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(54) Metal sheet clinching unit

Vorrichtung zum Krimpen von Metallblechen

Appareil de sertissage pour tôles

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Description

[0001] The present invention relates to a unit for clinching metal sheets according to the preamble of claim 1, in particular for clinching vehicle body panels, to which the following description refers purely by way of example.

[0002] As is known, vehicle body panels, e.g. door panels, comprise an inner frame; and a sheet metal outer panel defining the outer contour of the body, and having a peripheral edge defined by a number of tabs, which are bent 180° onto the peripheral edge of the inner frame. More specifically, the tabs are formed when pressing the outer panel so as to form an angle of about 90° with the rest of the panel, and are clinched to the edge of the inner frame by performing two successive roughly 45° bending operations.

[0003] Clinching is known to be performed by moving the clinching tools synchronously by means of levers operated by hydraulic actuators.

[0004] Another solution with hydraulic actuators is disclosed in EP1136253, on which the preamble of claim 1 is based, and comprises a C-type frame, which carries a pre-hemming tool and a hemming tool and can be advanced in a working position. The pre-hemming tool is advanced by a swing cylinder provided at the C-type frame, and afterwards a die carrying the panel to be hemmed is raised by a lifter hydraulic cylinder provided on the C-type frame to carry out the pre-hemming operation. Then, after having lowered the die and retreated the pre-hemming tool, the die is raised again and final hemming is conducted between the die and the hemming tool.

[0005] Known solutions of the above type, however, are fairly complex and require hydraulic systems which are relatively difficult to control to achieve the desired deformation characteristics, are expensive to maintain, and fail to provide for exerting consistent force on the clinching tools, due to alterations in the characteristics of the oil circulating in the system and/or oil leakage from the system.

[0006] To eliminate the above drawbacks, units have been devised in which the clinching tools are supported by oscillating members operated by cam actuating assemblies.

[0007] For example, EP0724922 discloses to carry out two subsequent bending operations by two hemming tools, which come in operation in sequence and are driven by cams mounted on a rotating driving shaft.

[0008] In actual use, however, known units of this sort obstruct loading and unloading of the clinched sheets, on account of the inevitable size of the unit as a whole close to the sheet supporting area.

[0009] It is an object of the present invention to provide a metal sheet clinching unit designed to provide a straightforward, low-cost solution to the above problems, and which, at the same time, is extremely strong and accurate.

[0010] According to the present invention, there is provided a unit for clinching metal sheets, as defined in claim 1. Claim 14 relates to a clinching assembly comprising two clinching units according to the invention.

[0011] An embodiment of the invention will be described by way of example with reference to he accompanying drawings, in which:

Figure 1 shows a view in perspective, with parts removed for clarity, of a preferred embodiment of a metal sheet clinching unit in accordance with the present invention;

Figures 2 to 4 show schematic side views, with parts removed for clarity, of the Figure 1 unit in three different operating positions;

Figures 5 to 7 show larger-scale views of three cams of the unit in the above drawings;

Figure 8 shows a smaller-scale side view, with parts removed for clarity, of the Figure 1 unit.

[0012] Number 1 in the accompanying drawings indicates as a whole an assembly for clinching metal sheets, and in particular for finishing the edges of vehicle body panels 2 comprising an inner frame 3 and a sheet metal outer panel 4. The outer panel 4 for clinching is formed, for example, on a press, and comprises an intermediate portion 5 facing inner frame 3, and, on each side of its outer perimeter, a projecting tab 6 (shown by a dash line in Figure 2) forming an angle of about 90° with portion 5.

[0013] Clinching is performed, for example, at a station comprising a central region 7 for supporting panel 2; and a number of assemblies 1 arranged about region 7 and controlled to clinch all the sides of the outer perimeter of outer panel 4 simultaneously.

[0014] The assembly 1 shown partly in Figure 1 comprises two side by side units 8, 9 comprising respective propeller shafts 10, which are coaxial, are connected to one another by a constant-velocity universal joint 11, and are rotated about an axis 12 by a single motor reducer 13 preferably comprising an electric motor with an electromagnetic brake.

[0015] For the sake of simplicity, the following description relates to unit 8, which only differs from unit 9 by supporting motor reducer 13, and may therefore be used on its own for clinching relatively short tabs 6.

[0016] Unit 8 comprises a base 15 connected, e.g. screwed, in a fixed position at said station; and a frame 16, which is defined by a number of electrowelded steel plates, supports motor reducer 13 in a manner not shown in detail, and supports shaft 10 hinged by means of bearings capable of withstanding relatively severe radial loads.

[0017] Frame 16 is connected to base 15 by a preferably recirculating-ball-type guide and slide device 17 comprising two parallel, transversely spaced guides 18, and which enables frame 16 to move, in a horizontal direction 19 substantially perpendicular to tab 6 for clinching, between a forward limit position adjacent to region 7 (Figures 2 and 3), and a withdrawn limit position away

from region 7 (Figure 4).

[0018] With reference to Figure 8, frame 16 is moved between said positions by an actuator 20 located in an intermediate position between motor reducer 13 and base 15, and defined by a pneumatic cylinder comprising a jacket 21a fixed to a lateral portion 22 of base 15, and a rod 21b fixed at one end to frame 16 and sliding along an axis 23 parallel to direction 19. More specifically, portion 22 and frame 16 support respective projecting stop members 24a, 24b which are brought into contact with each other to define a stop for the withdrawn position of frame 16.

[0019] With reference to Figures 2 to 4, frame 16 is kept in the forward limit position by a stop device 25 comprising a seat 26 formed in a retaining member 27 fixed to base 15, and a pin 28 which has a vertical axis 30 perpendicular to axis 12, is interposed between shaft 10 and base 15, and is fitted in axially sliding manner to a guide 29 fixed to frame 16. Pin 28 is operated by a cam and tappet device 32 to move axially between a lowered engaged position and a raised release position respectively engaging and releasing seat 26. Device 32 comprises a disk 33 fitted in a fixed position to shaft 10 and bounded radially by a shaped outer surface defining a cam 34 (Figure 5) on which rolls a tappet roller or cam follower 35 hinged to the top end of pin 28.

[0020] Roller 35 is forced radially upwards onto cam 34 by a lever 38 comprising an intermediate portion hinged to frame 16 about an axis parallel to axis 12. Lever 38 also comprises two opposite arms 40, 41; arm 40 is hinged to the top end of pin 28; and arm 41 is pushed downwards by a preloaded spiral spring 42 interposed between arm 41 and a shoulder 43 fixed to frame 16.

[0021] At the opposite end to roller 35, pin 28 terminates with a catch 44 bounded at the rear (i.e. on the opposite side to region 7) by a surface 45 which cooperates, in direction 19, with a complementary surface 46 of seat 26 when pin 28 is in the lowered position, and is tapered axially and preferably conical to assist insertion and withdrawal of pin 28.

[0022] When frame 16 is locked in the forward position, tab 6 is subjected to two successive bending, or so-called "preclinching" and "clinching", operations by respective known tools 48, 49 to deform tab 6 with respect to portion 5 by a first and second angle of about 45° along a bend line parallel to axis 12.

[0023] Tools 48, 49 comprise respective blades 50, 51 projecting towards region 7, and are connected releasably to respective supporting carriages 52, 53, of which carriage 52 is housed in frame 16, is interposed between region 7 and shaft 10 in direction 19, and is interposed vertically between carriage 53 and base 15.

[0024] Carriages 52, 53 are hinged to frame 16 by respective transmissions 54, 55 in the form of articulated quadrilaterals, in particular articulated parallelograms, comprising a front and rear connecting rod 56a, 56b and a top and bottom connecting 57a, 57b respectively, and which enable blades 50, 51 to move, parallel to themselves in a plane perpendicular to axis 12, back and forth along respective paths under the control of respective cam and tappet actuating devices 60, 61.

[0025] Devices 60, 61 comprise respective disks 62, 63, which are fitted to shaft 10 in fixed positions, are spaced axially apart from each other and from disk 33, and are bounded radially by shaped outer surfaces defining two cams 64 (Figure 6) and 65 (Figure 7) on which roll respective tappet rollers or cam followers 66, 67.

[0026] Roller 66 is hinged to a rear end of carriage 52, contacts cam 64 at a point substantially aligned with axis 12 and blade 50, and is forced radially onto cam 64 by a preloaded spiral spring 68 fitted to a horizontal rod 69. More specifically, rod 69 is perpendicular to axis 12, and has a front end 70 hinged to carriage 52; and spring 68 is interposed between a stop nut 71 fixed to the rear end of rod 69, and an appendix 73 fixed to frame 16 and through which rod 69 is fitted.

[0027] Roller 67, on the other hand, contacts cam 65 at an opposite point to rollers 35, 66, and is hinged to the rear arm 75 of a lever 76, the front arm of which is defined by connecting rod 57a. Roller 67 is forced radially onto cam 65 by a preloaded spiral spring 78, which is fitted to a vertical rod 79 and interposed between a stop 83 fixed to the bottom end of rod 79, and an appendix 85 fixed to frame 16 and through which rod 79 is fitted. The top end 80 of rod 79 is hinged to the rear arm 81 of a lever 82, the front arm of which is defined by connecting rod 57b.

[0028] An operating cycle of unit 8 will now be described as of a rest position, in which frame 16 is set to the withdrawn position to enable panel 2 to be loaded and fixed at region 7, and rollers 35, 66, 67 are positioned resting on cams 34, 64, 65 along respective constant-radius sectors 90a, 90b, 90c (Figures 5 to 7) to keep blades 50, 51 in the withdrawn limit position. After operating actuator 20 to move frame 16 into the forward position, motor reducer 13 is operated to rotate shaft 10 (anticlockwise in Figures 2 to 7) and so operate cams 34, 64, 65 synchronously.

[0029] Firstly, roller 35 rolls up along cam 34 onto a sector 91a, which has a larger constant radius than sector 90a and forces pin 28 to engage seat 26 and so lock frame 16 with respect to base 15 (Figures 2 and 5).

[0030] With reference to Figures 2 and 6, roller 66 then rolls along an increasing-radius sector 91b of cam 64 to move blade 50 towards tab 6, and then along a sector 92b which increases in radius less sharply than sector 91b to move blade 50 into contact with tab 6 and perform the first 45° bending ("preclinching") operation. Roller 66 then rolls along a constant-radius sector 93b to keep blade 50 in the forward limit position, and then back to sector 90b along a decreasing-radius sector 94b to withdraw carriage 52.

[0031] With reference to Figures 3 and 7, once the "preclinching" operation is completed, roller 67 rolls successively along a series of sectors 91c, 92c, 93c, 94c, which have the same functions as respective sectors 91b, 92b, 93b, 94c, to move blade 51 and perform the

second 45° bending ("clinching") operation.

[0032] As shown in Figures 4 and 5, at the end of the cycle, roller 35 rolls back to sector 90a to release pin 28 from seat 26 and so release frame 16. And, once motor reducer 13 is stopped, actuator 20 is operated to move frame 16 into the withdrawn rest position to remove panel 2 from region 7.

[0033] Device 17 therefore provides for obtaining fairly considerable space at the clinching station to load, lock and remove panel 2, while at the same time ensuring solidity, strength, and, therefore, a relatively high degree of operating precision of unit 8.

[0034] In fact, moving frame 16, shaft 10, devices 32, 60, 61 and carriages 52, 53 together provides for defining a precise forward work position of frame 16 with respect to base 15, for minimizing the number of cams activating carriages 52, 53, and so reducing errors in the positioning of blades 50, 51 caused by slack and wear.

[0035] In addition to arresting frame 16 in a precise predetermined work position, device 25 also supports the loads generated during the "preclinching" and "clinching" operations.

[0036] Unit 8 is extremely straightforward by comprising a relatively small number of component parts, and by activating device 25 by a means of a device 32 similar to devices 60, 61.

[0037] Unit 8 is highly reliable, by blades 50, 51 and pin 28 being controlled fully mechanically, with no complex electronic or other controls, by a single operating shaft 10 rotated directly by a single motor reducer 13.

[0038] Using a single shaft 10 supporting all of cams 34, 64, 65 also greatly reduces slack between the component parts of unit 8.

[0039] Unit 8 is also extremely compact, by virtue of the relative angular position of rollers 35, 66, 67, and is highly versatile, by tools 48, 49 and cams 34, 64, 65 being interchangeable and selectable according to the size and resistance of the material for bending.

[0040] Assembly 1 provides for bending relatively long tabs using a single motor reducer 13, and maintaining perfect timing of the rotation of shafts 10 of units 8 and 9.

[0041] Clearly, changes may be made to assembly 1 and units 8, 9 as described herein without, however, departing from the scope of the present invention, as defined by the appended claims.

[0042] In particular, the cams may differ from those illustrated, e.g. be defined by shaped grooves, as opposed to the outer surfaces of disks 33, 62, 63, and/or may be operated synchronously by other than shaft 10 described.

[0043] Moreover, frame 16 may be moved between the forward and withdrawn positions by other than actuator 20, and/or carriages 52, 53 may be fitted to frame 16 otherwise than as described, e.g. by means of guide devices.

Claims

1. A unit (8) for clinching metal sheets (4), comprising:

- a base (15);
- a frame (16);
- guide and slide means (17) enabling said frame (16) to move between a withdrawn rest position and a forward work position with respect to said base (15);
- a first tool (48) coupled to said frame (16) in a movable manner and able to perform a first bending operation on a tab (6) of a metal sheet (4);
- a second tool (49) coupled to said frame (16) and able to perform a second bending operation on said tab (6) after said first bending operation;
- actuating means (10,60,61) carried by said frame (16), for carrying out a first work path to perform said first bending operation, and a second work path to perform said second bending operation, when said frame (16) is located in its forward work position;

characterised in that:

- said first tool (48) is a pressing tool movable with respect to said frame (16) along said first work path under the operation of said actuating means;
- said second tool (49) is a pressing tool movable with respect to said frame (16) along said second work path under the operation of said actuating means; and
- said actuating means comprise cam means (60, 61) to move said first and second tools (48, 49) synchronously along said first and second work paths.

2. A unit as claimed in Claim 1, **characterized in that** said frame (16) moves between said forward position and said withdrawn position in a straight direction (19).

3. A unit as claimed in Claim 1 or 2, **characterized by** comprising an actuator (20) for moving said frame (16) between said forward position and said withdrawn position.

4. A unit as claimed in any one of the foregoing Claims, **characterized in that** said guide and slide means (17) are recirculating-ball type.

5. A unit as claimed in any one of the foregoing Claims, **characterized by** comprising stop means (25) which are activated to lock said frame (16) to said base (15) in said forward position during said first and said second bending operation.

6. A unit as claimed in Claim 5, **characterized by** comprising further cam means (32) operated to activate said stop means (25) synchronously with the movement of said first and second tools (48, 49).

7. A unit as claimed in Claim 6, **characterized in that** said actuating means (10) comprise a powered shaft (10) hinged to said frame (16); said cam means (60, 61) and said further cam means (32) comprising respective cams (64, 65, 34) operated by said powered shaft (10) and connected to respective cam follower members (66, 67, 35).

8. A unit as claimed in Claim 7, **characterized in that** said cam follower members (66, 67, 35) are spaced angularly apart about the axis (12) of said powered shaft (10).

9. A unit as claimed in Claim 7 or 8, **characterized by** also comprising elastic forcing means (42, 68, 78) fitted to said frame (16) and preloaded to keep at least one of said cam follower members (66, 67, 35) in contact with the relative cam (64, 65, 34) during rotation of said powered shaft (10).

10. A unit as claimed in any one of Claims 5 to 9, **characterized in that** said stop means (25) comprise a retaining seat (26) carried by said base (15), and a stop member (28) carried by said frame (16) and movable between an engaged position and a release position respectively engaging and releasing said retaining seat (26).

11. A unit as claimed in Claim 10, **characterized in that** said stop member (28) slides, inside a guide (29) connected to said frame (16), along an axis (30) perpendicular to the travelling direction (19) of the frame (16) between said forward position and said withdrawn position.

12. A unit as claimed in Claim 11, **characterized in that** said stop member (28) comprises an end portion (44) tapering axially at least partly, and which cooperates with a complementary surface (46) of said retaining seat (26).

13. A unit as claimed in any one of the foregoing Claims, **characterized by** comprising at least one transmission in the form of an articulated quadrilateral (54, 55) for connecting at least one of said first and second tools (48, 49) to said frame (16).

14. A clinching assembly (1) comprising two clinching units (8, 9) as claimed in any one of the foregoing Claims and arranged side by side; said actuating means further comprising a single motor (13), and a rotative transmission joint (11) for transmitting motion between said units (8, 9).

Patentansprüche

1. Einrichtung (8) für das Clinchen von Blechen (4), welche umfasst:

   - einen Boden (15);
   - einen Rahmen (16);
   - Führungs- und Gleitmittel (17), die das Bewegen des Rahmens (16) bezüglich des Bodens (15) zwischen einer eingefahrenen Ruhestellung und einer vorderen Arbeitsstellung ermöglichen;
   - ein mit dem Rahmen (16) in beweglicher Weise gekoppeltes erstes Werkzeug (48), das einen ersten Biegevorgang an einer Lasche (6) eines Blechs (4) durchführen kann;
   - ein mit dem Rahmen (16) gekoppeltes zweites Werkzeug (49), das nach dem ersten Biegevorgang einen zweiten Biegevorgang an der Lasche (6) durchführen kann;
   - von dem Rahmen (16) getragene Betätigungsmittel (10, 60, 61) zum Vollziehen einer ersten Arbeitsstrecke zum Ausführen des ersten Biegevorgangs und einer zweiten Arbeitsstrecke zum Ausführen des zweiten Biegevorgangs, wenn sich der Rahmen (16) in seiner vorderen Arbeitsstellung befindet;

   dadurch gekennzeichnet, dass

   - das erste Werkzeug (48) ein bezüglich des Rahmens (16) entlang der ersten Arbeitsstrecke unter Betrieb des Betätigungsmittels bewegliches Presswerkzeug ist;
   - das zweite Werkzeug (49) ein bezüglich des Rahmens (16) entlang der zweiten Arbeitsstrekke unter Betrieb des Betätigungsmittels bewegliches Presswerkzeug ist; und
   - das Betätigungsmittel Nockenmittel (60, 61) zum Bewegen des ersten und des zweiten Werkzeugs (48, 49) synchron entlang der ersten und der zweiten Arbeitsstrecke umfasst.

2. Einrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** sich der Rahmen (16) in einer geraden Richtung (19) zwischen der vorderen Stellung und der eingefahrenen Stellung bewegt.

3. Einrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** sie einen Aktor (20) zum Bewegen des Rahmens (16) zwischen der vorderen Stellung und der eingefahrenen Stellung umfasst.

4. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** die Führung und das Gleitmittel (17) von Kugelumlaufart sind.

5. Einrichtung nach einem der vorstehenden Ansprü-

che, **dadurch gekennzeichnet, dass** sie Anschlagmittel (25) umfasst, die zum Sichern des Rahmens (16) an dem Boden (15) in der vorderen Stellung während des ersten und des zweiten Biegevorgangs betätigt werden.

6. Einrichtung nach Anspruch 5, **dadurch gekennzeichnet, dass** sie weiterhin Nockenmittel (32) umfasst, die zum Betätigen der Anschlagmittel (25) synchron mit der Bewegung des ersten und des zweiten Werkzeugs (48, 49) betrieben werden.

7. Einrichtung nach Anspruch 6, **dadurch gekennzeichnet, dass** die Betätigungsmittel (10) eine an dem Rahmen (16) angelenkte angetriebene Welle (10) umfassen; wobei die Nockenmittel (60, 61) und das weitere Nockenmittel (32) jeweiligen Nocken (64, 65, 34) umfassen, die von der angetriebenen Welle (10) betrieben werden und mit den jeweiligen Nockenstößelelementen (66, 67, 35) verbunden sind.

8. Einrichtung nach Anspruch 7, **dadurch gekennzeichnet, dass** die Nockenstößelelemente (66, 67, 35) um die Achse (12) der angetriebenen Welle (10) winkelig beabstandet sind.

9. Einrichtung nach Anspruch 7 oder 8, **dadurch gekennzeichnet, dass** sie weiterhin federnde Druckmittel (42, 68, 78) umfasst, die an dem Rahmen (16) angebracht und vorspannt sind, um mindestens eines der Nockenstößelelemente (66, 67, 35) während der Drehung der angetriebenen Welle (10) in Berührung mit der entsprechenden Nocke (64, 65, 34) zu halten.

10. Einrichtung nach einem der Ansprüche 5 bis 9, **dadurch gekennzeichnet, dass** die Anschlagmittel (25) einen vom Boden (15) getragenen Haltesitz (26) und ein von dem Rahmen (16) getragenes Anschlagelement (28) umfassen, das zwischen einer eingerückten Stellung und einer Freigabestellung bewegbar ist, wobei es mit dem Haltesitz (26) einrückt bzw. diesen freigibt.

11. Einrichtung nach Anspruch 10, **dadurch gekennzeichnet, dass** das Anschlagelement (28) in einer mit dem Rahmen (16) verbundenen Führung (29) entlang einer Achse (30) senkrecht zur Verfahrrichtung (19) des Rahmens (16) zwischen der vorderen Stellung und der eingefahrenen Stellung gleitet.

12. Einrichtung nach Anspruch 11, **dadurch gekennzeichnet, dass** das Anschlagelement (28) einen axial zumindest teilweise zulaufenden Endteil (44) umfasst, der mit einer komplementären Fläche (46) des Haltesitzes (26) zusammenwirkt.

13. Einrichtung nach einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** sie mindestens eine Übertragung in Form eines Gelenkviereckes (54, 55) zum Verbinden mindestens eines des ersten und des zweiten Werkzeugs (48, 49) mit dem Rahmen (16) umfasst.

14. Clinch-Anordnung (1), welche zwei Seite an Seite angeordnete Clinch-Einrichtungen (8, 9) nach einem der vorstehenden Ansprüche umfasst; wobei die Betätigungsmittel weiterhin einen einzelnen Motor (13) und ein Drehübertragungsgelenk (11) zum Übertragen von Bewegung zwischen den Einrichtungen (8, 9) umfassen.

Revendications

1. Unité (8) permettant de river des tôles métalliques (4), comprenant :

- une base (15) ;
- un bâti (16) ;
- des moyens de guidage et de coulissement (17) permettant au dit bâti (16) de se déplacer entre une position d'appui en retrait et une position de travail en avant, par rapport à ladite base (15) ;
- un premier outil (48) couplé au dit bâti (16), de manière mobile et capable d'effectuer une première opération de cintrage sur une languette (6) d'une tôle métallique (4) ;
- un second outil (49) couplé au dit bâti (16) et capable d'effectuer une seconde opération de cintrage sur ladite languette (6), après ladite première opération de cintrage ;
- des moyens d'actionnement (10, 60, 61) portés par ledit bâti (16), afin d'exécuter un premier chemin de travail pour effectuer ladite première opération de cintrage, et un second chemin de travail pour effectuer ladite seconde opération de cintrage, lorsque ledit bâti (16) est situé dans sa position de travail en avant ;

caractérisée en ce que :

- ledit premier outil (48) est un outil de compression mobile par rapport au dit bâti (16), le long dudit premier trajet de travail, pendant le fonctionnement desdits moyens d'actionnement ;
- ledit second outil (49) est un outil de compression mobile par rapport au dit bâti (16), le long dudit second chemin de travail au moment du fonctionnement desdits moyens d'actionnement ; et
- lesdits moyens d'actionnement comprennent des moyens formant came (60, 61) pour déplacer lesdits premier et second outils (48, 49), de

manière synchrone, le long desdits premier et second chemins de travail.

2. Unité telle que revendiquée dans la revendication 1, **caractérisée en ce que** ledit bâti (16) se déplace entre ladite position en avant et ladite position en retrait dans une direction droite (19).

3. Unité telle que revendiquée dans la revendication 1 ou 2, **caractérisée en ce qu'**elle comprend un actionneur (20) permettant de déplacer ledit bâti (16) entre ladite position en avant et ladite position en retrait.

4. Unité telle que revendiquée dans l'une quelconque des revendications précédentes, **caractérisée en ce que** lesdits moyens de guidage et de coulissement (17) sont du type à recirculation de bille.

5. Unité telle que revendiquée dans l'une quelconque des revendications précédentes, **caractérisée en ce qu'**elle comprend des moyens d'arrêt (25) qui sont actionnés pour bloquer ledit bâti (16) sur ladite base (15) dans ladite position en avant, pendant ladite première et ladite seconde opérations de cintrage.

6. Unité telle que revendiquée dans la revendication 5, **caractérisée en ce qu'**elle comprend d'autres moyens formant came (32) qui fonctionnent pour actionner lesdits moyens d'arrêt (25), de manière synchrone avec le mouvement desdits premier et second outils (48, 49).

7. Unité telle que revendiquée dans la revendication 6, **caractérisée en ce que** ledit moyen d'actionnement (10) comprend un arbre motorisé (10) articulé sur ledit bâti (16) ; ledit moyen formant came (60, 61) et ledit autre moyen formant came (32) comprenant des cames respectives (64, 65, 34) qui sont actionnées par ledit arbre motorisé (10) et raccordées auxdits éléments de galet de came (66, 67, 35) respectifs.

8. Unité telle que revendiquée dans la revendication 7, **caractérisée en ce que** lesdits éléments de galet de came (66, 67, 35) sont espacés de manière angulaire autour de l'axe (12) dudit arbre motorisé (10).

9. Unité telle que revendiquée dans la revendication 7 ou 8, **caractérisée en ce qu'**elle comprend également des moyens de forçage élastiques (42, 68, 78) insérés sur ledit bâti (16) et préchargés pour maintenir au moins l'un desdits éléments de galet de came (66, 67, 35) en contact avec la came relative (64, 65, 34), au cours de la rotation dudit arbre motorisé (10).

10. Unité telle que revendiquée dans l'une quelconque des revendications 5 à 9, **caractérisée en ce que** ledit moyen d'arrêt (25) comprend un siège de retenue (26) supporté par ladite base (15), et un élément d'arrêt (28) porté par ledit bâti (16) et mobile entre une position engagée et une position dégagée, respectivement engageant et dégageant ledit siège de retenue (26).

11. Unité telle que revendiquée dans la revendication 10, **caractérisée en ce que** ledit élément d'arrêt (28) coulisse, à l'intérieur d'un guide (29) raccordé au dit bâti (16), le long d'un axe (30) perpendiculaire à la direction de circulation (19) du bâti (16), entre ladite position en avant et ladite position en retrait.

12. Unité telle que revendiquée dans la revendication 11, **caractérisée en ce que** ledit élément d'arrêt (28) comprend une partie d'extrémité (44) effilée axialement au moins partiellement, et qui coopère avec une surface complémentaire (46) dudit siège de retenue (26).

13. Unité telle que revendiquée dans l'une quelconque des revendications précédentes, **caractérisée en ce qu'**elle comprend au moins une transmission sous la forme d'un élément à quatre côtés articulé (54, 55) permettant de coupler au moins l'un desdits premier et second outils (48, 49) sur ledit bâti (16).

14. Ensemble pour river (1) comprenant deux unités pour river (8, 9), telles que revendiquées dans l'une quelconque des revendications précédentes et agencées côte à côte, ledit moyen d'actionnement comprenant en outre un moteur unique (13), et un joint de transmission rotatif (11) permettant de transmettre le mouvement entre lesdites unités (8, 9).

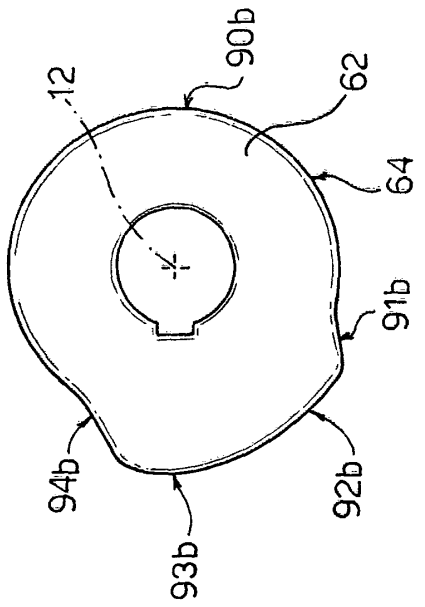


Fig.6

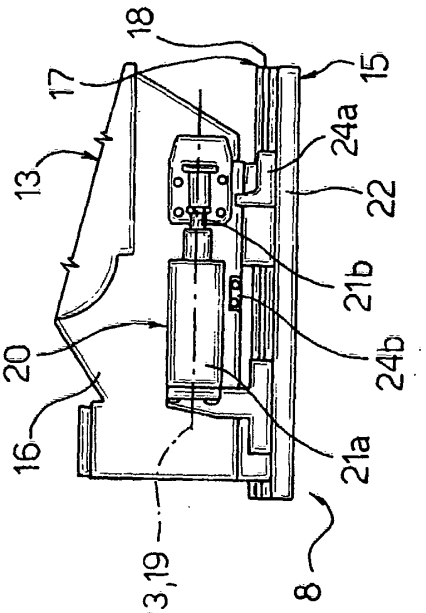


Fig.8

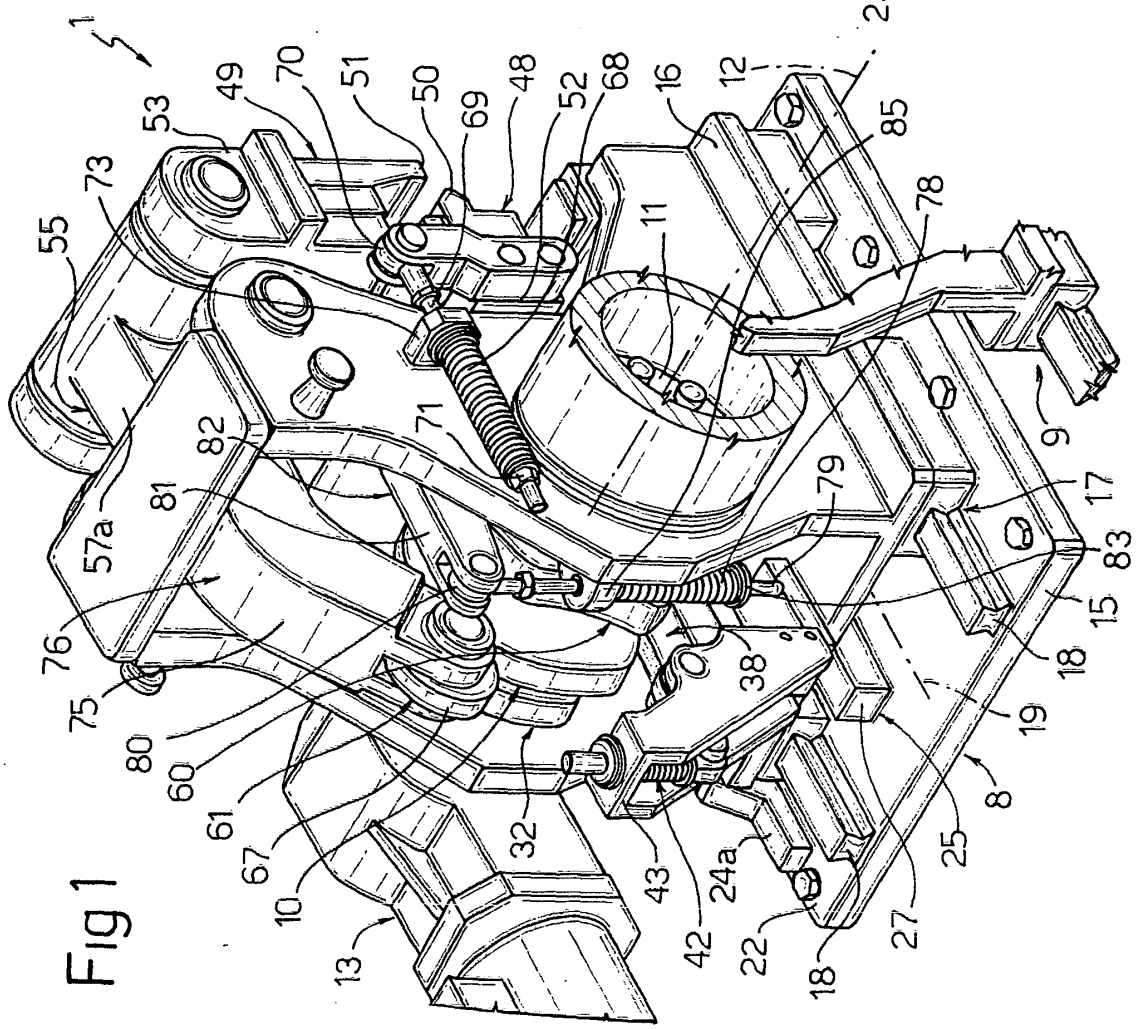
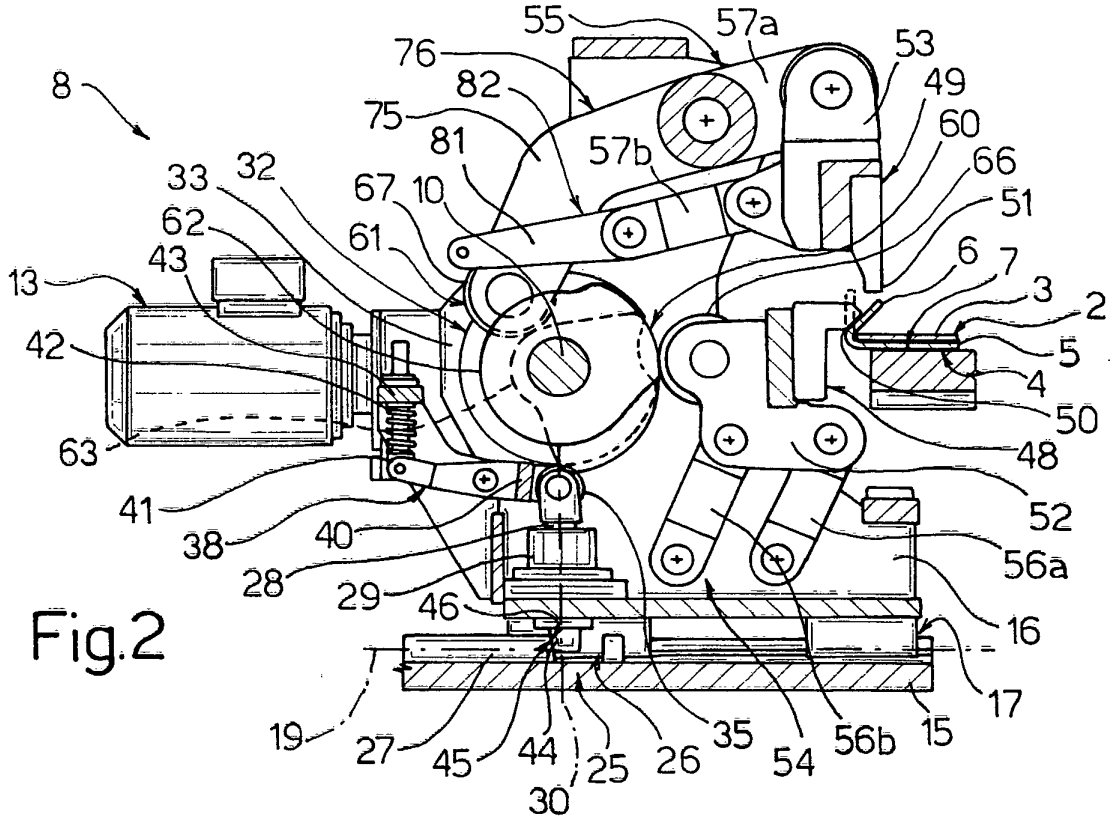


Fig 1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43
3
2
13
5
42
4
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63
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Fig.2

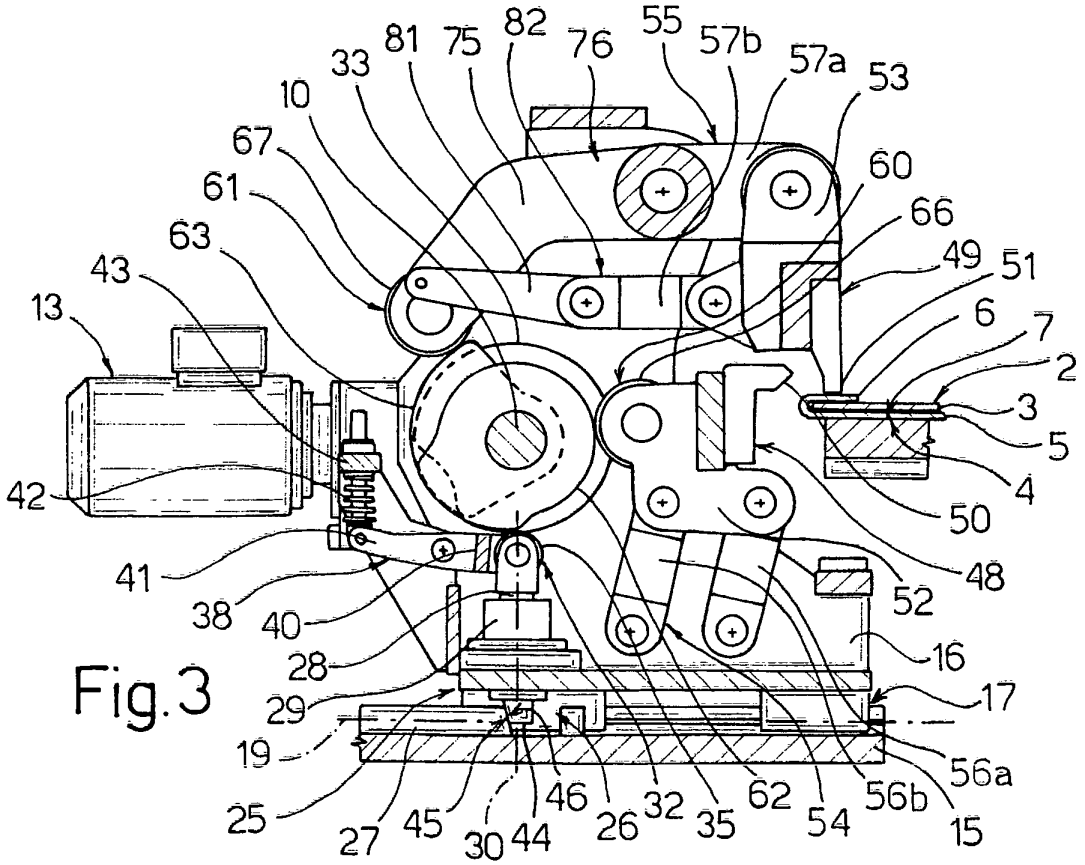
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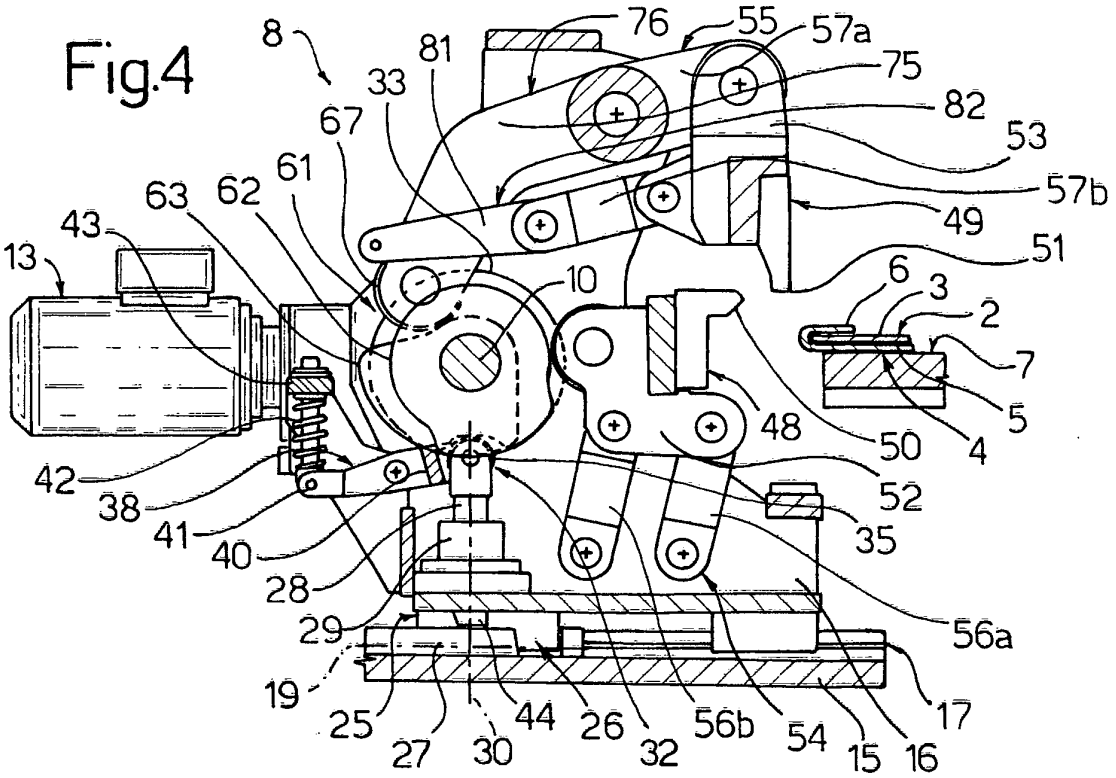
Fig.3

Fig.4



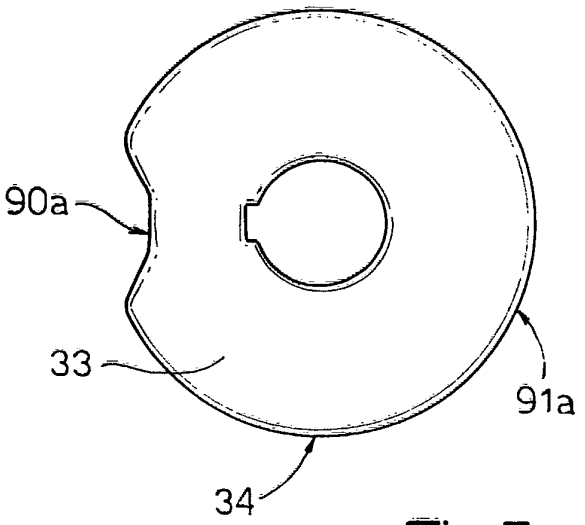


Fig.5

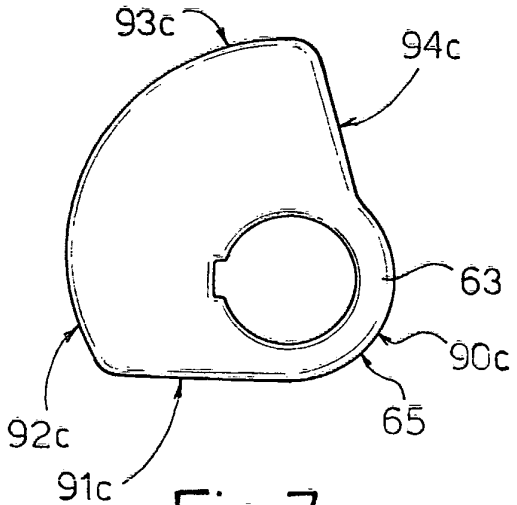


Fig.7