



(11)

EP 1 623 805 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.02.2006 Bulletin 2006/06

(51) Int Cl.:
B27F 1/08 ^(2006.01) **B27F 5/02** ^(2006.01)
B27C 5/02 ^(2006.01) **B27C 9/04** ^(2006.01)
B23Q 1/62 ^(2006.01)

(21) Application number: **05014734.7**

(22) Date of filing: **07.07.2005**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

(71) Applicant: **Balestrini Renzo S.p.A.**
20030 Seveso MI (IT)

(72) Inventor: **Balestrini, Antonio**
20030 Seveso (Milan) (IT)

(74) Representative: **Lecce, Giovanni**
UFFICIO BREVETTI CALCIATI S.r.l.
Via Fratelli Ruffini, 9
20123 Milano (IT)

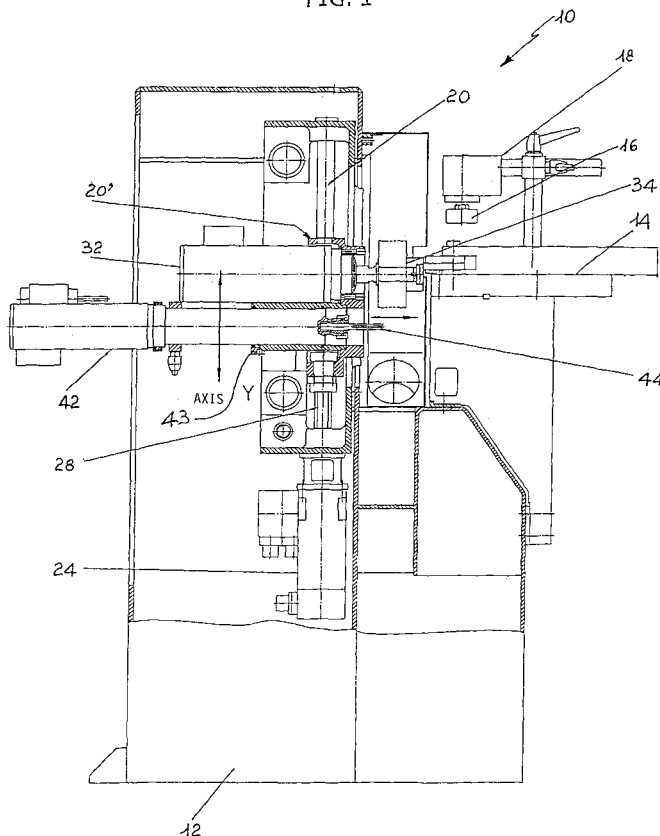
(30) Priority: **02.08.2004 IT MI20040375 U**

(54) Numerical control machine for the realization of junction elements

(57) A numerical control machine (10) for the realization of junction elements, specially adapted for making tenon, mortising, holes, slots and the like, on semifinished products destined to the furniture manufacturing, comprises an framework (12) featuring a work table (14) on which the pieces to be processed are stabilized by

means of strikes (16) cooperating with pneumatic cylinders (18) or the like; said machine is provided with a first slide (22') moving along one or more horizontal guides (22) defining an "X" axis and a second slide (20'), operatively connected to said first slide and featuring at least one operative unit (32).

FIG. 1



EP 1 623 805 A1

Description

[0001] The present invention relates to a numerical control machine for the realization of junction elements.

[0002] More particularly, the present invention relates to a machine as previously said specially adapted for making tenoning, mortising, holes, slots and the like on semifinished products destined to the furniture manufacturing.

[0003] It is known that in the industrial furniture manufacturing, e.g. chairs, tables and sofas, specific machines are used for the realization of junction elements on semifinished parts to be assembled together; such operations are typically constituted by tenoning, formed at the extreme sides of wooden splines or hardwood or of a different suitable material.

[0004] Thus, the so-called tenoning machines are known since long time, provided with a milling unit through which it is possible, by means of chipping machining, to obtain a shaped tailpiece representing the tenon. Known machines of this type, the movement of the milling unit thereof is guaranteed by cam-type electro-mechanic means, end-of-stroke switches and the like, are only suitable for making tenoning, therefore it is necessary the use of different machines for making, on the same piece or other complementary ones, slots or holes where to house the tenons themselves. Said known machines, further, perform the tenoning by moving the milling units which are not able to systematically adapt to the different angles of the path to be followed, which often brings to processing defects. Said defects are usually represented by chipping on the piece in process, determined by the movement of the tool whose direction of rotation and/or approaching to the piece itself are inappropriate. specially during the first steps.

[0005] The object of the present invention is to avoid the previously mentioned inconveniences.

[0006] More particularly, the object of the present invention is to provide a numerical control machine for the realization of junction elements, specially on semifinished pieces destined to the furniture manufacturing, adapted to the making, on the semifinished pieces themselves, of both tenoning and complementary slots or holes.

[0007] Further object of the invention is to provide a machine as previously defined wherein the one or more milling units move in the best way possible in order to adapt to the different angles along the entire operative phase.

[0008] Further object of the invention is to put at the users' disposal a machine for the making of junction elements which is able to guarantee a high level of resilience and reliability over time, so that to be easily and economically manufactured.

[0009] The previous ones together with other objects are obtained by the machine for the realization of junction elements of the present invention, specially adapted for making tenoning and mortising, holes, slots and the like

on semifinished pieces destined to the furniture manufacturing, featuring an framework provided with a work table on which the pieces in process are stabilized by means of strikes cooperating with pneumatic cylinders or the like, and is characterized in that it has a first slide moving along one or more horizontal guides defining an "X" axis and a second slide operatively connected to said first slide and featuring at least one operative unit.

[0010] The construction and functional characteristics of the machine for the realization of junction elements of the present invention will be better understood from the following description, wherein reference is done to the appended tables of drawings representing an embodiment but not limited to it wherein:

figure 1 schematically represents, in lateral view, the machine for the realization of junction elements of the present invention;

figure 2 schematically represents a frontal view of the same machine;

figure 3 schematically represents a rear view of the same machine;

figure 4 schematically represents an overhead view of the same machine;

figures from 5 to 7 represent respectively and schematically the same number of example paths and trajectories done by the tool or milling unit realizing the tenons.

[0011] As first reference to figures from 1 to 4, the machine for the realization of the junction elements of the present invention, indicated as a whole as 10 in figure 1, comprises a bearing framework 12, developed in vertical direction, frontally featuring on its own central-upper part a work or support table 14, destined to house the pieces to be processed, stabilized thereon by means of conventional strikes 16, activated for example by pneumatic cylinders 18 or the like.

[0012] Close to said work table 14 the machine 10 presents one or more horizontal sliding guides 22, wherein a first slide or trolley 22' moves, inside of which further guides 20 are placed, oriented in vertical direction, wherein a second slide or trolley 20' moves. Said slides are moved by respective motors 24 and 26, advantageously of brushless type, by means of ball-bearing screws 28, 30. In the example embodiment of the figures, the vertical movement of said slide is identified by "Y" axis, while the horizontal one is identified by the "X" axis; both movements of the slides 20', 22' are numerically controlled. An operative unit is connected to slide 20', advantageously constituted by a electrospindle 32 featuring on its relative free end a tool 34 for realizing the tenoning operations on the pieces placed and fixed on work table 14.

[0013] The interpolation of axes "Y" and "X" whose movement is guaranteed by motors 24 and 26, is electronically controlled by known means and allows the tool 34 to optimize the entrance and work path of the piece

as a function of the angle the operation requires, as figures 5, 6 and 7 schematically show. For example, in case of realization of horizontal tenons, as in figure 5, axis "X" is defined by slide 22', moved by motor 26, while axis "Y" is defined by slide 20' activated by motor 24 and ball-bearing screw 28; the tenoning tool 34 is assembled on the electrospindle 32 which is fixed on slide 20', which runs within slide 22'.

[0014] Horizontal movements on guides 22 of the slide 22' which contains and supports the sliding guides 20 for the vertical movements of slide 20', interpolated by the numerical control system allow to have the processing described as follows.

[0015] Figure 5 wherein tenons are indicated as 38, shows that the tool 34 constantly keeps a trajectory parallel to the profile to be obtained, trajectory indicated as 40 and corresponding to the centre of the tool itself. In detail, with reference to said figure 5, point A indicates the beginning of the process for the realization of the tenon relative to the piece fixed on the right side of the table 14, A-B line defines the horizontal movement of the tool 34 controlled by axis "X" only, while B-C line refers to the circular movement of the tool 34 itself controlled by the interpolation of both "X" and "Y" axes. It follows that C-D line refers to the movement of said tool controlled by "X" axis only, D-A line to the circular one controlled by the interpolation of the two axes and the A-E line the superimposition one, for an optimum finishing, with the tool controlled again only by "X" axis, moving horizontally.

[0016] Point E corresponds to the end of the process for the right piece 40, disengaging tool 34 from the piece itself, whose disengagement's circular movement E-F is controlled by the interpolation of "X" and "Y" axes. F-G line indicates the movement of the tool 34 which moves toward the piece fixed to the left of the working table 14 and is controlled by the horizontal movement of "X" axis and by the linear interpolation of "X" and "Y" axes; point G corresponds to the beginning of the processing on the right piece, which takes place accordingly to the same mode of the previous processing. These trajectories, underlined by figures 5, 6, and 7 adapt themselves to the angles required by the processing to be performed, i.e. tenoning and/or mortising, allowing the correct insertion of the tool within the piece, despite the piece is fixed on the left or right side of the work table 14, thus avoiding any chipping problem. In practice, the tool always approaches the piece in a tangent manner to the reference plane of the tenon and/or mortise, as shown by lines A-B and G-H of figure 5, A1-B1 and G1-H1 of figure 6 and A2-B2 and G2-H2 of figure 7.

[0017] Accordingly to a second advantageous characteristic of the invention, machine 10 is provided with a second operative unit, advantageously constituted by an electrospindle 42, featuring a tool 44, or tip, on its frontal free end, for making holes and/or mortising on the pieces.

[0018] Electrospindle 42 is fixed on the slide 20' via a sliding compass 43 which allows the axial movement thereof in order to realize the drilling and mortising oper-

ations. Said electrospindle 42 is mounted close to the electrospindle 32 and, preferably, in a position underneath the same; tool 44 is controlled in the same manner as tenoning tool 34, via appropriate interpolations of "X" and "Y" axes.

[0019] Electrospindle 42 is further provided with conventional means for the axial movement in order to obtain a drilling or mortising depth, as well as depth adjustment means 46.

[0020] As can be understood from the above description, the invention shows evident advantages.

[0021] The machine for the realization of junction elements of the present invention allows to realize extremely precise tenoning, due to the constant positioning of the tool accordingly to an optimum path relative to the piece to be processed; further advantages are given by the possibility to perform, on the same machine, mortising operations thanks to the presence of the electrospindle 42.

[0022] Nevertheless the invention has been described with particular reference to one embodiment, just given as an example and not limited to it, numerous modifications and variants will be evident to a person skilled in the art due to the previously reported description.

[0023] The present invention, therefore, intends to embrace all possible modifications and variants within the spirit and scope of protection of the following claims.

Claims

1. Numerical control machine (10) for the realization of junction elements, specially adapted for realizing tenoning and mortising, holes, slots and the like on semifinished products destined to the furniture manufacturing, featuring a work table (14) on which the pieces to be processed are stabilized by means of strikes (16) cooperating with pneumatic cylinders (18) or the like, **characterized in that** it includes a first slide (22') sliding along one or more horizontal guides (22) defining an "X" axis and a second slide (20') operatively connected to said first slide and featuring at least one operative unit (32).
2. Machine as claimed in claim 1, **characterized in that** the second slide (22') slides along one or more vertical guides (20) obtained within the first slide (22').
3. Machine as claimed in any of the previous claims, **characterized in that** the slides (20'-22') are moved by brushless motors (24-26) via ball-bearing screws (28-30), both movements of said slides being numerically controlled.
4. Machine as claimed in any of the previous claims, **characterized in that** a second operative unit (42) is connected to the second slide (20'), via a sliding

compass (23).

5. Machine as claimed in any of the previous claims, **characterized in that** said operative units (32-42) are constituted by electrospindles, respectively provided with a tenonig tool (34) and a drilling and/or mortising tip (44). 5
6. Machine as claimed in any of the previous claims, **characterized in that** the electrospindle (42) is provided with means for the axial movement (48) and depth adjustment (46). 10

15

20

25

30

35

40

45

50

55

FIG. 1

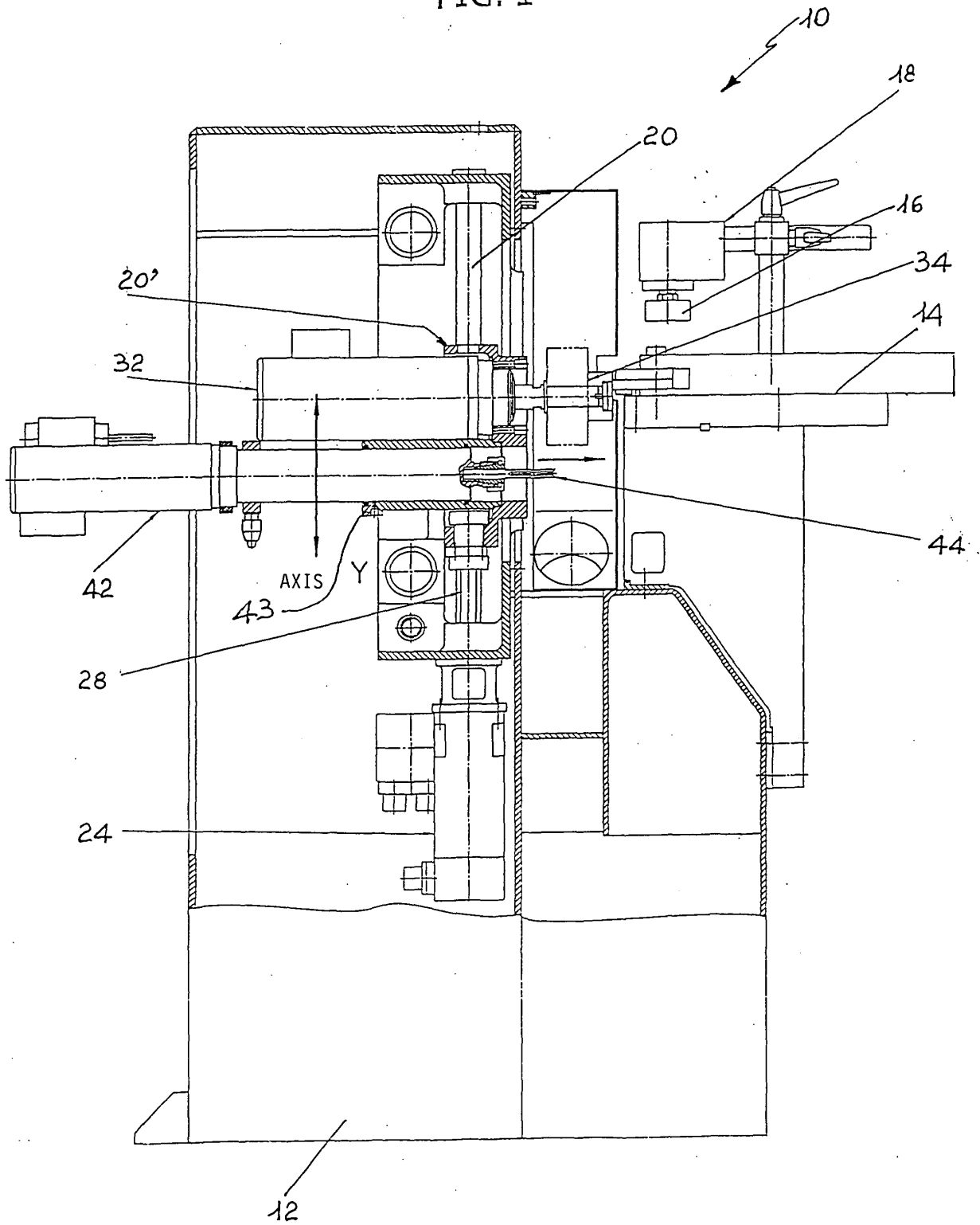
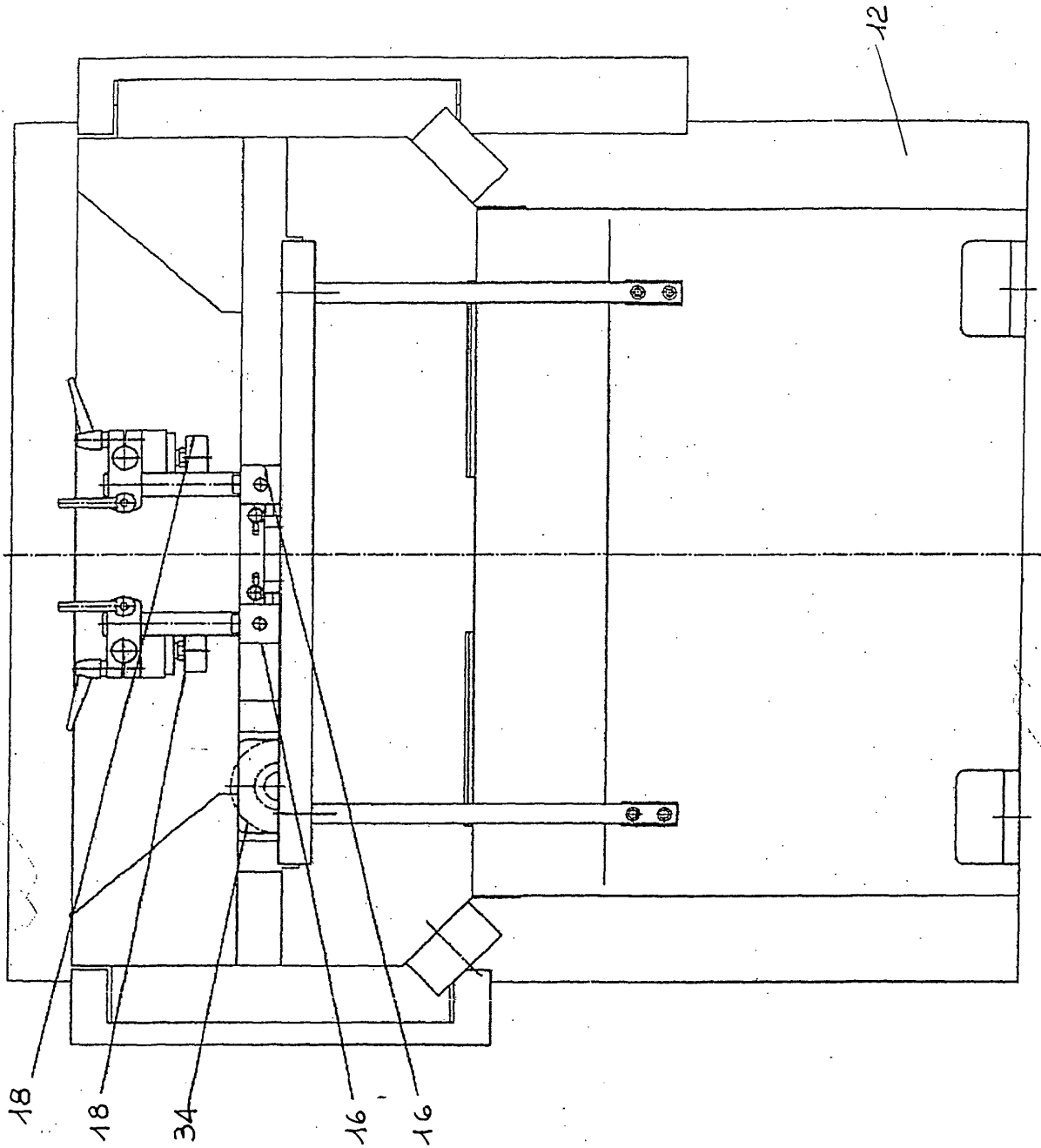
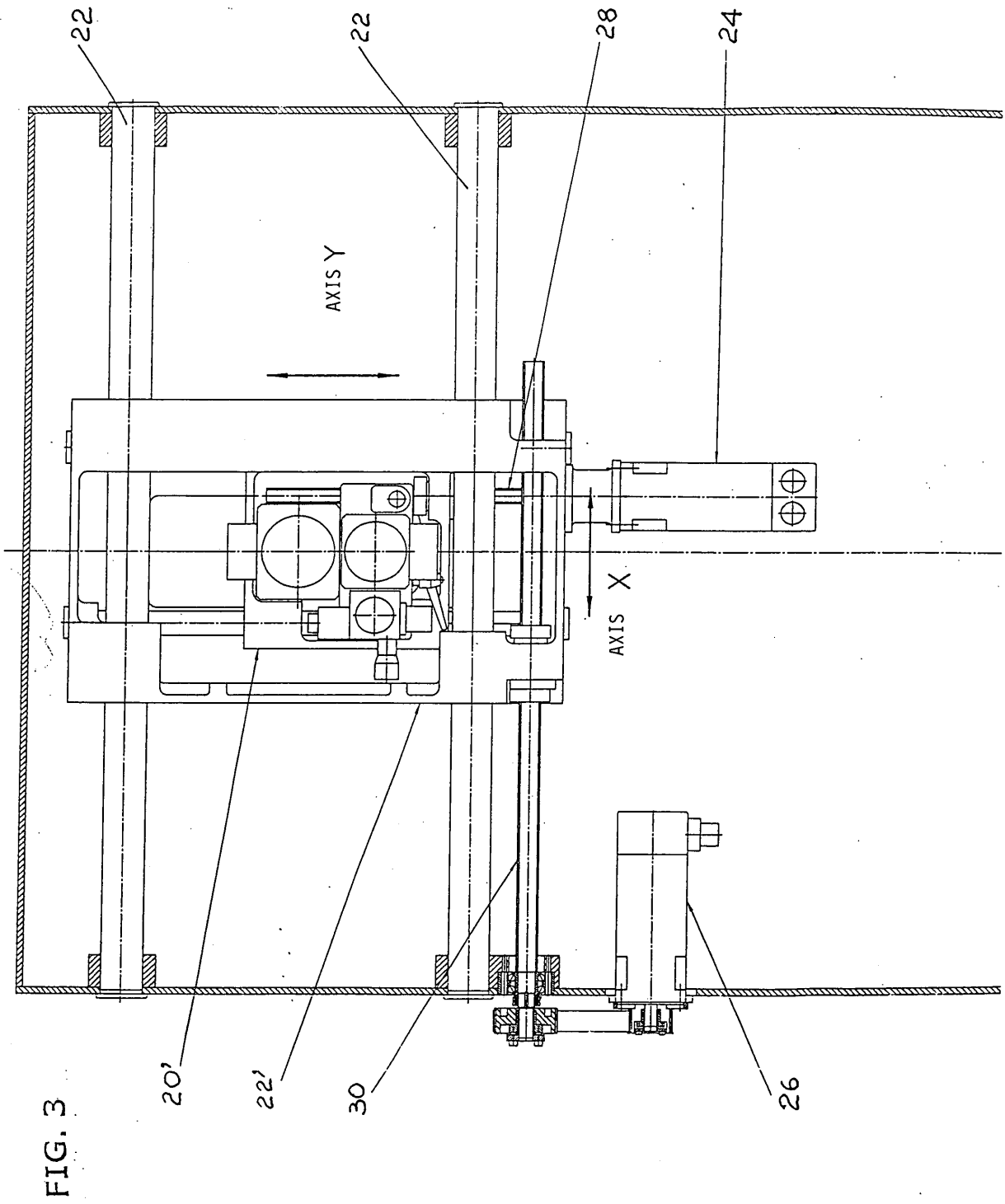


FIG. 2





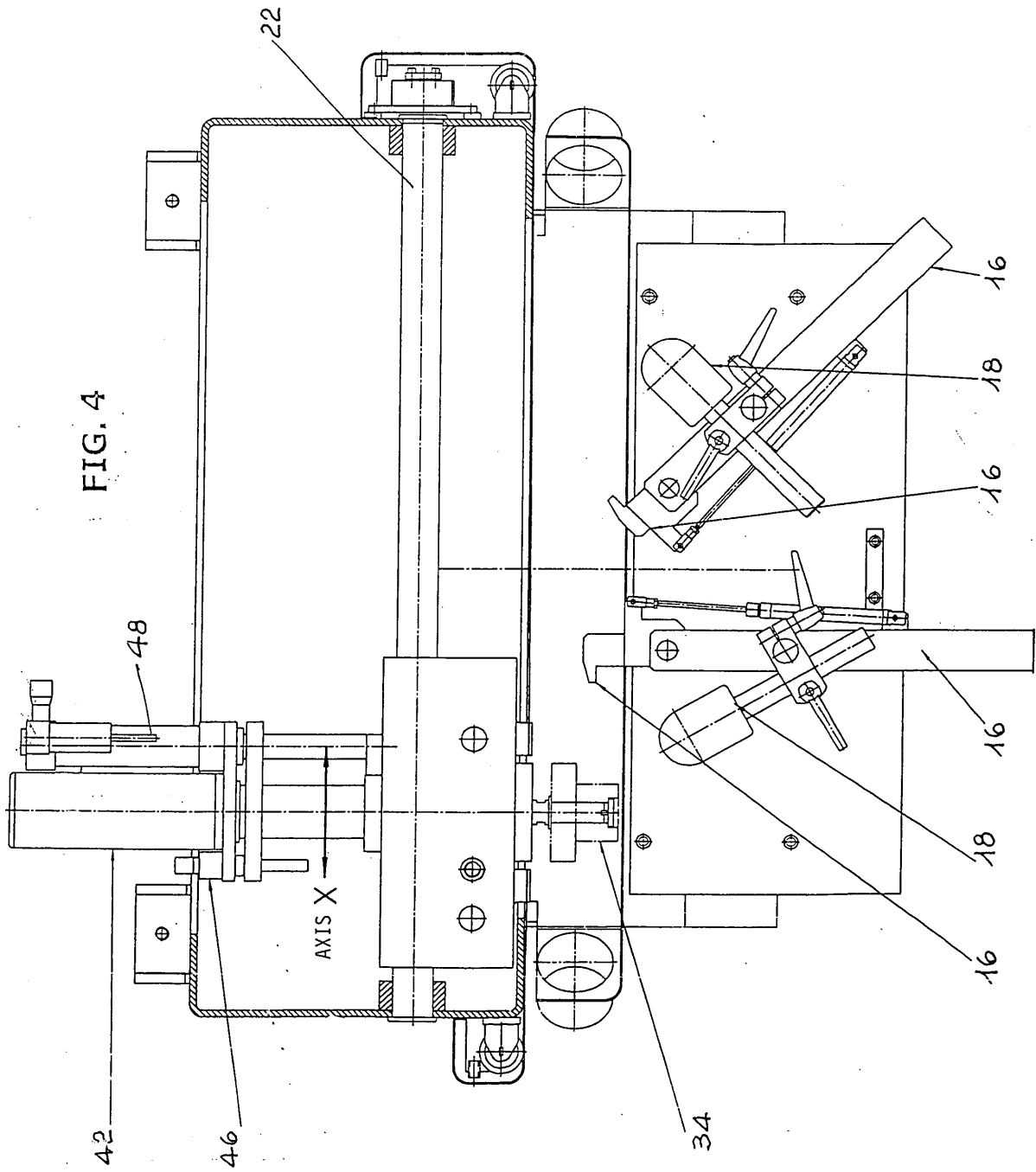


FIG. 5

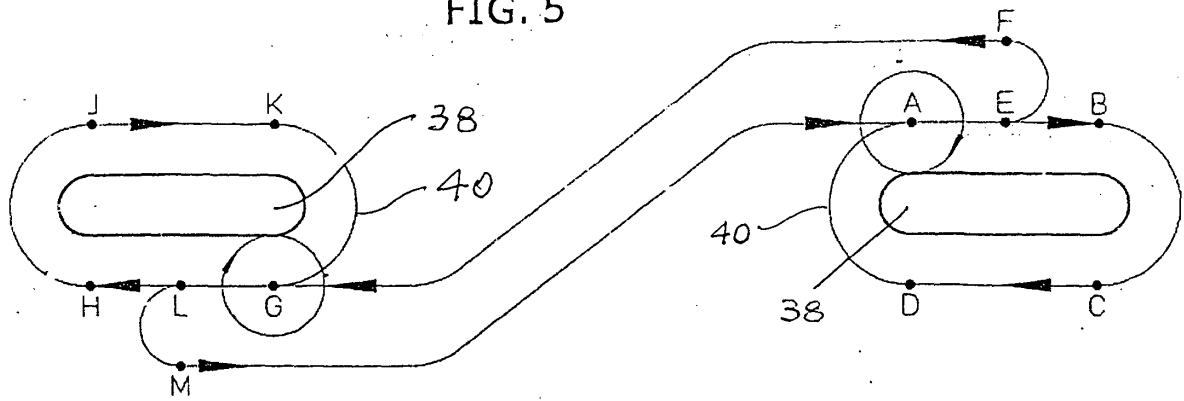


FIG. 6

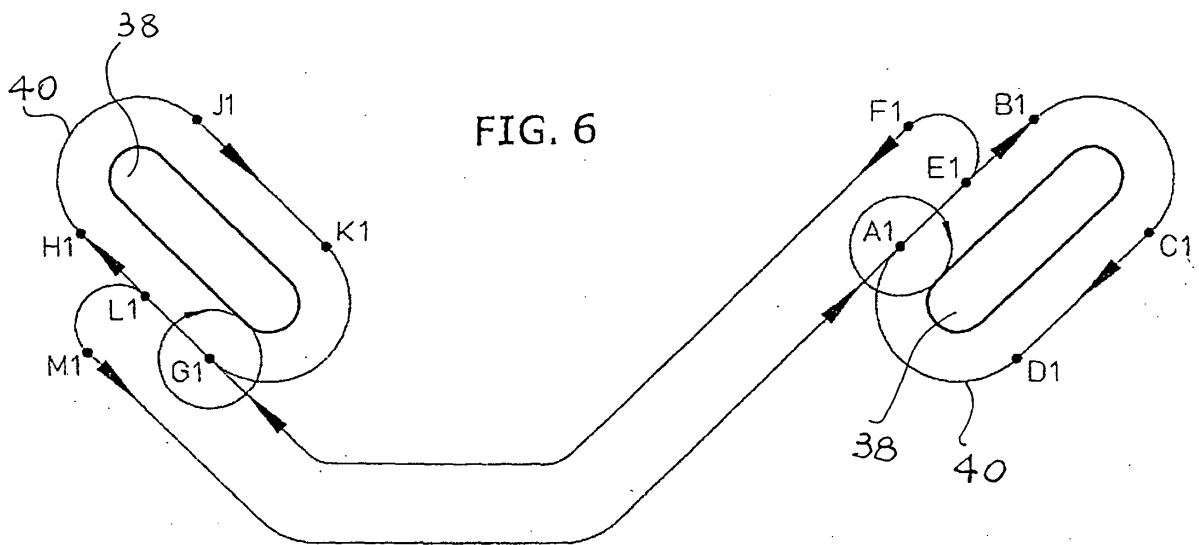
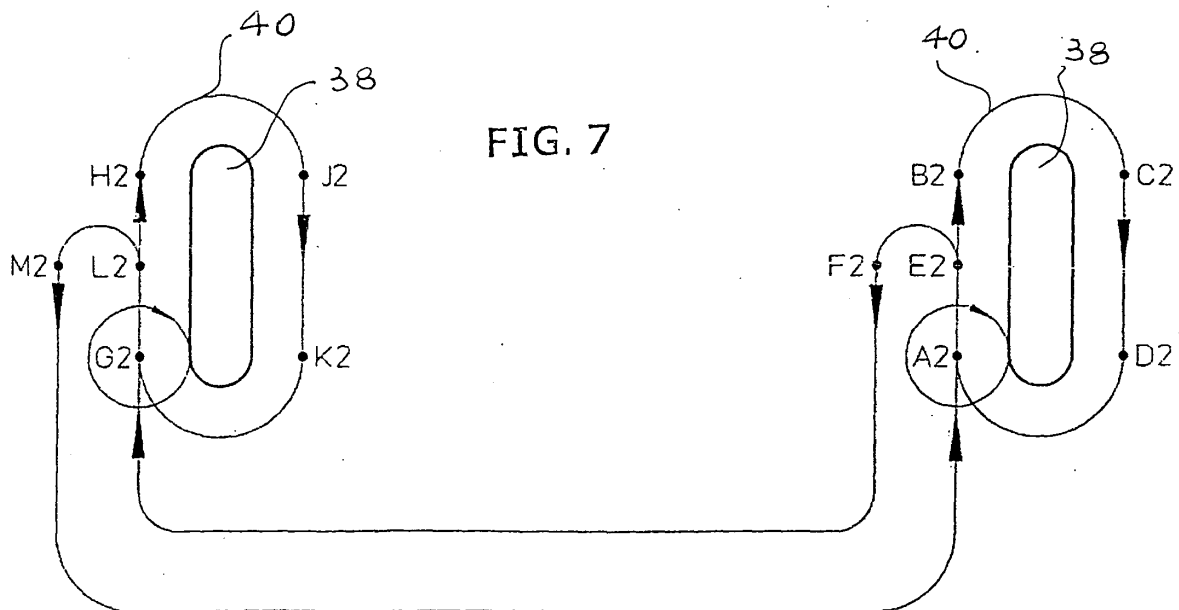


FIG. 7





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 01 4734

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)
X	EP 1 250 976 A (BACCI PAOLINO DI BACCI DI AGOSTINO) 23 October 2002 (2002-10-23) * abstract; figures *	1-6	B27F1/08 B27F5/02 B27C5/02 B27C9/04 B23Q1/62
X	EP 0 462 940 A (DITTA BACCI PAOLINO DI GIUSEPPE BACCI DI AGOSTINO BACCI) 27 December 1991 (1991-12-27) * abstract; figures 1-5 *	1-6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B27F B27C B23Q
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 3 November 2005	Examiner Meritano, L
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			

1

EPO FORM 1503 03.82 (P04C01)

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

EP 05 01 4734

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.

03-11-2005

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1250976	A	23-10-2002	IT FI20010068 A1	21-10-2002

EP 0462940	A	27-12-1991	AT 111010 T	15-09-1994
			DE 9016128 U1	21-03-1991
			DE 59102812 D1	13-10-1994
			ES 2060341 T3	16-11-1994
			IT 1238935 B	07-09-1993
