



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
22.11.2023 Bulletin 2023/47

(51) International Patent Classification (IPC):
B21L 11/00^(2006.01)

(21) Application number: **23171127.6**

(52) Cooperative Patent Classification (CPC):
B21L 11/005

(22) Date of filing: **02.05.2023**

(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 ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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(30) Priority: **17.05.2022 IT 202200010157**

(54) **APPARATUS FOR PROVIDING CHAINS AND/OR CABLES FOR JEWELRY**

(57) An apparatus (10) for providing chains and/or cables for jewelry, comprising at least the following assemblies:

- an assembly (11) for feeding a base wire,
- an assembly (12) for cutting the wire,
- an assembly (13) for forming a link,

- an assembly (14) for conveying the link,
- an assembly (15) for forming a chain and/or cable.

The apparatus (10) comprises dedicated movement means (17a, 17b, 18, 20, 22, 26, 29, 34, 37, 40, 42, 45, 47, 51) for each one of the assemblies (11, 12, 13, 14, 15).

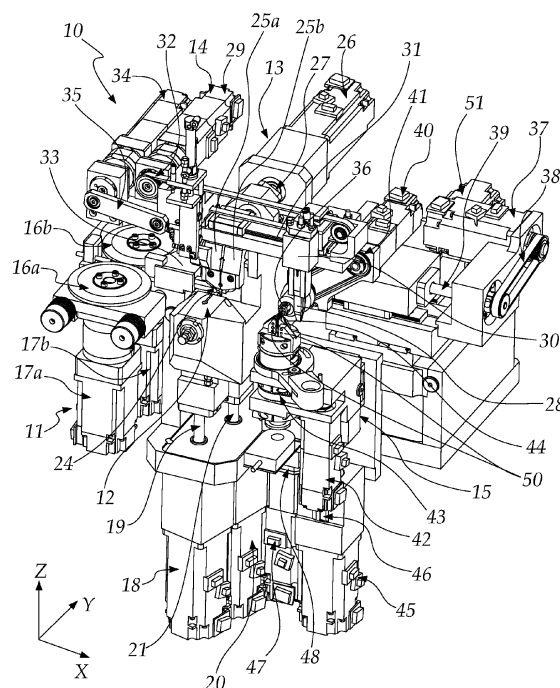


Fig.1

Description

[0001] The present invention relates to an apparatus for providing chains and/or cables for jewelry.

[0002] Apparatuses provided with a plurality of tools are currently used for the provision of chains and cables for jewelry to perform the various steps of movement and processing starting from a basic metal wire.

[0003] Usually a metal wire is introduced in the apparatus and is subjected to successive operations by said tools, such as, for example:

- feeding to a cutting assembly, by means of advancement rollers,
- cutting, by means of the cutting assembly,
- deformation to form a link, by means of shaped clamps,
- movement of said link, by means of pincers,
- linking the link to a previously provided link, by means of contoured clamps and pins,
- etc.

[0004] In such apparatuses, usually all tool movements are controlled by one or two motors that transmit motion to the various tools by means of a camshaft, in which each cam is kinematically connected to a respective tool by means of lever systems, and imparts its motion due to the rotation of the shaft.

[0005] Such background art has some drawbacks.

[0006] First, in apparatuses of the known type, time-consuming and inconvenient calibration operations, in particular of the cams, are required before starting machining in order to check/set the correct motion of the various tools.

[0007] In fact, the cams must be positioned precisely in order to ensure the correct and timely movement of the tools during machining.

[0008] Moreover, in apparatuses of the known type, when machining has to be changed to provide a different type of chain/cable, it is necessary to replace one or more cams with others of appropriate size in order to impart to the respective tool the correct motion to perform the operations necessary to obtain the desired type and size of chain/cable.

[0009] This entails long machine downtimes and time-consuming and awkward operations, as well as the need for the availability of cams of different shapes/sizes to be used depending on the type of product required.

[0010] The aim of the present invention is to provide an apparatus for providing chains for and/or cables jewelry that is capable of avoiding the drawbacks of the background art in one or more of the above aspects.

[0011] Within this aim, an object of the invention is to provide an apparatus for providing chains and/or cables for jewelry that allows much faster and easier operations for calibration of the various tools than similar apparatuses of the known type.

[0012] Another object of the invention is to provide an

apparatus for providing chains and/or cables for jewelry that allows to change the type of machining while significantly reducing machine downtimes with respect to similar apparatus of the known type.

[0013] Another object of the invention is to provide an apparatus for providing chains and/or cables for jewelry that does not require cams for the movement of the various tools, or at least does not require their replacement to change from one type of machining to another.

[0014] A further object of the present invention is to overcome the drawbacks of the background art in a manner that is alternative to any existing solutions.

[0015] Not least object of the invention is to provide an apparatus for providing chains and/or cables for jewelry that is highly reliable, relatively easy to provide, and at competitive costs.

[0016] This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by an apparatus for providing chains and/or cables for jewelry, comprising at least the following assemblies:

- an assembly for feeding a base wire,
- an assembly for cutting said wire,
- an assembly for forming a link,
- an assembly for conveying said link,
- an assembly for forming a chain and/or cable,

said apparatus being characterized in that it comprises dedicated movement means for each one of said assemblies.

[0017] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the apparatus for providing chains and/or cables for jewelry according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a first general perspective view of the apparatus for providing chains and/or cables for jewelry, according to the invention;

Figure 2 is a second general perspective view of the apparatus for providing chains and/or cables for jewelry shown in Figure 1.

[0018] With reference to the figures, an apparatus for providing chains and/or cables for jewelry, according to the invention, is generally designated by the reference numeral 10.

[0019] The apparatus 10 comprises, in machining order, the following assemblies:

- an assembly 11 for feeding a base wire (not shown in the figures),
- an assembly 12 for cutting the wire,
- an assembly 13 for forming a link (not shown in the figures),
- an assembly 14 for conveying said link,
- an assembly 15 for forming a chain and/or cable (not

shown in the figures).

[0020] One of the particularities of the invention resides in that it comprises dedicated movement means for each of said assemblies 11, 12, 13, 14, 15.

[0021] In the present description, the expression "dedicated movement means" means that the movement means are adapted to move only the tools belonging to the respective assembly.

[0022] In particular, the base wire feeding assembly 11 comprises a pair of rollers 16a, 16b, each moved by a respective first electric motor 17a, 17b.

[0023] The rollers 16a, 16b move simultaneously, but in opposite directions, to produce the advancement of the wire that runs between them along a first direction X.

[0024] The wire cutting assembly 12 comprises:

- a blade, not shown in the figures, which translates along a second direction Y and/or a third direction Z, perpendicular to the first direction X,
- a second electric motor 18,
- a first ballscrew 19 interposed between said second motor 18 and the translating blade, and for kinematic connection between them.

[0025] Once the base wire advances and arrives at the cutting assembly 12, the translating blade moves to cut the wire to the desired size to provide a link.

[0026] The assembly 13 for forming a link comprises:

- a pin 24, extending along a second direction Y, perpendicular to the first direction X,
- a third electric motor 20, for the translation of pin 24 along a third direction Z, perpendicular to the first direction X and to the second direction Y,
- a second ballscrew 21, interposed between said third motor 20 and said pin, and for kinematic connection between them,
- a fourth electric motor 22, for the translation of the pin 24 in the second direction Y,
- a third ballscrew 23, interposed between said fourth motor 22 and said pin 24, and for kinematic connection between them,
- a pair of contoured clamps 25a, 25b, to impart a given bend to the cut piece of wire,
- a fifth electric motor 26 for opening/closing the clamps 25a, 25b by sliding, for their mutual spacing/approach along the first direction X,
- a fourth ballscrew 27, interposed between the fifth motor 26 and the pair of clamps 25a, 25b, and for kinematic connection between them,
- a contrast element 33, which can translate along the first direction X,
- a sixth electric motor 34, for moving the contrast element 33,
- a rod-and-crank transmission 35, interposed between the contrast element 33 and the sixth motor 34, and for kinematic connection between them.

[0027] The wire cut by the assembly 12 is deformed by the assembly 13 by means of the action of clamps 25a, 25b, which bend it around the pin 24 to provide a link.

[0028] The assembly 14 for conveying said link comprises:

- a pincer 28, which translates along the first direction X,
- a seventh electric motor 29,
- a slider 30, from which the pincer 28 extends and can slide on a guide 31,
- a first belt-pulley transmission 32, interposed between the slider 30 and the sixth motor 29, and for kinematic connection between them.

[0029] The pincer 28 can slide between:

- a first position for retrieving the newly formed link, at the pin 24, translated along the second direction Y,
- a second position for releasing the link, at the assembly 15 for forming a chain and/or cable.

[0030] The assembly 15 for forming a chain and/or cable comprises:

- a first mandrel 36, for linking the links, with extension along the second axis Y,
- an eighth electric motor 37, for moving the first mandrel 36 along the first direction X,
- a second belt-pulley transmission 38, interposed between the eighth motor 37 and a fifth ballscrew 39, and for kinematic connection between them,
- the fifth ballscrew 39, interposed between said second belt-pulley transmission 38 and the first mandrel 36, and for kinematic connection between them,
- a ninth motor 51, for moving the first mandrel 36 along the second axis Y,
- a sixth ballscrew 52, interposed between the ninth motor 51 and the first mandrel 36, and for kinematic connection between them,
- a tenth electric motor 40, for the rotation of the first mandrel 36 about the third axis Z,
- a third belt-pulley transmission 41, interposed between the tenth motor 40 and the first mandrel 36 and for kinematic connection between them,
- a second chain/cable forming mandrel 44, extending along the third axis Z and provided with clamps 50,
- an eleventh electric motor 42 for the rotation of the second mandrel 44 about the third axis Z,
- a fourth belt-pulley transmission 43, interposed between the eleventh motor 42 and the second mandrel 44, and for kinematic connection between them,
- a twelfth electric motor 45, for the movement of the second mandrel 44 along the third axis Z,
- a seventh ballscrew 46, interposed between the twelfth motor 45 and the second mandrel 44, and for kinematic connection between them,
- a thirteenth electric motor 47, for opening/closing the

- clamps 50 of the second mandrel 44, an eighth ballscrew 48, interposed between the thirteenth motor 47 and the second mandrel 44, and for kinematic connection between them.

[0031] By means of the per se known movement and interaction between the first mandrel 36 and the second mandrel 44, the links are linked to each other and a chain and/or cable is formed.

[0032] Advantageously, all the motors 17a, 17b, 18, 20, 22, 26, 29, 34, 37, 40, 42, 45, 47, 51, of the apparatus 10 are of the brushless type.

[0033] In particular, all the motors 17a, 17b, 18, 20, 22, 26, 29, 34, 37, 40, 42, 45, 47, 51 of the apparatus 10 are connected to and controlled by a single electronic controller, not shown in the figures.

[0034] Such electronic controller is programmable and therefore, depending on the type of machining to be performed, it is sufficient to modify one or more of the instructions of the controller to change the movements of one or more tools of the assemblies 11, 12, 13, 14, and 15, as needed, without the need to physically intervene on the apparatus and significantly reducing machine downtimes with respect to similar apparatuses of the known type.

[0035] Likewise, by virtue of the electronic controller, tool calibration operations are much easier and faster than with similar apparatuses of the known type.

[0036] Moreover, to ensure compactness of the apparatus 10:

- the first motors 17a, 17b, the second motor 18, the third motor 20, the eleventh motor 42, the twelfth motor 45 and the thirteenth motor 47 have mutually parallel extensions,
- the fifth motor 26, the sixth motor 34, the seventh motor 29, the tenth motor 40 and the ninth motor 51 have mutually parallel extensions.

[0037] In practice it has been found that the invention achieves its intended aim and objects by providing an apparatus for providing chains and/or cables for jewelry that allows much faster and easier operations for calibrating the various tools than similar apparatuses of the known type.

[0038] With the invention, an apparatus for providing chains and/or cables for jewelry has been provided which allows to change the type of machining while significantly reducing machine downtimes with respect to similar apparatuses of the known type.

[0039] Moreover, with the invention an apparatus for providing chains and/or cables for jewelry has been provided which does not require cams for the movement of the various tools, or at least does not require their replacement for transition from one type of machining to another.

[0040] The invention thus conceived is susceptible of numerous modifications and variations, all of which are

within the scope of the appended claims; all the details may furthermore be replaced with other technically equivalent elements.

[0041] In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements and the state of the art.

[0042] The disclosures in Italian Patent Application No. 102022000010157 from which this application claims priority are incorporated herein by reference.

[0043] 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 interpretation of each element identified by way of example by such reference signs.

Claims

1. An apparatus (10) for providing chains and/or cables for jewelry, comprising at least the following assemblies:

- an assembly (11) for feeding a base wire,
- an assembly (12) for cutting said wire,
- an assembly (13) for forming a link,
- an assembly (14) for conveying said link,
- an assembly (15) for forming a chain and/or cable,

said apparatus (10) being **characterized in that** it comprises dedicated movement means (17a, 17b, 18, 20, 22, 26, 29, 34, 37, 40, 42, 45, 47, 51) for each one of said assemblies (11, 12, 13, 14, 15).

2. The apparatus (10) according to claim 1, **characterized in that** said assembly (11) for feeding a base wire comprises a pair of rollers (16a, 16b), each moved by a respective first electric motor (17a, 17b), said rollers (16a, 16b) producing the advancement of said wire along a first direction (X).

3. The apparatus (10) according to any one of the preceding claims, **characterized in that** said wire cutting assembly (12) comprises:

- a blade, which translates along a second direction (Y) and/or a third direction (Z), which are perpendicular to said first direction (X),
- a second electric motor (18),
- a first ballscrew (19), interposed between said second motor (18) and said translating blade and for kinematic connection between them.

4. The apparatus (10) according to any one of the preceding claims, **characterized in that** said link form-

ing assembly (13) comprises:

- a pin (24), which is extended along a second direction (Y) which is perpendicular to said first direction (X), 5
- a third electric motor (20), for the translation of said pin (24) along a third direction (Z) which is perpendicular to said first direction (X) and to said second direction (Y), 10
- a second ballscrew (21), interposed between said third motor (20) and said pin (24) and for kinematic connection between them,
- a fourth electric motor (22) for the translation of said pin (24) in said second direction (Y), 15
- a third ballscrew (23), interposed between said fourth motor (22) and said pin (24) and for kinematic connection between them,
- a pair of contoured clamps (25a, 25b), 20
- a fifth electric motor (26) for opening/closing said clamps (25a, 25b),
- a fourth ballscrew (27), interposed between said fifth motor (26) and said pair of clamps (25a, 25b) and for kinematic connection between them. 25

5. The apparatus (10) according to the preceding claim, **characterized in that** said link forming assembly (13) comprises:

- a contrast element (33), which can translate along said first direction (X), 30
- a sixth electric motor (34) for moving said contrast element (33),
- a rod-and-crank transmission (35), interposed between said contrast element (33) and said sixth motor (34), and for kinematic connection between them. 35

6. The apparatus (10) according to any one of the preceding claims, **characterized in that** said assembly (14) for conveying said link comprises: 40

- a pincer (28), which translates along said first direction (X), 45
- a seventh electric motor (29),
- a slider (30), said pincer (28) extending from said slider (30) and being able to slide on a guide (31),
- a first belt-pulley transmission (32), interposed between said slider (30) and said sixth motor (34), and for kinematic connection between them. 50

7. The apparatus (10) according to claim 5, **characterized in that** said pincer (28) is configured to slide between: 55

- a first position for retrieving said link, at said

pin (24) translated along said second direction (Y),

- a second position for releasing said link at said assembly (15) for forming said chain and/or cable.

8. The apparatus (10) according to any one of the preceding claims, **characterized in that** said assembly (15) for forming said chain and/or cable comprises:

- a first mandrel (36) for linking the links, with an extension along said second axis (Y),
- an eighth electric motor (37) for the movement of said first mandrel (36) along said first direction (X),
- a second belt-pulley transmission (38), interposed between said eighth motor (37) and a fifth ballscrew (39), and for kinematic connection between them,
- said fifth ballscrew (39), interposed between said second belt-pulley transmission (38) and said first mandrel (36), and for kinematic connection between them,
- a ninth motor (51) for the movement of said first mandrel (36) along said second axis (Y),
- a sixth ballscrew (52), interposed between said ninth motor (51) and said first mandrel (36), and for kinematic connection between them,
- a tenth electric motor (40), for the rotation of said first mandrel (36) about said third axis (Z),
- a third belt-pulley transmission (41), interposed between said tenth motor (40) and said first mandrel (36) and for kinematic connection between them,
- a second mandrel (44) for forming said chain/cable, with extension along said third axis (Z) and provided with clamps (50),
- an eleventh electric motor (42), for the rotation of said second mandrel (44) about said third axis (Z),
- a fourth belt-pulley transmission (43), interposed between said eleventh motor (42) and said second mandrel (44) and for kinematic connection between them,
- a twelfth electric motor (45) for the movement of said second mandrel (44) along said third axis (Z),
- a seventh ballscrew (46), interposed between said twelfth motor (45) and said second mandrel (44), and for kinematic connection between them,
- a thirteenth electric motor (47) for the opening/closing of said clamps (50) of said second mandrel (44),
- an eighth ballscrew (48), interposed between said thirteenth motor (47) and said second mandrel (44), and for kinematic connection between them.

9. The apparatus (10) according to any one of the preceding claims, **characterized in that** all the motors (17a, 17b, 18, 20, 22, 26, 29, 34, 37, 40, 42, 45, 47, 51) of said apparatus (10) are of the brushless type.

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10. The apparatus (10) according to any one of the preceding claims, **characterized in that** all the motors (17a, 17b, 18, 20, 22, 26, 29, 34, 37, 40, 42, 45, 47, 51) of the apparatus (10) are connected and controlled by a single programmable electronic controller.

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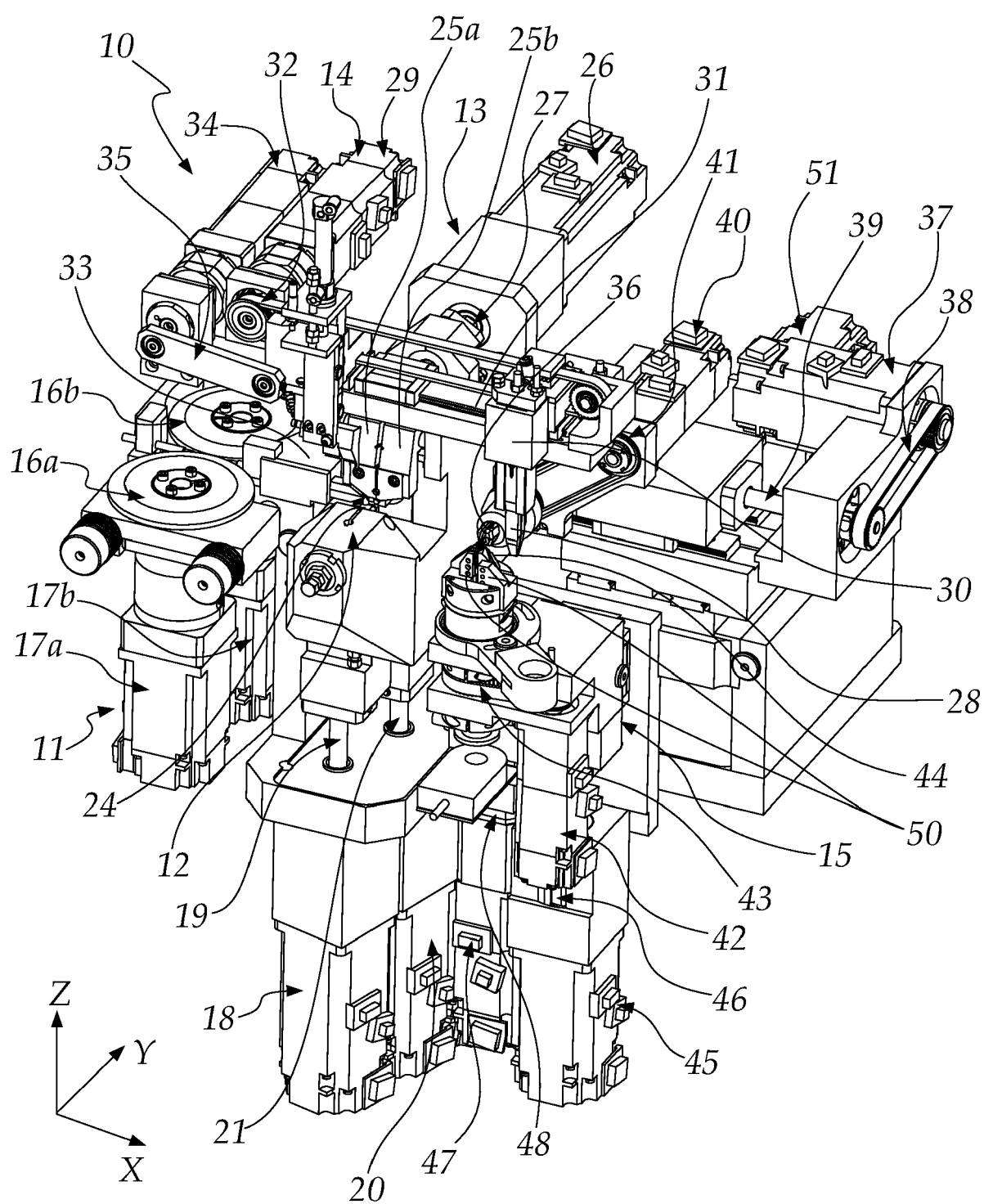


Fig.1

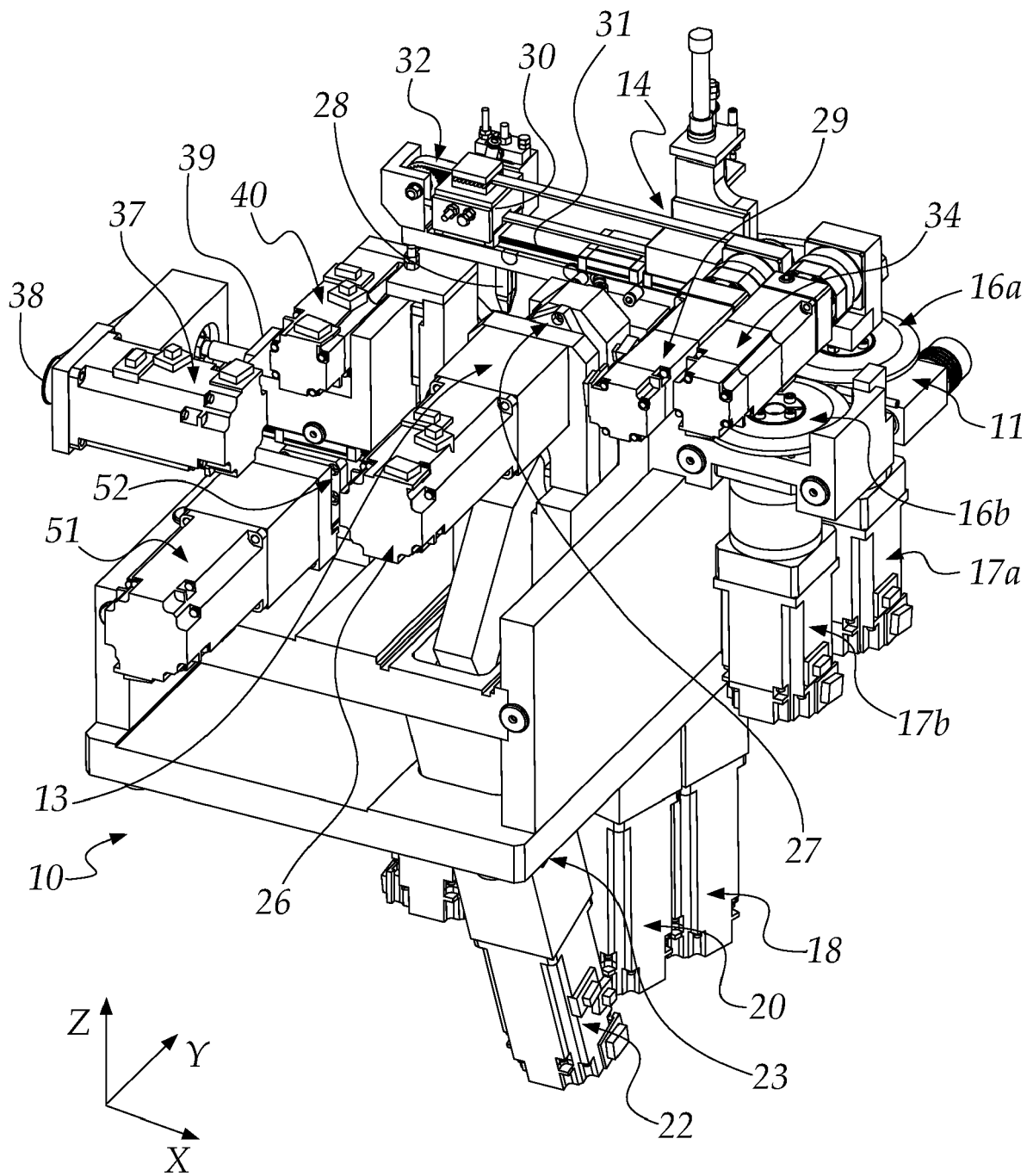


Fig. 2



EUROPEAN SEARCH REPORT

Application Number

EP 23 17 1127

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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)
Y	IT 2018 0000 1349 A1 (STOCCO RINO [IT]) 19 July 2019 (2019-07-19) * page 5, line 3 - page 12, line 13; figures 1-8 *	1-10	INV. B21L11/00
Y	WO 2022/070158 A1 (OMBI S R L [IT]) 7 April 2022 (2022-04-07) * page 1, line 25 - page 3, line 16 * * page 6, line 1 - page 10, line 2; figures 2-4 *	1-10	
Y	EP 3 722 020 A1 (PETTENUZZO GIANNI [IT]) 14 October 2020 (2020-10-14) * paragraph [0037] - paragraph [0149]; figures 1-7 *	1-10	
Y	IT FI 940 220 A1 (N O R M A ENGINEERING S R L [IT]) 7 June 1996 (1996-06-07) * page 7, last paragraph - page 20, paragraph 2; figures 1-5 *	1-10	
A	IT 2019 0001 8371 A1 (S I L O S P A [IT]) 10 April 2021 (2021-04-10) * page 4, line 9 - page 9, line 7; figures 1-4 *	1-10	TECHNICAL FIELDS SEARCHED (IPC) B21L

The present search report has been drawn up for all claims

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Place of search

Munich

Date of completion of the search

29 September 2023

Examiner

Ritter, Florian

CATEGORY OF CITED DOCUMENTS

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

EP 23 17 1127

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

29-09-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
IT 201800001349 A1	19-07-2019	-----	-----
WO 2022070158 A1	07-04-2022	EP 4221913 A1	09-08-2023
		WO 2022070158 A1	07-04-2022
EP 3722020 A1	14-10-2020	CN 111790880 A	20-10-2020
		EP 3722020 A1	14-10-2020
		ES 2914712 T3	15-06-2022
IT FI940220 A1	07-06-1996	NONE	
IT 201900018371 A1	10-04-2021	-----	-----

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT 102022000010157 [0042]