



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
15.11.2017 Bulletin 2017/46

(51) Int Cl.:
B26D 1/16 (2006.01) **B26D 3/16** (2006.01)
B26D 7/06 (2006.01) **B26D 7/01** (2006.01)

(21) Application number: **17168432.7**

(22) Date of filing: **27.04.2017**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
MA MD

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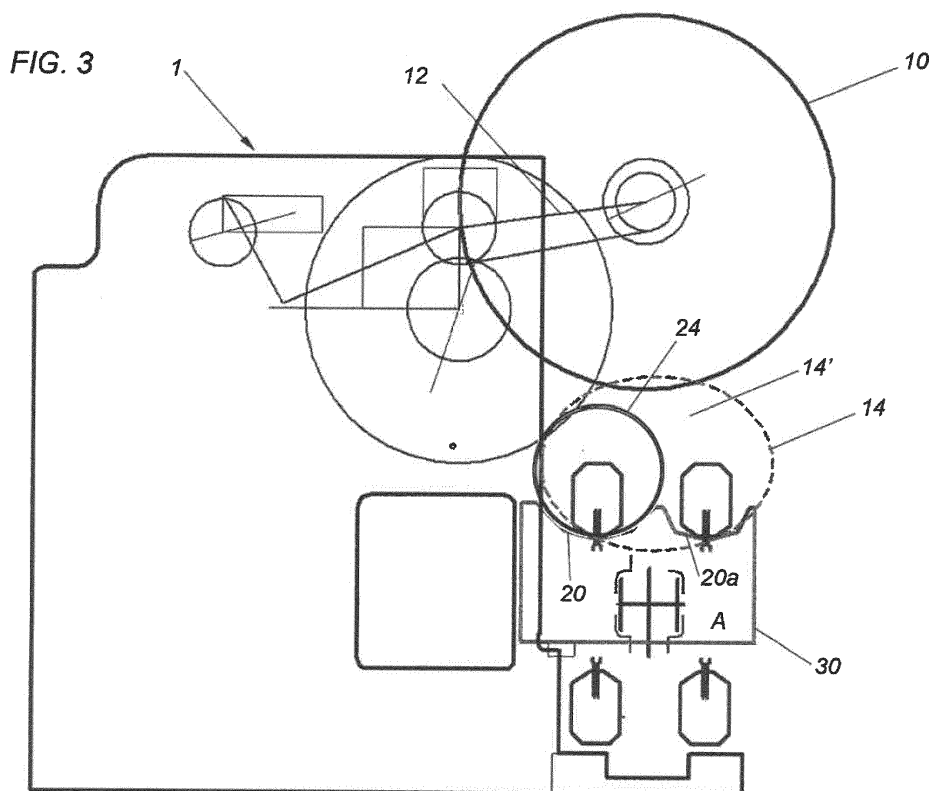
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(30) Priority: **10.05.2016 IT UA20163298**

(54) **CUTTING MACHINE AND METHOD OF CUTTING ROLLS OF SHEET MATERIAL**

(57) Cutting machine for cutting rolls of sheet material from sticks or logs (22, 22a, 24) moving forwards in parallel channels (20, 20a) in a horizontal direction (Z), comprising at least one cutting blade (10) driven by actuating means (12) able to impart to said cutting blade (10) a path (14) defining a cutting area (14') contained in a plane (XY) perpendicular to the direction (Z) of forward

movement of the logs, the axes X, Y and Z forming a Cartesian coordinate system, with the axis X horizontal, wherein said parallel channels (20, 20a) have different dimensions and are mounted movable in said direction (X) so as to cause the diameter of the logs to fall within said cutting path (14).



Description

[0001] The object of the present invention is a cutting machine for cutting rolls of sheet material such as paper, tissue paper, nonwoven fabric, plastic materials, etc., starting from sticks or logs.

[0002] The invention likewise relates also to a method of cutting these rolls of sheet material.

[0003] In the production of rolls of sheet materials logs are initially produced which have subsequently to be cut into rolls of the required length. Special cutting machines serve this purpose which have one or more disk or rotating belt blades which are cyclically lowered onto the logs to be cut, which are moved forwards in special channels. In known cutting machines motor drives are provided to confer to the blade the rotary motion, the oscillatory motion of raising and lowering of the blade and the forward movement of the blade and of the chains which drive the logs by means of special pushers.

[0004] Conventionally the blade is made to rotate on a path contained in a cutting plane transversal to the direction of forward movement of the logs. Articulated mechanisms are in themselves known which, by means of cam or connecting rod-crank systems, make the axis of the cutting blade follow a path normally circular or elliptical.

[0005] Known cutting machines are found to have low versatility. More particularly they have channels which allow the use of logs of limited diameter; in fact, due to the paths followed by the blade, linked to the maximum extension of the mechanical elements which determine therefore a limited cutting area, there is no possibility of using numerous cutting channels in parallel, unless the blade assembly is replaced radically.

[0006] The cutting machines are consequently divided on the basis of the diameter of logs to be cut and the number of channels used, given that the cutting area remains constant. For example, up to five channels can be provided in case of rolls with diameter of 240 mm, while one or two channels are provided in case of industrial rolls of more than 400 mm. There are in this way problems whenever production is changed, moving to the cutting of rolls with different diameter.

[0007] WO 2004/094117 A1 describes a cutting machine for the cutting of rolls of sheet material from sticks or logs which are moved forwards in a plurality of parallel longitudinal channels having the same dimension and mounted in a fixed position.

[0008] Cutting machines are known in particular with two channels for logs up to a certain diameter and with one channel for logs of greater diameter.

[0009] Consequently there is the need to cut logs of various diameters without having to resort to different cutting machines.

[0010] The object of the invention is that of eliminating these disadvantages by providing a cutting machine for cutting rolls of sheet material of different sizes, which is practical, economical and easy to make.

[0011] Another object of the present invention is to provide such a cutting machine for the cutting of rolls of sheet material which is highly versatile.

[0012] Yet another object of the present invention is that of providing such a cutting machine which also allows rolls, of such diameter that they would normally exit from it, to be returned within the cutting path of the blade.

[0013] These objects are achieved in accordance with the invention, with the features listed in the annexed independent claim 1.

[0014] Preferred embodiments of the invention are disclosed by the dependent claims.

[0015] According to the present invention a cutting machine is provided for cutting rolls of sheet material from sticks or logs advancing in parallel channels in a horizontal direction (Z), comprising at least one cutting blade driven by actuating means able to impart to said cutting blade a path defining a cutting area contained in a plane (XY) perpendicular to the forwarding direction (Z) of the logs, the axes X, Y and Z forming a Cartesian coordinate system, with the axis X which is horizontal, wherein said parallel channels have different dimensions and are mounted movable in said direction (X) to cause the diameter of the logs to fall within said cutting path.

[0016] The cutting machine for cutting rolls of sheet material according to the invention provides an actuation system such as to allow the cutting blade to follow a virtually elliptical orbit. This system of actuation is made up of a main arm supporting the cutting blade pivoted in one of its intermediate parts to a first connecting rod and in its opposite end part to the blade and to a second connecting rod connected to a mechanism for the regulation of wear of the blade.

[0017] According to an embodiment of the invention a bench is provided on which two channels of different dimensions are formed to house logs of various diameters. When the diameter of a log to be cut exceeds the cutting area defined by the path of the cutting blade, the bench is made to translate in the predefined direction X so as to bring the diameter of the log back within the cutting area.

[0018] The invention likewise relates to a method of cutting rolls of sheet material from sticks or logs according to claim 6.

[0019] Further features of the invention will be made clearer by the following detailed description, referred to one of its purely non-limiting examples, illustrated in the accompanying drawings in which:

Fig. 1 is a perspective view of the cutting machine for the cutting of rolls of sheet material according to the invention which provides for the use of two channels of different dimensions;

Fig. 2 is a schematic view of the functioning of the cutting machine of Fig. 1 wherein the two channels are occupied by logs of same dimensions whose cross-section area comes within the cutting path;

Fig. 3 is a schematic view of the functioning of the

cutting machine of Fig. 1 wherein a channel is occupied by a log whose diameter exceeds the cutting path;

Fig. 4 is a schematic view of the functioning of the cutting machine of Fig. 1 wherein the bench holding the channels is moved to bring the log with the diameter of Fig. 3 back within the cutting path.

[0020] With the aid of the drawings a description is given of the cutting equipment according to the invention. Fig. 1 shows a perspective view of a cutting machine comprising a supporting framework 1 on which a bench 30 is mounted, supporting channels parallel to a horizontal axis Z for the housing and the forward movement of the logs. The configuration of the accompanying drawings provides two channels 20, 20a of different dimensions containing two respective logs 22, 22a of identical dimensions (Fig. 2) or one single log 24 of greater size (Figs. 3 and 4). However the apparatus according to the invention can be adapted to several cutting channels. The logs 22, 22a, 24 moving forwards in the channels 20, 20a are fed to a cutting blade 10, with rotating disk, which provides for cutting them into the required length.

[0021] The blade 10 is made to rotate around its own axis by a motor via a transmission, for example a belt (not shown in the drawings) and is mounted at one end of an articulated arm 12. The movement of the arm 12 allows imparting to the blade of a cutting path 14 defining a cutting area 14' on a vertical plane XY which is perpendicular to the direction Z in which the logs move forwards. The axes X, Y and Z, with the X axis horizontal, form a Cartesian coordinate system.

[0022] Figures 2, 3 and 4 are schematic views of a section of the cutting apparatus taken along a plane perpendicular to the Z axis previously defined. Fig. 2 shows an exemplifying application in which the channels 20, 20a are occupied by two logs 22, 22a of diameter below a certain limit, for example of 240 mm, and the bench 30 is in a certain position with respect to the framework 1, denoted by A. In this example both the diameters of the logs fall within the cutting area 14' defined by the path 14 of the cutting blade 10 and the cutting of the two logs can take place without further actions.

[0023] Fig. 3 shows an exemplifying application wherein only the channel 20 is occupied by a log 24 of greater dimensions, for example of the diameter of 350 mm, and the bench 30 is still in the position A. In this case the diameter of the log 24 goes beyond the cutting path 14 and it is not possible to obtain effective cutting.

[0024] Fig. 4 shows an application wherein the channel 20 containing the log 24 of Fig. 3 is in a position B with respect to the framework 1, so as to be able to be cut by the cutting blade 10.

[0025] In order to obtain this, the bench 30 carrying the channels 20, 20a is translated in the direction X by such a length that the diameter of the log to be cut comes back within the cutting path 14. The movement can occur in both the courses of the direction X.

[0026] In the preferred embodiment illustrated, the bench 30 comprises two channels, specifically a channel of greater size 20 for industrial rolls and a channel of smaller size 20a for rolls intended for private use, but the invention is not limited to this, being able to provide a greater number of channels.

[0027] The translation of the bench 30 in the direction X is driven by a special actuation member, for example a servomotor (not shown).

[0028] Naturally the invention is not limited to the particular embodiment previously described and illustrated in the accompanying drawings, but numerous detailed changes may be made thereto, within the reach of the person skilled in the art, without thereby departing from the scope of the invention itself as defined by the appended claims.

Claims

1. Cutting machine for cutting rolls of sheet material from logs (22, 22a, 24) advancing in parallel channels (20, 20a) in a horizontal direction (Z), comprising at least one cutting blade (10) driven by actuating means (12) able to impart to said cutting blade (10) a path (14) defining a cutting area (14') contained in a plane (XY) perpendicular to the direction (Z) of forward movement of the logs, the axes X, Y and Z forming a Cartesian coordinate system, with the X as horizontal axis, **characterised in that** said parallel channels (20, 20a) are of different dimensions and are mounted movable in said direction (X) so to cause the diameter of the logs to fall within said cutting path (14).
2. Cutting machine according to claim 1, wherein said channels (20, 20a) are supported by a bench (30) movable with respect to a carrying framework (1) of said apparatus in said direction (X).
3. Cutting machine according to claim 2, wherein said movable bench (30) is moved by a servomotor.
4. Cutting machine according to any one of the preceding claims, wherein two parallel channels (20, 20a) are provided.
5. Cutting machine according to any one of the preceding claims, wherein said path (14) of the cutting blade (10) is elliptical.
6. Method of cutting rolls of sheet material from sticks or logs, wherein the logs (22, 22a, 24) are made to move forwards in parallel channels (20, 20a) of different dimensions in a horizontal direction (Z), to feed them to a cutting blade (10) determining a path (14) defining a cutting area (14') contained in a plane (XY) perpendicular to the direction (Z) of the forward

movement of the logs, the axes X, Y and Z forming a Cartesian coordinate system, with the X as horizontal axis, wherein it is provided to move said channels (20, 20a) in said direction (X) to cause the diameter of the logs to fall within said cutting path (14). 5

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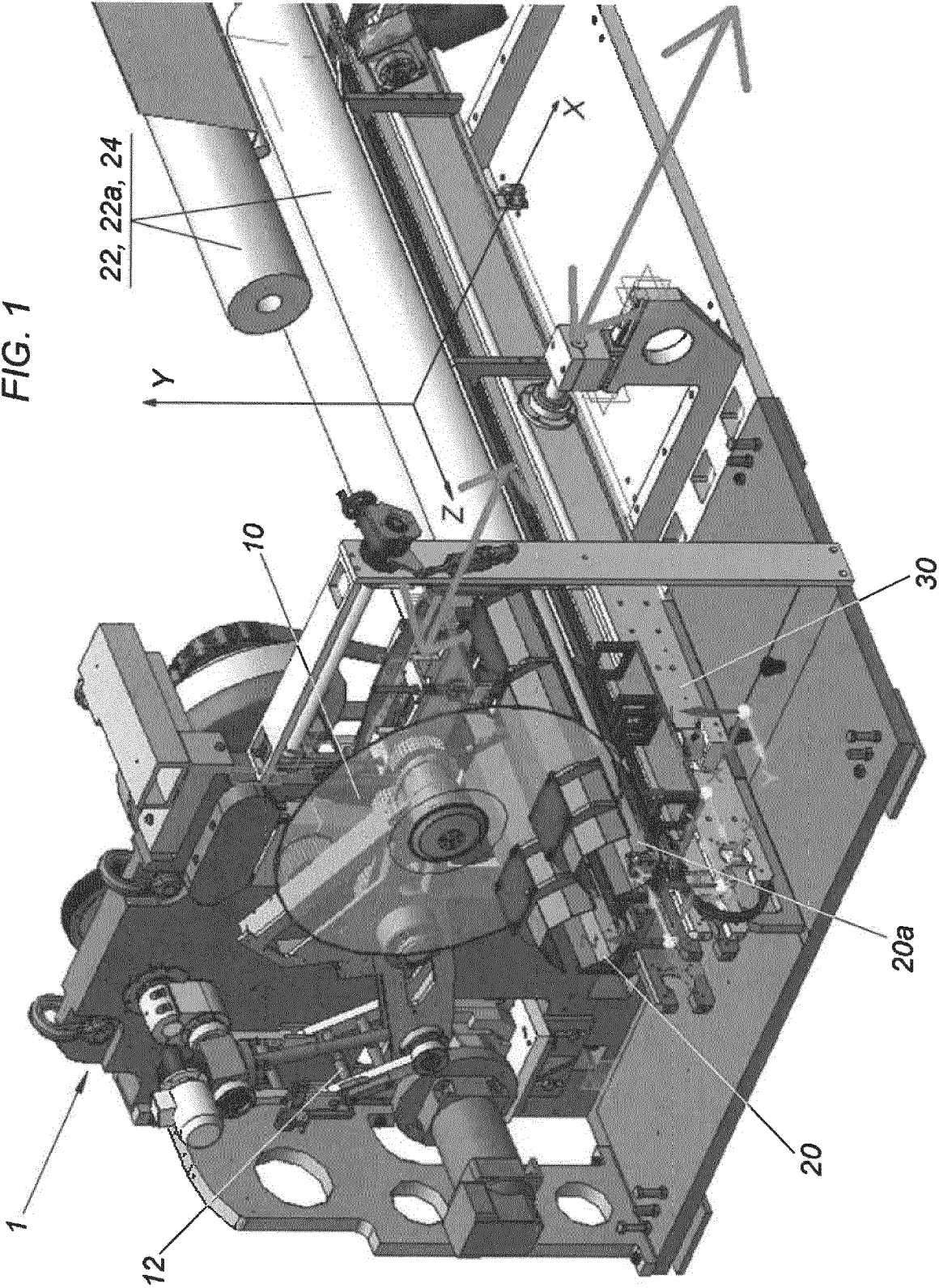
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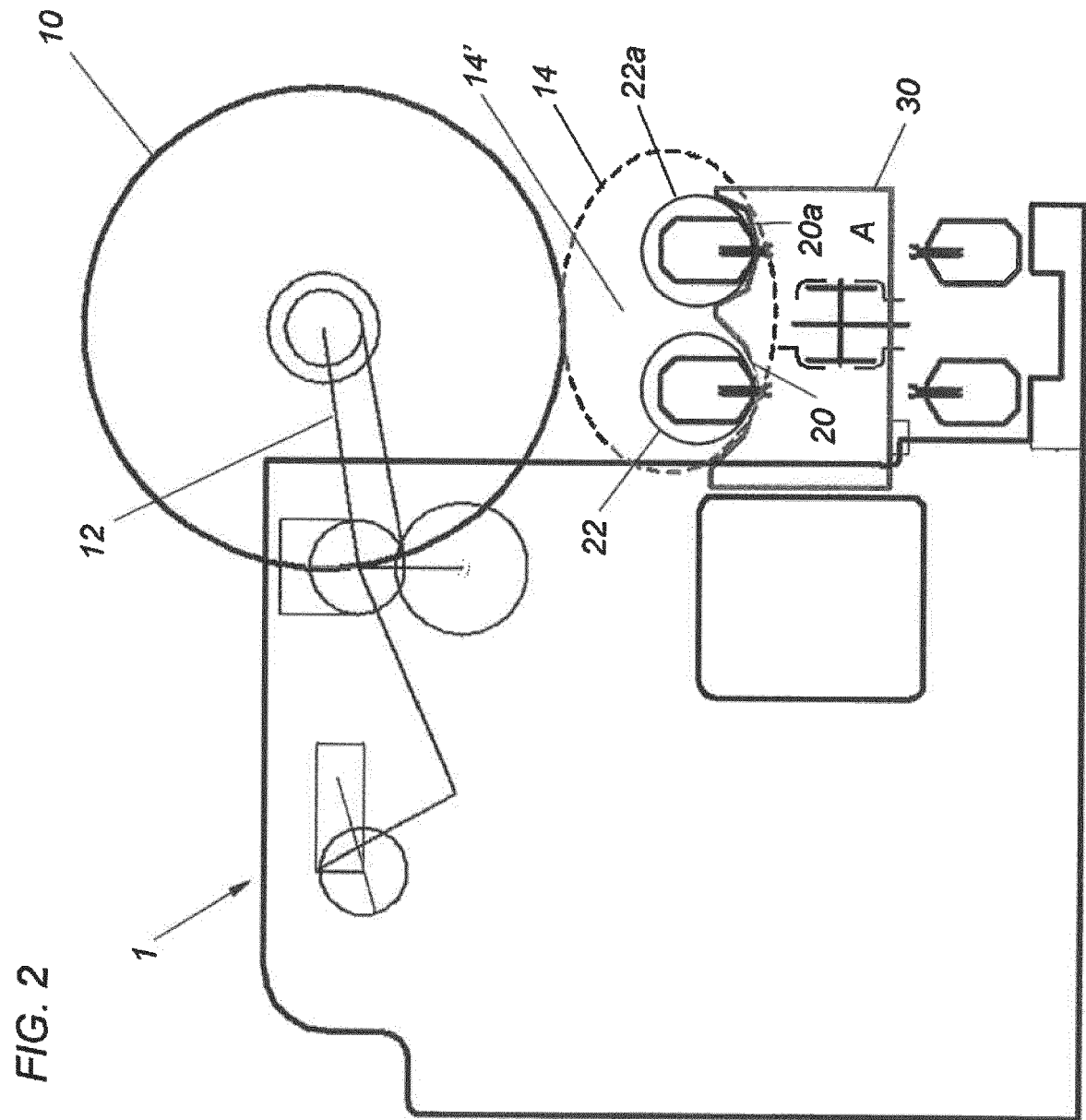
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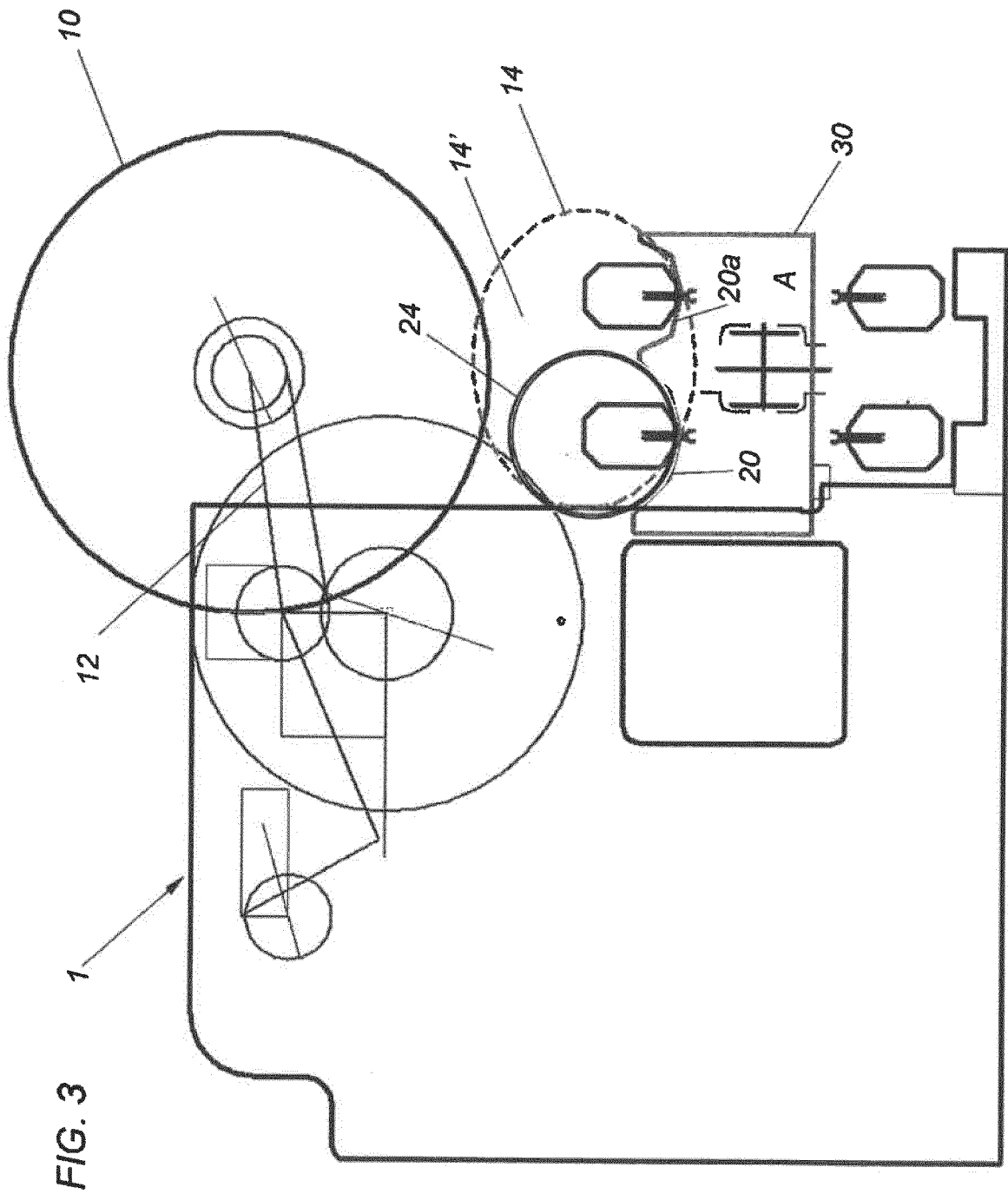
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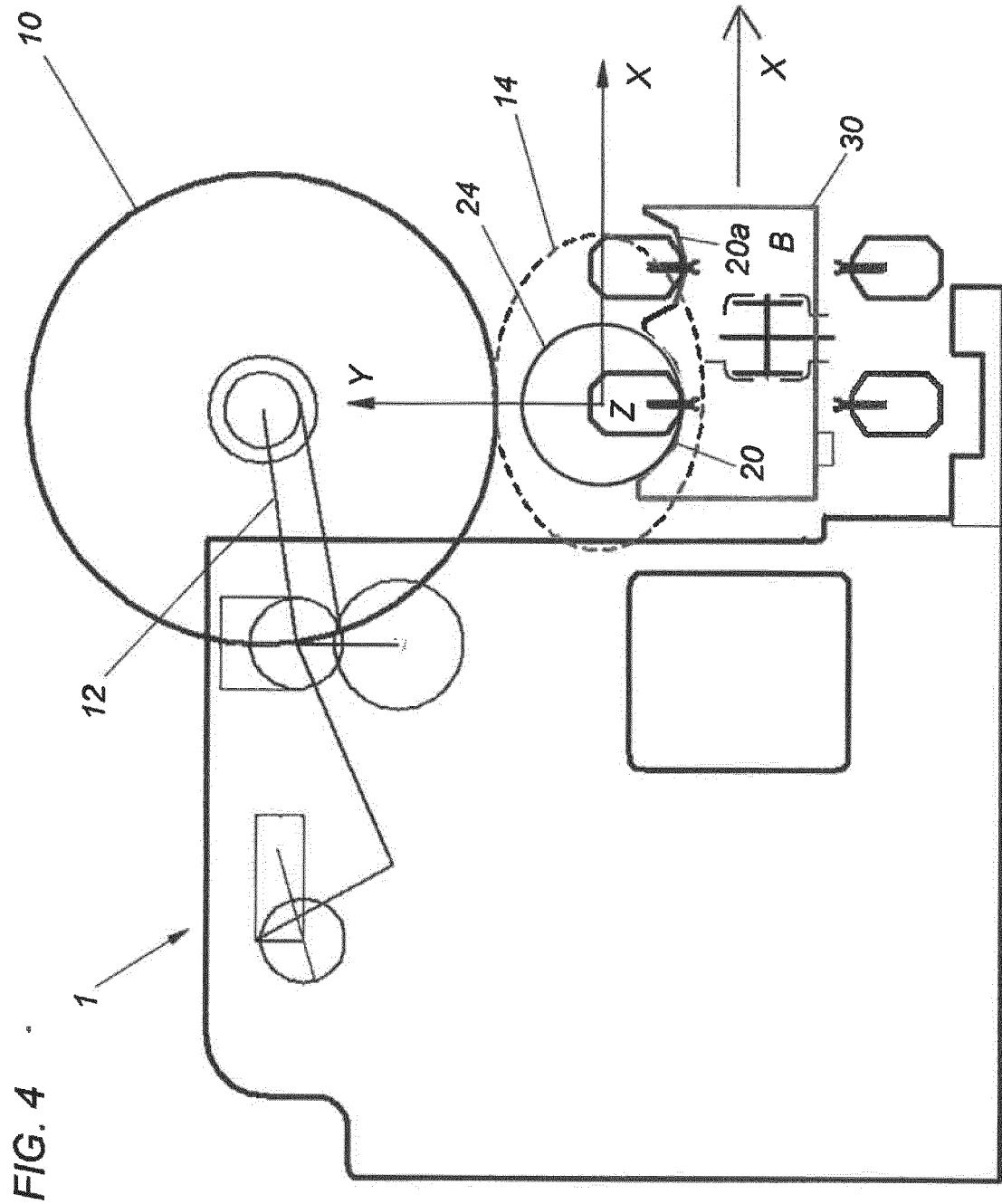
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EUROPEAN SEARCH REPORT

Application Number
EP 17 16 8432

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2004/094117 A1 (PERINI FABIO [IT]) 4 November 2004 (2004-11-04) * page 1, line 5 - page 3, line 31 * * page 3, line 31 - page 5, line 35; figures 1-6 *	1-6	INV. B26D1/16 B26D3/16 B26D7/06 B26D7/01
A	EP 2 489 486 A1 (GAMBINI INT SA [LU]) 22 August 2012 (2012-08-22) * paragraph [0020] * * paragraph [0023] - paragraph [0049]; figures 1-12 *	1-6	
A	EP 1 481 777 A2 (PAPER CONVERTING MACHINE CO [IT]) 1 December 2004 (2004-12-01) * paragraph [0020] - paragraph [0044]; figures 1-10 *	1-6	
			TECHNICAL FIELDS SEARCHED (IPC)
			B26D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 September 2017	Examiner Maier, Michael
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 17 16 8432

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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18-09-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004094117 A1	04-11-2004	AT 332215 T	15-07-2006
		BR PI0408199 A	04-04-2006
		CN 1756630 A	05-04-2006
		DE 602004001460 T2	15-02-2007
		EP 1615754 A1	18-01-2006
		ES 2268647 T3	16-03-2007
		IL 170122 A	18-11-2009
		JP 4084401 B2	30-04-2008
		JP 2006524140 A	26-10-2006
		RU 2308368 C2	20-10-2007
		US 2006169357 A1	03-08-2006
		WO 2004094117 A1	04-11-2004

EP 2489486 A1	22-08-2012	EP 2489486 A1	22-08-2012
		ES 2440082 T3	27-01-2014
		US 2012204691 A1	16-08-2012

EP 1481777 A2	01-12-2004	NONE	

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2004094117 A1 [0007]