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(54) Clamping device for flat workpieces

(57) Clamping device for flat workpieces comprising a mooring clamp (1) and drive means (2) to move said clamp (1) from a rest position to a mooring position and viceversa, the clamp (1) comprising a first substantially L-shaped arm (3) to hold the upper part of a workpiece (9) arranged horizontally, and a second arm (4) to hold the lower part of the workpiece (9), both arms (3,4) being connected by a rotating shaft (5), the first arm (3) being connected to the drive means (2) by a rotating shaft (6), and the second arm (4) being connected to a frame (7) by a rotating shaft (8). The drive means (2) act on the clamp (1) moving the rotating shaft (6) of the first arm (3) along a rectilinear path.

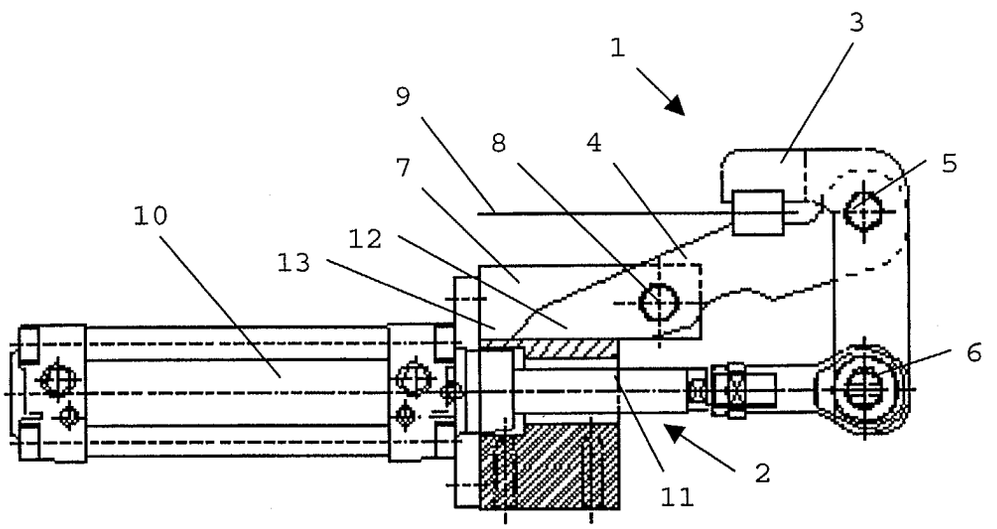

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to devices for clamping flat workpieces, particularly metal sheets.

PRIOR ART

[0002] Clamping devices are known which comprise mooring clamps for holding flat workpieces, particularly metal sheets.

[0003] DE 197 15 452 C1 describes a device for clamping flat workpieces by means of a hydraulically-operated mooring clamp, using said clamp to hold the top and bottom parts of the workpiece located horizontally, and which is placed in a frame. To introduce the workpiece, the clamp can turn from a mooring position to a rest position, underneath the workpiece, by pressure drive.

[0004] The clamp comprises a first arm and a second arm with rotation shafts that are parallel. The first arm can rotate on a horizontal shaft on the frame underneath the workpiece, descending from a mooring position to a rest position and, at its free end, bent upward, it receives the rotating support of the second arm, one of the ends of this second arm being able to rest from the upper part on the surface of the workpiece, and the other end of said second arm being connected to a piston cylinder unit installed on the frame so that, in the area where said piston cylinder unit is applied, there are some guide means for the second arm, by which said second arm is guided forced during the rotation movement along the corresponding guide path.

DESCRIPTION OF THE INVENTION

[0005] The object of the invention is to provide a clamping device for flat workpieces as described in the claims.

[0006] The clamping device for flat workpieces of the invention comprises a mooring clamp and drive means to move said mooring clamp from a rest position to a mooring position and viceversa. Said mooring clamp comprises a substantially L-shaped first arm to clamp the upper part of a workpiece preferably disposed horizontally, and a second arm to clamp the lower part of said workpiece, both arms being joined by a rotating shaft.

[0007] The first arm, that is, the substantially L-shaped arm, is joined to the drive means by a rotating shaft, and the second arm is connected to a frame by another rotating shaft.

[0008] The drive means of the device of the invention act on the mooring clamp moving the first arm rotating shaft along a rectilinear path, preferably horizontal. This does away with the need of guide devices for the movement of said rotating shaft along non-rectilinear paths, while nonetheless maintaining the functionality of the clamping device. This gives rise to a unit with fewer parts that is therefore simpler, lighter and more economical.

[0009] On the other hand, the fact that the movement of the first arm rotating shaft is along a straight line means that the drive means are not subject to back and forth movements depending on the points on said path, so that the device is more robust and compact. Therefore, where for example the drive means comprise a hydraulic cylinder with a rod connected to the first arm rotating shaft, because the path of said rotating shaft is a straight line, the hydraulic cylinder remains in a fixed position at all times.

[0010] These characteristics and advantages of the invention, along with other additional characteristics and advantages, will become clear in the light of the figures and the detailed disclosure of the invention.

DESCRIPTION OF THE DRAWINGS

[0011]

FIG. 1 is a profile view of an embodiment of the clamping device of the invention with the mooring clamp in the mooring position.

FIG. 2 is a profile view of the embodiment in FIG. 1 with the mooring clamp in the rest position.

FIG. 3 is a profile view of the mooring clamp of the embodiment in FIG. 1 with said mooring clamp in a mooring position, in an intermediate position and in a rest position.

DETAILED DISCLOSURE OF THE INVENTION

[0012] The clamping device for flat workpieces of the invention comprises a mooring clamp 1 and drive means 2 that displace said mooring clamp 1 from a rest position (shown in figure 2) to a mooring position (shown in figure 1) , and viceversa.

[0013] The mooring clamp 1 comprises a substantially L-shaped first arm 3 to hold the upper part of the workpiece 9, preferably placed in a horizontal position, and a second arm 4 to hold the bottom part of the workpiece 9. Both arms 3 and 4 are connected by a rotating shaft 5, the first arm 3 is connected to the drive means 2 by a rotating shaft 6, and the second arm 4 is connected to a frame 7 by a rotating shaft 8.

[0014] The drive means 2 act on the mooring clamp 1 displacing the rotating shaft 6 of the first arm 3 along a rectilinear path, as seen in figures 1, 2 and 3. Said rectilinear path is preferably horizontal.

[0015] Figure 3 shows the mooring clamp 1 of the invention in three different positions: in the mooring position (on the left of the figure), in an intermediate position (in the centre of the figure) and in a rest position (on the right of the figure). It is seen from this figure 3 that, with

the mooring clamp 1 of the invention, the mooring of the workpiece 9 is optimal without having to vary the path of rotating shaft 6, that is, keeping it completely in a straight line.

[0016] In the embodiment in figures 1, 2 and 3, the drive means 2 comprise a pneumatic or hydraulic cylinder 10 with a rod 11. The pneumatic or hydraulic cylinder 10 is in a fixed position and the rod 11 is connected to the rotating shaft 6 of the first arm 3.

[0017] In this embodiment, the second arm 4 has an extension 12 from the rotating shaft 8, and the frame 7 includes a stop 13. Thus, when arms 3 and 4 move to the mooring position, said extension 12 and said stop 13 come into contact and prevent arms 3 and 4 from moving up beyond that position.

Claims

1. A clamping device for flat workpieces comprising a mooring clamp (1) and drive means (2) that displace said mooring clamp (1) from a rest position to a mooring position and viceversa, the mooring clamp (1) comprising a first arm (3) substantially L-shaped to clamp the upper part of a workpiece (9) preferably placed horizontally, and a second arm (4) to clamp the lower part of the workpiece (9), both arms (3,4) being connected by a rotating shaft (5), the first arm (3) being connected to the drive means (2) by a rotating shaft (6), and the second arm (4) being connected to a frame (7) by a rotating shaft (8), **characterised in that** the drive means (2) act on the mooring clamp (1) displacing the rotating shaft (6) of the first arm (3) along a rectilinear path.

2. A clamping device for flat workpieces according to claim 1, **characterised in that** said rectilinear path is substantially horizontal.

3. A clamping device for flat workpieces according to any of the preceding claims, **characterised in that** the drive means (2) comprise a pneumatic or hydraulic cylinder (10) with a rod (11), said pneumatic or hydraulic cylinder (10) being in a fixed position and said rod (11) being connected to the rotating shaft (6) of the first arm (3).

4. A clamping device for flat workpieces according to any of the preceding claims, **characterised in that** the second arm (4) has, as from the rotating shaft (8), an extension (12) and the frame (7) includes a stop (13) , said extension (12) and said stop (13) coming into contact when the arms (3,4) move to the mooring position, thereby limiting the upward movement of said arms (3,4).

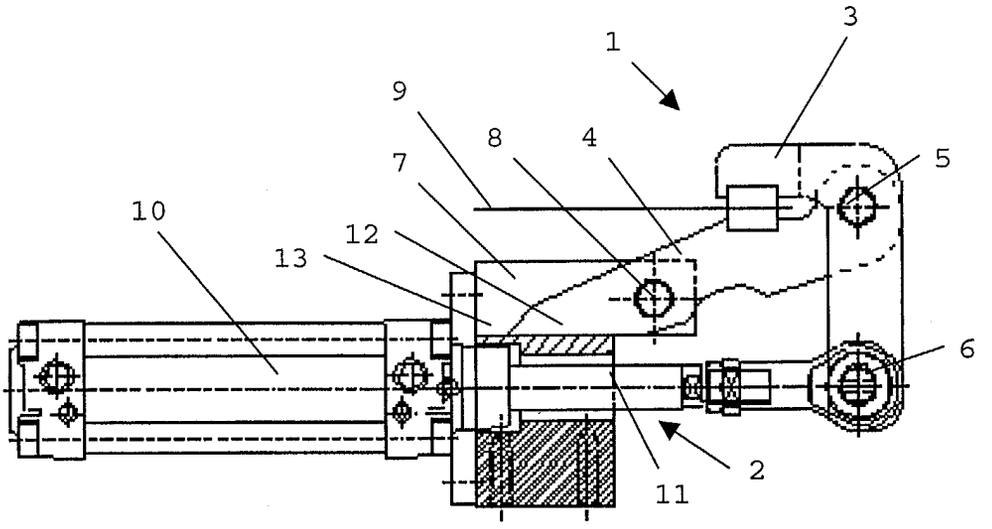

Fig. 1

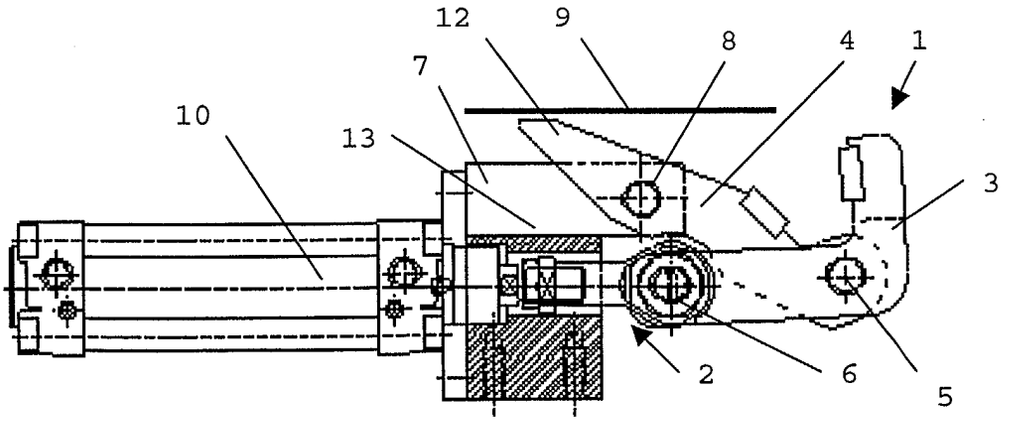

Fig. 2

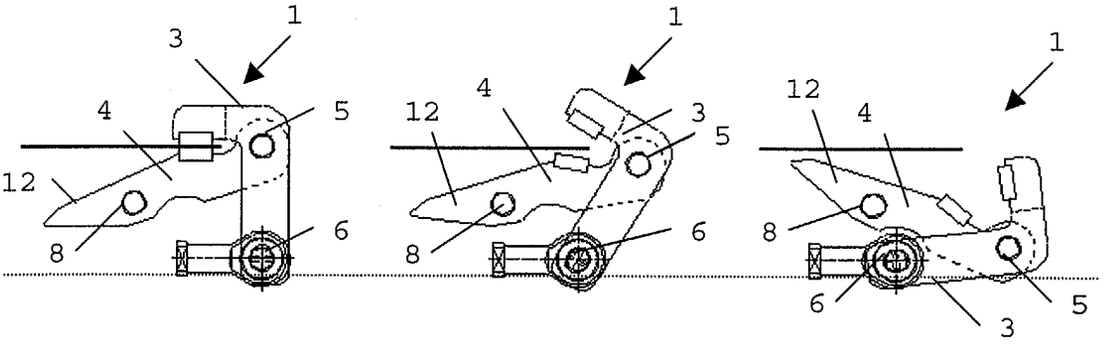

Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 38 0162

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 1 236 005 A (LELAND FRANCIS BLATT) 16 June 1971 (1971-06-16) * the whole document * ---	1-3	B25B5/12 B25B5/14
A,D	DE 197 15 452 C (MANNESMANN AG) 24 September 1998 (1998-09-24) * the whole document * ---	1-3	
A	GB 1 343 091 A (BRAMMALL INC) 10 January 1974 (1974-01-10) * figures 1-9 * -----	1-3	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B25B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	9 October 2003	Kühn, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 38 0162

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
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09-10-2003

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