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(54) UNIVERSAL RIVETING UNIT FOR INSTALLATION OF GUIDE PINS ON SLATS OF OUTDOOR BLINDS

(57) Universal riveting unit (1) comprising vibration hoppers (2) for guide pins (14), where hoppers (2) are mounted on a supporting structure (3) which is arranged on a support arm (4) and supported on supporting legs (7), whereas the unit further comprises a mechanical sliding (5) with slip rails (11) and a riveting device (31) comprising a riveting head (10) with a riveting tool (8), where a tool plate (15) is arranged in the riveting device (31), in its opening a support (16) of a revolver (24) with a rotating central cylinder (17) is arranged, in relation to which columns (18) of the revolver (24) are provided, whereas on their upper surfaces riveting beds (20) are provided, whereas the revolver (24) is made as a rotational and extensible component driven by a revolver drive (25) for linear movement in the axis of the rotating central cylinder (17) and at the same time for the rotational movement about this axis, wherein the riveting device (31) is further provided with a loading manipulator (23) with a grab (22) and a riveting device drive (21), whereas on a supporting base plate (6) on the riveting device (31) fixed side plates (13) with guide grooves (28) are arranged in which pins (32) of tilting side plates (12) are housed, on which both the revolver (24), the loading manipulator (23) and the riveting head (10) with a riveting tool (8) for their simultaneous tilting and achievement of the desired angle of the guide pin (14) application with respect to a slat (9).

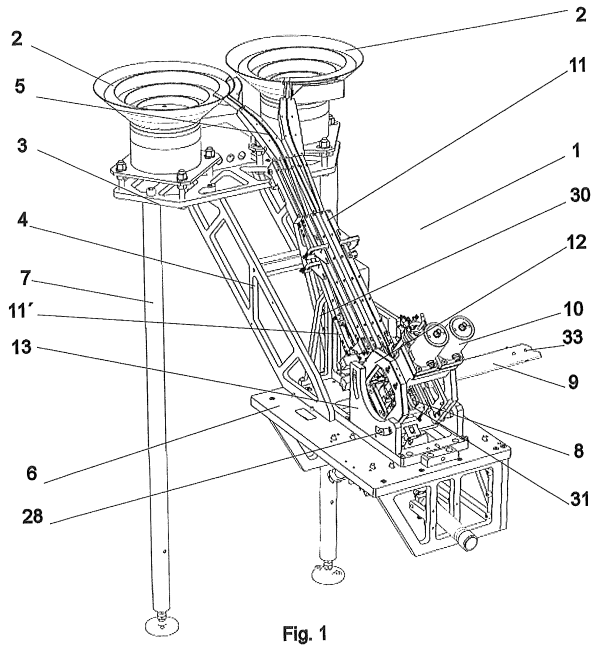

Fig. 1

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Description

Technical background

[0001] The invention relates to an universal riveting unit for installation of guide pins on slats of outdoor blinds.

State of the Art

[0002] In the manufacturing of slats of outdoor blinds, a device is known that allows automatic application of guide pins to a blind's slat. The guide pin is a metal or plastic component used to fix the slat in the guide rail mounted on the window lining. The most commonly used manner of connection of the guide pin with a slat is riveting for metal guide pins, and ultrasonic welding for plastic guide pins. In the case of a metal guide pin, the pin is conveyed from a hopper to a bed which ensures its fixed position. The most commonly used combination for conveying a pin into a bed is a combination of vibration hopper and mechanical sliding. In the second step of the production, to the guide pin thus prepared a slat is brought. Positioning device or the rolling mill line itself ensures precise positioning. Thereafter, the slat is coupled with the guide pin, in the case of mechanical riveting by the movement of the bed at the axis angle of riveting and the counter-pressure of the riveting matrix. In case of ultrasonic welding, the mechanical principle is the same, only the riveting matrix is replaced by an ultrasonic sonotrode.

[0003] Technical devices based on this principle are known but they have substantial technical constraints when there is a requirement to apply various types of guide pins on one device. In addition, if there is a requirement to apply various types of pins to various types of slats, automation becomes difficult to implement. So far, this problem has been solved in that way that for each combination of guide pin/slat, a special device has to be prepared and those devices are then arranged in series along the axis of the slat movement.

[0004] Theoretically, in case of three types of guide pins in an left/right arrangement for two types of slats mutually attached on one production line, with existing technical solution, it would be necessary to arrange 12 separate tools and 6 positioning devices. In practice, instead of automation of the production of all combinations only one guide pin for each type of slat would be chosen. Even after this compromise, the device would still consists of four separate tools. The main disadvantage of the existing solution is the high demands on space in the installation of fully automated production lines and mechanical complexity.

[0005] The aim of this invention is to introduce a riveting unit for automatic riveting or welding of guide pins, which would be usable for more combination of the type of slats and guide pins. At the same time, the speed of production of the slats must not be limited. The device should be versatile, therefore usable for both riveting and ultrasonic welding. Further requirements are easy adjustment and installation.

Summary of the invention

[0006] The above mentioned deficiencies are eliminated by the universal riveting unit according to the invention, which is characterised by the fact that a tool plate is arranged in the riveting device, in its opening a support of a revolver with a rotating central cylinder is arranged, in relation to which columns of the revolver are provided, whereas on their upper surfaces riveting beds are provided, whereas the revolver is made as a rotational and extensible component driven by a revolver drive for linear movement in the axis of the rotating central cylinder and at the same time for the rotational movement about this axis, wherein the riveting device is further provided with a loading manipulator with a grab and a riveting device drive, whereas on a supporting base plate on the riveting device fixed side plates with guide grooves are arranged in which pins of tilting side plates are housed, on which both the revolver, the loading manipulator and the riveting head with a riveting tool for their simultaneous tilting and achievement of the desired angle of the guide pin application with respect to a slat.

[0007] In a preferred embodiment, the columns are four and are evenly distributed around the periphery of the rotating central cylinder.

[0008] In another preferred embodiment is the mechanical sliding also provided with a lower slip rail below the upper slip rail.

[0009] In another preferred embodiment is the riveting tool designed as an ultrasonic sonotrode for ultrasonic welding of the plastic guide pin to the slat.

Brief description of drawings

[0010] The invention will be further described using drawings, where Fig.1 represents an overall view of the universal riveting unit according to the invention, Fig. 2 is an isometric view of the guide pin for slats, Fig. 3 illustrates two different types of slats on which guide pins, such as those of Fig. 2, are mounted, Fig. 4 is a detail of the load manipulator assembly in combination with a revolver, where also a slat is indicated, Fig. 5 represents a detail of the arrangement of the sliding rails leading to the revolver and Fig. 6 shows a detailed side view of the riveting device of Fig. 1.

Preferred embodiments of the invention

[0011] In Fig.1 an universal riveting unit 1 and vibration hoppers 2 are shown. In vibration hoppers 2 of the universal riveting unit 1, guide pins 14 are stored to be applied on slats 9. In Fig. 2, a sample guide pin 14 with a guide pin cap 19' and two cylindrical protrusions 19 which engage in the slat opening 33 of the slat 9 is shown. The guide pin cap 19' can be made in various embodiments.

The vibration hoppers 2 are mounted on a supporting structure 3 which is arranged on a support arm 4 and supported on supporting legs 7. This supporting arms 4 are disposed on the supporting base plate 6. In order to bring the guide pin 14 from the vibration hopper 2 to the loading position, a mechanical sliding 5 with slip rails 11, 11', on which guide pin 14 is guided, is used. Fig. 1 shows the slip rails 11, 11' which are arranged below each other and attached to the supporting base plate 6 through the holder 30. This part of the riveting unit 1 is substantially of the standard type, except the lower slip rail 11'.

[0012] The invention relates to a novel arrangement of the riveting device 31. Figure 4 shows in detail a tool plate 15 which is arranged in the riveting device 31. Fig. 6 is an overall side view of the riveting device 31 which includes a riveting head 10 with a riveting tool 8. Fixed side plates 13 with guide grooves 28 are provided on the supporting base plate 6, in which pins 32 of the tiltable side plates 12 are disposed. The tiltable side plates 12 are movable relative to the fixed side plates 13. On the tiltable side plates 12 on the crossbars both a revolver 24, a loading manipulator 23, as well as a riveting head 10 with a riveting tool 8 are arranged for their simultaneous tilting.

[0013] Due to this the required angle of the guide pin 14 application with respect to the slat 9 is achieved, and cylindrical protrusions 19 of the guide pin 14 with a guide pin cap 19' have been riveted perpendicularly to the middle surface 26 of the slat 9.

[0014] Fig. 4 shows that a support 16 and a rotating central cylinder 17 of the revolver 24 are arranged in the plate opening 29 of the tool plate 15, with respect to which a corresponding number of columns 24 of the revolver 24 bearing the corresponding number of riveting beds 20 is radially arranged. In Fig 4., beds 20 can not be clearly seen because the guide pins 14 are mounted thereon. Due to the solution used, the guide pin 14 can be brought to predetermined take away position 27 on each of slip rails 11, 11' (Fig. 5 and 6). Each position has a unique dimension for a particular guide pin 14. From the take away position 27, the guide pin 14 is removed by a grab 22 of the loading manipulator 23 driven by the riveting device drive 21 and is laid down on one of the defined riveting beds 20. The revolver 24 is a rotational and extensible component 25 driven by a drive. This revolver 24 has the rotating central cylinder 17 which allows precise linear movement in a vertical axis and a rotational movement about that axis. By combining the rotary and linear movement, accurate position of the pre-defined bed 20 on the revolver 24 to the charging position i.e., where the riveting tool 8 will move against it, can be achieved. Another advantage is, that this operation can take place at a time when the slat 9 passes into its working position and the total speed of the production process of the outdoor blind is not affected. Fig. 4 shows an exemplary embodiment of the revolver 24 with four riveting beds 20 in a star arrangement.

[0015] The solution according to the invention enables to insert any guide pin 14 into the beds 20, i.e. into the working position, in a cycle meeting the requirements of the production speed. In contrast to the known solution, the area of the respective riveting portion of the machine was reduced to a third. Thus, it is possible to apply two types of guide pins 14 in the left/right arrangement, in fact four different guide pins 14, to one type of the slat 9, which would otherwise in practice mean to have four riveting heads at disposal.

[0016] Fig. 3 illustrates an example of two different types A and B of slats 9, where the arrow indicates the middle surface 26 determined to be fitted with guide pins 14 along their edges. The problem of applying guide pins 14 to various types of slats 9 is mainly due to the different angles of the middle surface 26 on the slat 9 to which the guide pin 14 has to be applied at the same angle. This problem is solved by possibility of tilting the entire riveting head 10 with the riveting tool 8 about the axis of the slat 9 by a defined angle with respect to the horizontal plane.

[0017] In the riveting unit 1 with two slip rails 11, 11' it is possible to rivet in two positions. According to the profile of the slat 9, the riveting unit 1 is tilted to the desired position so that the end of the slip rails 11, 11' is always substantially in line with the upper surface of the revolver 24.

[0018] By combining the revolver 24 with the loading manipulator 23, the multi-riveting device 31 for the application of various types of guide pins 14 is obtained for various types of slats 9 of external blinds. This unique technical solution reduces by 60% the demand for installation on automated production lines while improving all the monitored features of the equipment. In addition, greater reliability has been achieved in the entire application of the guide pin 14. Mechanical simplification of the entire unit 1 and simplification of the assembly and adjustment has been achieved.

[0019] For example, when requesting three different guide pins in left/right arrangements for two different types of slats, the solution according to the invention can theoretically replace twelve tools with one universal.

Claims

1. A universal riveting unit (1) comprising vibration hoppers (2) for guide pins (14), where hoppers (2) are mounted on a supporting structure (3) which is arranged on a support arm (4) and supported on supporting legs (7), whereas the unit further comprises a mechanical sliding (5) with slip rails (11) and a riveting device (31) comprising a riveting head (10) with a riveting tool (8), **characterised by that** a tool plate (15) is arranged in the riveting device (31), in its opening a support (16) of a revolver (24) with a rotating central cylinder (17) is arranged, in relation to which columns (18) of the revolver (24) are provided, whereas on their upper surfaces riveting beds (20) are provided, whereas the revolver (24) is made as

a rotational and extensible component driven by a revolver drive (25) for linear movement in the axis of the rotating central cylinder (17) and at the same time for the rotational movement about this axis, wherein the riveting device (31) is further provided with a loading manipulator (23) with a grab (22) and a riveting device drive (21), whereas on a supporting base plate (6) on the riveting device (31) fixed side plates (13) with guide grooves (28) are arranged in which pins (32) of tilting side plates (12) are housed, on which both the revolver (24), the loading manipulator (23) and the riveting head (10) with a riveting tool (8) for their simultaneous tilting and achievement of the desired angle of the guide pin (14) application with respect to a slat (9).

2. Universal riveting unit according to claim 1, **characterised in that** the columns (18) are four and are evenly distributed around the periphery of the rotating central cylinder (17).

3. Universal riveting unit according to claim 1, **characterised in that** the mechanical sliding (5) is also provided with a lower slip rail (11') below the upper slip rail (11).

4. Universal riveting unit according to claim 1, **characterised in that** the riveting tool (8) is designed as an ultrasonic sonotrode for ultrasonic welding of the plastic guide pin to the slat.

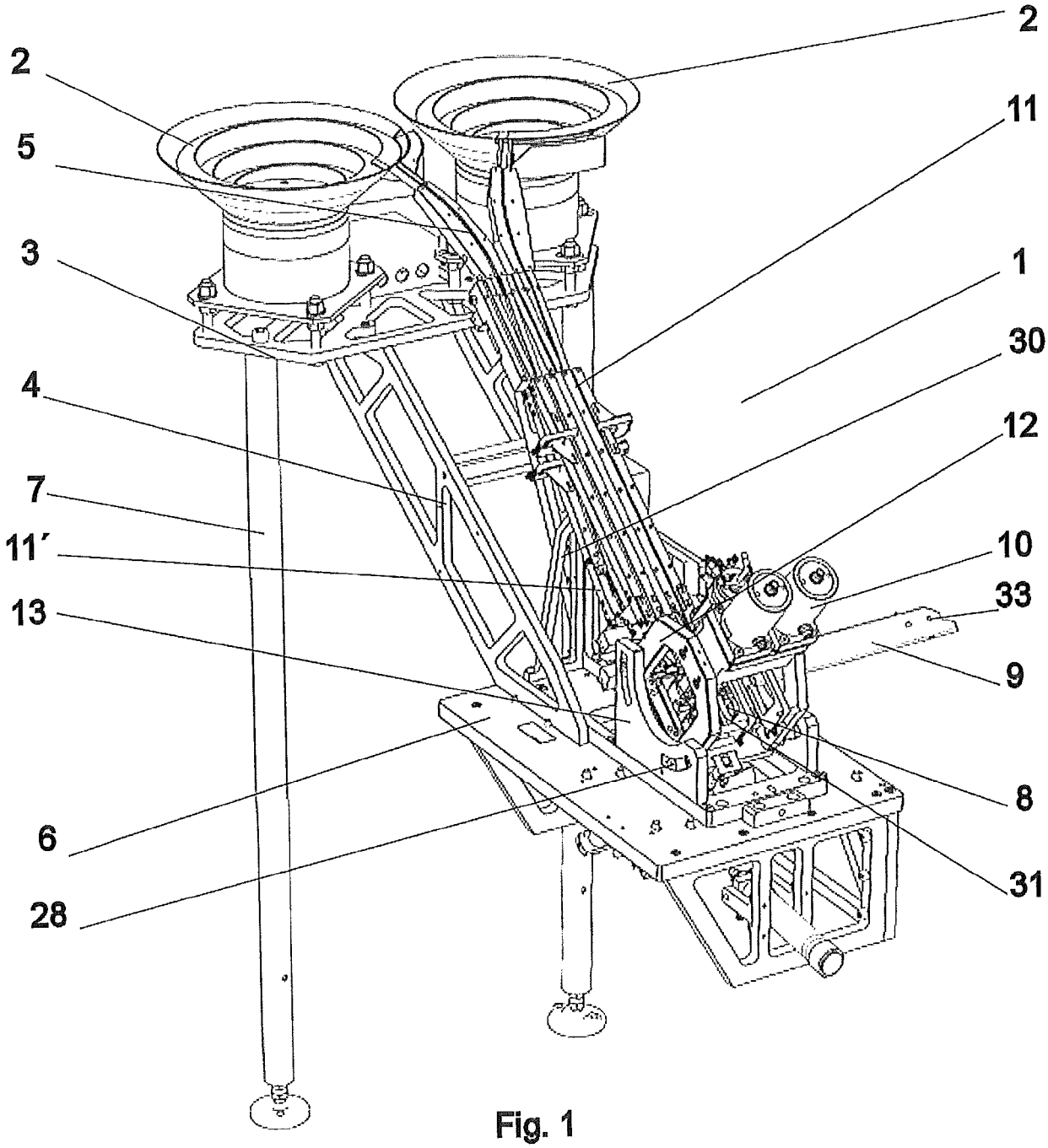

Fig. 1

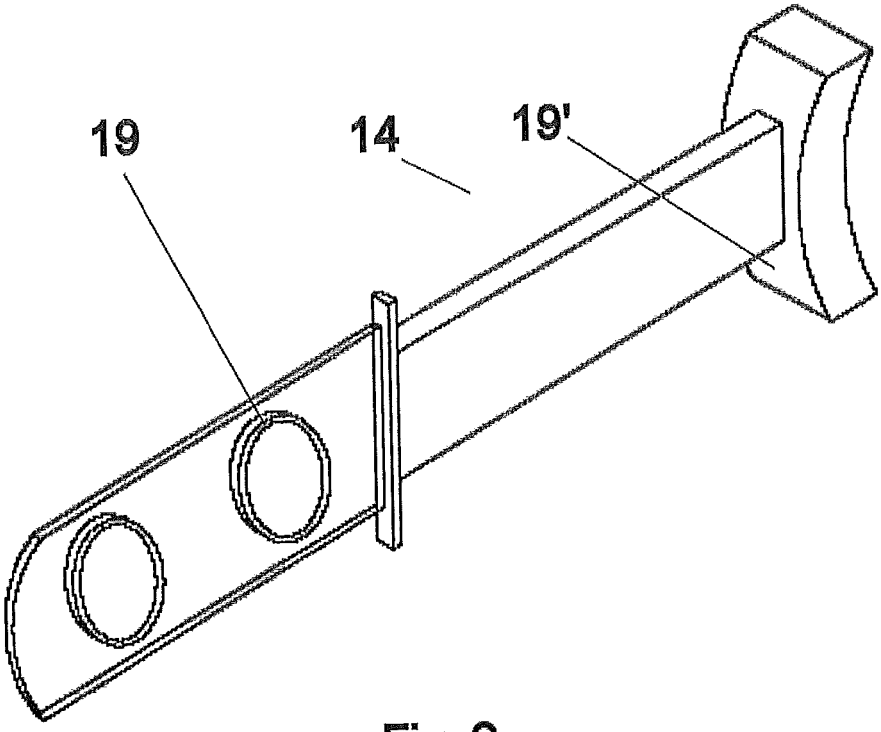

Fig. 2

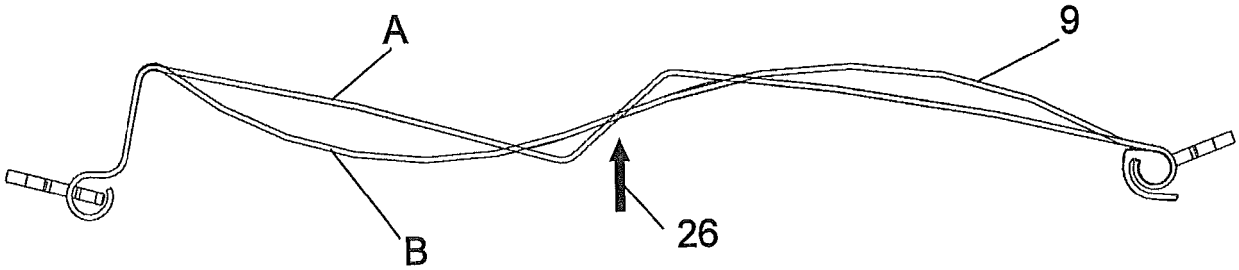

Fig. 3

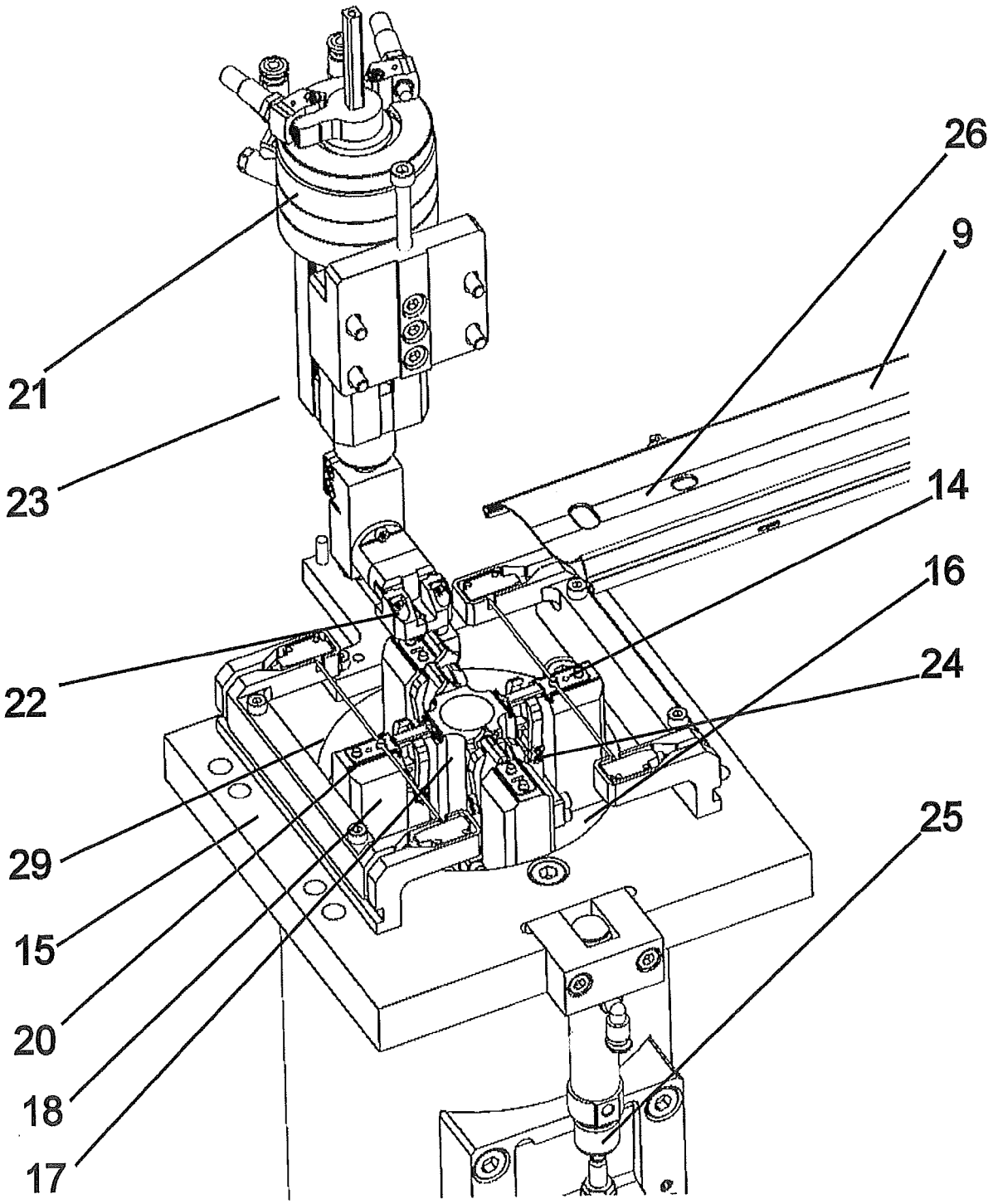

Fig. 4

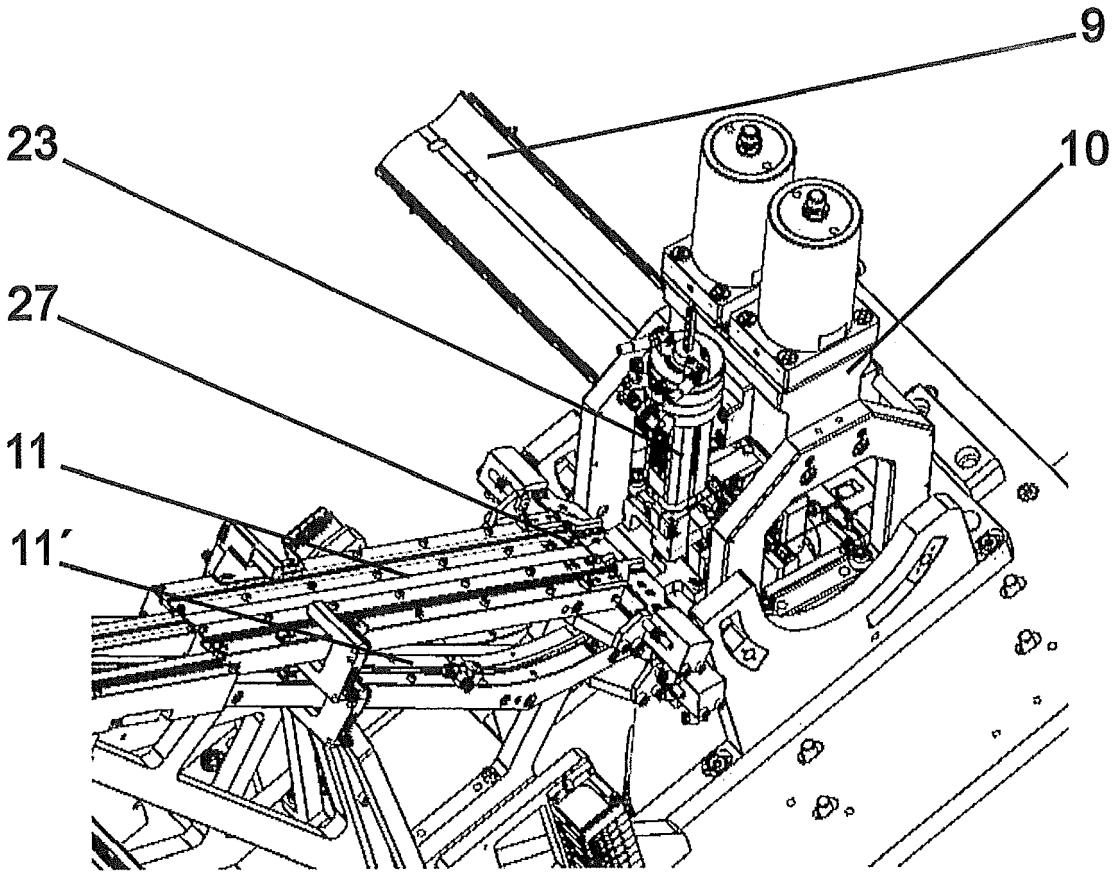

Fig. 5

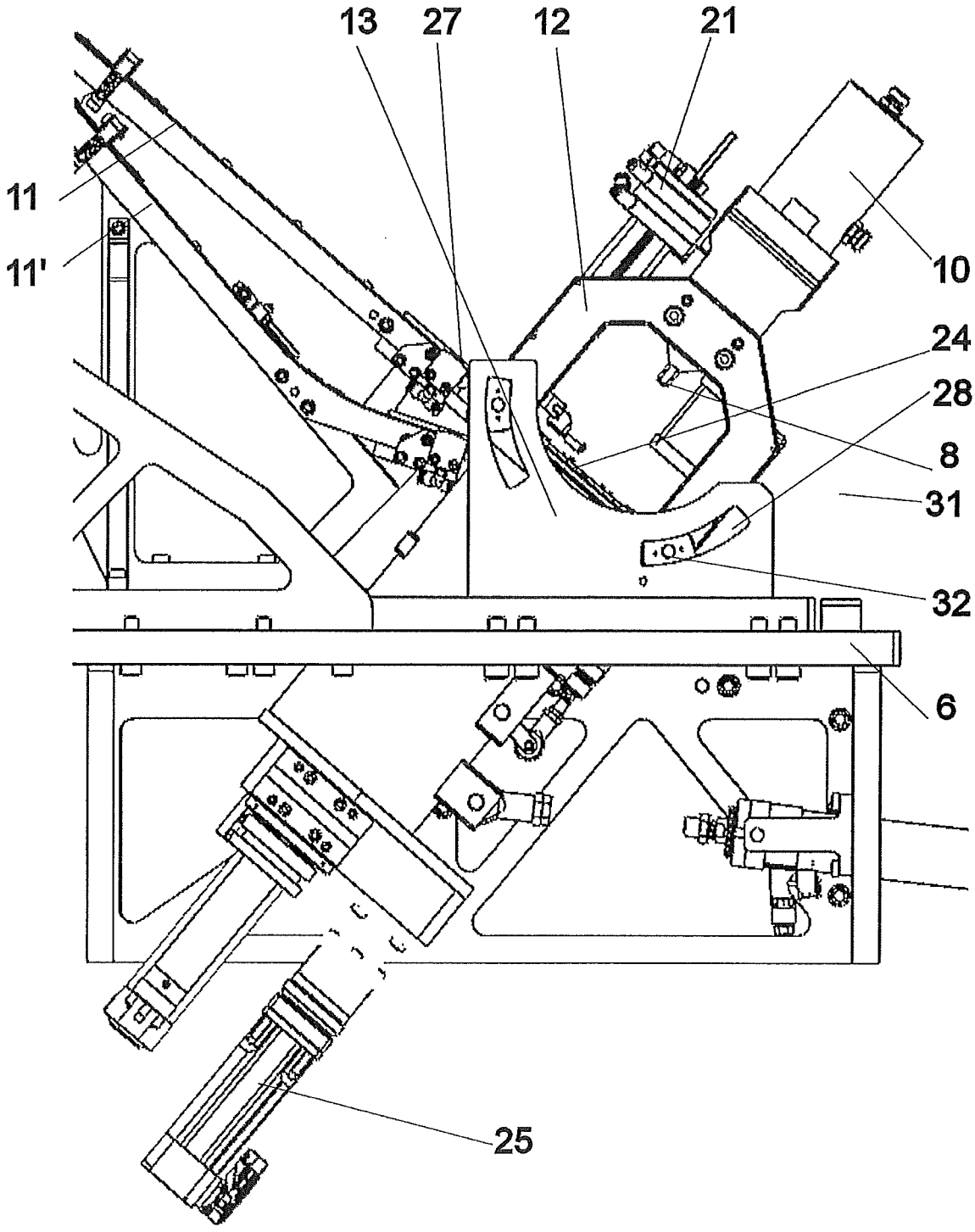

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 7280

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	EP 2 653 646 A2 (DALLAN SPA [IT]) 23 October 2013 (2013-10-23) * paragraphs [0045] - [0075]; figures 1-8 * -----	1	INV. B21J15/10 B21J15/14 B21J15/32 E06B9/327
A	US 1 176 867 A (SMITH ROBERT B [US]) 28 March 1916 (1916-03-28) * page 3, lines 9-96 - page 2; figure 1 * -----	1	E06B9/386 E06B9/266

TECHNICAL FIELDS SEARCHED (IPC)

B21J
E06B
B29C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	27 February 2018	Augé, Marc

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 19 7280

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27-02-2018

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EP 2653646 A2	23-10-2013	DK 2653646 T3	20-10-2014
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US 1176867 A	28-03-1916	NONE	

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