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(71) Applicant: **PRIMATEX MACHINERY PRIVATE LIMITED**
Dhanraj Mahal Second Floor Chhatrapati Shivaji Maharaj Marg
Bombay 400 039 Maharashtra(IN)

(72) Inventor: **Apte, Vasant Vyankatesh**
2/25 Vishnu Prasad M.G. Road
Vile Parle, (East) Bombay 400 057(IN)

(74) Representative: **Hedley, Nicholas James Matthew et al**
BERNIER & BURRINGTON 9 Staple Inn
London WC1V 7QH(GB)

(54) Stenter clips.

(57) The invention provides a stenter pin having a pin body (12) made of pressed sheet metal. One end of the body is attached to a chain (18) that moves the pin between the hot air/steam nozzles of a textile-drying or textile-treating stenter. The other end of the clip body is provided with a stainless steel table (22) that co-operates with a knife-edge (21.3) of a clip gate to hold the edge of the textile while it is transported through the stenter. Alternatively (as shown), the edge of the textile (4) may be retained by the pins (7.51) of a pin bar (7.5) which is also mounted at the front of the clip body. The central region of the clip body has a V-shaped region (12.1) and a pair of rolling bearings (11.1) are mounted on the two arms of the V-shaped region. The two pairs of rolling bearings move in guide channel rails (24, 25) fixed inside the stenter to prevent the tilting of the stenter clip.

The clip is made of pressed metal and so is cheaper than known clips; by arranging the bearing - (11.1) at 45° to the horizontal, the height of the clip can be very small allowing the nozzles of the stenter to be positioned closer to the textile and hence allowing more efficient treatment of the textile.

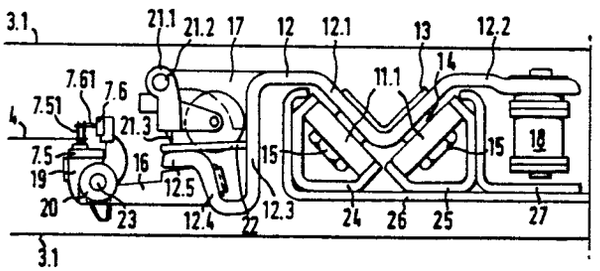

FIG. V

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STENTER CLIPS

This invention relates to clips for use in a stenter which is a machine for thermally treating a textile fabric. The fabric in open width condition is passed through the stenter. During the passage of the fabric through the stenter, hot air/steam is directed onto the fabric from above and below by an assembly of blowers, radiators, nozzles etc. arranged above and below the fabric. The assemblies are known as 'chambers' and are suitably insulated to ensure minimum loss of heat.

The fabric in open width condition is conveyed through the chambers by holding its edges in an assembly of devices known as stenter clips. The stenter clips are either joined together to form an endless chain or are conveyed on a separate endless roller chain. Two such endless chains are located one at either side of the stenter and convey the fabric through the chambers. Where the fabric enters the chambers, means are provided for fixing the fabric on the clips. The two endless chains are made to move continuously in such a way that it is possible to convey the fabric through the heating chambers in a controlled manner.

The entire assembly of the clips, the endless chains, the guide rails for the clips and the roller chains has to be located within the hot chamber. It occupies some space and so requires the vertical spacing of the air ducts directing the hot air/steam onto the fabric from above and below the fabric. The rate of evaporation of moisture from the fabric will be inversely proportional to the said vertical spacing and so the greater the spacing is, the lower will be rate of evaporation and, ultimately, the lower the production and performance will be.

In stenters now being manufactured using jets of hot air/steam for drying the fabric, this vertical spacing of the air ducts above and below the fabric varies between 100 to 150 mm depending upon their respective designs.

It is an object of this invention to reduce the vertical spacing of the jet nozzles discharging hot air/steam with a view to increase production without in any way affecting the efficient functioning of the fabric conveying mechanism.

Existing clips are made of alloy-castings requiring expensive and time-consuming machining operations and involving lot of skilled labour. It is a further object of this invention to reduce the machining operations and the labour involved in their manufacture by providing pressed metal components which can be produced on power pressures, requiring semi-skilled operators and giving a faster rate of component production.

Existing stenters manufactured to suit old textile production technology were never required to run at speeds exceeding 50/60 metres per minute. With more advanced technology developed by us, it is necessary that the stenters are run at speeds exceeding 100 metres per minute, at which speed the clips of existing cast alloy design may prove unsuitable in the long run.

It is a further object of this invention to provide a sturdy design for stenter clips which are preferably manufactured out of stainless steel pressed components and are able to run at a speed even exceeding 200 metres per minute.

Since the clips must be properly guided in their passage through the stenter, existing clips are provided with resting faces which slide over a sliding rail requiring lubrication (dry or wet) appropriate to the temperature of about 200°C at which the fabric is being processed in the stenter. The higher speeds of the mechanisms lead to faster wear of the sliding surfaces resulting in higher maintainance costs.

It is a further object of this invention to eliminate these sliding surfaces and the problems connected therewith by providing rolling elements preferably incorporating ball bearings.

In the existing arrangement, a rolling element is used to locate the clip properly in the chain rail and to take the load exerted by the widthwise pull of the fabric during stretching. The entire clip rests on two rails and is made to slide over them while conveying the fabric through the stenter. These rails may be of self-lubricating graphite-impregnated material or sintered phosphor bronze material requiring normal lubrication. This arrangement is liable to tilt in upwardly or downwardly causing fluctuations in the fabric height because there is nothing to prevent the upward or downward tilting of the clip.

According to the present invention, there is provided a stenter clip comprising means for attaching the clip to a conveyor within a stenter, means to which a clip gate and/or a pin carrier is or can be attached and rolling elements for engaging a guide rail in the stenter to guide the clip through the stenter, characterised in that the body of the clip is made of pressed sheet metal and further characterised in that the said rolling elements comprise two pairs of rolling elements the axes of the elements of one pair being transversely arranged with respect to the axes of the other pair.

In the arrangement proposed by this invention, the rolling elements are so arranged that they form a configuration whereby the upward or downward movement of the clip body is positively restricted because of their inclined positions. These elements could be arranged in a V configuration, preferably

rightangled or they can also be so aranged that their axes cross each other, preferably at right-angles. When the stenter clip tends to tilt one way, one set of rolling elements come into action and prevents the inclination in that direction. The other set of rolling elements come into action when the stenter clip arrangement tends to incline the other way. Thus the entire arrangement is not liable to tilt at all. This ensures a uniform level of the fabric during its passage through the stenter. There is no sliding surface in this arrangement but there is only rolling contact which also reduces the load on the driving motor of the conveyor.

The clip body of the stenter clip is preferably manufac-tured out of stainless steel pressed components. The total assembly height of the conveying mechanism preferably does not exceed 50 mm, so that the air can be spaced at a vertical distance of 60 mm. Each stenter clip may be provided with four rolling elements each of which preferably incorporates ball bearings. The axes of the rolling elements are preferably located at 45° to the vertical whereby they form a V-configuration which when properly located in the chain rail guide of a stenter, provides a proper rolling surface eliminating the need for a resting surface. The group of these four rolling elements is so arranged that the entire clip body assembly is carried by this group of rolling elements providing a floating arrangement and the weight of the clip is borne by the four elements. The inclined mounting of the elements help in preventing the movement of the clip in any direction except in the direction of the movement of the fabric.

In one embodiment of the invention, there is provided a stenter clip wherein the clip body is made from a pressed sheet metal (e.g. stainless steel) with a V-bend in the middle and a projection at the rear adapted for fixing the conveyor roller chain, and another projection in the front adapted to mount thereon the clip-gate carrier also made of pressed sheet metal (e.g. stain-less steel), the V bend adapted to hold two pairs of ball bearings, one pair on each arm of the V-bend, a stainless steel table plate for receiving the clip-gate which can hold the fabric by wedge action during the clip operation of the stenter and alternatively or in addition, a lug made of pressed metal sheet (e.g. stainless steel) to carry the pin-bar and the pin lock assemblies for holding the fabric on pins during the pin operations on the stenter.

The chain guide rails of the stenter should be adapted to suit the requirement of the clip of this invention to provide a channel having two guide surfaces between which the respective rolling elements can move. The guide rails may comprise a channel pressed out of sheet metal (e.g. mild steel) that guide the rolling elements in both the forward and return passage of the clips within the stenter. The pressed sheet metal channels may be clamped between two pressed metal parts of generally Z-shaped section to hold them steady in the stenter.

In an embodiment of this invention, the axes of the four rolling elements are preferably so arranged as to form a cross configuration whereby the total widthwise space required for the guiding chain rail could be considerably reduced. Although the rolling elements are preferably arranged at 45° for simplicity of manufacture, they could also be arranged at any other inclination including vertical and horizontal without in any way affecting the performance.

This invention is now described with reference to the accompanying drawings, in which:

Figure I is a schematic vertical sectional view through a stenter using known stenter clips;

Figure II is a side elevation of a known stenter clip;

Figure III is a schematic vertical section through a stenter using stenter clips according to the present invention;

Figure IV is a side elevation of a stenter clip according to the present invention;

Figure V is an enlarged side elevation showing part of the clip shown in Figure IV.

Figure 1 shows schematically in a vertical section the assembly of a blower 1, radiator 2, tapering nozzle 3, and the fabric 4 held between clips 5 - (shown symbolically). The tapering nozzles 3 each have two longitudinal slits for discharging hot air/steam on the running fabric 4. The walls, the ceiling and the floor of the stenter in the corresponding section are indicated by the numeral 6.

Figure II shows a side elevation of a clip 5 located between the tapering nozzles 3. The numeral 7 indicates a casting holding a clip gate 7.1, a clip gate pin 7.2, a knife edge 7.3 and table plate 7.4. The clip holds the fabric between the knife edge 7.3 and table plate 7.4 or in pins 7.51 of a pin bar 7.5 with pins 7.61 of a pin lock 7.6 preventing the fabric from leaving the pins 7.51 of the pin bar 7.5. The pin lock 7.6 is described in published British Patent Application No. 2140838. While processing fabric in a stenter the differential pressure exerted on the fabric by impinging jets from above and below the fabric may be sufficient to release the fabric 4 from the pins 7.51 and the pin lock 7.6 prevents the fabric being so released. The pins 7.61 are almost at right-angles to pins 7.51.

In Figure II, 10 indicates a bolt for locking a rolling element or bearing 11 by nut 10.1 to the clip body 7. 10.2 indicates a roller chain for conveying the entire assembly through the chambers of the stenter. The roller chain 10.2 is an endless chain moving under an independent drive from an elec-

tric motor (not shown). The clip body casting 7 is mounted on the roller chain 10.2 which is guided by bearing 11 in the track 8 when the roller chain is in motion. 9 indicates graphite impregnated slide rails which are mounted on a track 8. The clip body 7 rests on slide rails 9 when it is being conveyed through the chambers. Nozzles 3 are located above and below chain rails 8 leaving a gap of about 5 to 10 mm to facilitate the adjustment of rails to suit the width of the textile fabric being processed. The vertical distance between the fabric 4 and the nozzle 3 is governed by the total height of the chain rail 8 and the gap between the nozzle 3 and chain rail 8. It is an object of this invention to reduce this vertical distance.

Figure III illustrates this invention and shows in a vertical sectional view, an assembly similar to that shown in Figure I with the distance between the hot air/steam jet nozzles 3 substantially reduced. The locations of the upper and the lower housings 3.1 of the jet nozzles are not disturbed but they are extended so that the jets are brought nearer to the fabric so that jets of hot air/steam at higher pressure impinge on the fabric from above and below. The numerals 5.1 indicate symbolically the proposed clip rail assembly.

Figure IV shows in a vertical sectional view the proposed chain rail assembly for one edge of the fabric. There is a corres-ponding chain rail assembly for the other edge.

Figure V shows in vertical section an enlarged view of one half of the proposed chain rail assembly of Figure IV. The numerals 12 indicate the clip body formed from sheet metal and provided in its central area with a V-bend 12.1 on the arms of which rolling bearings 11.1 are mounted; a projection 12.2 at the rear allows for attachment of a roller chain 18; a right-angled bend 12.3 at the front of the clipboardy is for mounting a clip gate carrier 17 formed from sheet metal, another projection 12.4 at the front is for mounting a lug 16 also formed from sheet metal and another projection 12.5 also at the front is for mounting a stainless steel table plate 22. A clip gate 21.1 is mounted on the clip gate carrier 17 by a clip gate pin 21.2. The numerals 21.3 indicates the knife edge of clip gate 21.1. Table plate 22 is mounted on front projection 12.5 of the clip body 12. A pin bar carrier 19 and a pin lock carrier 20 are mounted on the lug 16 by a fulcrum pin 23. The numeral 7.5 indicates a pin bar with one or two rows of sharp pins 7.51 which is mounted on pin bar carrier 19 by screws (not shown). A pin lock 7.6 with pins 7.61 is mounted on pin lock carrier 20 by screws (not shown). The edge of fabric 4 can either be held by wedge action between the knife edge 21.3 of clip gate 21.1 and the table plate 22 or in the pins 7.51 of the pin bar 7.5 and locked by pins 7.61 of pin lock 7.6.

In Figure V the bearings 11.1 are mounted on the V bend 12.1 of the clip body 12 by bolt 15 and nuts (not shown). The numerals 13 and 14 indicate brackets formed from sheet metal for strengthening the sheet metal forming the V bend 12.1 and are fixed to it along the bearings 11.1 by bolt 15.

In Figure V the assembly of four bearings 11.1, two of which are mounted on one arm and two on the other arm of V bend 12.1 of clip body 12, is guided in channels 24 and 25 formed of sheet metal. Channel 24 is mounted in a further channel 21 also formed of sheet metal by screws (not shown). The numeral 27 indicates a sheet metal formed Z section which is mounted on channel 26 by screws (not shown) and that properly locates channel 25. Channel 25 is fixed to channel 26 and Z section 27 by screws (not shown). Channels 24 and 25 are identical in construction.

Figure IV shows two assemblies of complete clip 12, channels 24 and 25 and Z section 27 mounted in a common channel 26. One assembly is for the forward passage of the clip while the other is for the return passage of the clip. Figure IV shows the complete assembly of a chain rail 5.1 of Figure III as required for conveying one edge of fabric web 4. Two such assemblies are required for conveying both the edges of fabric 4 as shown symboli-cally in Figure III by the numeral 5.1.

In an alternative embodiment to that shown in Figures IV and V, the V-bend 12.1 could be replaced by a flat plate provided with two cantilever arms punched out of the flat plate. The arms are bent down at angle of 45° to the horizontal and the bearings 11.1 are fixed to the arms, preferably with strengthening plates and nuts and bolts. This embodiment has not been illustrated as the illustration would be very similar to the illustration of Figure V.

The foregoing invention can be used on any type of stenter which employs a clip-assembly for conveying fabric through chambers of the stenter.

Claims

1. A stenter clip comprising means for attaching the clip to a conveyor within a stenter, means to which a clip gate and/or a pin carrier is or can be attached and rolling elements for engaging a guide rail in the stenter to guide the clip through the stenter, characterised in that the body of the clip is made of pressed sheet metal and further characterised in that the said rolling elements comprise two parts of rolling elements the axes of the elements of one pair being transversely arranged with respect to the axes of the other pair.

2. A clip as claimed in claim 1, wherein the two pairs of rolling elements are mounted on respective arms of a generally V-shaped portion of the clip body.

3. A clip as claimed in claim 2, wherein the generally V-shaped portion is formed by bent sheet material.

4. A clip as claimed in claim 2, wherein the generally V-shaped portion is formed by cantilever arms extending from the rest of the clip body.

5. A clip as claimed in any one of claims 1 to 4, wherein the angle between the axes of the two pairs of rollers is approximately 90°

6. A clip as claimed in any one of claims 1 to 5, wherein the rolling elements incorporate ball bearings.

7. A clip as claimed in any one of claims 1 to 6, which includes a table and an associated clip gate, which together can hold the edge of a piece of fabric by wedge action and/or a lug made of pressed metal sheet for supporting both a pin-bar and a pin-lock assembly for holding the edge of a piece of fabric.

8. A stenter clip wherein the clip body is made from a pressed metal sheet (e.g. stainless steel) with a V-bend in the middle and a projection at the rear adapted for fixing the conveyor roller chain, and another projection in the front adapted to mount thereon the clip-gate carrier also made of pressed metal sheet (e.g. stainless steel), the V-bend adapted to hold two pairs of ball-bearings, one pair on each arm of the V-bend, a stainless steel table plate for receiving the clip-gate which can hold the fabric by wedge action during the clip operation of the stenter and alternatively or in addition a lug made of pressed metal sheet (e.g. stainless steel) to carry the pin-bar and the pin-lock assemblies for holding the fabric on pins during the pin operations on the stenter.

9. A stenter clip as claimed in claim 8, wherein the V-bend is replaced by a flat plate with three-sided square punchings in two pairs, each punched square being bent downwards at 45° and ball-bearings fixed thereunder with supporting strengthening plates and/or washers with nuts and bolts.

10. A stenter comprising stenter clips as claimed in any one of claims 1 to 9, and particularly a stenter which includes guide rails in which the rolling elements can move, each of the said rails having two guide surfaces between which the respective rolling elements are, in operation, guided.

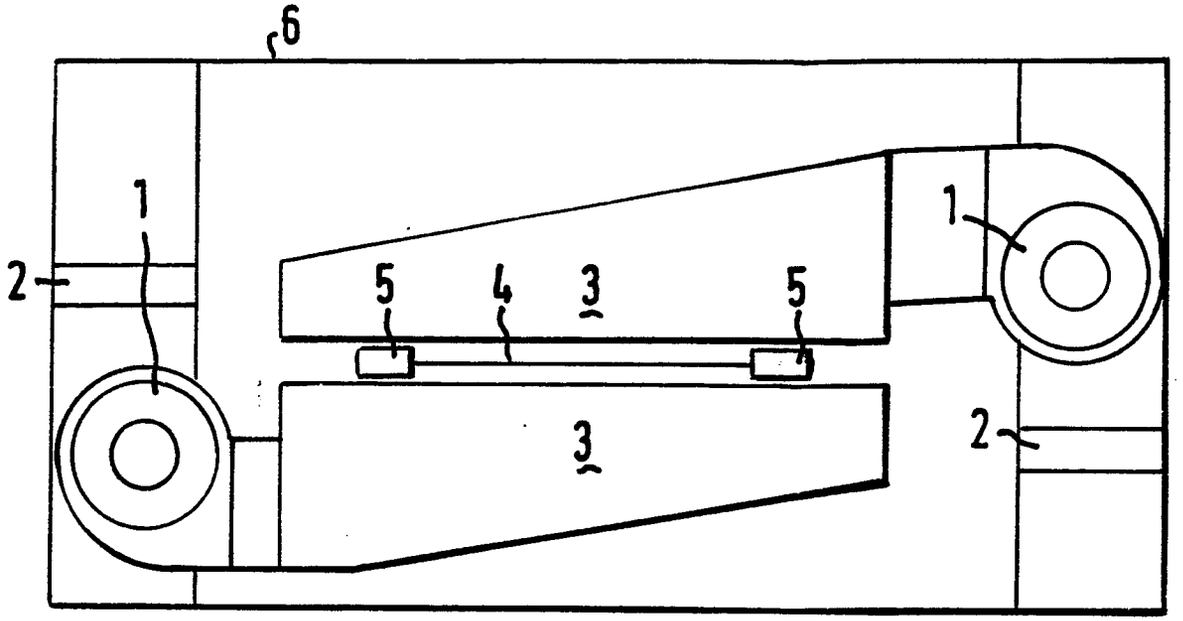

FIG. I

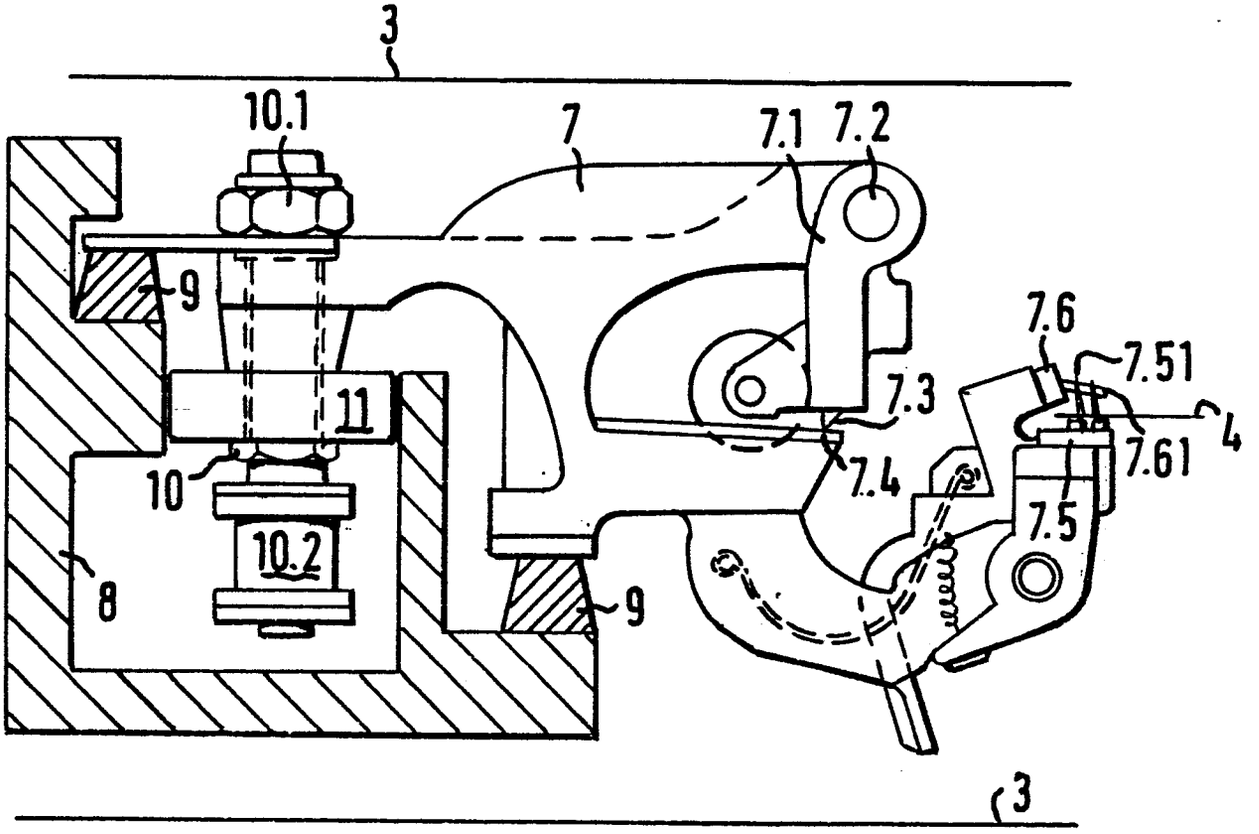

FIG. II

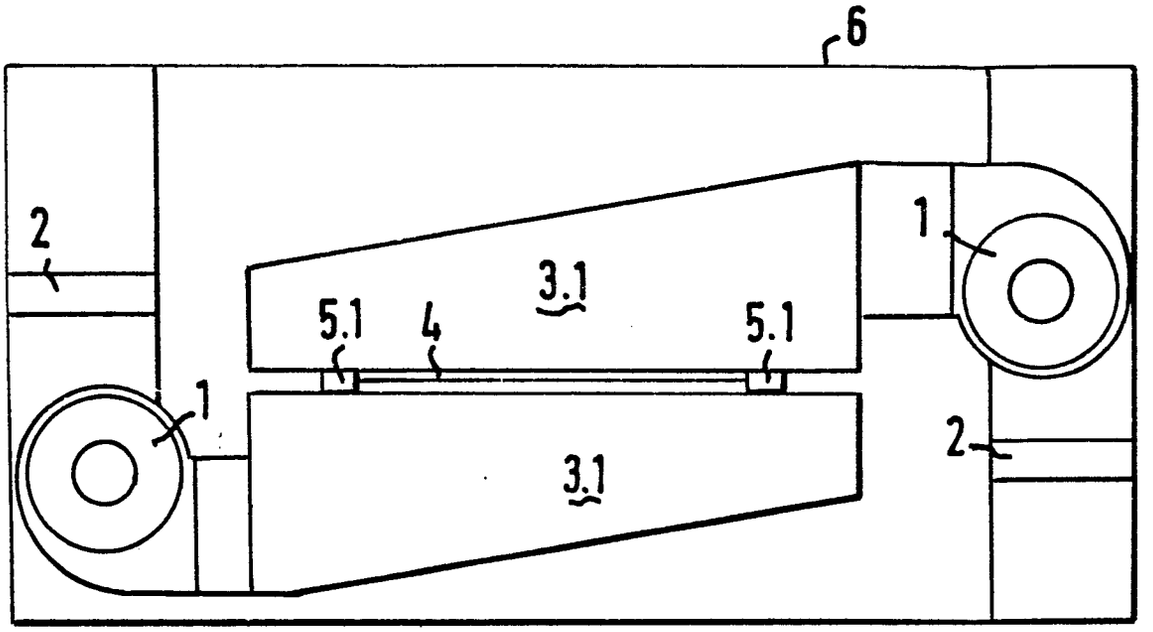

FIG. III

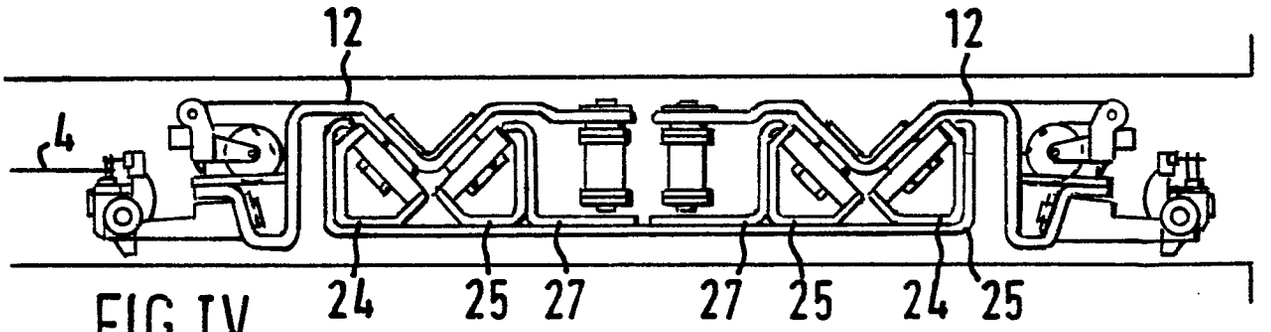

FIG. IV

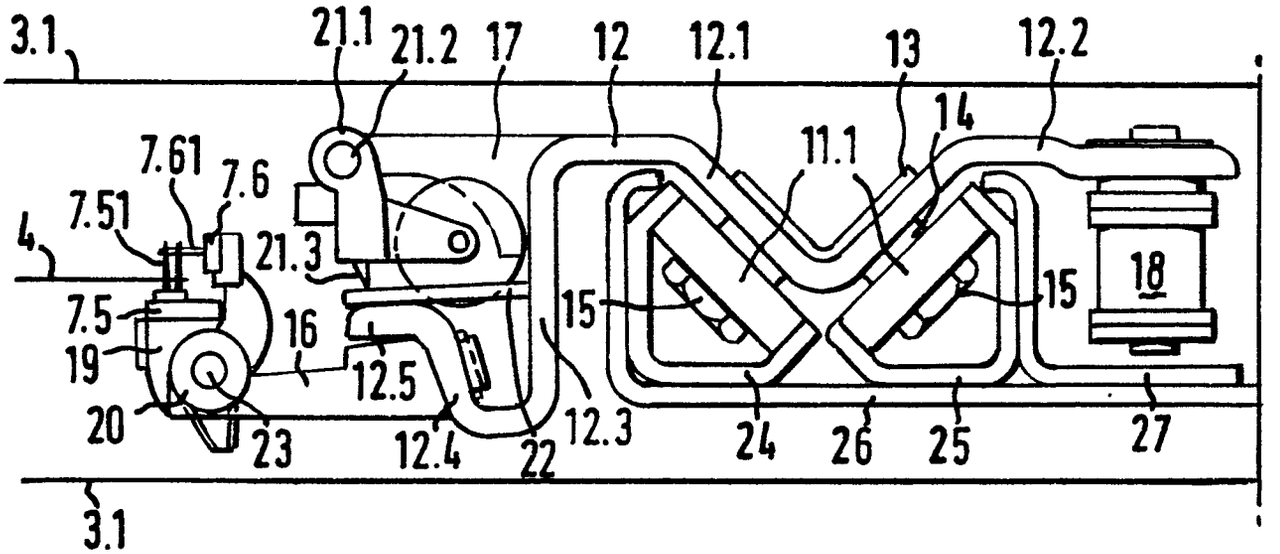

FIG. V

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 86 30 6462

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.4)
X	GB-A-1 067 872 (BAKELITE XYLONITE) * Whole document * ---	1,2,5, 7,10	D 06 C 3/04
A	US-A-3 457 608 (LINDAUER DORNIER) ---		
A	GB-A-2 148 960 (KRANTZ) -----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

D 06 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	09-12-1986	PETIT J.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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