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(54) **A linear-motor-drive machine for precise positioning of items to be printed and/or varnished**

(57) The present invention provides a linear-motor-driven machine for precise positioning of items to be printed and/or varnished.

The linear electric motor (1) controls the stroke of

the feed carriage (2) which is equipped with the mandrels (8), whereon printed and/or varnished items are put. The feed carriage (2) with the mandrels (8) moves with respect to the printing units having (4) the matrix (6) and squeegee (17) system.

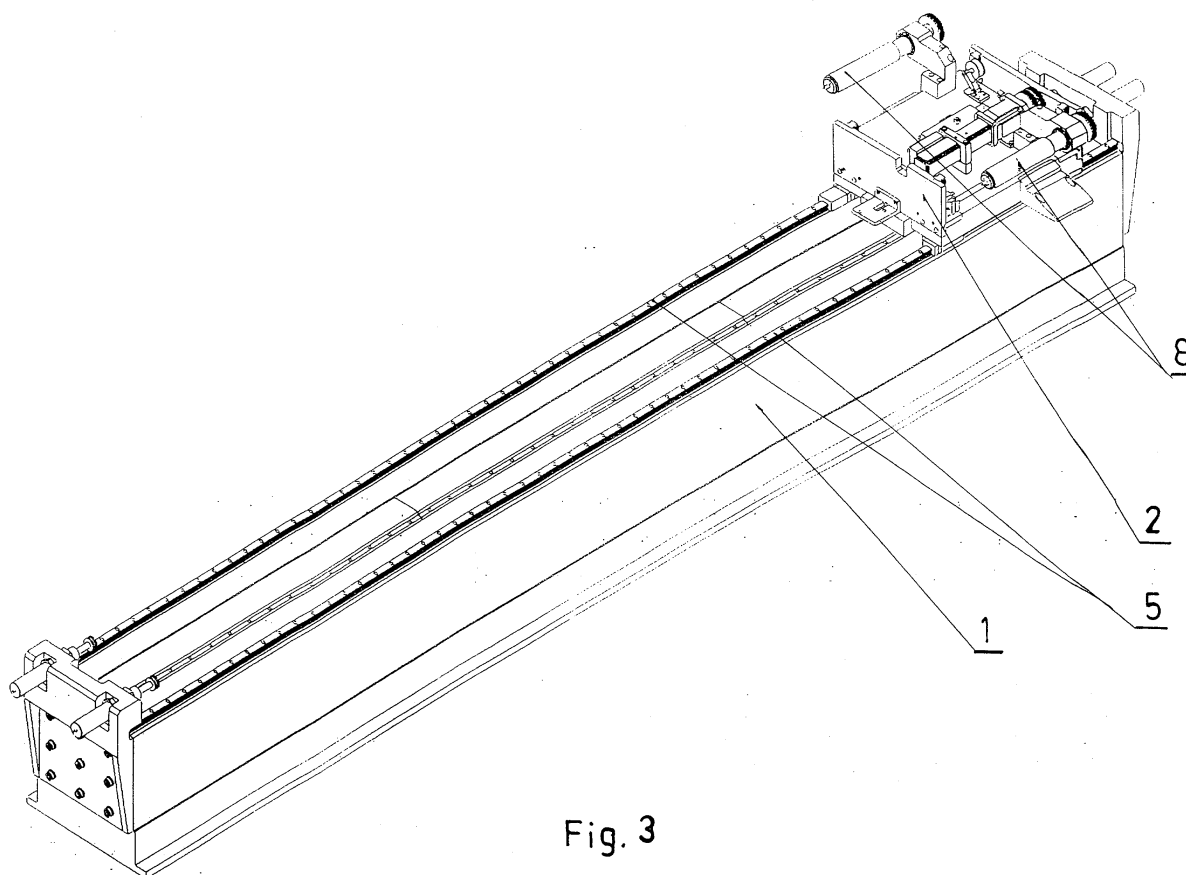


Fig. 3

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Description

[0001] The present invention provides a linear-motor-driven machine for precise positioning of items to be printed and/ or varnished.

[0002] The machine according to the invention is used for applying patterns, such as decorative elements or signs, and other multicolor signs on various items.

[0003] Among some of the well known are SEQUA CORPORATION machines, used for printing cylindrical products through the methods of screen printing, offset and hot-stamping, which run on automatic lines for the production of cosmetic packages or soft drink cans. Products to be printed and/or varnished are placed on the mandrels arranged around the circumference of a rotating wheel conveyor. The mandrels are arranged in equal angular spaces from each other with their centers facing each other. The mandrels within close proximity of the printing elements, such as squeegee systems and matrix mounts.

[0004] A disadvantage of the machines manufactured in that way is their low precision in positioning products whereon multicolor print is applied in the process of applying multicolored agent layers, which results from low precision in arranging objects with respect to each other. Only monochromatic prints is most frequently applied in that way.

[0005] The present invention is characterized in that the machine is equipped with the linear electric motor, the body of which is mounted along the skeleton of the machine, and the skeleton is divided into the modules, out of which the four ones are printing units.

[0006] The linear electric motor controls a stroke of the feed carriage located on the upper part of the linear electric motor. The feed carriage rides on the guides.

[0007] The feed carriage has a base and mandrels mounted on the holders. The mandrels rotate about their lengthwise axis with the aid of the transmission belt, the gear wheels and the drive. The free end of each mandrel has ports on its front plane. The exterior of the feed carriage base is equipped with the elements which control its motion.

[0008] The machine has a skeleton based printing units, wherein each of them has its own skid plate, in which slots for matrix fixing are located. The squeegee fixing system and the matrix moving system are located on the skid plate.

[0009] The machine according to the present invention is characterized in that it has a simple modular structure, and that the use of a linear electric motor which moves the feed carriage causes that its translational motion on the linear guides is very precise, and that consequently, it is possible to position printed elements very precisely with respect to the matrices, and that the multiple system of the printing modules allows to apply each paint or varnish layer very precisely in the multicolor printing process using a subtractive color mixture. Due to the use of a linear electric motor in the machine it is

possible to position printed and/or varnished items repeatedly and precisely.

[0010] The method according to this invention is illustrated in the drawing in which fig. 1 shows an end view of the machine, fig. 2 shows a top view of the machine, fig. 3 shows an axonometric view of the linear electric motor, fig. 4 shows an axonometric view of the feed carriage, and fig. 5 shows an axonometric view of the printing module.

[0011] The machine is equipped with the linear electric motor 1, used for moving the feed carriage 2. The body of the linear electric motor 1 is mounted along the skeleton 3 of the machine, whereas the skeleton of the machine is divided into the modules, out of which the four ones form the printing unit 4. The feed carriage 2, which rides on the guides 5 on the top surface of the linear electric motor 1, consists of the base 6 and the mandrels 8 mounted on the holders 7, which hold printed and/or varnished items, with the mandrels 8 rotating around their lengthwise axis with the aid of the belt 9, and the gear wheels 10 from the drive 11, and with the openings 12 on the free end of the mandrel 8 on its front plane for generating negative pressure in order to put items on the mandrels 8, and for generating overpressure inside printed items in order to take them off the mandrels 8 after the printing and/or varnishing process is finished. The exterior of the feed carriage 2 base 6 has elements controlling 13 its motion.

[0012] The feed carriage 2 moves on the body of the linear electric motor 1 with the printing elements fixed on the mandrels 8, successively to the printing modules 4, whereas the printing modules 4 are the same and consist of the horizontal skid plate 14, wherein the matrix 16 fixing slots 15 and the filling and sweeping squeegee 17 system are located, whereas the matrix 16 moving system 18 is located on the upper surface of the skid plate 14.

[0013] The operational cycle of the machine comprises the step of putting printed elements, through the negative pressure, on the mandrels 8 mounted on the feed carriage 2, next, the step of moving the carriage with the products stuck on the mandrels 8 under the matrix plane 16, and finally the step of setting the mandrels 8 in rotational motion concurrently with the step of setting the matrix 16 moving mechanism in motion. The squeegee system 17 is set in motion above the matrix 16, applying a printing agent on the product surface. Next, the feed carriage 2 moves under the second printing unit 5, and another layer of a printing agent is applied on the product which rotates on the mandrel 8, and next, the feed carriage moves over another printing unit and the process of applying a printing agent is repeated. Next, the printed and/or varnished product is dried, pushed away from the mandrel 8 by the overpressure generated inside the product, and the operational cycle of the machine is finished.

Claims

1. The machine for precise positioning of items to be printed, having the printing units for screen printing, offset, hot-stamping methods, and/or to be varnished, which is equipped with the lift and sub-assemblies with mandrels for fixing products to be printed, **characterized in that** it has the linear electric motor (1) for moving the feed carriage (2), whereas the body of the linear electric motor (1) is mounted along the skeleton (3) of the machine, whereas the skeleton (3) is divided into the module holding parts which form the printing units (4). 5 10
2. The machine according to claim 1 is **characterized in that** the linear electric motor (1) moves the feed carriage (2) along the guides (5) located on the body of the linear electric motor (1), whereas the feed carriage (2) has the base (6), and the mandrels (8) mounted on the holders (7). 15 20
3. The machine according to claim and 2 is **characterized in that** it has the mandrels (8) which are rotated along their lengthwise axis by the belt (9), and the gear wheels (10) from the drive (11). 25
4. The machine according to claim 2 and 3 is **characterized in that** the free end of each mandrel (8) has the ports (12) on its front plane. 30
5. The machine according to claim 1 and 2 is **characterized in that** the exterior of the feed carriage (2) base (6) has elements which control its motion (13). 35
6. The machine according to claim 1 is **characterized in that** it has skeleton (3) based printing units (4), where each of them has the skid plate (14), in which the slots (15) for matrix (16) fixing are located. 40
7. The machine according to claim 1 and 6 is **characterized in that** the squeegee fixing system (17) and the matrix (16) moving (18) system are located on the skid plates (14) of the printing units (4). 45

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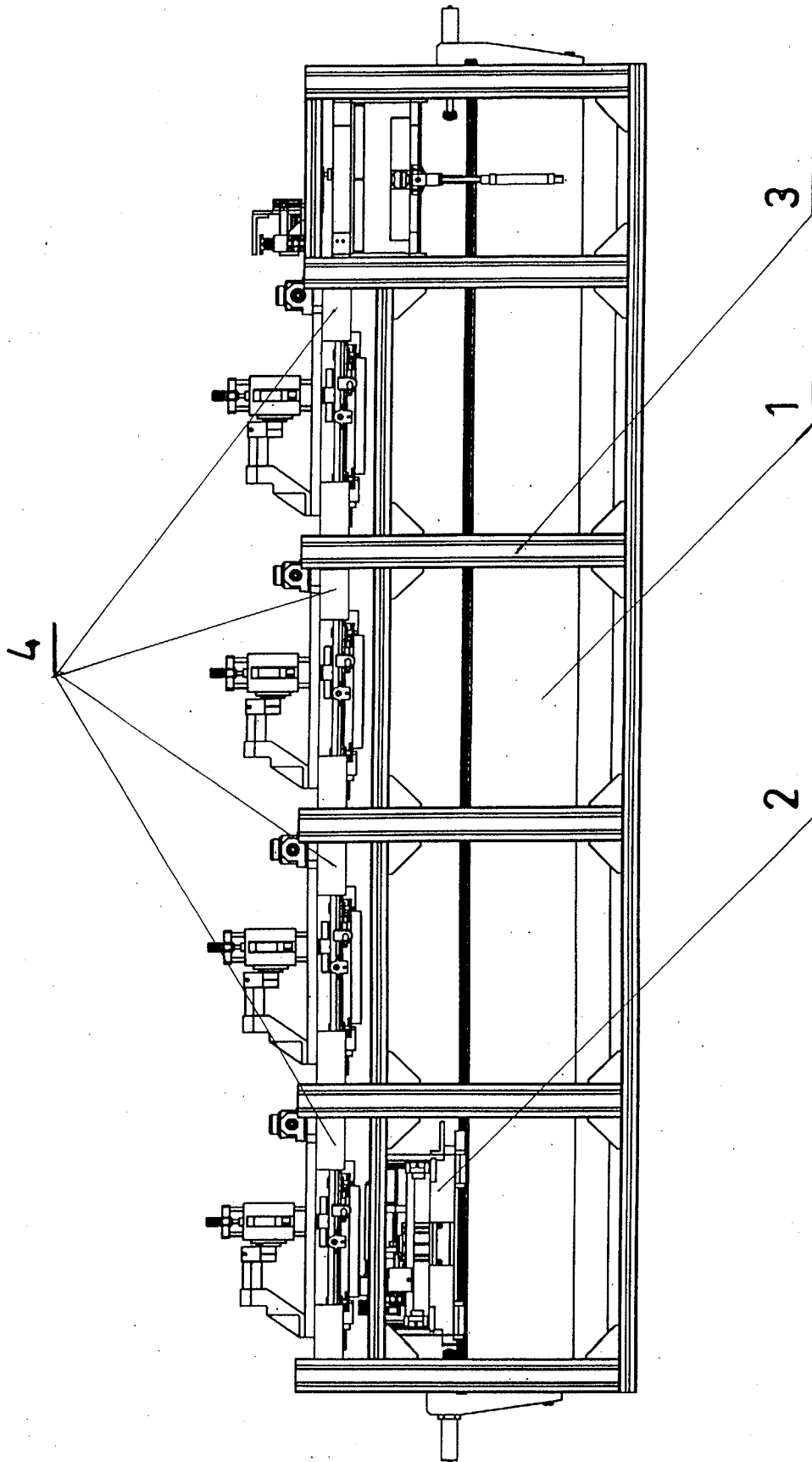


Fig. 1

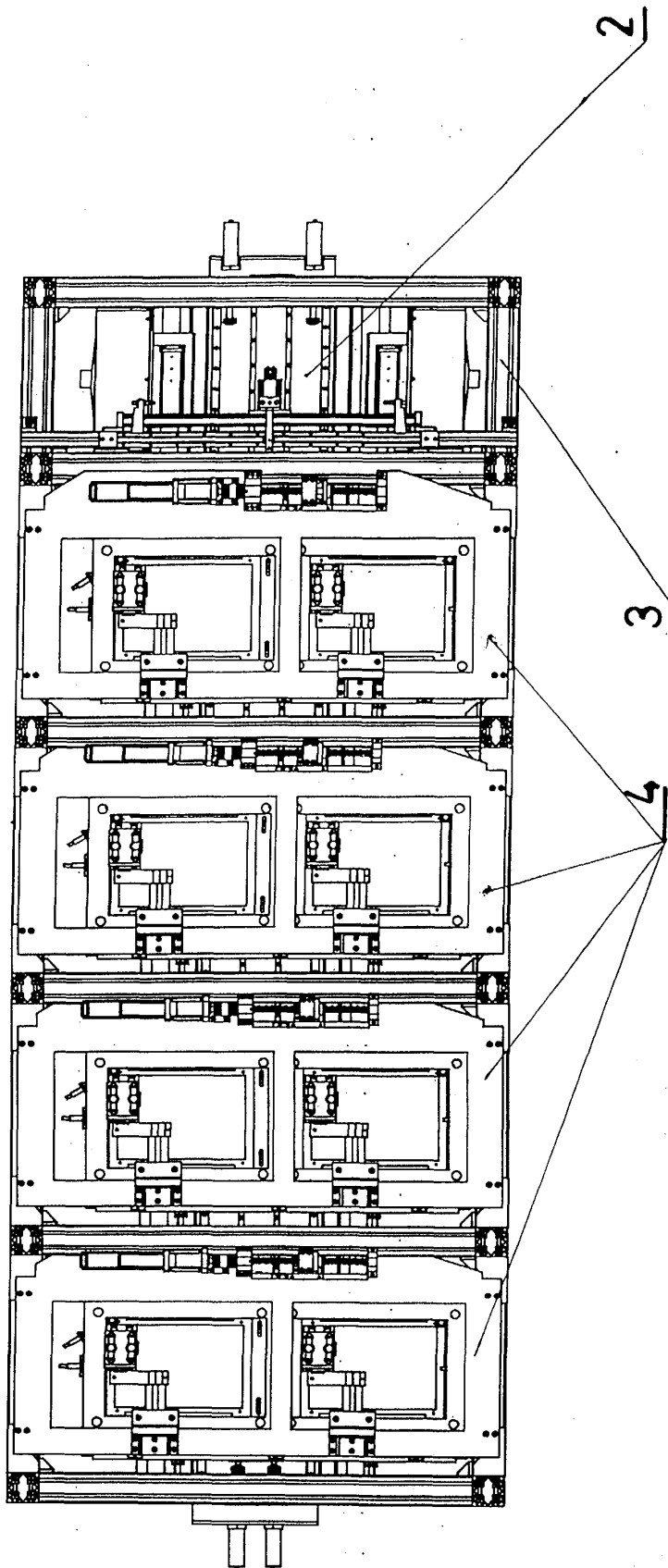


Fig. 2

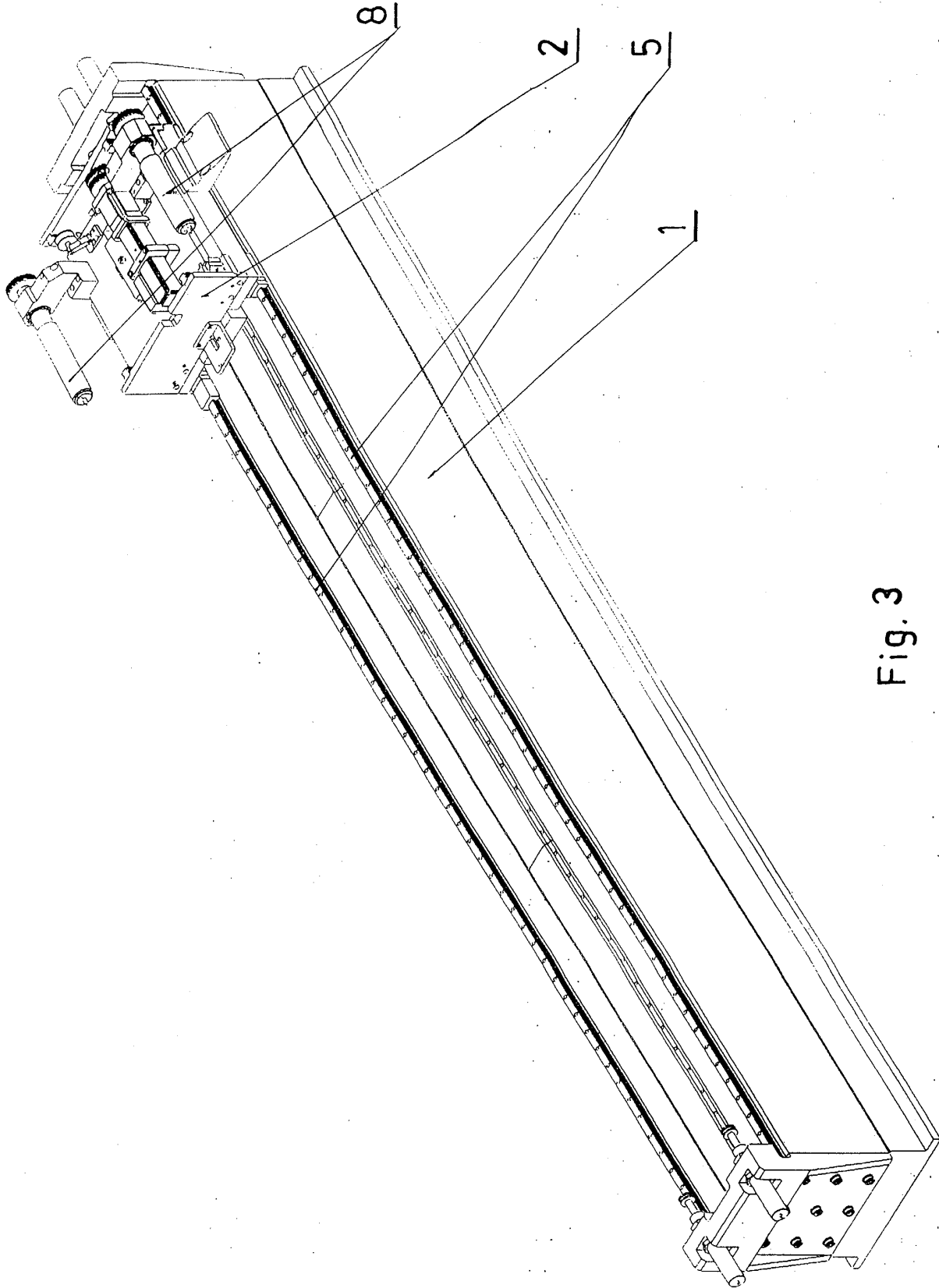


Fig. 3

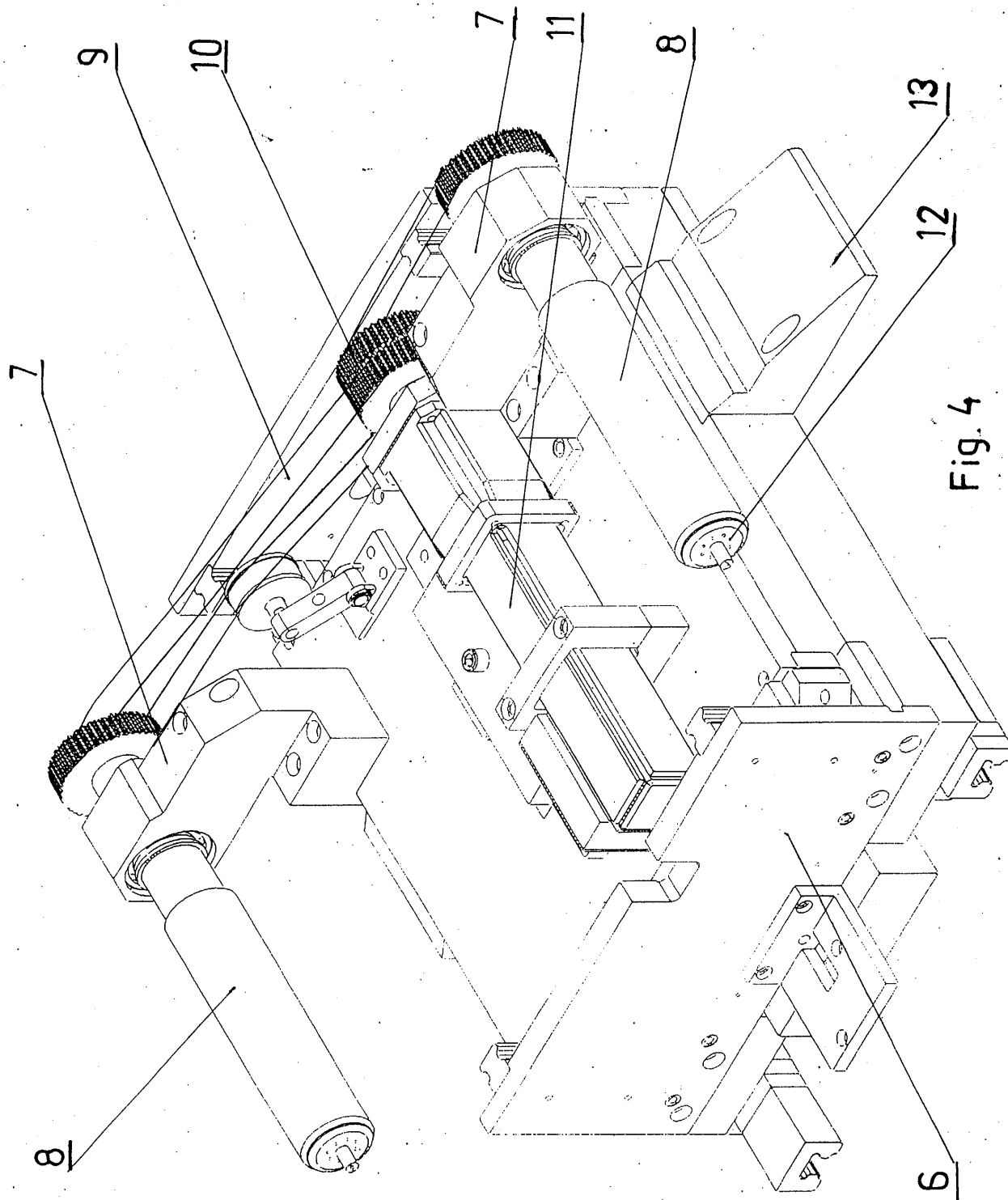


Fig. 4

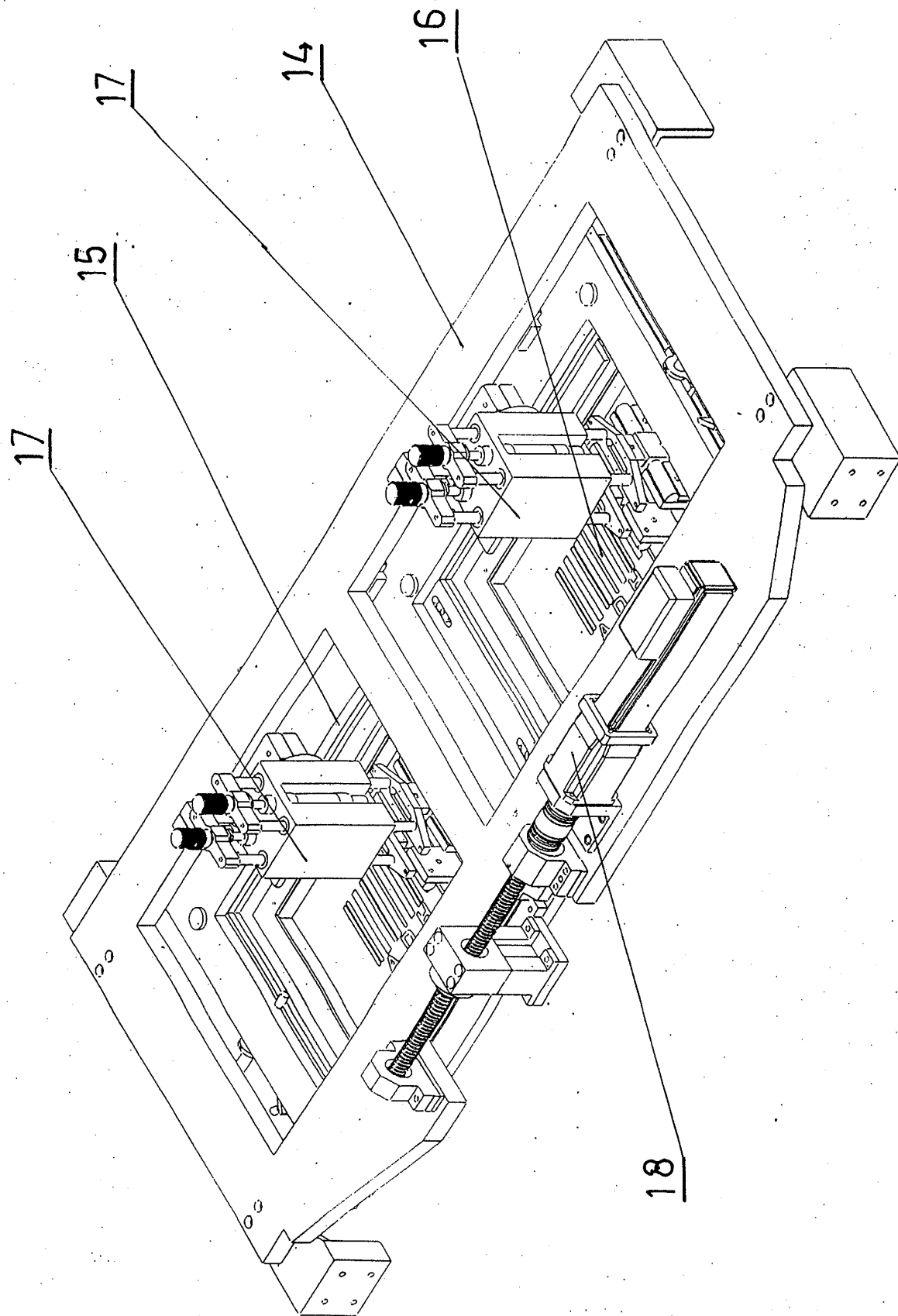


Fig. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 04 46 0041

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 44 31 596 C (PAUL BALSFULLAND) 19 October 1995 (1995-10-19) * the whole document *	1	B41F15/08
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			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			B41F
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 December 2004	Examiner Loncke, J
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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The members are as contained in the European Patent Office EDP file on
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