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

(11) **EP 3 833 539 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
21.02.2024 Bulletin 2024/08

(21) Application number: **19769898.8**

(22) Date of filing: **07.08.2019**

(51) International Patent Classification (IPC):
B23Q 17/22 *(2006.01)* ***B30B 15/08*** *(2006.01)*
B21D 11/22 *(2006.01)* ***B21D 5/00*** *(2006.01)*
B21D 5/02 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
B30B 15/08; B21D 5/002; B21D 5/02

(86) International application number:
PCT/IB2019/056724

(87) International publication number:
WO 2020/031109 (13.02.2020 Gazette 2020/07)

(54) **GUIDE DEVICE FOR MACHINES FOR MECHANICAL PROCESSING, PARTICULARLY FOR BENDING PRESSES**

FÜHRUNGSVORRICHTUNG FÜR MASCHINEN ZUR MECHANISCHEN BEARBEITUNG, INSBESONDERE FÜR BIEGEPRESSEN

DISPOSITIF DE GUIDAGE POUR MACHINES DE TRAITEMENT MÉCANIQUE, EN PARTICULIER POUR PRESSES À CINTRER

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **10.08.2018 IT 201800008050**

(43) Date of publication of application:
16.06.2021 Bulletin 2021/24

(73) Proprietor: **Triveneta Impianti S.r.l.**
37060 Castel d'Azzano (VR) (IT)

(72) Inventors:
- **PASOTTO, Enrico**
  37060 Castel d'Azzano (VR) (IT)
- **CORRIERI, Emiliano**
  37060 Castel d'Azzano (VR) (IT)

(74) Representative: **Brunacci, Marco**
BRUNACCI & PARTNERS S.r.l.
Via Pietro Giardini, 625
41125 Modena (MO) (IT)

(56) References cited:
CN-U- 202 715 682
CN-U- 202 741 501
CN-U- 204 672 840
CN-U- 205 816 477
CN-U- 206 716 879
JP-A- H0 839 153
US-A1- 2004 020 255
US-B1- 6 817 111

EP 3 833 539 B1

Description

Technical Field

[0001] The present invention relates to a guide device for machines for mechanical processing, particularly for bending presses.

Background Art

[0002] These bending press machines are used for bending sheet-like elements and are provided with a bearing structure provided with a supporting surface and with a recess of suitable shape, made on the supporting surface itself, and on which a sheet-like element to be bent can be positioned.

[0003] On top of the supporting surface there is a work portion associated in a movable manner with the supporting structure, with which one or more bending tools are associated.

[0004] The tools can be associated directly with the work portion of the machine, or by means of the interposition of removable attachment means, which in turn are associated with the work portion of the machine, e.g. by means of bolts. Generally, the sheet-like element to be bent is placed on the supporting surface and held in the correct position by one or more abutment elements, after which the work portion, and the bending tool with it, lowers and plastically deforms the sheet-like element by giving it the same curvature as the recess.

[0005] If the sheet-like element is very large, it may however require a first partial bend, followed by subsequent partial bends which should be the continuation of the previous ones.

[0006] In addition, in these cases the sheet-like element is often too large to be held in place by the abutment elements.

[0007] Another case in which it is not possible to use the abutment elements is that, e.g., of a sheet-like element of rectangular shape that requires a diagonal bend, i.e. not parallel to any of its sides.

[0008] In these and other cases, since the abutment elements are not effectively available, a prior art for correct bending requires human precision of an operator, who must manually verify that the positioning of the sheet-like element is such as to obtain the desired bend.

[0009] In the case of very large sheet-like elements, which require a series of partial bends in succession as described above, the operator also has the task of verifying that each bend after the first is the continuation of the previous one, with good precision.

[0010] To do this, after positioning the sheet-like element on the machine, the operator can only insert the head into the machine and visually check the alignment.

[0011] This prior art has some drawbacks, including the fact that the achievable precision is entrusted to the human eye and the machining tolerances are consequently worse than in the more standard case of sheet-like elements for which it is possible to perform a single bend and/or use the abutment elements. In addition, if the alignment between the individual partial bends in succession to each other is incorrectly carried out, the entire sheet-like element must be replaced, resulting in a considerable waste of material and time.

[0012] In addition, another drawback of this prior art is that, in some cases, it forces operators to insert their head into the bending press machine to control the positioning of the sheet-like element, this representing a risk factor for their safety.

[0013] In order to at least partially overcome these drawbacks, another technique has been developed for bending sheet-like elements.

[0014] This technique consists in using a laser device associated with the bending press machine.

[0015] The laser device generally comprises a projection portion, which emits a light beam to be projected, and an attachment portion, corresponding to the upper part of the device and provided with connecting means such as e.g. threaded elements.

[0016] The laser device is fixed, by means of the connecting means, to a fixed upright, supplied separately from the bending press machine and fixed thereto through means such as screws or bolts, which require the execution of holes or other works on the bearing structure of the machine.

[0017] The laser device projects a luminous line onto the sheet-like element, which helps the operator to achieve precise bending and reducing the need to rely on the human eye.

[0018] This well-known technique is also not without its drawbacks, including the fact that the laser device must be fixed to an upright not included in the machine, but supplied separately, which requires laborious and time-consuming machining on the machine itself to allow it to be fixed.

[0019] Another drawback is the fact that a laser device so created is not very versatile, since it can be removed from a machine and reassembled on another machine only if the latter is in turn provided with a special upright, which brings with it the aforementioned drawbacks.

[0020] Another drawback of this well-known technique is the fact that the laser device has a limited precision, however, because it must be fixed to an upright outside the machine and therefore away from the sheet-like element to be bent, a characteristic that worsens the quality of the projected luminous line thus affecting also the precision in the execution of the bending of the sheet-like element.

[0021] JP H08 39153 A describes a guide device according to the preamble of claim 1. Other devices are known from US 6 817 111 B1 and CN 205 816 477.

Description of the Invention

[0022] The main aim of the present invention is to devise a guide device for machines for mechanical process-

ing, particularly for bending presses, that allows precisely guiding the bending of sheet-like elements.

[0023] Another object of the present invention is to devise a guide device for machines for mechanical processing, particularly for bending presses, that can be applied to any type of bending press machines, reducing the costs related to its use, in particular eliminating the need for elements external to the machine and locked together thereto.

[0024] A further object of the present invention is to improve the precision achievable in bending with respect to the prior art, also for sheet-like elements for the positioning of which it is not possible to use abutment elements.

[0025] Yet another object of the present invention is to devise a guide device for machines for mechanical processing, particularly for bending presses, which is versatile and easy to dismantle and reassemble on other machines.

[0026] Another object of the present invention is to devise a guide device for machines for mechanical processing, particularly for bending presses, that allows overcoming the mentioned drawbacks of the prior art in a simple, rational, easy and effective to use as well as low cost solution.

[0027] The aforementioned objects are achieved by the present guide device for machines for mechanical processing, particularly for bending presses, having the characteristics of claim 1.

Brief Description of the Drawings

[0028] Other characteristics and advantages of the present invention will be more evident from the description of a preferred, but not exclusive, embodiment of a guide device for machines for mechanical processing, particularly for bending presses, illustrated as an indicative, but not limiting example, in the attached tables of drawings in which:

Figures 1 and 2 are axonometric views of the guide device according to the invention;

Figure 3 is an axonometric view of the machine for mechanical processing according to the invention.

Embodiments of the Invention

[0029] With particular reference to these figures, reference numeral 1 globally indicates a guide device for machines for mechanical processing, particularly for bending presses.

[0030] In the particular embodiment shown in the illustrations, the guide device 1 is assembled on a machine 2, which the present invention also relates to.

[0031] The machine 2 comprises a bearing structure 3 having a supporting surface 4, having a recess 26 of suitable shape and on which at least one sheet-like element 5 to be bent is positionable.

[0032] In addition, the machine 2 comprises a work portion 6 associated movable with the bearing structure 3 close to/away from the supporting surface 4 and comprising at least one housing seat 7 for housing at least one work tool 8. Preferably, the work portion 6 is movable vertically in translation.

[0033] With reference to the particular embodiment shown in the illustrations, the machine 2 comprises a plurality of housing seats 7.

[0034] As the technician in the sector knows, the work tool 8 can be, e.g., of the type of a punch for bending sheet metal or a forming element that is adapted to give a particular shape to the object to be machined.

[0035] The work tool 8, in particular, is provided with a shaped portion 9 adapted to give a desired shape to a sheet-like element 5.

[0036] The work tool 8 is also provided with an attachment end 10 which is shaped so as to fit into the housing seat 7.

[0037] In detail, the work tool 8 is fixed in position, e.g., by gripping means 11, which tighten the attachment end 10 and hold it inside the housing seat 7.

[0038] In the embodiment shown in the figures, the attachment end 10 forms the upper part of the work tool 8.

[0039] It is specified that, in the context of the present treatise, words such as "upper", "lower", "top", "bottom" and the like are to be considered with reference to the configuration wherein the work tool 8 is assembled on the work portion 6, with the attachment end 10 housed in the housing seat 7.

[0040] The machine 2 comprises the guide device 1, in turn, comprising:

- an attachment portion 12 associable in a removable manner with at least one housing seat 7 of the work tool 8;
- a projection portion 13 configured to project a light radiation defining at least one bending line 14 on the sheet-like element 5 to be bent.

[0041] Advantageously, the attachment portion 12 comprises at least one fastening element 15 insertable at least partly inside the housing seat 7.

[0042] In the embodiment shown in the figures, the fastening element 15 is the upper part of the attachment portion 12, but it cannot be ruled out that it may be arranged differently, e.g. laterally to the guide device 1.

[0043] It is specified that, in the present treatise, the words "upper", "lower" and the like refer to the configuration wherein the guide device 1 is assembled on the work portion 6, with the fastening element 15 housed in the housing seat 7.

[0044] In particular, the attachment portion 12 is housed inside the housing seat 7 and the projection portion 13 protrudes cantilevered with respect to the housing seat 7 itself and is coplanar with the work tool 8; this allows the projection of the bending line 14 on the sheet-like element 5, i.e. below the projection portion 13. Ad-

vantageously, the guide device 1 is substantially coplanar with the work tool 8 and the latter is substantially parallel to the bending line 14.

[0045] In the specific embodiment shown in the figures, an attachment end 10 of one or more work tools 8 can also be accommodated in the same housing seat 7.

[0046] As a result, the attachment end 10 and the fastening element 15 have substantially the same shape.

[0047] In other words, the attachment end 10 and the fastening element 15 have coinciding shapes, which means that they can be used in an interchangeable manner inside the housing seat 7 and can be fixed in position in the same way. In particular, with reference to the guide device 1, the attachment portion 12 is associated with the housing seat 7 by means of the gripping means 11, which tighten the fastening element 15 and hold it inside the housing seat 7.

[0048] It cannot however be ruled out to use a fastening element 15 of a different shape than the shape of the attachment end 10, e.g. by using a specially adapted housing seat 7.

[0049] In addition, it cannot also be ruled out that the attachment portion 12 of the guide device 1 is associated with the housing seat 7 by interposition, e.g., of screws, plugs or pins.

[0050] In the specific embodiment shown in the figures, moreover, the attachment portion 12 is just one and is provided with only one fastening element 15 and the projection portion 13 is just one.

[0051] It cannot also be ruled out to use a guide device 1 provided with a different number of attachment portions 12, of fastening elements 15 and/or of projection portions 13, e.g. provided with two different fastening elements 15 to suit different housing seats 7, or provided with two projection portions 13 emitting different light radiation.

[0052] Appropriately, the projection portion 13 comprises at least one laser device.

[0053] In addition, the guide device 1 comprises adjustment means 16, 17 of the inclination of the projection portion 13 with respect to the attachment portion 12.

[0054] Advantageously, these adjustment means 16, 17 comprise:

- at least one through slot 16 made on the attachment portion 12;
- at least one housing hole 17 made on the projection portion 13;

in a such a way that the through slot 16 and the corresponding housing hole 17, in assembly configuration, are mutually mating and adapted to accommodate at least one respective blocking medium 18 to block the projection portion 13 in a predefined position.

[0055] In the specific embodiment shown in the figures, the adjustment means 16, 17 comprise two slots 16 and two corresponding housing holes 17.

[0056] It cannot however be ruled out that the adjustment means 16, 17 comprise three, four, five, etc.. slots and their respective housing holes 17.

[0057] It cannot however be ruled out the number of slots 16 is different from the number of housing holes 17, e.g. by making two slots 16 and three housing holes 17.

[0058] In addition, in this specific embodiment there are blocking means 18 comprising two bolts, which are inserted into the slots 16 and into their respective housing holes 17 and then tightened to block the position of the projection portion 13.

[0059] It cannot also be ruled out to use different adjustment means 16, 17, e.g. by using only housing holes 17 made both on the attachment portion 12 and on the projection portion 13, and/or different blocking means 18, such as plugs or pins to be inserted by interference.

[0060] Appropriately, the adjustment means 16, 17 are configured to allow the rotation of the projection portion 13 around a substantially horizontal axis 19.

[0061] With reference to a first direction 20, located along the attachment portion 12, and to a second direction 21, located along the projection portion 13, it is possible to tilt the projection portion 13 with respect to the attachment portion 12 by means of a rotation around the axis 19.

[0062] Specifically, as shown in Figure 2, the first direction 20 is defined by the line tangent to the upper ends of the slots 16, while the second direction 21 is defined by the line passing through the center of the housing holes 17.

[0063] The intersection of the first direction 20 and of the second direction 21 forms an angle 22 the amplitude of which is proportionate to the inclination of the projection portion 13.

[0064] In the specific method illustrated in the figures, in fact, the slots 16 have a width 23 greater than the diameter of the housing holes 17; this feature allows varying the width of the angle 22.

[0065] Advantageously, the projection portion 13 is associated with the attachment portion 12 by interposition of connecting means 24.

[0066] These connecting means 24, in the specific example of the embodiment of the figures, coincide with the blocking means 18.

[0067] It cannot however be ruled out to use the blocking means 18 adapted to block the inclination of the projection portion 13, while leaving it free to shift with respect to the attachment portion 12, and connecting means 24 (e.g. other bolts) to associate the projection portion 13 with the attachment portion 12 and thus also prevent their mutual shifts.

[0068] The guide device 1 also comprises on/off switching means 27 of the laser device.

[0069] Preferably, the on/off switching means comprise at least one button element associated with the projection portion 13.

[0070] In this case, the laser device projects a continuous light beam, until the operator switches off the laser device by pressing the button element again.

[0071] According to the invention, the on/off switching

means comprise a wireless device configured to allow the on and/or off switching of the laser device remotely.

[0072] Preferably, the wireless device is of the Bluetooth type.

[0073] In this regard, it should be noticed that the guide device 1 comprises a programming and control unit operationally connected to the wireless device and configured to allow the on and/or off switching of the laser device at predefined time intervals.

[0074] This way, the light beam is projected according to the needs of the operators and to the different phases of the bending process.

[0075] In addition, the on and/or off switching of the laser device at predefined time intervals allows the operator to be informed when the bending press machine is in the bending phase.

[0076] Advantageously, the guide device 1 comprises a power supply battery; this allows the laser device to be powered without the use of power cables and greatly simplifying the assembly and disassembly operations of the same onto/from the bending press machines.

[0077] With reference to the particular embodiment shown in Figure 3, the work portion 6 of the machine 2 comprises at least one attachment medium 25 comprising the housing seat 7.

[0078] In the aforementioned embodiment method, there is a plurality of attachment means 25, each comprising a housing seat 7, associated in a removable manner with the work portion 6 and fixed thereto by means of screws.

[0079] In detail, the attachment means 25 comprise two plate elements associated with the work portion 6, which are opposite each other and defining the housing seat 7.

[0080] With reference to this specific embodiment, the attachment means 25 comprise the gripping means 11.

[0081] In this way, the attachment end 10 of a work tool 8 or the fastening element 15 of the guide device 1 are clamped between the two plate elements. Alternatively, it cannot be ruled out that these attachment means 25 are absent and that the respective housing seats 7 are formed directly on the work portion 6.

[0082] The operation of the invention, according to the embodiment described above, is as follows.

[0083] It is necessary to use the guide device 1, e.g., if the bending is particularly complex because not parallel to any side of the sheet-like element 5, or because of the large size of the sheet-like element 5, which requires partial bending operations in sequence which are precisely aligned with each other.

[0084] The guide device 1 is fixed to one of the attachment means 25 by means of the gripping means 11.

[0085] The latter are tightened so that the fastening element 15 is clamped, by abutting against it.

[0086] The attachment portion 12 is directly housed in the housing seat 7, while the connecting means 24, inserted in the housing holes 17 and in the slots 16, are left momentarily loose, so as not to fix the position of the projection portion 13 yet.

[0087] As a result of this operation, and after inserting the attachment end 10 of one or more work tools 8 into one or more housing seats 7, the guide device 1 is substantially coplanar to the work tools 8 themselves.

[0088] A sheet-like element 5 is now placed on the supporting surface 4.

[0089] At this point, the laser device of the projection portion 13 is switched on, which projects the bending line 14 onto the sheet-like element 5.

[0090] Due to the fact that the guide device 1 is substantially coplanar with the work tools 8 and movable therewith during the operation of the machine 2, the bending line 14 is aligned with the work tools 8 themselves and with the recess 26, thus indicating the position and orientation of the bending operation that will be carried out.

[0091] Subsequently, the projection portion 13 is rotated around the axis 19, so that the bending line 14 is projected onto the sheet-like element 5, avoiding blurring and other possible defects in the brightness of the emitted radiation.

[0092] After the projection portion 13 has been positioned, i.e. after determining the width of the angle 22 according to the size of the sheet-like element 5 and of the position of the bending line 14, the connecting means 24 are tightened to fix the selected inclination of the projection portion 13.

[0093] The position of the sheet-like element 5 can then be changed again on the supporting surface 4, e.g. to align a partial bend carried out previously with the bending line 14 (i.e. also with the partial bend to be carried out later), or to place correctly a bend which is not parallel to the sides of the sheet-like element 5.

[0094] The work portion 6 is then moved downwards so that the work tools 8 give the bend with the same shape as the recess 26 to the sheet-like element 5.

[0095] In this last step, the guide device 1 is coplanar with the work tool 8 with high precision level and the bending line 14 indicates exactly the position of the bending that is about to be given, since the guide device 1 is placed in a housing seat 7 and moves simultaneously with the work tool 8 used.

[0096] It has in practice been ascertained that the described invention achieves the intended objects.

[0097] In particular, it is pointed out that the guide device for machines for mechanical processing, particularly for bending presses, allows precise bending of sheet-like elements to be guided, thanks to the fact that it is always integral and coplanar with the work tool used.

[0098] In addition, this guide device can be applied to any type of bending press machine, thus reducing the costs related to its use and, in particular, eliminating the need for elements external to the machine and locked together with it, as this guide device can be associated with the same attachment means to which the work tools are fixed.

[0099] In addition, this guide device improves the

achievable bending accuracy compared to the prior art, even for sheet-like elements for the positioning of which it is not possible to use the abutment elements of the bending press machine.

[0100] In addition, the precision of the bending process is increased compared to the prior art thanks to the fact that the guide device is placed at the work tools: this allows significantly reducing the defects and blurs of the projected bending line, since the guide device itself is not fixed to elements external to the machine. Finally, this guide device is versatile and easy to disassemble and re-assemble on other machines, as it simply requires the use of housing seats already supplied with the bending press machines.

Claims

1. Guide device (1) for machines (2) for mechanical processing, comprising at least one housing seat (7) of at least one work tool (8), particularly for bending presses, comprising:

   - at least one attachment portion (12) associated in a removable manner with said at least one housing seat (7);
   - at least one projection portion (13) configured to project a light radiation defining at least one bending line (14) on a sheet-like element (5) to be bent;

   characterized by the fact that it comprises on/off switching means (27) of said laser device comprising at least one wireless device configured to allow the on and/or off switching of said laser device remotely and by the fact that it comprises a programming and control unit operationally connected to said wireless device and configured to allow the on and/or off switching of said laser device at predefined time intervals.

2. Guide device (1) according to claim 1, **characterized by** the fact that said attachment portion (12) comprises at least one fastening element (15) insertable at least partly inside said housing seat (7).

3. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that said projection portion (13) comprises at least one laser device.

4. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises adjustment means (16, 17) of the inclination of said projection portion (13) with respect to said attachment portion (12).

5. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that said adjustment means (16, 17) comprise:

   - at least one through slot (16) made on said attachment portion (12);
   - at least one housing hole (17) made on said projection portion (13);

   said at least one through slot (16) and said at least one housing hole (17), in assembly configuration, being mutually mating and adapted to house at least one respective blocking medium (18) to block said projection portion (13) in a predefined position.

6. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that said adjustment means (16, 17) are configured to allow the rotation of said projection portion (13) around a substantially horizontal axis (19).

7. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that said projection portion (13) is associated with said attachment portion (12) by interposition of connecting means (24).

8. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that said on/off switching means comprise at least one button element associated with said projection portion (13).

9. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that said wireless device is of the Bluetooth type.

10. Guide device (1) according to one or more of the preceding claims, **characterized by** the fact that it comprises a power supply battery.

11. Machine (2) for mechanical processing, particularly for bending sheet-like elements, comprising:

    - a bearing structure (3) having at least one supporting surface (4) on which at least one sheet-like element (5) to be bent is positionable;
    - at least one work portion (6) associated movable with said bearing structure (3) close to/away from said supporting surface (4) and comprising at least one housing seat (7) of at least one work tool (8);
    - at least one guide device (1) according to claim 1.

12. Machine (2) according to claim 11, **characterized by** the fact that said attachment portion (12) is housed inside said housing seat (7) and said projection portion (13) protrudes cantilevered with respect

to said housing seat (7) itself, said projection portion (13) being coplanar with said work tool (8).

13. Machine (2) according to one or more of claims from 11 to 12, **characterized by** the fact that said guide device (1) is substantially coplanar with said at least one work tool (8) and the latter is substantially parallel to said bending line (14).

14. Machine (2) according to one or more of claims from 11 to 13, **characterized by** the fact that said attachment portion (12) is associated with said housing seat (7) by interposition of gripping means (11).

Patentansprüche

1. Führungsvorrichtung (1) für Maschinen (2) zur mechanischen Bearbeitung, mit mindestens einem Gehäusesitz (7) mindestens eines Arbeitswerkzeugs (8), insbesondere für Biegepressen, umfassend:

- mindestens einen Anbringungsabschnitt (12), der dem mindestens einen Gehäusesitz (7) abnehmbar zugeordnet ist;
- mindestens einen Projektionsabschnitt (13), der dazu ausgebildet ist, eine Lichtstrahlung zu projizieren, die mindestens eine Biegelinie (14) auf einem zu biegenden plattenförmigen Element (5) definiert;

dadurch gekennzeichnet, dass sie Ein/Aus-Schaltmittel (27) der Laservorrichtung umfasst, die mindestens eine drahtlose Vorrichtung umfassen, die so ausgebildet ist, dass sie das Ein- und/oder Ausschalten der Laservorrichtung aus der Ferne ermöglicht, und dadurch, dass sie eine Programmier- und Steuereinheit umfasst, die mit der genannten drahtlosen Vorrichtung in Wirkverbindung steht und dazu ausgebildet ist, das Ein- und/oder Ausschalten der Laservorrichtung in vordefinierten Zeitintervallen zu ermöglichen.

2. Führungsvorrichtung (1) nach Anspruch 1, **dadurch gekennzeichnet, dass** der Anbringungsabschnitt (12) mindestens ein Befestigungselement (15) umfasst, das zumindest teilweise in den Gehäusesitz (7) einführbar ist.

3. Führungsvorrichtung (1) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Projektionsabschnitt (13) mindestens eine Laservorrichtung umfasst.

4. Führungsvorrichtung (1) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** sie Einstellmittel (16, 17) für die Neigung des Projektionsabschnitts (13) in Bezug auf den Anbringungsabschnitt (12) umfasst.

5. Führungsvorrichtung (1) nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einstellmittel (16, 17) Folgendes umfassen:

- mindestens einen durchgehenden Schlitz (16), der an dem Anbringungsabschnitt (12) ausgebildet ist;
- mindestens ein Gehäuseloch (17), das an dem Projektionsabschnitt (13) ausgebildet ist;

wobei der mindestens eine durchgehende Schlitz (16) und das mindestens eine Gehäuseloch (17) in einer Montagekonfiguration zueinander passen und dazu ausgebildet sind, mindestens ein jeweiliges Blockiermedium (18) aufzunehmen, um den Projektionsabschnitt (13) in einer vordefinierten Position zu blockieren.

6. Führungsvorrichtung (1) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Einstellmittel (16, 17) so ausgebildet sind, dass sie die Drehung des Projektionsabschnitts (13) um eine im Wesentlichen horizontale Achse (19) ermöglichen.

7. Führungsvorrichtung (1) nach einem oder mehreren der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** der Projektionsabschnitt (13) mit dem Anbringungsabschnitt (12) durch Zwischenschaltung von Verbindungsmitteln (24) verbunden ist.

8. Führungsvorrichtung (1) nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die Ein/Aus-Schaltmittel mindestens ein dem Projektionsabschnitt (13) zugeordnetes Tastenelement umfassen.

9. Führungsvorrichtung (1) nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** die drahtlose Vorrichtung vom Bluetooth-Typ ist.

10. Führungsvorrichtung (1) nach einem oder mehreren der vorangehenden Ansprüche, **dadurch gekennzeichnet, dass** sie eine Versorgungsbatterie umfasst.

11. Maschine (2) zur mechanischen Bearbeitung, insbesondere zum Biegen plattenförmiger Elemente, umfassend:

- eine Tragstruktur (3) mit mindestens einer Stützfläche (4), auf der mindestens ein zu biegendes plattenförmiges Element (5) positionier-

bar ist;
- mindestens einen Arbeitsabschnitt (6), der mit der Tragstruktur (3) in der Nähe der Stützfläche (4) bzw. von dieser weg beweglich verbunden ist und mindestens einen Gehäusesitz (7) für mindestens ein Arbeitswerkzeug (8) umfasst;
- mindestens eine Führungsvorrichtung (1) nach Anspruch 1.

12. Maschine (2) nach Anspruch 11, **dadurch gekennzeichnet, dass** der Anbringungsabschnitt (12) innerhalb des Gehäusesitzes (7) aufgenommen ist und der Projektionsabschnitt (13) in Bezug auf den Gehäusesitz (7) auskragend vorsteht, wobei der Projektionsabschnitt (13) koplanar mit dem Arbeitswerkzeug (8) ist.

13. Maschine (2) nach einem oder mehreren der Ansprüche 11 bis 12, **dadurch gekennzeichnet, dass** die Führungsvorrichtung (1) im Wesentlichen koplanar mit dem mindestens einen Arbeitswerkzeug (8) ist und letzteres im Wesentlichen parallel zu der Biegelinie (14) ist.

14. Maschine (2) nach einem oder mehreren der Ansprüche 11 bis 13, **dadurch gekennzeichnet, dass** der Anbringungsabschnitt (12) mit dem Gehäusesitz (7) durch Zwischenschaltung von Greifmitteln (11) verbunden ist.

Revendications

1. - Dispositif de guidage (1) pour machines (2) de traitement mécanique, comprenant au moins un siège de réception (7) d'au moins un outil de travail (8), en particulier pour des presses à cintrer, comprenant :

- au moins une partie d'attache (12) associée d'une manière amovible audit au moins un siège de réception (7) ;
- au moins une partie de projection (13) configurée pour projeter un rayonnement lumineux définissant au moins une ligne de cintrage (14) sur un élément de type feuille (5) à cintrer ;

caractérisé par le fait qu'il comprend des moyens de commutation marche/arrêt (27) dudit dispositif laser comprenant au moins un dispositif sans fil configuré pour permettre la commutation marche et/ou arrêt dudit dispositif laser à distance, et **par le fait qu'**il comprend une unité de programmation et de commande connectée de manière fonctionnelle audit dispositif sans fil et configurée pour permettre la commutation marche et/ou arrêt dudit dispositif laser à des intervalles de temps prédéfinis.

2. - Dispositif de guidage (1) selon la revendication 1, **caractérisé par le fait que** ladite partie d'attache (12) comprend au moins un élément de fixation (15) apte à être introduit au moins en partie à l'intérieur dudit siège de réception (7).

3. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait que** ladite partie de projection (13) comprend au moins un dispositif laser.

4. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait qu'**il comprend des moyens de réglage (16, 17) de l'inclinaison de ladite partie de projection (13) par rapport à ladite partie d'attache (12).

5. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait que** lesdits moyens de réglage (16, 17) comprennent :

- au moins une fente traversante (16) réalisée sur ladite partie d'attache (12) ;
- au moins un trou de réception (17) réalisé sur ladite partie de projection (13) ;

ladite au moins une fente traversante (16) et ledit au moins un trou de réception (17), en configuration d'assemblage, s'accouplant mutuellement et étant agencés pour recevoir au moins un moyen de blocage respectif (18) pour bloquer ladite partie de projection (13) dans une position prédéfinie.

6. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait que** lesdits moyens de réglage (16, 17) sont configurés pour permettre la rotation de ladite partie de projection (13) autour d'un axe sensiblement horizontal (19) .

7. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait que** ladite partie de projection (13) est associée à ladite partie d'attache (12) par interposition de moyens de liaison (24).

8. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait que** lesdits moyens de commutation marche/arrêt comprennent au moins un élément bouton associé à ladite partie de projection (13).

9. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le fait que** ledit dispositif sans fil est du type Bluetooth.

10. - Dispositif de guidage (1) selon une ou plusieurs des revendications précédentes, **caractérisé par le**

fait qu'il comprend une batterie d'alimentation électrique.

11. - Machine (2) de traitement mécanique, en particulier pour le cintrage d'éléments de type feuille, comprenant :

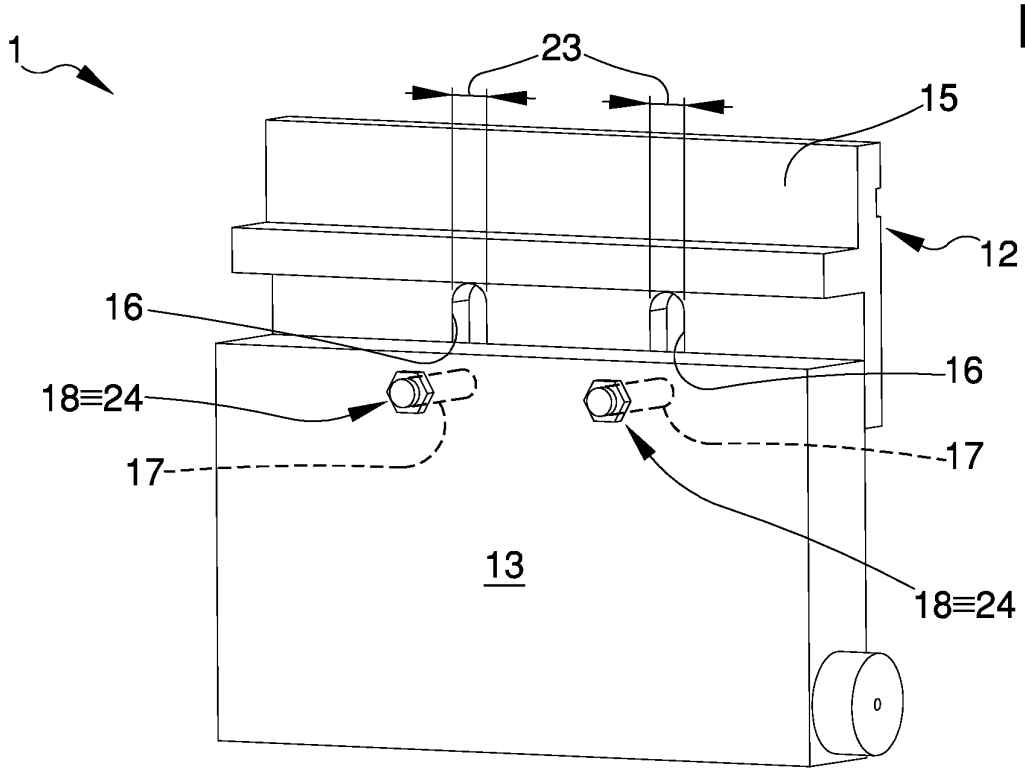
- une structure porteuse (3) ayant au moins une surface de support (4) sur laquelle au moins un élément de type feuille (5) à cintrer peut être positionné ;
- au moins une partie de travail (6) associée de manière mobile à ladite structure porteuse (3) à proximité/à l'écart de ladite surface de support (4) et comprenant au moins un siège de réception (7) d'au moins un outil de travail (8) ;
- au moins un dispositif de guidage (1) selon la revendication 1.

12. - Machine (2) selon la revendication 11, **caractérisée par le fait que** ladite partie d'attache (12) est reçue à l'intérieur dudit siège de réception (7) et ladite partie de projection (13) fait saillie en porte-à-faux par rapport audit siège de réception (7) lui-même, ladite partie de projection (13) étant coplanaire avec ledit outil de travail (8).

13. - Machine (2) selon une ou plusieurs des revendications 11 à 12, **caractérisée par le fait que** ledit dispositif de guidage (1) est sensiblement coplanaire avec ledit au moins un outil de travail (8) et ce dernier est sensiblement parallèle à ladite ligne de cintrage (14).

14. - Machine (2) selon une ou plusieurs des revendications 11 à 13, **caractérisée par le fait que** ladite partie d'attache (12) est associée audit siège de réception (7) par interposition de moyens de saisie (11).

Fig.1


1
23
15
12
16
16
18≡24
17
17
13
18≡24

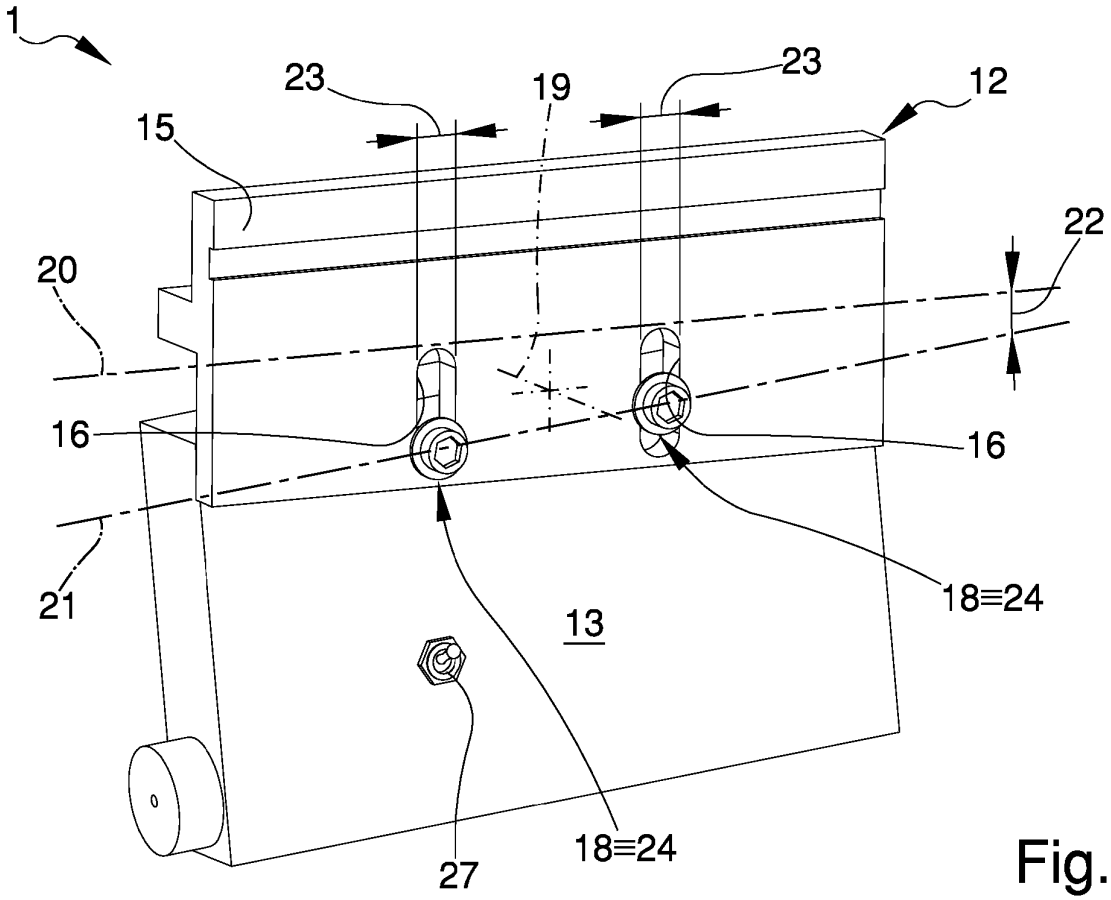
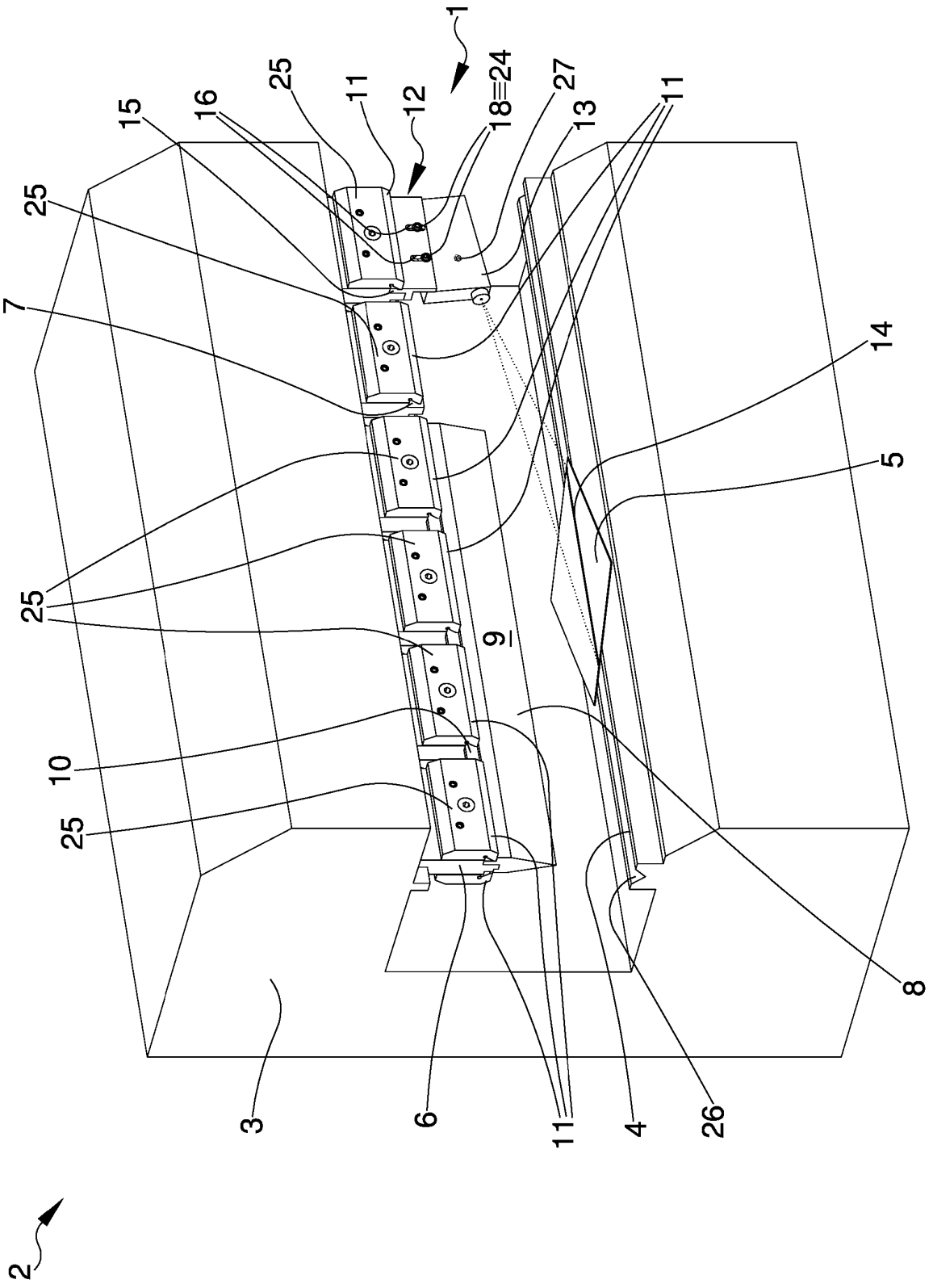

1
23
19
23
12
15
22
20
16
16
21
18≡24
13
18≡24
27

Fig.2

Fig.3



REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP H0839153 A **[0021]**
- US 6817111 B1 **[0021]**
- CN 205816477 **[0021]**