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⑪ Publication number : **0 447 382 A1**

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EUROPEAN PATENT APPLICATION

⑳ Application number : **91850046.3**

⑤① Int. Cl.⁵ : **B65D 85/20, F16L 3/22**

㉔ Date of filing : **26.02.91**

③① Priority : **16.03.90 SE 9000953**

④③ Date of publication of application :
18.09.91 Bulletin 91/38

⑧④ Designated Contracting States :
DE ES FR IT

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⑤④ **Clamp for metal bars.**

⑤⑦ A clamp for a plurality of bar-shaped items, comprising a base with upwardly pointing claws (13,14) having gripping surfaces (20,21) and a lid which can be held by the claws (13,14) in at least two positions at different levels above the base, where each level corresponds to a certain diameter of the item, and where one position is changed to another by reversing the lid about a vertical or horizontal axis.

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CLAMP FOR METAL BARS

Field of use

Metal bars, such as rock drill rods, are often shipped in lots comprising a large number of bars of equal size, which one wishes to keep bundled together for simpler handling. This is accomplished with shaped supports of wood or plastics, keeping the bars straight and parallel at such a distance that they do not touch each other.

Previously known designs, shown by the patents SE 454 266, DE 31 28 345 and EP 071 163 suffer from certain drawbacks in use, such as being useable for one diameter only, and having a limited elasticity which makes it difficult to fit to a slightly oversize diameter bar, and which necessitates special friction means to keep slightly undersize diameter bars axially fixed.

The present invention is a supporting clamp consisting of two parts, which can be adapted to four different bar diameter by positional changes between the parts, and which exerts an elastic pressure on the bars even with undersize diameters within the normal diameter tolerance limits.

Description of the invention

A supporting clamp according to the invention consists of two differently shaped parts: a base with upwardly pointing claws, and a reversible lid, which can be placed in four different positions by reversing about a horizontal and a vertical axis, corresponding to four different bar diameter. The claws are provided with gripping surfaces to hold the lid in its different positions.

The clamp is further described with reference to figure 1, showing a base, figure 2 showing a lid and figures 3 to 6 showing sections through the clamp with the lid in its four different positions, where a dot helps to illustrate the different lid positions in the figures.

The base comprises two side plates (11,12) upwardly extending as a plurality of claws (13,14), where the claws (13) on one side plate (11) are shaped different from the claws (14) on the other side plate (12). Below the claws (13,14) the side plates (11,12) are recessed towards the middle and connected by transverse walls (17). Between the claws (13,14) on each side, the side plates are lowered and form supporting contours (18,19).

The claws (13,14) are resilient and in their upper parts tapering. Each claw is joined to the side plate by two pillars (24). Below the tapering part each claw has gripping surfaces of different shape facing downwards. On each of the claws (13) of the first side plate (11) there is one upper gripping surface (21) with a width equal to the distance between the pillars (24)

and a divided lower gripping surface (20) in two portions each covering the width of one pillar (24). On each of the claws (14) of the second side plate (12) there is one upper gripping surface (23) with a width equal to the full width of the claw (14) and a lower gripping surface (22) which only extends between the pillars (24). On the underside of the base there are two short tongues (25) below each claw (13,14).

The lid comprises a central plate (31) with two raised longitudinal ribs (32,33) on each side. The plate (31) is, at least in regions adjoining the claws (13,14) of the base, narrow enough to fit between the claws, and is in this region provided at one edge with tongues (37) each with a width equal to the distance between the pillars (24), and at the other edge with shelves (36) with a width equal to the width of an entire claw (13,14). Between tongues (37) and shelves (36) the ribs are connected by transverse walls (38). At the ends (40) of the lid the central part (39) of the rib is lower than the rest of the ribs (32,33) and chamfered or rounded.

Figure 3 shows a cross-section of the clamp at a pair of claws (13,14) when the lid is in its lowest position to accommodate the smallest diameter bar. The lid is turned so that the tongue (37) and the shelf (36) are located higher than the central plate (31) of the lid, which is supposed to be symmetric with respect to those surfaces of the ribs (32,33) which will press against the bars. The tongue (37) rests against the lower gripping surface (22) between the pillars (24), and the shelf (36) rests against the divided lower gripping surface (20).

Figure 4 shows a cross-section at a pair of claws (13,14) where the lid has been reversed about a vertical axis relative to figure 3, with the tongue (37) resting against the upper gripping surface (21) between the pillars (24), and the shelf (36) resting against the full width upper gripping surface (23), placing the lid in its second lowest position.

Figure 5 shows a cross-section at a pair of claws (13,14) where the lid has been reversed about a horizontal axis relative to figure 4, causing the central plate (31) of the lid to be located higher than the tongue (37) and the shelf (36). The tongue (37) rests against the lower gripping surface (22) between the pillars (24), and the shelf (36) rests against the divided lower gripping surface (20), placing the lid in its second highest position.

Figure 6 shows a cross-section at a pair of claws (13,14) where the lid has been reversed about a vertical axis relative to figure 5, with the tongue (37) resting against the upper gripping surface (21) between the pillars (24), and the shelf (36) resting against the upper full width gripping surface (23), placing the lid in its highest position, accommodating the largest

diameter bar.

The clamp is applied to the metal bars, which may have round or hexagonal section, by placing the bars on the supporting edges (18,19) of the side plates (11,12) of the base. The tongues (37) of the lid are then inserted below the gripping surface (21,22) between the pillars (24) of the claws (13,14) of that side plate which corresponds to the pertinent diameter, followed by pressing down that edge of the lid which carries the shelves (36) until the shelves (36) rest under the gripping surfaces of the claws of the other side plate.

When a first layer of bars have been joined by the two parts of the first clamps, one can put bases of new clamps on top of the lids of the first clamps, where the uppermost parts of the claws (13,14) of the first clamps fit into the recessed parts (15,16) of the side plates (11,12) of the new bases, and the short tongues (25) on the underside of the new bases fit on both sides of the connecting walls (38) of the first lids. This secures the clamps to each other, and many layers of bars can be put on top of each other.

If it is desired to place the first layer of bars somewhat higher above the floor to facilitate handling with a fork lift truck, extra lids are placed under the first clamps. The lids are then located by the short tongues (25). All layers of bars and the extra lids if any can be strapped together with strong metal or synthetic straps pulled lengthwise under the lowest clamp part and tightened on top of the uppermost clamp part. The straps are prevented from catching on obstacles by being recessed in the connecting walls (38) and the central parts (39) of the ends of the lids. The rounding of the central parts (39) allows some slipping of the straps which facilitates tightening and avoids fracture of the straps at the corners.

The invention has been described with application to round or hexagonal bars, but by suitably shaping the supporting edges (18,19) it can be adapted to any type of bar, or to two or more bars between neighbouring pairs of claws. The number of claws or bars in a layer is not restricted to what is shown in the figures. The clamps can also be used for bar-shaped items of other or composite materials, such as electric cables.

Most suitable material for the clamps is a synthetic resin with or without fiber reinforcement, since this ensures a suitable resilience of the pillars (24) of the claws.

The described embodiment with gripping surfaces (20,21,22,23) in two levels and unsymmetric tongues (37) and shelves (36) has four different lid positions. It is within the scope of the invention to utilize only two positions by putting all gripping surfaces in one level, or by omitting one reversing possibility of the lid, or to utilize more than four positions by combining a choice of bases and lids..

Claims

1. Clamp for a plurality of bar-shaped items, comprising a base with upward-pointing claws (13,14) and a reversible lid which can be gripped and held by gripping surfaces on the claws, **characterized** by having each claw connected to the base by two pillars (24) and shaped with one gripping surface (21,22) between the pillars and one gripping surface (20,23) extending over the full width of the claw with or without interruption.
2. Clamp according to claim 1, **characterized** by having the lid provided with narrow tongues (37) resting against gripping surfaces (21,22) between the pillars (24) and wide shelves (36) resting against gripping surfaces (20,23) extending over the width of the claws.
3. Clamp according to claim 2, **characterized** in having the tongues (37) and the shelves (36) located on one side of a plane central between those surfaces of the lid which can press against the items.
4. Clamp according to claim 1, **characterized** by the gripping surface (21) between the pillars (24) of the claws (13) on the first side being located at a higher level than that gripping surface (20) which extends over the width of the claw (13) with an interruption, and by the gripping surface (22) between the pillars (24) of the claws (14) of the other side being located at a lower level than that gripping surface (23) which extends over the width of the claw (14).
5. Clamp according to claim 3 or 4, **characterized** by the tongues (37) and shelves (36) of the lid matching the gripping surfaces (20,21,22,23) of the claws with the lid in at least two different positions, where one position is changed to the other by reversing 180 degrees about a vertical or horizontal axis.
6. Clamp according to claim 3 or 4, **characterized** by the tongues (37) and shelves (36) of the lid matching the gripping surfaces (20,21,22,23) of the claws with the lid in at least two positions at different levels above the base.

Fig. 1

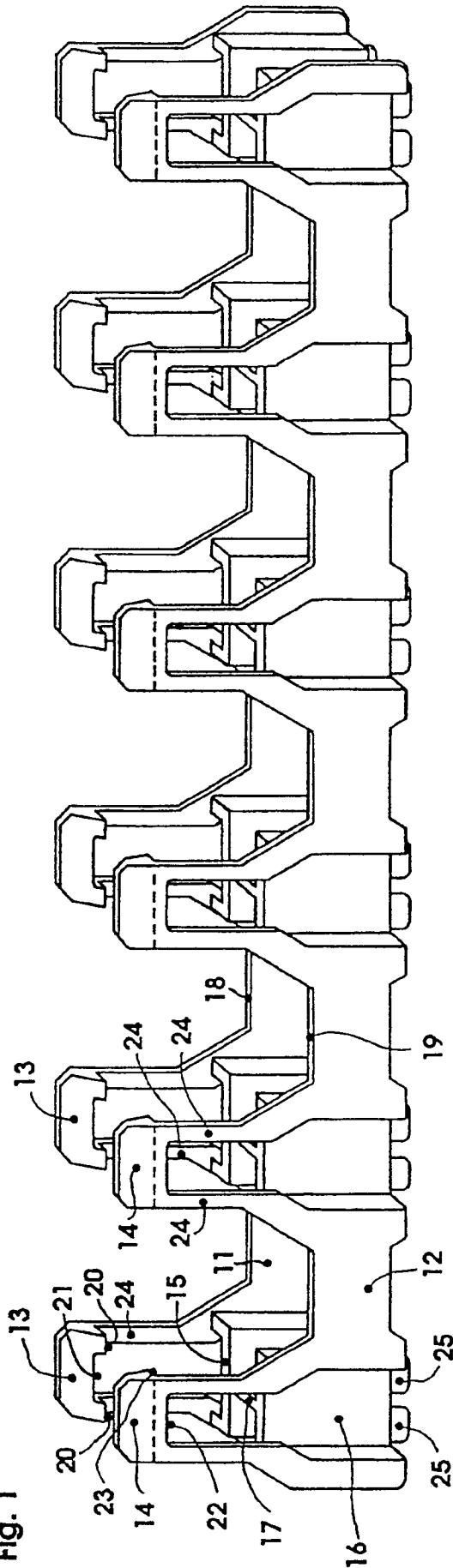


Fig. 2

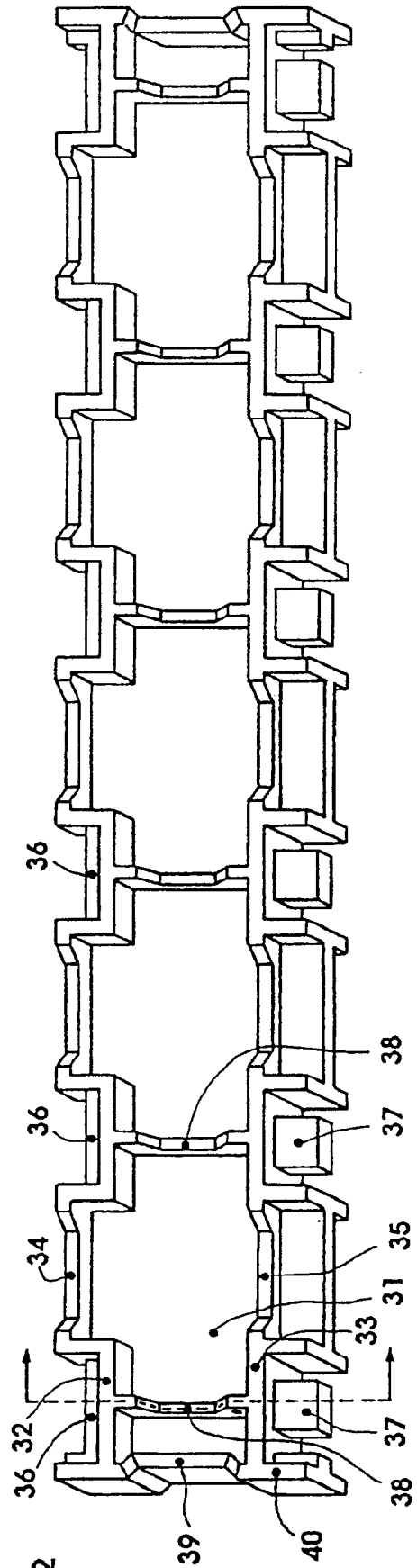


Fig. 6

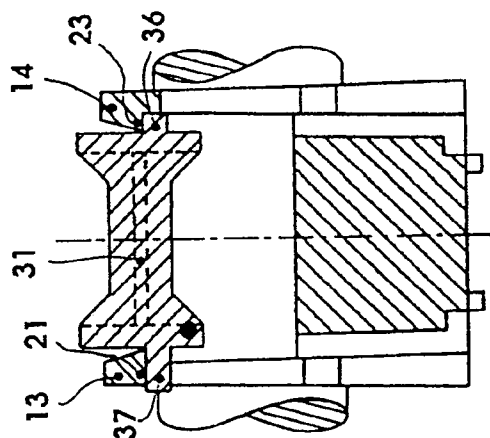


Fig. 5

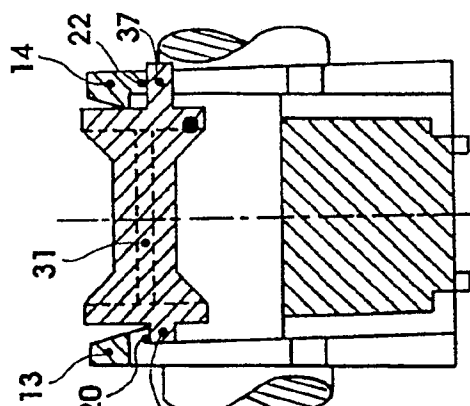


Fig. 4

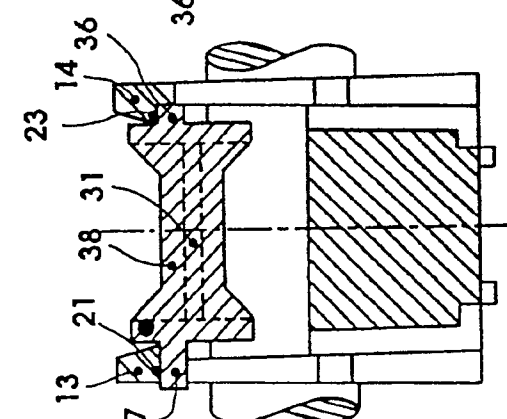
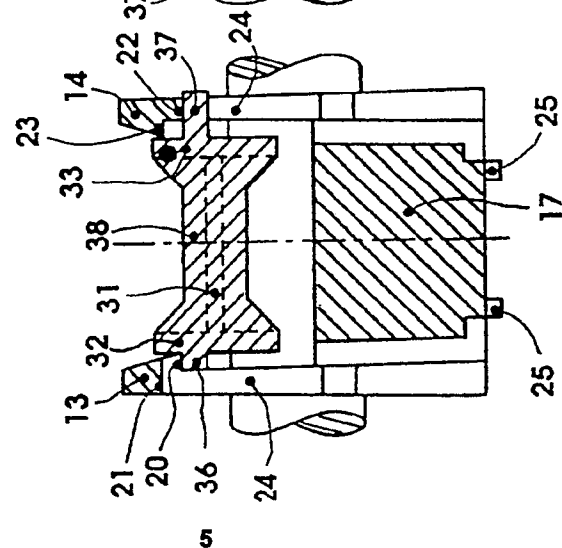


Fig. 3





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EUROPEAN SEARCH REPORT

Application Number

EP 91 85 0046

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.5)
D,A	SE-B-454266 (NORABEL) * claim 1; figures 1a-2 * ---	1	B65D85/20 F16L3/22
D,A	EP-A-0071163 (DREYFUSS) ---		
D,A	DE-A-3128345 (NIPPON KOKAN ET AL.) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D B25H E21B F16L
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 18 JUNE 1991	Examiner SPETTEL, J.D.M.L.
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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