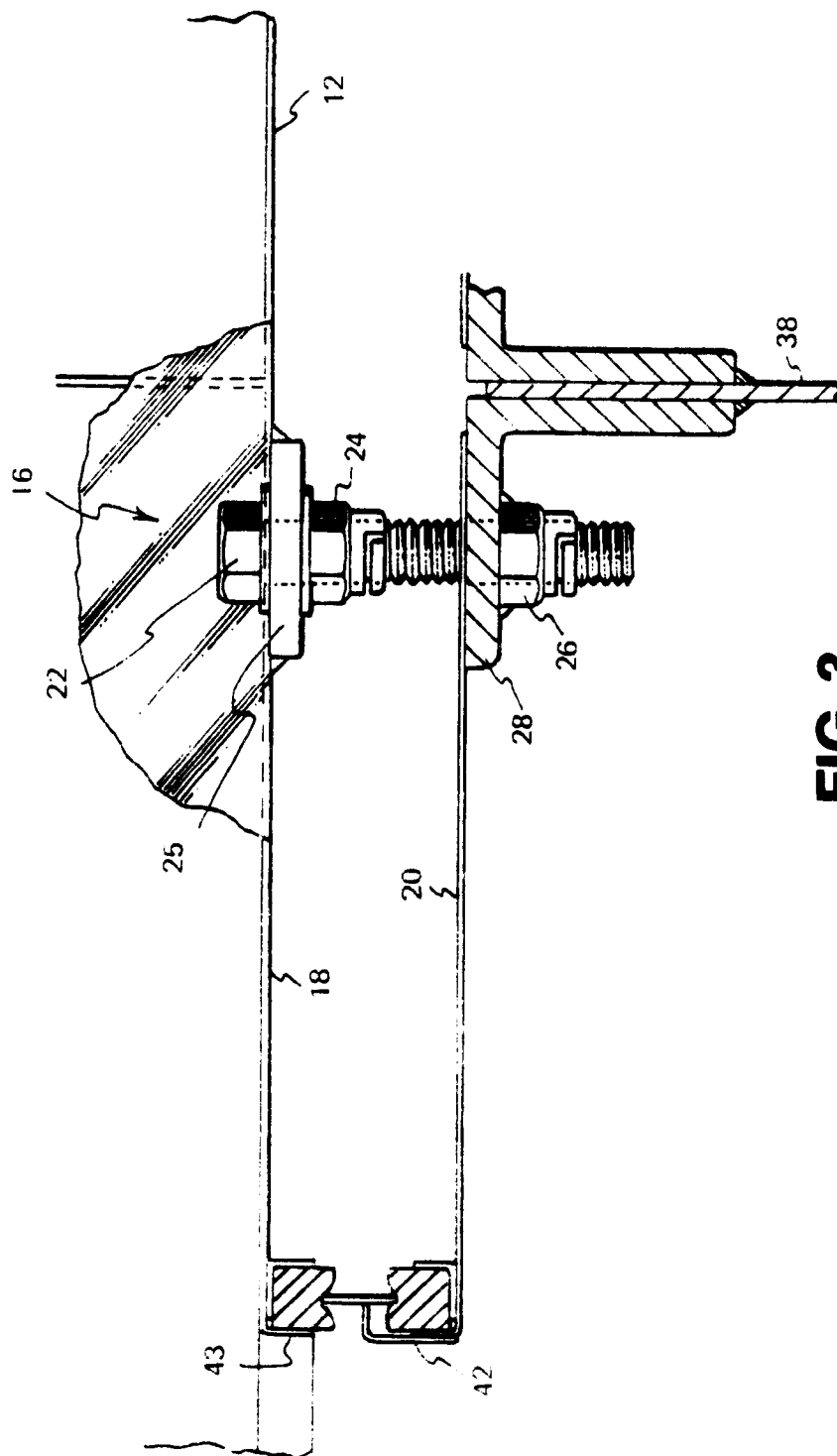


FIG. 3

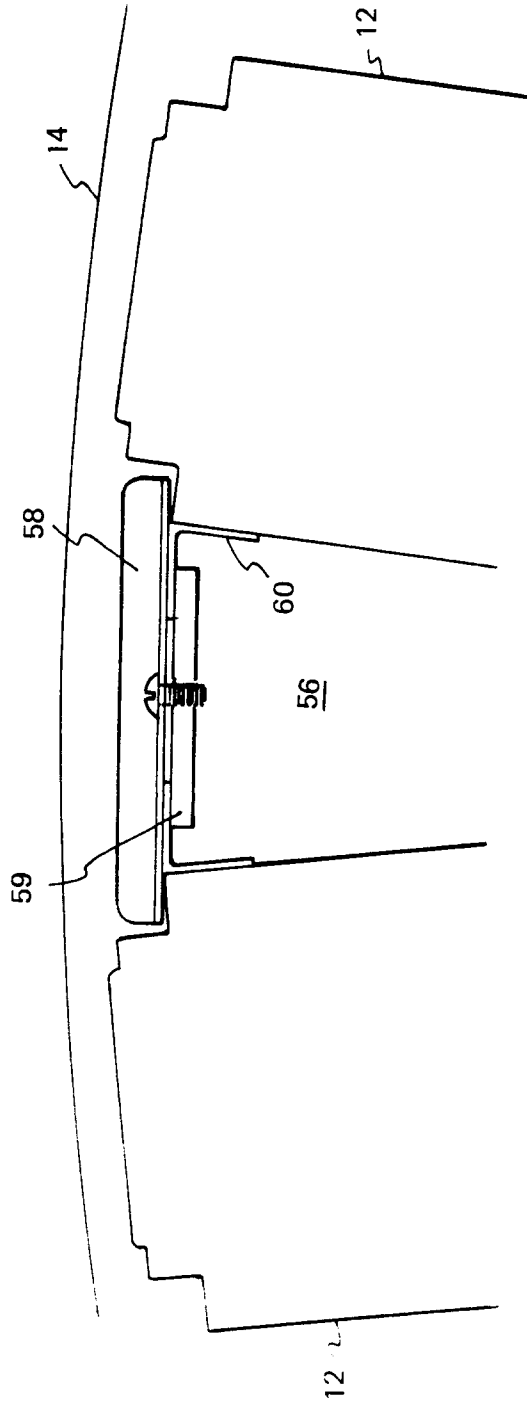


FIG. 4

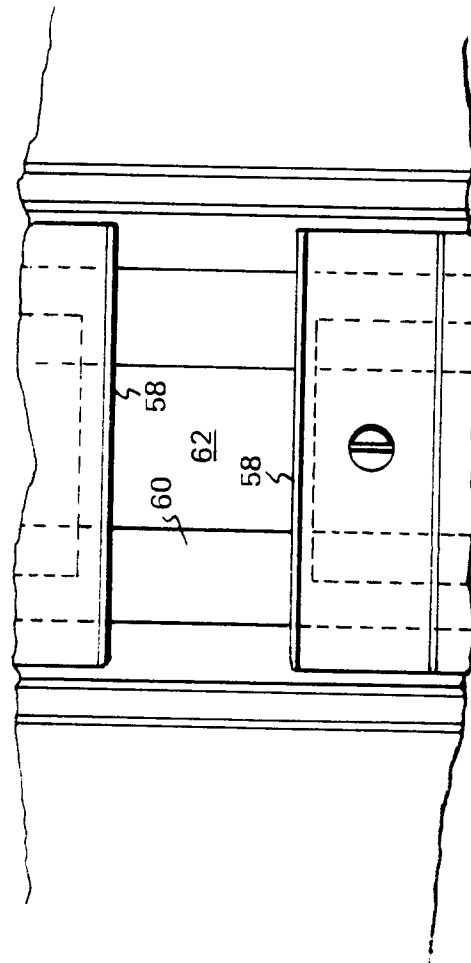


FIG. 5



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 91 31 1844

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
E	GB-A-2 245 256 (SPOONER INDUSTRIES LIMITED) * the whole document * ---	1-10	F26B13/20 B65H23/24
E	EP-A-0 482 500 (HOECHST AKTIENGESellschaft) * the whole document * ---	1, 2	
X	FR-A-2 201 751 (DOMTAR LIMITED) * the whole document * ---	1, 2, 3, 4, 10	
X	DE-A-3 942 029 (VALMET PAPER MACHINERY INC.) * the whole document * ---	1, 2 3, 10	
X	EP-A-0 236 819 (THERMO ELECTRON-WEB SYSTEMS, INC.) * the whole document * ---	4, 5 3, 10	
X	DE-A-2 752 574 (BACHOFEN & MEIER) * the whole document * ---	1, 2 10	
X	GB-A-894 062 (J.W. ZANDERS, FEINPAPIERFABRIK G.M.B.H.) * the whole document * ---	1, 2 10	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 736 106 (OFFEN) * the whole document * ---	1, 2	F26B B65H
A	US-A-4 837 946 (HELLA ET AL) * the whole document * -----	7	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 AUGUST 1992	Examiner SILVIS H.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			