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(71) Applicant: **Theel, Peter**
Geenhovensedreef 2
NL-5552 BD Valkenswaard(NL)

(72) Inventor: **Theel, Peter**
Geenhovensedreef 2
NL-5552 BD Valkenswaard(NL)

(74) Representative: **Vollebregt, Cornelis Jacobus, Ir.**
P.O. Box 645
NL-5600 AP Eindhoven (NL)

(54) A device for feeding cardboard sheets to processing machines.

(57) The invention relates to a device for feeding cardboard sheets to processing machines, said device being provided with means for picking up a stack (4) of cardboard sheets from a feed conveyor (2) and for tilting and delivering said stack (4) to a discharge conveyor (26) feeding the cardboard sheets to a processing machine. The means for picking up and tilting a stack (4) of cardboard sheets are formed by a belt conveyor (12), which is pivotable, through at least 90°, from a vertical position for picking up a stack (4) of cardboard sheets into a discharge position, in which the belt conveyor (12) extends in the direction of the discharge conveyor (26). Clamping means (19,25) are connected to the belt conveyor (12) for clamping down the stack (4) of carboard sheets between said clamping means. At least those clamping means (25) which are located downstream, when seen in the direction of movement of the cardboard sheets from the belt conveyor (12) towards the discharge conveyor (26), can be removed from the path of movement of the cardboard sheets.

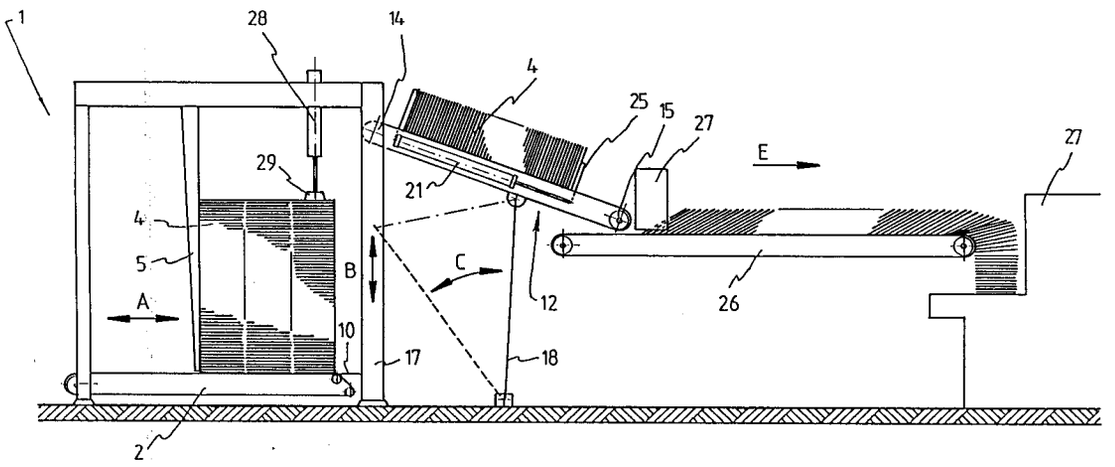

Fig 1

EP 0 537 823 A1

The invention relates to a device for feeding cardboard sheets to processing machines, said device being provided with means for picking up a stack of cardboard sheets from a feed conveyor and for tilting and delivering said stack to a discharge conveyor feeding the cardboard sheets to a processing machine, said means for picking up and tilting a stack of cardboard sheets comprising a belt conveyor, which is pivotable through at least 90°, from a vertical position for picking up a stack of cardboard sheets into a discharge position, in which the belt conveyor extends in the direction of the discharge conveyor, whilst clamping means are connected to the belt conveyor for clamping down the stack of carboard sheets between said clamping means, whereby at least those clamping means which are located downstream, when seen in the direction of movement of the cardboard sheets from the belt conveyor towards the discharge conveyor, can be removed from the path of movement of the cardboard sheets.

Such a device is known from EP-A-0,329,925.

In this known device the means for picking up a stack of cardboard sheets are pivotable about a fixed horizontal pivot pin, which is spaced by some distance from the bottom side of the stack of cardboard sheets supplied by means of the feed conveyor. Upon pivoting of the stack of cardboard sheets supplied by means of the feed conveyor the bottom edge of the stack of cardboard sheets directed towards the feed conveyor will consequently move in a circular arc in the direction of the feed conveyor. This implies that a next stack of cardboard sheets supplied by means of the feed conveyor must be kept spaced from the stack of cardboard sheets picked up by the means for picking up and tilting a stack of cardboard sheets. This requires the use of a complicated construction of the feed conveyor. A further disadvantage of this construction is that successive stacks of cardboard sheets cannot support each other, which constitutes a drawback when cardboard sheets having smaller dimensions are being processed, since non-supported stacks, which may have a height of 1200 - 2000 mm, will become unstable thereby.

According to the invention means are provided for reciprocating the upstream end of the belt conveyor in at least substantially vertical direction, whilst the belt conveyor is supported between its ends by a coupling means, which is pivotable about horizontal pivot pins with respect to the belt conveyor and with respect to a fixed point.

When using the construction according to the invention successive stacks of cardboard sheets can be supplied in abutting relationship to the means for picking up and tilting a stack of cardboard sheets, so that a simple construction of the feed conveyor can be used. In addition to that the stacks of cardboard sheets supplied on the feed conveyor may support each other, as a result of which also a quick processing of stacks of cardboard sheets having smaller dimensions can be realised.

The invention will be explained in more detail hereafter with reference to a possible embodiment of the construction according to the invention diagrammatically illustrated in the accompanying Figures.

Figure 1 is a diagrammatic side view of a device according to the invention.

Figure 2 is a larger-scale, diagrammatic side view of the belt conveyor.

Figure 3 is a diagrammatic plan view of a part of the feed conveyor and supporting means for the stacks of cardboard sheets to be supplied.

The device shown in Figure 1 comprises a frame 1, near whose bottom side an endless belt conveyor 2 is arranged, by means of which stacks 4 of cardboard sheets, arranged one behind the other, can be moved in the direction according to the arrow A.

Vertically extending supporting arms 5 are provided so as to support the stacks 4 arranged one behind the other. The arms 5 are coupled to a horizontally extending bridge 6, which is supported in the frame 1 by means of trolley carriages 7 in such a manner, that back supports 5 are movable within the frame, in the direction according to arrow A and opposite thereto.

Furthermore the back supports 5 are movable along the bridge 6 by means of lead screws 8, which can be driven by means of motors 9, so as to adjust the spacing between the back supports 5 to the width of a stack 4 of cardboard sheets.

Sliding strips 10, extending parallel to each other and being in line with the upper part of the belt conveyor 2, are provided near the discharge end of the belt conveyor 2, whilst elongated recesses 11, extending in the longitudinal direction of the belt conveyor 3, are present between said sliding strips (Figure 3).

Near the discharge end of the feed conveyor 2 a belt conveyor 12 is provided, which is built up of a plurality of spaced-apart belts 13, which are passed over two drums 14 and 15, one of which can be driven by means of a motor 16.

The end of the belt conveyor 12 comprising the drum 14 is located between two spaced-apart uprights 17 of the frame 1 and can be moved up and down, by means not shown, such as lead screws or the like, along said uprights 17, as indicated by means of the arrow B. In addition to that the belt conveyor 12 is supported between its ends by a coupling rod 18, which is pivotally connected to the belt conveyor 12 with one end and to the floor with its other end.

During the reciprocating movement of the end of the belt conveyor 12 guided between the vertical frame beams 17 the coupling rod 18 will pivot in the manner indicated by the arrow C. As a result of this arrangement the belt conveyor 12 can be pivoted between a vertical position, in which the belt conveyor 12 is located between the frame beams 17, when seen in Figure 1, and a position in which the belt conveyor 12 will slope downwards from its end located between the frame beams 17, as illustrated in Figure 1.

As is illustrated in more detail in Figure 2, clamping means are provided near the end of the belt conveyor guided by the frame beams 17, said clamping means being formed by a plurality of fingers 19 located between the belts 13, which fingers extend perpendicularly to the parts of the belts 13 extending parallel to each other, as will be apparent from Figure 2. The fingers 19 are thereby guided in guide bushes 20, so as to be movable in longitudinal direction, and can be locked in a desired position with respect to said guide bushes 20 by clamping means (not shown). The construction is thereby such that in the vertical position of the belt conveyor 12 the fingers 19 are located in recesses 11 present between the sliding plates 10.

The distance along which the fingers 19 project on the left-hand side of the belts 13, when seen in Figure 2, will be adapted to the depth, when seen in the longitudinal direction of the belt conveyor 2, of a stack 4 to be picked up.

At least one air cylinder 21 is coupled to the frame of the belt conveyor 12, by means of which air cylinder a sliding block 22 can be reciprocated along guide means 23, in a direction parallel to the parts of the belts 13 extending parallel to each other.

A shaft 24 is coupled to the sliding block 22, a plurality of clamping means 25 in the shape of fingers being secured to said shaft, which fingers can be pivoted to and fro, by means of a motor (not shown) mounted on the sliding piece 22, between the position illustrated in full lines in Figure 2 and the position illustrated in dotted lines in Figure 2, as is indicated by means of the arrow D.

As is furthermore shown in Figure 1, the device is furthermore provided with a discharge conveyor 26, which is arranged in such a manner, that in the position of the belt conveyor 12 illustrated in Figure 1 the downstream end of the belt conveyor 12 is located above the discharge conveyor 26. Near the downstream end of the discharge conveyor 12, above the belt conveyor 26, bumper means 27 are arranged on either side of the belt conveyor, to which a reciprocating vibrating motion can be imparted, perpendicularly to the plane of the drawing and to the longitudinal direction of the belt conveyor 26, when seen in Figure 1.

The belt conveyor 26 is intended to discharge cardboard sheets delivered to the belt conveyor in the direction according to the arrow E in the usual manner, towards a processing machine 27.

A clamping device is furthermore provided in the frame 1, said clamping device being provided with a setting cylinder 28 and a clamping plate 29, which can be pressed, by means of the setting cylinder 28, against the upper face of a stack 4 of cardboard sheets located near the downstream end of the belt conveyor 2.

A batch of cardboard sheets to be fed to the processing machine 27 can be placed on the feed conveyor 2, by conveying means not shown, in the form of a number of stacks 4 of cardboard sheets located one behind the other, after the supporting beams 5 have first been moved apart sufficiently to allow the stack to pass. Then the supporting beams 5 can be placed against the rear side of the rearmost stack 4, as shown in Figures 1 and 3, so as to prevent said rearmost stack 4 from falling over, in the direction indicated by the arrow A, when the stacks are being moved.

The stacks 4 will be moved in the direction according to the arrow A in steps, each time in such a manner that the foremost stack is moved on to the sliding plates 10, whilst the belt conveyor 12 is in its vertical position and the lowermost clamping fingers 19 will therefore be located in the recesses 11, so that the stack will also come to rest on said clamping fingers 19. Then the clamping fingers 25 can be pulled against the upper face of the respective stack, so that the stack is clamped down between the clamping fingers 19 and 25.

The stack located directly adjacent thereto is thereby clamped down as a result of the press-down action of the stamp 29, so that when the belt conveyor 12 is subsequently pivoted from its vertical position into the position shown in Figure 1 together with the stack clamped down between the clamping means 19 and 25, also the foremost stack remaining behind on the belt conveyor 12 will remain upright.

After the belt conveyor 12 has reached the position shown in Figure 1, the clamping fingers 25 will be pivoted into the position illustrated in dotted lines in Figure 2, after which the endless belts 13 forming part of the belt conveyor 12 can be set moving, so as to discharge the stack present on the belt conveyor 12 into the direction of the discharge conveyor 26. It will be apparent that the cardboard sheets, seen in Figure 1, will automatically fall over in clockwise direction thereby, so that said cardboard sheets will come to lie on the belt conveyor 26 in overlapping relationship, as indicated in Figure 1, and be discharged in the direction according to the arrow E by means of the belt conveyor 26. The cardboard sheets thereby move

between the reciprocating bumper means 27 disposed near the sides of the discharge conveyor 26, said bumper means effecting a correct alignment of the cardboard sheets delivered to the conveyor 26.

After the cardboard sheets have been discharged from the belt conveyor 12 said belt conveyor may be returned to its vertical position, after which the stamp 29 can be moved up slightly by means of the setting cylinder 28, so as to be able to effect a movement of the stacks 4 in the direction according to the arrow A by means of the belt conveyor 2 again.

In practice it has become apparent that in this manner also high stacks of cardboard sheets, which have a relatively small dimension, when measured in the direction of displacement according to the arrow A, can be processed in a stable and fast manner, without there being a risk of the stacks e.g. falling over on the belt conveyor 2 or losing their intended cohesion in any other manner.

Claims

1. A device for feeding cardboard sheets to processing machines, said device being provided with means for picking up a stack of cardboard sheets from a feed conveyor and for tilting and delivering said stack to a discharge conveyor feeding the cardboard sheets to a processing machine, said means for picking up and tilting a stack of cardboard sheets comprising a belt conveyor, which is pivotable through at least 90°, from a vertical position for picking up a stack of cardboard sheets into a discharge position, in which the belt conveyor extends in the direction of the discharge conveyor, whilst clamping means are connected to the belt conveyor for clamping down the stack of cardboard sheets between said clamping means, whereby at least those clamping means which are located downstream, when seen in the direction of movement of the cardboard sheets from the belt conveyor towards the discharge conveyor, can be removed from the path of movement of the cardboard sheets, characterized in that means are provided for reciprocating the upstream end of the belt conveyor in at least substantially vertical direction, whilst the belt conveyor is supported between its ends by a coupling means, which is pivotable about horizontal pivot pins with respect to the belt conveyor and with respect to a fixed point.

2. A device according to claim 1, characterized in that said belt conveyor is pivotable from its vertical position, through an angle of more than 90°, in such a manner that the belt conveyor slopes downwards in the direction of the discharge conveyor, so as to discharge said cardboard sheets to said discharge conveyor.

3. A device according to any one of the preceding claims, characterized in that said belt conveyor is formed by a plurality of endless belts located side by side, and that said clamping means are formed by fingers extending between said belts.

4. A device according to claim 5, characterized in that the fingers located near the downstream end of the belt conveyor are movable in the longitudinal direction of the belt conveyor, and that said fingers are pivotable between a position in which they extend at least substantially perpendicularly to the belt parts of the belt conveyor, and a position in which they are located between the belt parts of the belt conveyor.

5. A belt conveyor according to any one of the preceding claims 3 or 4, characterized in that the fingers located near the upstream end of the belt conveyor are adjustable perpendicularly to the longitudinal direction of the belt parts of the belt conveyor.

6. A device according to any one of the preceding claims, characterized in that at least one support means is provided above the feed conveyor, which support means can be placed so as to abut against an upright side of a stack of cardboard sheets and which can move along with the feed conveyor.

7. A device according to claim 6, characterized in that two support means are provided, which are adjustable perpendicularly to the direction of movement of the feed conveyor.

8. A device according to any one of the preceding claims, characterized in that near the downstream end of the feed conveyor a clamping mechanism is provided, by means of which a stack of cardboard sheets can be clamped down between the feed conveyor and the clamping mechanism.

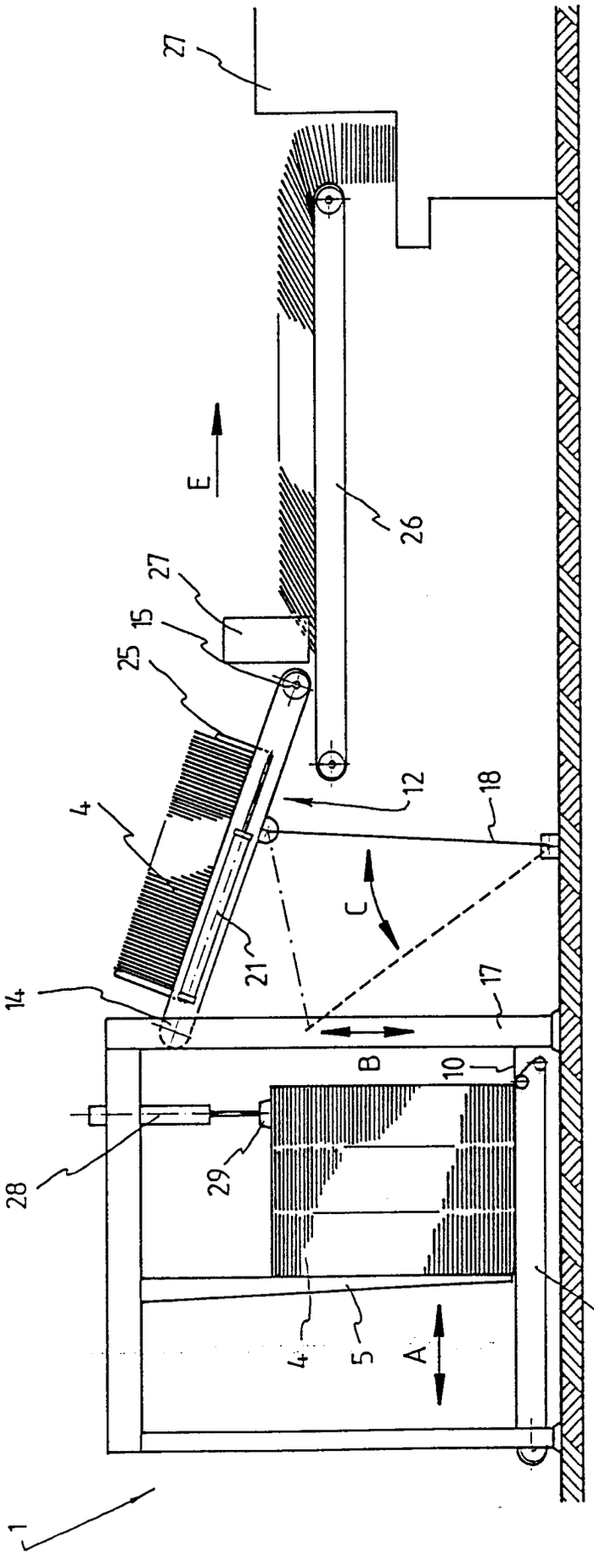

Fig 1

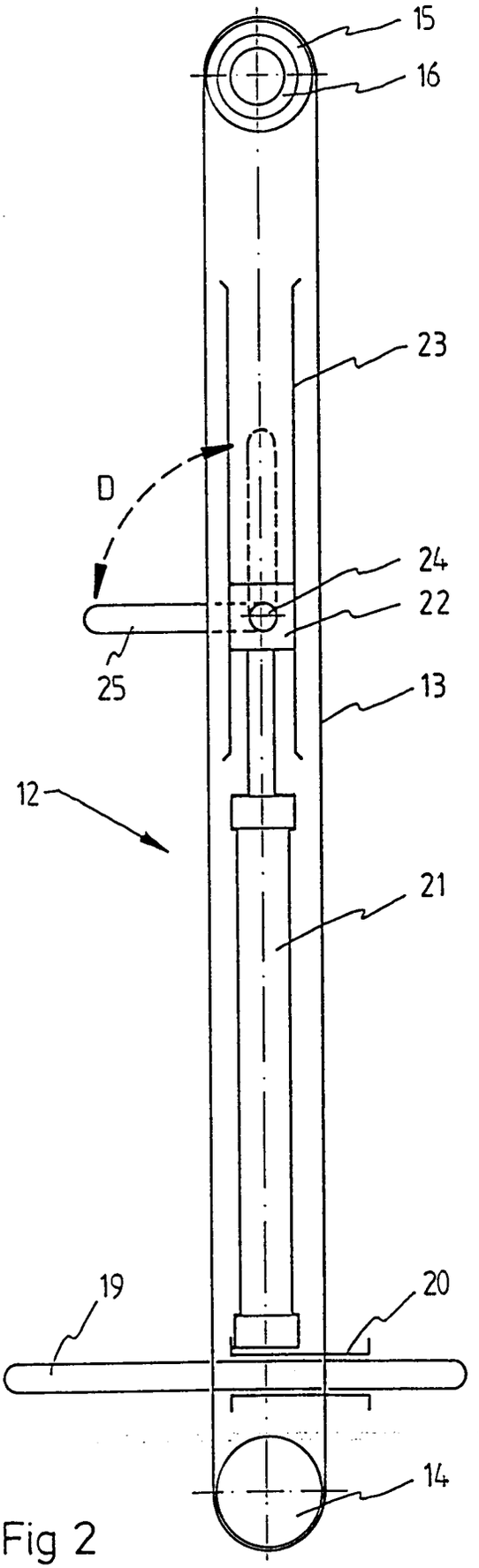

Fig 2

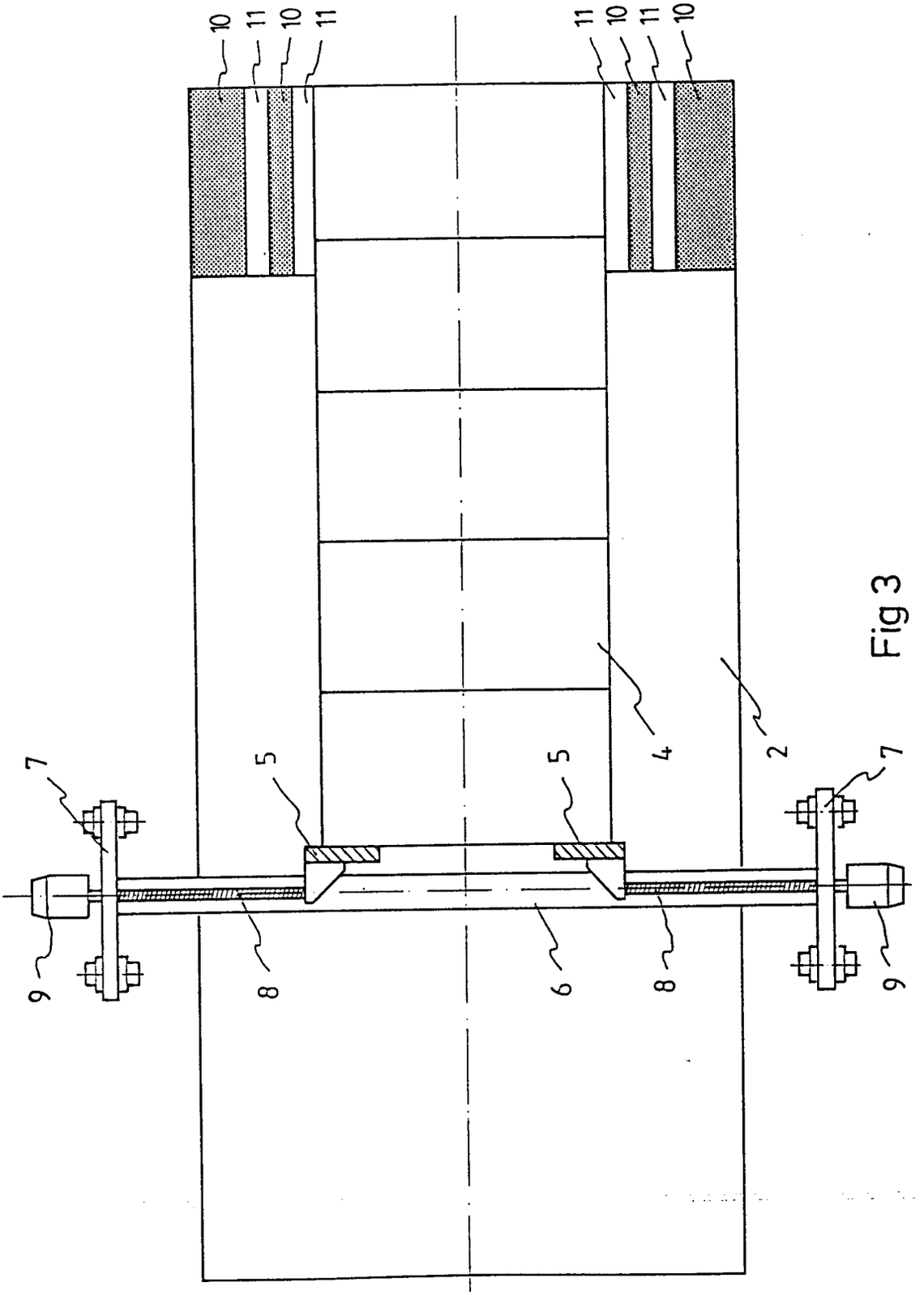

Fig 3

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EUROPEAN SEARCH REPORT

Application Number
EP 92 20 2990

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)
D,A	EP-A-0 329 945 (FOCKE & CO. (GMBH & CO.)) * column 4, line 29 - column 8, line 11 * * figures 1-3 *	1-8	B65H1/30
A	US-A-4 986 731 (T. SHINOMIYA)		
A	US-A-4 042 234 (M. TOKUNO)		
A	DE-C-3 739 659 (B.A.T. CIGARETTENFABRIKEN GMBH)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B65H
B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04 FEBRUARY 1993	BOURSEAU A.M.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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