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(54) Supporting structure for a continuous band of material inside drying units.

(57) The present invention relates to a supporting structure (1) for a continuous band of material (14) inside drying units. The supporting structure (1) comprises a framework which supports a plurality of main cylinders (3-13) which define a path for the continuous band (14); the path extends substantially in the shape of a scroll from an entry region to an exit region, and the main cylinders (3-13), which define the scroll path, make contact with a same side of the continuous band (14).

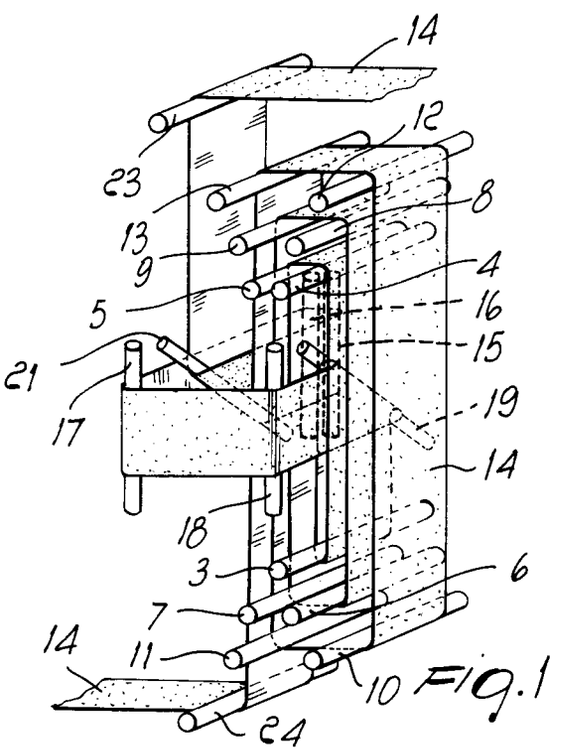

Fig.1

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The present invention relates to a supporting structure for a continuous band of material inside drying units.

As is known, sheets of paper or paper-like material bearing printings, adhesive parts or other items on one face are manufactured starting from a continuous band of material which is subsequently cut, folded or punched so as to divide it into the individual sheets as required. In the case of continuous forms intended for use in computer-controlled printers, for example, the various forms are obtained from a continuous band, on one face of which wordings are written, adhesives are applied or other actions are performed, and are separated from one another by a perforated line which allows to separate the various sheets from one another after use.

In this type of production, it is necessary to dry the ink, paint or other material which is generally applied by means of a printing process on one face of the continuous band.

The drying units currently used in this field are generally constituted by box-like bodies through which the drying medium, usually air or particular gases, flows; the continuous band is drawn, with a preset speed, along said box-like body so that at the exit the paint, ink or other material previously applied is perfectly dry.

Inside the box-like bodies, the continuous band follows a straight or curved path which extends only in one direction in order to avoid making contact with the printed side of the band. Due to this reason, the drying systems currently in use have considerable dimensions, and the bulk thereof increases with the traction speed of the continuous band, in order to thereby achieve the complete drying of the print before it exits from the drying unit.

The considerable bulk of these drying units is the source of numerous problems. In fact, in order to limit the overall size of these units within limits which are compatible with the layout requirements of other machines in an industrial structure, it is necessary to reduce the traction speed of the continuous band, with the disadvantage that the productive capacity of modern printing machines is penalized.

Furthermore, with large-size units there are problems in correctly supporting the continuous band in order to avoid drifting during traction, which could damage the band; considerable drying agent consumption furthermore occurs which increases operating costs.

Also due to the dimensions of the box-like bodies of known drying units, there are problems in sealing them correctly in order to avoid the dispersion of odors or noxious substances into the surrounding environment.

The design and layout of these drying units is even more difficult in printing processes which use a plurality of machines arranged in series and which process the band one after the other, since a drying unit is required at the exit of each machine.

The aim of the present invention is to solve the problems described above by providing a supporting structure for a continuous band inside a drying unit which allows to significantly limit, for an equal traction speed, the overall size of the drying unit with respect to conventional units.

Within the scope of this aim, an object of the invention is to provide a supporting structure which allows, despite the use of a reduced-bulk drying unit, to achieve high traction speeds of the continuous band so as to fully exploit the productive capacity of modern printing machines.

Another object of the invention is to provide a supporting structure which avoids drift or waving of the continuous band despite high traction speeds of the continuous band.

A further object of the invention is to provide a supporting structure which, by reducing the overall volume of the drying unit, allows a saving in operating costs.

This aim, these objects and others which will become apparent hereinafter are achieved by a supporting structure for a continuous band of material inside drying units as defined in the appended claims.

Further characteristics and advantages of the invention will become apparent from the description of a preferred but not exclusive embodiment of a supporting structure according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a schematic perspective view of the supporting structure according to the invention, with the framework omitted for the sake of greater clarity;

figure 2 is a lateral elevation view of the supporting structure, taken from one side;

figure 3 is a lateral elevation view of the supporting structure, taken from the other side;

figure 4 is a front elevation view of the supporting structure;

figure 5 is a rear elevation view of the supporting structure;

figure 6 is a sectional view of figure 4, taken along the plane VI-VI; and

figure 7 is an enlarged perspective view of a detail of the supporting structure according to the invention.

With reference to the above figures, the supporting structure according to the invention, generally indicated by the reference numeral 1, comprises a framework which is substantially constituted by two lateral shoulders 2a and 2b which are

mutually parallel and which support a plurality of main cylinders, indicated by the reference numerals 3 to 13, which are arranged so as to define, for a continuous band 14, a path which, according to the invention, is substantially shaped like a scroll. Along said path, the continuous band 14 contacts the main cylinders with a same side which is its non-printed side.

More particularly, the main cylinders 3-13 are arranged so that their axes are mutually parallel and spaced and are supported by the shoulders 2a and 2b so as to be able to rotate about their respective axes.

Conveniently, each main branch of the scroll is defined between a pair of main cylinders, for example the cylinders 3 and 4 or the cylinders 4 and 5, the axes of which are mutually parallel and coplanar.

The continuous band 14 can be wound around the main cylinders 3-13 starting from the outside of the scroll toward the center or starting from the center toward the outside, according to the requirements.

Advantageously, auxiliary cylinders 15, 16, 17 and 18 are provided which define a path for the entry or exit of the continuous band 14 into or from the center of the scroll.

Said auxiliary cylinders 15, 16, 17 and 18 are arranged so that their axes are mutually parallel and spaced and are perpendicular to the axes of the main cylinders 3-13. The auxiliary cylinders, too, are supported by the shoulders 2a and 2b so that they can rotate about their respective axes.

In practice, the entry or exit path followed by the continuous band 14 is also scroll-shaped, so that the side of the band which is in contact with the auxiliary cylinders 15-18 is always the side which has not been printed. The entry path defined by the auxiliary cylinders 15-18 is shaped like a scroll the trace or path of which extends in an ideal plane which intersects in a substantially perpendicular manner the ideal plane in which the path of the scroll defined by the main cylinders 3-13 extends. The last part of the entry or exit path enters the center of the scroll defined by the main cylinders 3-13 and is connected thereto by means of a first transmission cylinder 19 which is arranged at the center of the scroll defined by the main cylinders 3-13. Such transmission cylinder 19 is fixed to the shoulders 2a and 2b at its ends and is inclined at 45° with respect to the main cylinders 3-13. Conveniently, in order to reduce the sliding friction of the continuous band 14, the transmission cylinder 19 is hollow and is crossed by a plurality of holes 20 in the region with which the continuous band 14 makes contact. The inside of said transmission cylinder 19 is connected, in a known manner, to a source of compressed air, so that a flow occurs through the holes 20 in order to reduce friction between the continuous band 14 and the transmission cylinder 19.

A transmission cylinder 21, set at 45° with respect to the main cylinders, is arranged in the initial portion of the entry or exit path as well, and is executed substantially like the transmission cylinder 19.

The supporting structure according to the invention is intended to be enclosed in a box-like body 22, shown in broken lines in figure 2, through which a drying agent, such as hot air, gas or others, is pumped in a per se known manner.

Without changing the fact that the spatial arrangement of the supporting structure according to the invention may be any according to the requirements and that the continuous band 14 can enter into, or exit from, the center of the scroll path defined by the main cylinders 3-13, the path followed by the band is explained in greater detail hereinafter in the case of entry at the center of the scroll path defined by the main cylinders 3-13 arranged horizontally, as shown in figures 1 to 6.

The continuous band which arrives from a printing machine is arranged in a horizontal plane and is redirected into a vertical plane by means of a roller 23 which is parallel to the cylinders 3-13 and is supported by the shoulders 2a and 2b. Said roller 23 makes contact with the continuous band on its non-printed side.

The continuous band 14 is then redirected by the transmission cylinder 21, which also makes contact with the non-printed side of the band, and begins the entry path by winding in sequence around the auxiliary cylinders 15, 16, 17 and 18. After the auxiliary cylinder 18, the continuous band 14 enters the scroll path defined by the main cylinders, following a direction which is parallel to the axes of the main cylinders 3-13, and is conveyed to the main cylinder 3 by the transmission cylinder 19. The transmission cylinder 19, too, makes contact with the continuous band on its non-printed side. Starting from the main cylinder 3, the continuous band 14 follows the entire scroll path from the center toward the outside, winding around the main cylinders 4 to 13. Finally, the continuous band 14 is guided outside the box-like body 22 by a further roller 24 which is parallel to the main cylinders 3-13 and is supported by the shoulders 2a and 2b. The roller 24 can make contact with the printed side of the continuous band, since the applied material, such as paint, ink or other, is by then dry.

In practice it has been observed that the supporting structure according to the invention fully achieves the intended aim, since by defining, in a limited space, a path which engages the continuous band for a considerable length, it allows to dry

the printing material even at high traction speeds capable of fully exploiting the productive potentiality of modern printing machines, solving all the bulk problems which can be observed in known drying units.

A further advantage is that it is possible to perform differentiated drying for the various regions of the continuous band by providing appropriate separation baffles inside the box-like body which surrounds the supporting structure according to the invention.

The supporting structure thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept; all the details may furthermore be replaced with technically equivalent elements.

In practice, the materials employed, as well as the dimensions, may be any according to the requirements and the state of the art.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. Supporting structure (1) for a continuous band of material (14) inside drying units, characterized in that it comprises a framework (2a,2b) supporting a plurality of main cylinders (3-13) which define, for the continuous band (14), a path extending substantially in a scroll shape from an entry region to an exit region, said main cylinders (3-13) which define said scroll path making contact with a same side of said continuous band.

2. Supporting structure according to claim 1, characterized in that said main cylinders (3-13) which define said scroll path are mutually parallel and spaced.

3. Supporting structure according to claims 1 and 2, characterized in that each branch of the scroll is defined by a pair of main cylinders (3,4; 4,5) with axes mutually parallel and coplanar.

4. Supporting structure according to one or more of the preceding claims, characterized in that it comprises auxiliary cylinders (15,16,17,18) which define, for said continuous band (14), an entry or exit path into or from the center of said scroll path.

5. Supporting structure according to one or more of the preceding claims, characterized in that said auxiliary cylinders (15,16,17,18) make contact with said continuous band (14) on the same side with which said main cylinders (3-13) which define said scroll path make contact.

6. Supporting structure according to one or more of the preceding claims, characterized in that said entry or exit path extends proximate to the center of said scroll path, along a direction which is parallel to the axes of said main cylinders (3-13), a first transmission cylinder (19) being provided at the center of said scroll path, said transmission cylinder (19) being inclined at substantially 45° with respect to said main cylinders (3-13), for deviating the continuous band (14) onto the innermost main cylinder of said scroll path.

7. Supporting structure according to one or more of the preceding claims, characterized in that said main cylinders (3-13) and said auxiliary cylinders (15,16,17,18) are supported by said framework (2a,2b) so that they can rotate about their axes.

8. Supporting structure according to one or more of the preceding claims, characterized in that said entry or exit path defined by said auxiliary cylinders (15,16,17,18) is shaped substantially like a scroll, with a trace or path which extends in an ideal plane intersecting, in a substantially perpendicular manner, the ideal plane of extension of the trace of the scroll path defined by said main cylinders (3-13), the terminal branch of the scroll path defined by said auxiliary cylinders (15,16,17,18) entering, or exiting from, the center of the scroll path defined by said main cylinders (3-13).

9. Supporting structure according to one or more of the preceding claims, characterized in that said transmission cylinder (19) is hollow and is fixed to said framework (2a,2b), said transmission cylinder (19) being provided, in its region of contact with said continuous band (14), with a plurality of holes (20) for delivering compressed air fed into it in order to reduce the friction which derives from the sliding of said continuous band (14).

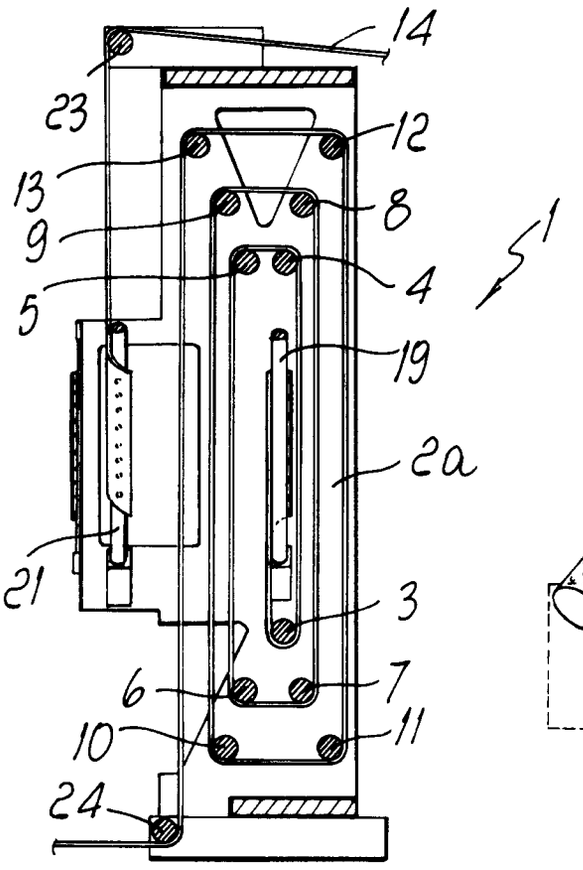

FIG. 6

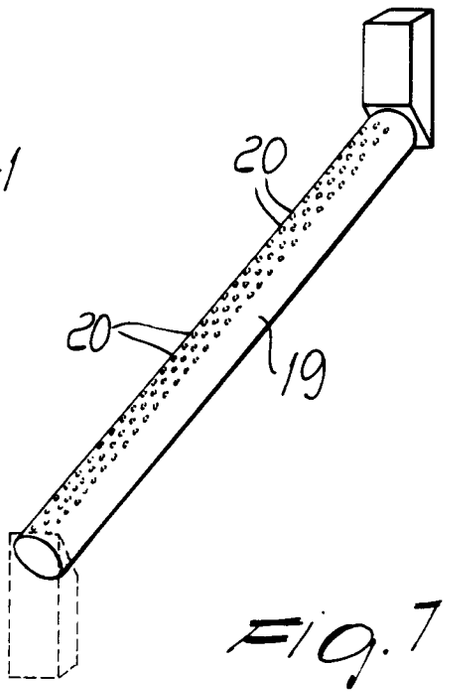

FIG. 7

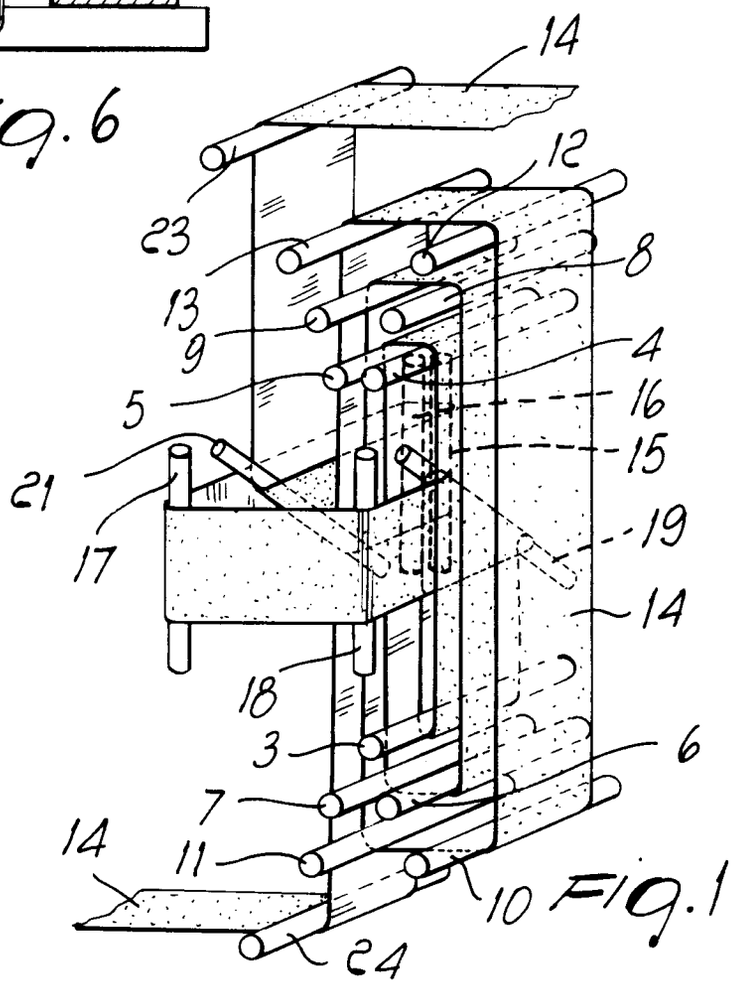

FIG. 1

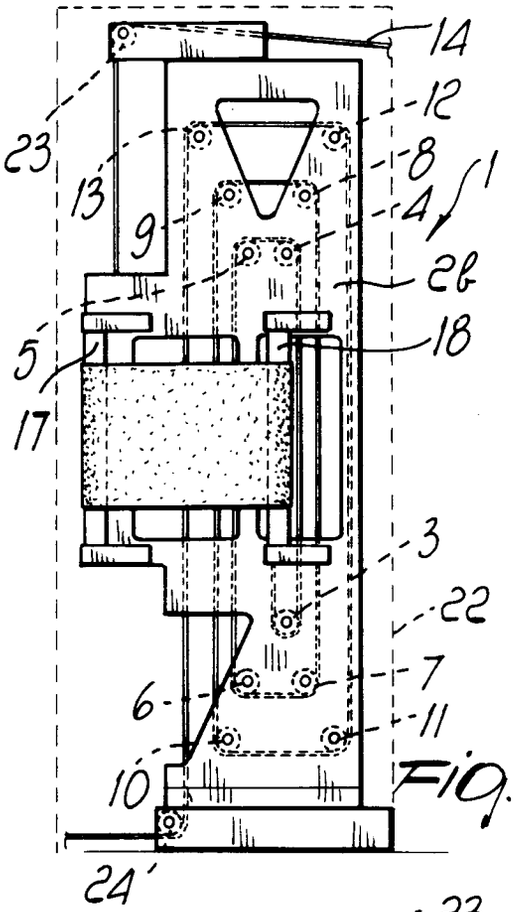

FIG. 2

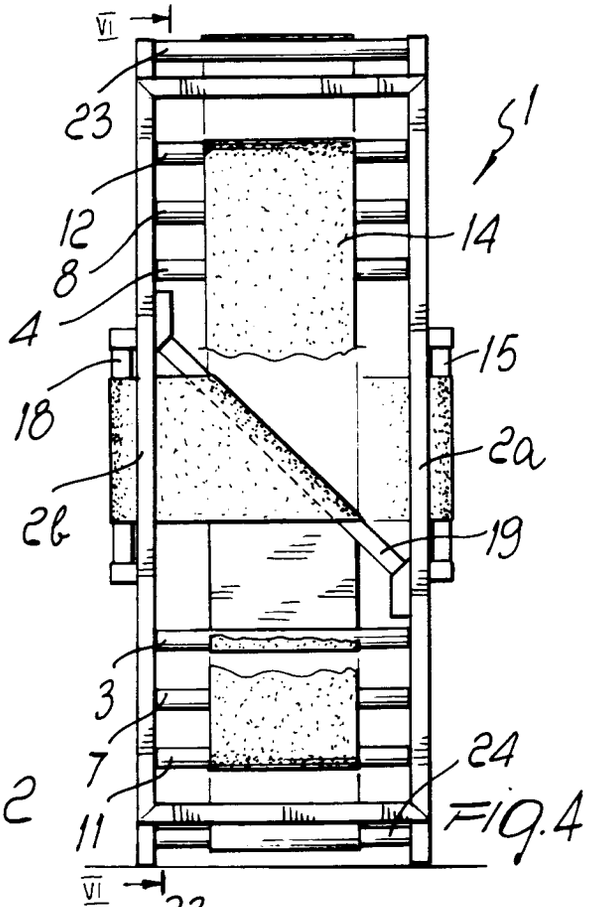

FIG. 4

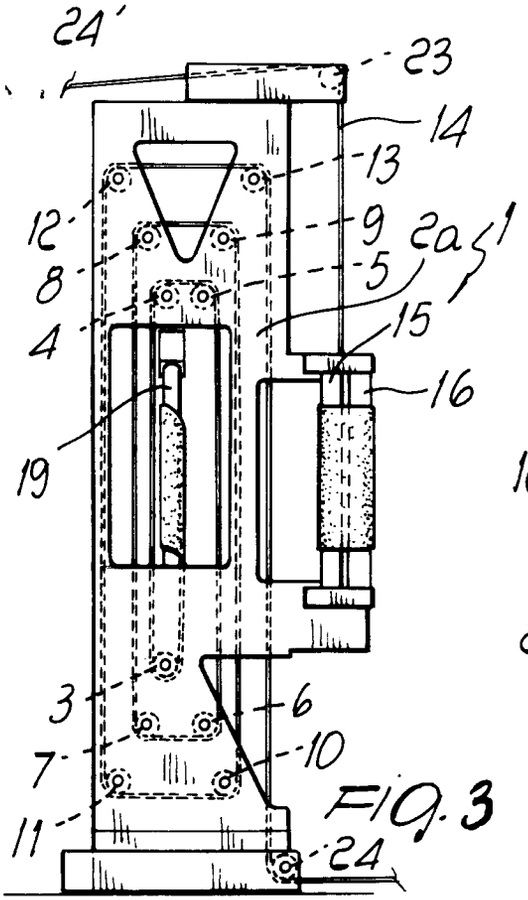

FIG. 3

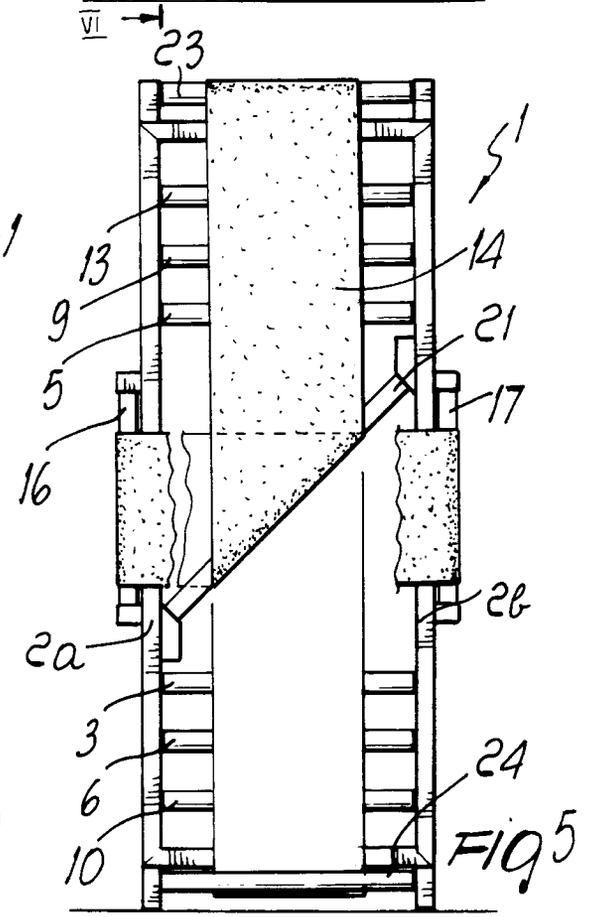

FIG 5

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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 6484

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)
X	DE-C-969 580 (MASCHINENFABRIK TILLM. GERBER SÖHNE & GEBR. WANSLEBEN) * the whole document *	1-7	B41F23/04
X	US-A-2 624 573 (E. G. RICE) * the whole document *	1-8	
Y		9	
Y	US-A-3 954 213 (ANDERSEN)	9	
A	GB-A-2 096 578 (G. D. SOCIETA PER AZIONI) * page 2, line 27 - line 42; figure 2 *	9	
A	US-A-3 079 702 (A. M. HALLEY ET AL) * the whole document *	1-9	
A	FR-E-29 505 (ANQUETIN)	1-7	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B41F
B65H
F26B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25 JUNE 1992	MEULEMANS J.P.

CATEGORY OF CITED DOCUMENTS

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