(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 205 285 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
15.05.2002 Bulletin 2002/20

(51) Int Cl.[7]: **B27B 5/22**

(21) Application number: **00124237.9**

(22) Date of filing: **10.11.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(71) Applicant: **Lazzari S.r.l.**
47900 Rimini (IT)

(72) Inventor: **Lazzari, Marco**
47900 Rimini (IT)

(74) Representative: **Modiano, Guido, Dr.-Ing. et al**
Modiano & Associati SpA
Via Meravigli, 16
20123 Milano (IT)

(54) **Panel saw**

(57) A squaring machine (1), particularly for cutting panels, constituted by a frame (9) which is articulated like a parallelogram and can slide on a horizontal flat carriage (3) along a path which is parallel to the cutting line; the frame (9) comprising, on a first stringer (9c), a bar (13) on which at least one locator (20) for the positioning of the panel is slidingly provided, the machine comprising positioning elements, supported by the bar, which are adapted to adjust the locator (20) along the bar, and angle variation elements, provided on the frame, which are adapted for the adjustment, about a fulcrum, of the bar (13) with respect to the cutting line (6a), the elements being electronically controllable and being mutually correlated so as to determine the movement of the abutment in relation to the angle of the bar (13).

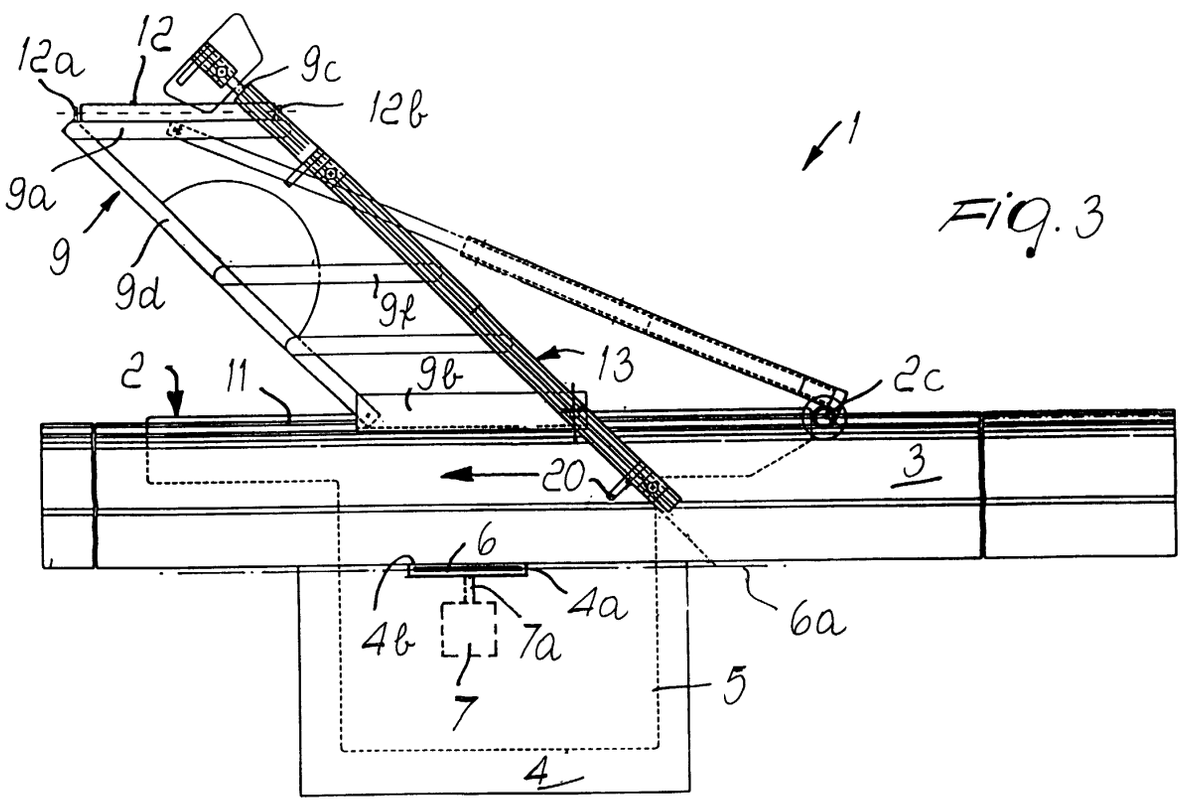


Fig. 3

EP 1 205 285 A1

Description

[0001] The present invention relates to a squaring machine, particularly for cutting panels.

[0002] It is known that a wide range of squaring machines for cutting wood or wood-like panels, meant to obtain semifinished components for manufacturing furniture, is commercially available. These machines provide cuts of the mutually perpendicular type (such as for example cuts required to obtain components of a wardrobe) or angled cuts (such as for example particular cuts for obtaining components for kitchens or particular furniture).

[0003] Machines in which the management of the locator abutments for positioning the panel to be cut is controlled by automation means assisted by a numeric control system are currently proposed for squared cuts.

[0004] Up to now, the need for angled cuts to be performed with a squaring machine had been scarcely felt, but the need to propose increasingly personalized and differentiated furniture has promoted this prerogative so that the machine could become widespread among users.

[0005] Current squaring machines are constituted by a sliding frame which is supported by a telescopic arm pivoted at one end. A linear reference, preferably an aluminum bar, is provided on the frame and is set so as to be perfectly perpendicular to the cutting line formed by the cutting blade. By arranging the panel to be cut on the supporting surface of the linear reference, one is certain of obtaining a cut which is at right angles thereto, as demanded by manufacturing requirements. Moreover, a sliding locator and a ruler with millimeter graduations are inserted on the linear reference, and the ruler is used as a reference for the cutting measurement.

[0006] At present, for oblique cuts, even for large panels, the linear reference is rotated with respect to the cutting line, moving it manually from its perpendicular position. This rotation is controlled by a fulcrum about which the aluminum bar rotates with a protractor which is applied to the sliding plane and on which the bar is positioned for the preset cutting angle. Although this technique is simple to perform, it has the drawback that at large angles the surface for resting on the sliding surface is reduced.

[0007] One method that overcomes the above-mentioned problem related to the reduction of the supporting surface consists of a bar which is rigidly coupled to the sliding surface and undergoes a rhomboidal deformation, so as to keep the supporting surface constant.

[0008] Notwithstanding the above refinements, a strongly felt problem is due to the fact that a linear cutting measurement, obtained with the perpendicular reference, varies as soon as the bar is rotated in order to provide angled cuts, since the distance of the abutment from the cutting line on the reference line varies according to trigonometric relations. This causes considerable complications in practical execution, since it requires dimensional correction operations which are very demanding for the ordinary user.

[0009] The aim of the present invention is to eliminate the above-noted drawbacks, by providing a squaring machine which is simple in practical use for the ordinary user.

[0010] Within this aim, a particular object of the present invention is to provide a machine which is highly flexible and rapid so as to meet the requirements and the demands for higher productivity.

[0011] Another object of the present invention is to provide a machine which is simple, relatively easy to provide in practice, safe in use, effective in operation, and relatively modest in cost.

[0012] These and other objects which will become better apparent hereinafter are achieved by a squaring machine, particularly for cutting panels, constituted by a frame which is articulated like a parallelogram and can slide on a horizontal flat carriage along a path which is parallel to the cutting line, said frame comprising, on a first stringer, a bar on which at least one locator for the positioning of said panel is slidingly provided, characterized in that it comprises positioning means, supported by said bar, which are adapted to adjust said locator along said bar, and angle variation means, provided on said frame, which are adapted for the adjustment, about a fulcrum, of said bar with respect to said cutting line, said means being electronically controllable and being mutually correlated so as to determine the movement of said locator in relation to said angle of said bar.

[0013] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of the squaring machine, particularly for cutting panels, according to the invention, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a squaring machine according to the present invention;
Figure 2 is a plan view of the squaring machine;
Figure 3 is a plan view of the squaring machine in a different operating condition;
Figure 4 is a perspective view of a panel supporting frame of the squaring machine;
Figure 5 is a bottom perspective view of a detail of Figure 4;
Figure 6 is a side view of a side of the frame.

[0014] With reference to the figures, the reference numeral 1 generally designates a squaring machine, particularly for cutting panels. The machine 1 comprises a footing 2 which supports, on a top 2a, a slide 2b, on which a flat carriage 3 slides which is substantially rectangular and is elongated in the direction in which it slides. In the central region of the long side of the flat carriage 3 there is a platform 4 which is supported by supports 5 which protrude from the footing 2. The plat-

form 4 forms, on the edge 4b that lies at the front of the flat carriage 3, a slit 4a in which a cutting blade 6 is accommodated, said blade forming a cutting line 6a which is parallel to the edge 4b. The blade 6, as shown in Figures 2 and 3, is rotationally rigidly coupled to a horizontal secondary shaft 7a which is associated with a motor 7.

[0015] The footing 2 rotatably supports, at a lateral lower end 2c, a telescopic arm 8 which is adapted to support a frame 9 which is articulated like a parallelogram and is coplanar to the flat carriage 3.

[0016] The frame 9 comprises two cross-members 9a and 9b which are mutually parallel and are articulated to two stringers 9c and 9d which are also mutually parallel. The first cross-member 9a is rotatably connected, in the central region, to the upper end 10a of a rod 10 which is vertical and vertically adjustable and is rotatably connected, by means of its lower end 10b, to the tip 8a of the telescopic arm 8, so as to allow horizontal support of the first cross-member 9a. Finally, two protrusions 12a and 12b protrude from the ends of the first cross-member 9a and rotatably support, as shown in Figures 2 and 3, a roller 12 which assists the sliding of the panels to be cut. The second cross-member 9b has, on the face directed toward the flat carriage 3, a sliding block 11a which can slide along a guide 11 which is associated with the other long side of the flat carriage 3. The first stringer 9c and the second stringer 9d are rotatably connected to the ends of the first and second cross-members 9a, 9b and are rotatably connected, in their central region, to an element 9f which acts both as a support for the panels to be cut and as a reinforcement for the frame 9.

[0017] The first stringer 9c supports, at the tip 9g, a retention element 9h for the panels and supports, at the remaining portion, a bar 13 which is rigidly coupled thereto and internally forms a longitudinal cavity 14, as shown in Figure 6.

[0018] The machine comprises positioning means, arranged inside the cavity 14, and the means for varying the angle of the bar 13, which are associated with the central region of the frame 9.

[0019] The positioning means are constituted by a belt 15 which runs along the entire length of the cavity 14 so as to wrap around two pulleys 16 and 17; one of said pulleys, for example the pulley 16, is actuated by an actuator 18 which is connected thereto by means of the shaft 19. A locator 20 is fixed on the belt 15 and is adapted to position the panel by means of an electronic management of the actuator 18.

[0020] The means for varying the angle of the bar 13, as shown in Figures 4 and 5, are constituted by a toothed sector 21 which is fixed on the second stringer 9d. The toothed sector 21 meshes with a pinion 22 which is keyed on the shaft 23 of a motor 24 which is fixed onto the element 9f. The motor 24 is controlled electronically and is correlated to the actuator 18 so that predefined angular variations applied to the bar 13 are matched, according to trigonometric relations, by specific linear movements of the locator 20.

[0021] In the step before cutting, the wood panel is rested on the articulated frame 9 and placed against the bar 13, which forms a linear reference which is perpendicular to the cutting line. The positioning of the panel is completed by locking it with the locator 20 and the retention element 9g.

[0022] If the cut to be produced is at right angles, the positioning of the panel is adjusted in a linear fashion by the locator 20 according to a predefined dimension, which is set on a computer and transmits to the actuator 18 the movements to be imparted to the positioning means. For right-angled cuts, there is also a manual adjustment by using a ruler graduated in millimeters provided on the bar 13.

[0023] At this point, after providing the above refinements, one has the certainty that a precision square cut is obtained by imparting a translatory motion to the frame 9 in the direction of the arrow A toward the cutting blade 6.

[0024] If the cut to be provided is at an angle, after positioning the panel the cutting angle is set on the computer. The computer transmits the processed information to the motor and to the actuator, so that a rotation of the bar 13, imparted by the motor, is automatically matched by a movement of the locator, imparted by the actuator, which leaves unchanged the distance of the locator from the cutting line.

[0025] From the above description it is evident that the invention achieves the intended aim and objects and in particular the fact is stressed that the electronic adjustment that controls the actuator and the motor by means of an interface, provided by a computing algorithm, allows to correct the error on the linear dimension produced by the arrangement of the bar at an angle with respect to the cutting line.

[0026] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

[0027] All the details may furthermore be replaced with other technically equivalent ones.

[0028] In practice, the materials used, as well as the shapes and the dimensions, may be any according to requirements without thereby abandoning the scope of the protection of the appended claims.

[0029] 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. A squaring machine, particularly for cutting panels, constituted by a frame (9) which is articulated like

a parallelogram and can slide on a horizontal flat carriage (3) along a path which is parallel to a cutting line (6a), said frame (9) comprising, on a first stringer (9c), a bar (13) on which at least one locator (20) for the positioning of said panel is slidingly provided, **characterized in that** it comprises positioning means (15), supported by said bar (13), which are adapted to adjust said locator (20) along said bar (13), and angle variation means (21), provided on said frame (9), which are adapted for the adjustment, about a fulcrum, of said bar (13) with respect to said cutting line (6a), said means being electronically controllable and being mutually correlated so as to determine the movement of said locator in relation to said angle of said bar (13).

2. The machine according to claim 1, **characterized in that** said bar (13) comprises a longitudinal cavity (14) for accommodating said positioning means, which are constituted by a belt (15) which lies within said cavity (14) and wraps around two pulleys (16, 17), one of which can be actuated by an actuator (18), said locator (20) being fixed on said belt (15).

3. The machine according to claim 1, **characterized in that** said means for varying the angle of said bar (13) comprise a toothed sector (21) which is rigidly coupled to a second stringer (9d) of said frame (9) and meshes with a pinion (22) which is keyed onto the shaft of a motor (23), supported by an element (9f) of said frame (9).

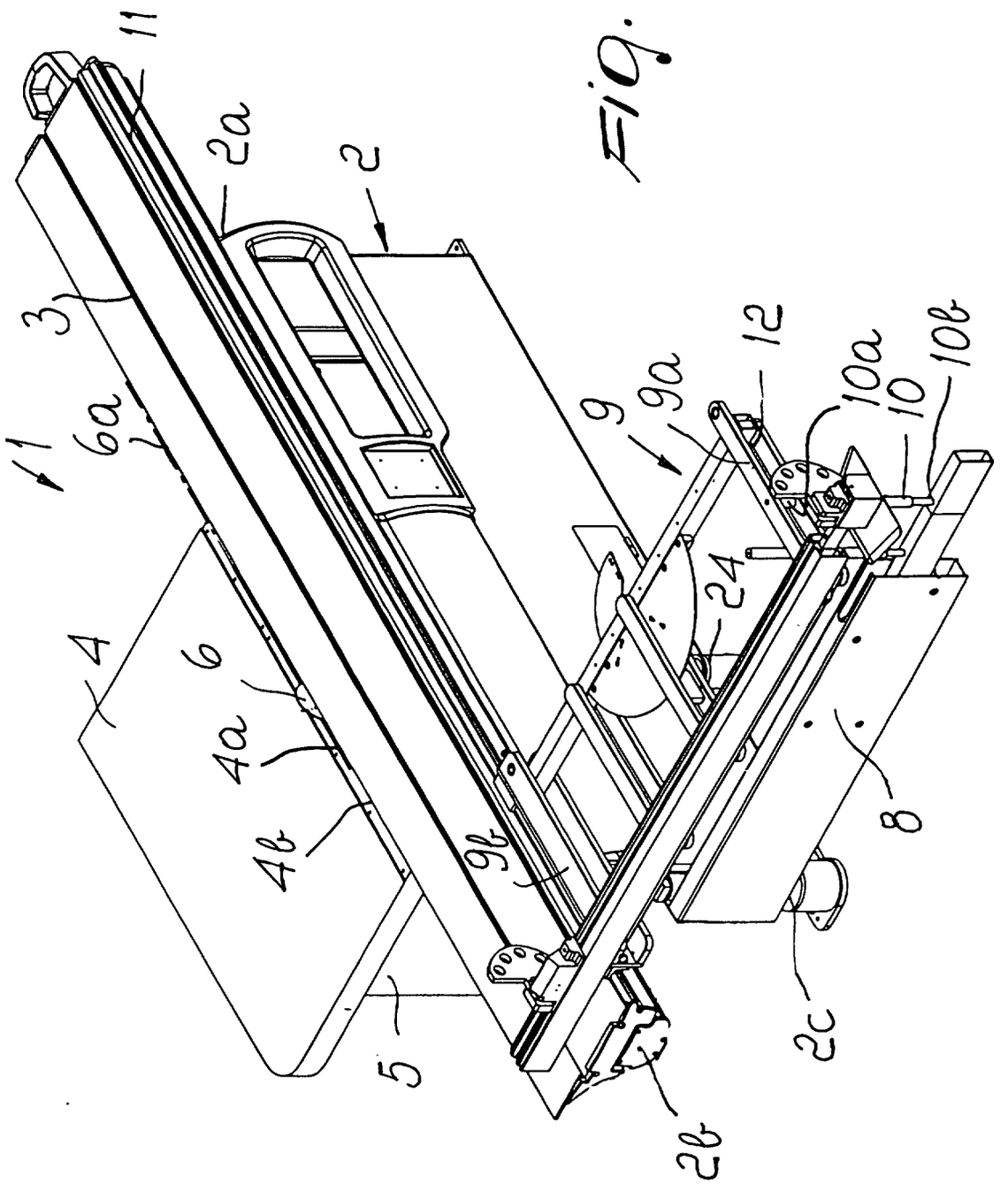


Fig. 1

Fig. 2

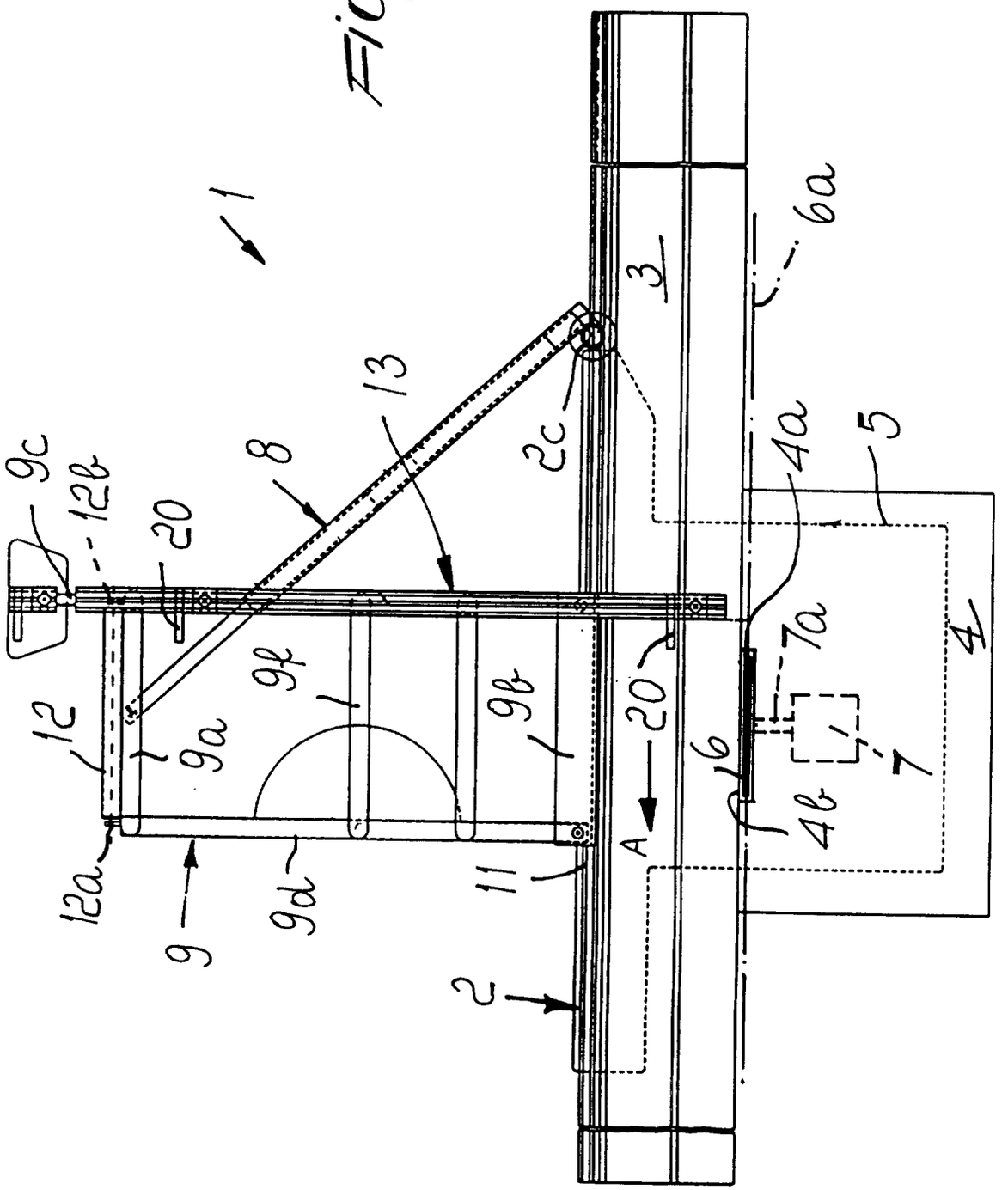
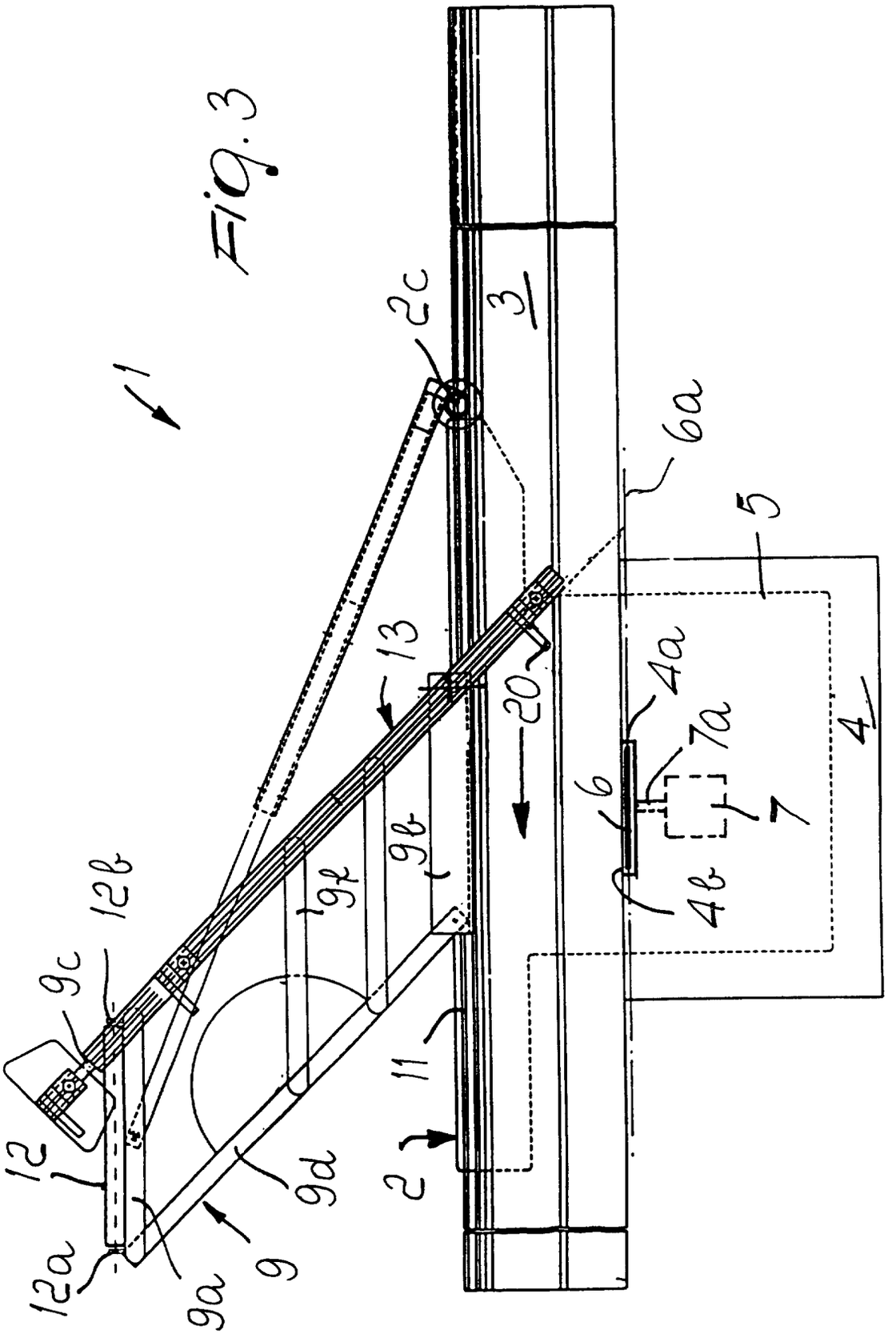


Fig. 3



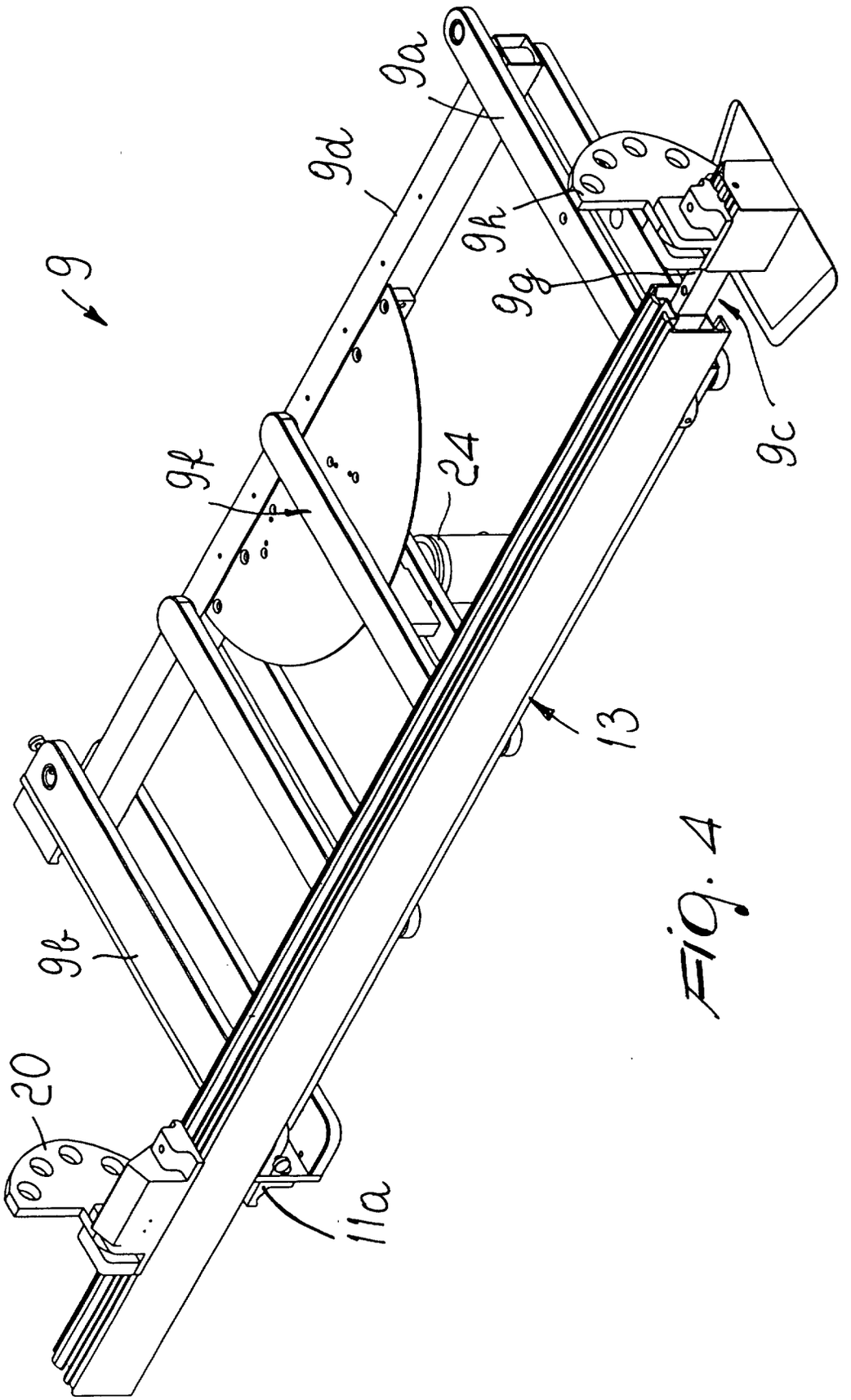


Fig. 4

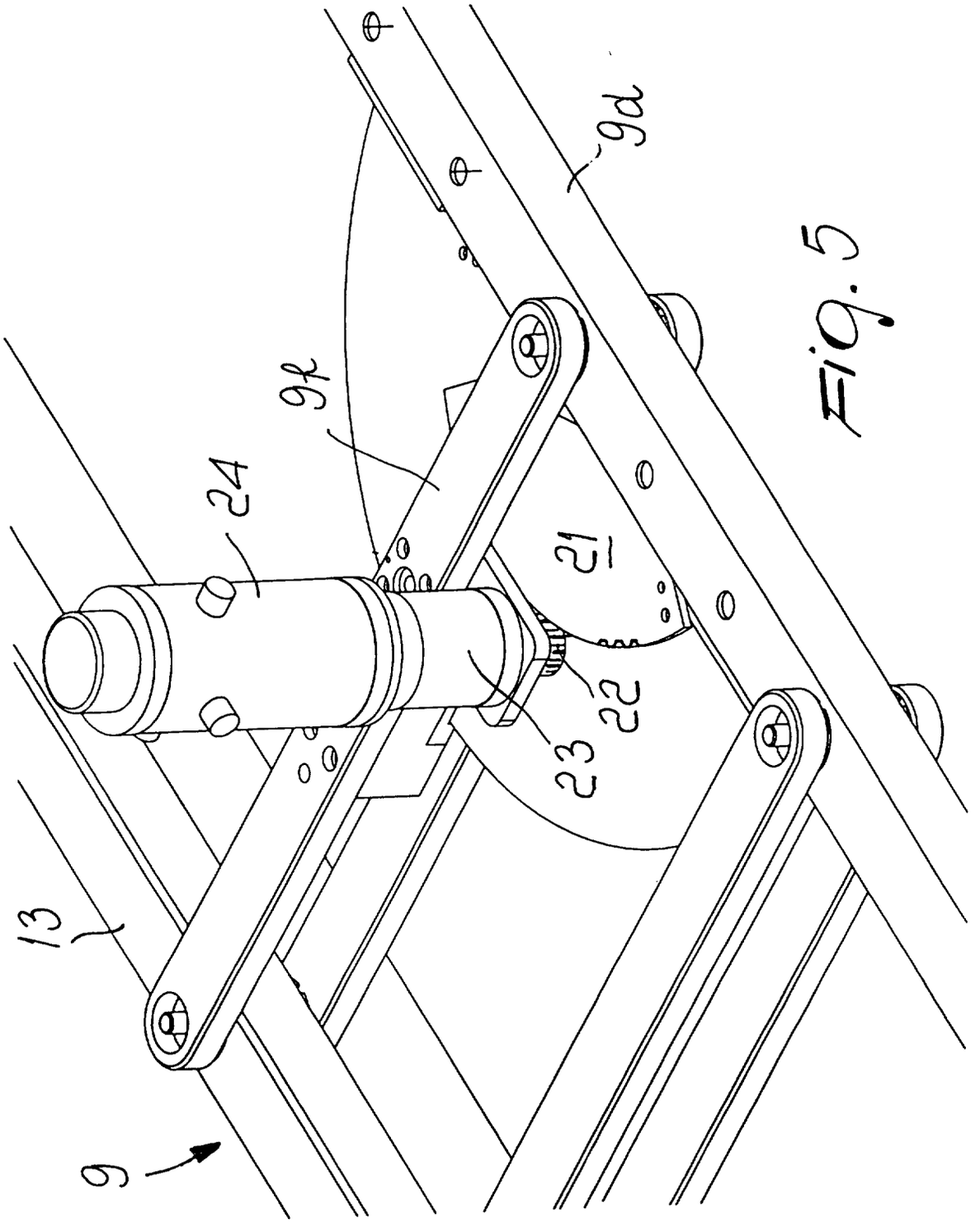


Fig. 5

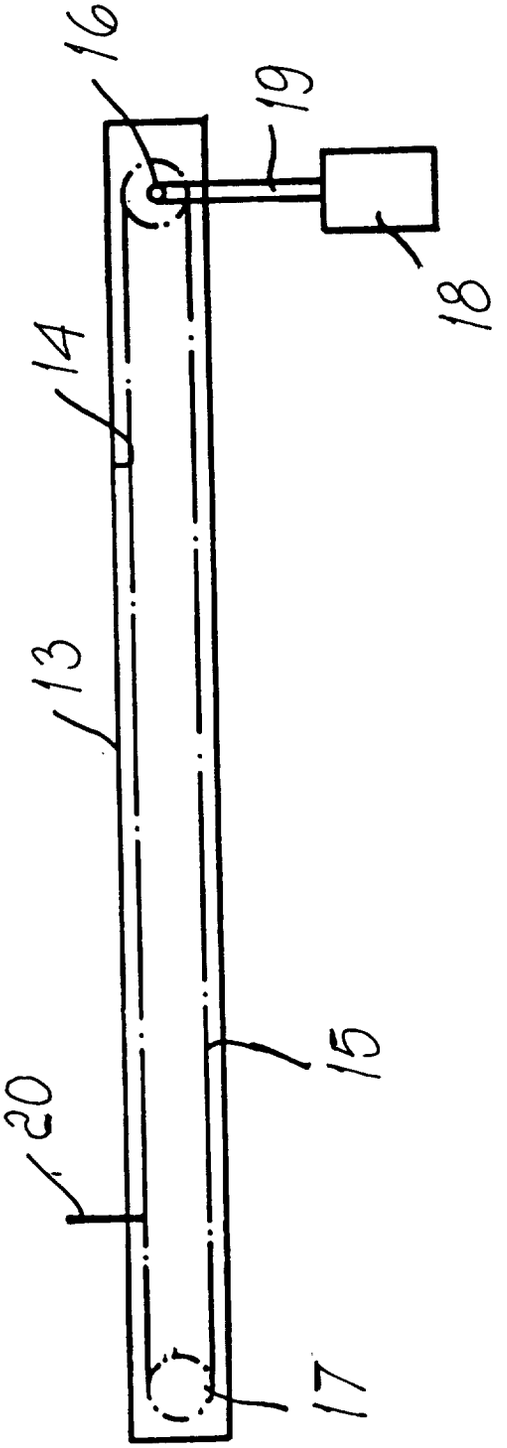


Fig. 6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 12 4237

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.7)
A	DE 93 07 635 U (LEONHARD HOFMANN MASCHINENFABRIK GMBH) 29 July 1993 (1993-07-29) * page 3, line 12 - line 28 * * page 4, line 19 - line 25 * * page 7, line 1 - line 30 * * page 8, line 17 - page 9, line 13 * * figures *	1-3	B27B5/22
A	US 5 251 142 A (CRAMER FRED C) 5 October 1993 (1993-10-05) * column 5, line 38 - line 66 * * figures 1,3 *	1,2	
A	EP 0 692 349 A (OPTICAL AND ELECTRONIC ENGINEE) 17 January 1996 (1996-01-17)		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B27B
B27G
B23Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 May 2001	Moet, 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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 00 12 4237

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-05-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9307635 U	29-07-1993	NONE	
US 5251142 A	05-10-1993	NONE	
EP 0692349 A	17-01-1996	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82