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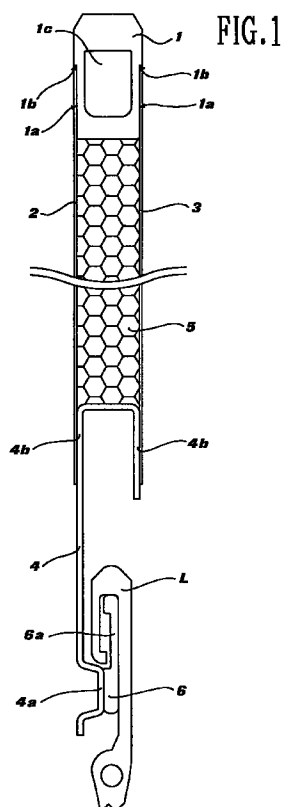
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(54) Crosspiece of composite structure for heald frames of looms

(57) Crosspiece of composite structure for the construction of heald frames for looms, formed by an upper section (1), consisting of extruded aluminium or of another light and highly resisting material, and by a lower section (4, 7), made of sheet steel or of another light and highly resisting metallic material, between said sections there being interposed a flat body (5) having a honeycomb structure, made of aluminium or of another light and highly resisting material. Said three elements (1, 4 or 7, 5) are kept mutually connected by a pair of thin sidewalls (2, 3) of composite material, glued onto the side surfaces of said elements.



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Description

The present invention applies to the construction of fittings for looms and, particularly, of heald frames; it concerns, more exactly, a crosspiece having a composite structure to be used in the construction of heald frames for looms.

Heald frames are devices mounted in looms to obtain - through their reciprocating motion on a vertical or horizontal plane, perpendicular to the weaving plane - the movement of groups of warp yarns according to a preset weaving pattern. The heald frames comprise two side members, acting as guides for the reciprocating sliding motion of the frame, and two crosspieces into which are inserted the healds (thin rods of steel, or of other materials), each holding a warp yarn.

To form the frame structure, the side members and crosspieces are fixed together at right angles, in correspondence of the four corners of the frame, in a perfectly rigid manner - so as to prevent any possible deformation of the frame during weaving - and, at the same time, easy to disassemble, so as to allow inserting or removing the healds according to the number required for each weaving operation.

With the improvement of the performances of modern looms, specially the increase of the weaving speed, it has become particularly important to reduce the weight of the masses moving with a reciprocating motion, and thus also the weight of the heald frames. The present trend is to thus use, for the construction of heald frames, lighter and lighter materials, such as aluminium, light alloys and composite materials, seeking to reach the best compromise between the characteristics of lightness and those of resistance to mechanical stresses.

The object of the present invention is to thus supply a crosspiece structure which is very light and has, at the same time, high characteristics of rigidity and resistance to mechanical stresses. Said object is reached by means of a crosspiece of composite structure for the construction of heald frames for looms, formed by an upper section and by a lower section between which there is interposed a flat body having a honeycomb structure, said three elements being kept mutually connected by a pair of thin sidewalls of composite material, glued onto the side surfaces of said elements.

Further characteristics and advantages of the crosspiece according to the present invention will anyhow be more evident from the following detailed description of some preferred embodiments thereof, given by way of example and illustrated on the accompanying drawings, in which:

Fig. 1 is a sectional view of a crosspiece according to the present invention; and

Fig. 2 is a partial view, similar to that of fig. 1, illustrating a different embodiment of the crosspiece according to the invention.

As shown in fig. 1, the crosspiece of the present invention comprises the following main elements:

- An upper section 1, consisting of extruded aluminium (for instance of alloy 6005 HB85) or of another light and highly resisting material, which forms the top part of the crosspiece, and the two side surfaces of which have partially depressed zones 1a ending into shoulders 1b; this section can even be provided with a lightening cavity 1c, the ends of which are apt to house means for fixing the side members of the frame.
- Two thin sidewalls 2 and 3 (their thickness varying within few millimeter tenths) glued onto said depressed zones 1a and against said shoulders 1b, so that their external surface is coplanar with the non-depressed part of the side surfaces of said section 1. Said sidewalls are preferably made of fiber glass or of another composite material.
- A lower section 4, forming the bottom part of the crosspiece and acting as support for the healds L. In the embodiment of fig. 1, said section consists of a thin steel sheet (for instance AISI 304), or of a plate of other metallic material, bent as shown on the drawing. The section 4 comprises an overturned U-shaped top part acting as connection zone, the two sides 4b of which have their external surface coplanar with the depressed side surfaces 1a of the upper section 1, the lower ends of the sidewalls 2 and 3 being glued onto said external surfaces of the sides 4b.
- A flat body 5 having a honeycomb structure - preferably also made of aluminium or of another light and highly resisting material - which fits with precision into the volume defined by the aforescribed elements 1, 2, 3 and 4. More precisely, the transversal dimension of said body 5 is equal to the distance between the depressed zones 1a of the side surfaces of the upper section 1, and to the distance between the sides 4b of the top connection zone of the lower section 4, said thin sidewalls 2 and 3 being uniformly applied onto the coplanar surfaces of said sides 1a and 4b and of said flat body 5. Moreover, unlike the pattern shown on the drawings - which, for clearness, represent a typical honeycomb structure - in the structure of the body 5, the axes of the honeycombs are perpendicular to the longitudinal axis of the sections 1 and 4, that is, of the crosspiece.

To allow hooking the healds L onto said section 4, this latter also comprises, close to its bottom end, a longitudinal ribbing 4a for fixing means to guide the healds; such means essentially consist of a steel plate 6, preferably welded to said ribbing 4a of the lower section 4. The plate 6 is meant to form, with the section 4, a track to support and guide the hook end of the healds L, which place themselves astride of its upper edge. To improve the guiding action, the plate 6 has a depressed

zone, or longitudinal groove 6a, on its side facing the section 4.

The aforescribed structure has excellent mechanical characteristics, particularly a high rigidity and capability to dampen vibrations and noise; its weight is moreover reduced, even as far as 20%, in respect of the weight of an extruded aluminium monolithic bar of the same size.

In the embodiment shown in fig. 2, the lower section 4 of fig. 1, acting as support for the healds, is replaced by a section 7 consisting - like the upper section 1 - of extruded aluminium or of another light and highly resisting material. Also this section 7 comprises partially depressed side surfaces 7a ending into shoulders 7b - with a symmetrical arrangement in respect of the depressed surfaces 1a and shoulders 1b of the upper section 1 - to allow glueing thereon the sidewalls 2 and 3.

The section 7 equally comprises a ribbing 8, obtained directly by extrusion, to fix thereon the already described guide means in the form of a plate 6. In this case, however, instead of being fixed by welding, the plate 6 is fixed by riveting, or by riveted pins, or else by glueing.

A cavity 7c is finally formed into the section 7, acting as guide for a steel block (not shown) positioned therein, said block comprising threaded holes for fixing an intermediate tie rod for the heald frame. This embodiment of the crosspiece is therefore particularly suited for frames of great width.

Claims

1. Crosspiece of composite structure for the construction of heald frames for looms, characterized in that it is formed by an upper section (1) and by a lower section (4, 7), between which there is interposed a flat body (5) having a honeycomb structure, and in that said three elements (1, 4 or 7, 5) are kept mutually connected by a pair of thin sidewalls (2, 3) of composite material, glued onto the side surfaces of said elements.
2. Crosspiece as in claim 1), wherein the upper section (1) consists of extruded aluminium, or of another light and highly resisting material, and it is preferably a hollow section.
3. Crosspiece as in claim 2), wherein the two side surfaces of said section (1) have partially depressed zones (1a) ending into shoulders (1b), onto which there are glued said thin sidewalls (2, 3) of composite material, the external surface of said sidewalls being coplanar with the non-depressed part of the side surfaces of said section (1).
4. Crosspiece as in claim 1), wherein said lower section (4) comprises a top connection zone, onto the sides (4b) of which there are glued said thin Side-
- walls (2, 3) of composite material.
5. Crosspiece as in claim 1), wherein said lower section (4) comprises, close to its bottom end, a longitudinal ribbing (4a) for fixing means (6) to guide the healds (L).
6. Crosspiece as in claim 4) or 5), wherein said lower section (4) consists of a thin bent steel sheet, said top connection zone being in the shape of an over-turned U.
7. Crosspiece as in claim 1), wherein said lower section (7) consists of extruded aluminium or of another light and highly resisting metallic material.
8. Crosspiece as in claim 1), wherein said flat body (5) having a honeycomb structure consists of a section of aluminium, or of another light and highly resisting material, wherein the axes of the honeycombs are perpendicular to the longitudinal axis of the crosspiece.
9. Crosspiece as in claims 1), 3) and 4), wherein the transversal dimension of said flat body (5) with a honeycomb structure is equal to the distance between the depressed zones (1a) of the side surfaces of said upper section (1), and to the distance between the sides (4b) of said top connection zone of the lower section (4), said thin sidewalls (2, 3) of composite material being uniformly applied onto the coplanar surfaces of said sides (1a, 4b) and of said honeycomb body (5).
10. Crosspiece as in claim 1) or 9), wherein said thin sidewalls (2, 3) of composite material have a thickness varying within few millimeter tenths.
11. Crosspiece as in claim 10), wherein said thin sidewalls (2, 3) of composite material are made of fiber glass.
12. Crosspiece as in claim 5), wherein said means to guide the healds (L) consist of a steel plate (6), the hook end of the healds placing itself astride of the upper edge of said plate.
13. Crosspiece as in claim 12), wherein said steel plate (6) has a depressed guiding zone (6a) on its side facing the section (4).
14. Crosspiece as in claims 5) and 12), wherein said steel plate (6) is welded onto said ribbing (4a) of the lower section (4).
15. Crosspiece as in claims 7) and 12), wherein said steel plate (6) is either riveted or glued onto the ribbing (8) of the lower section (7).

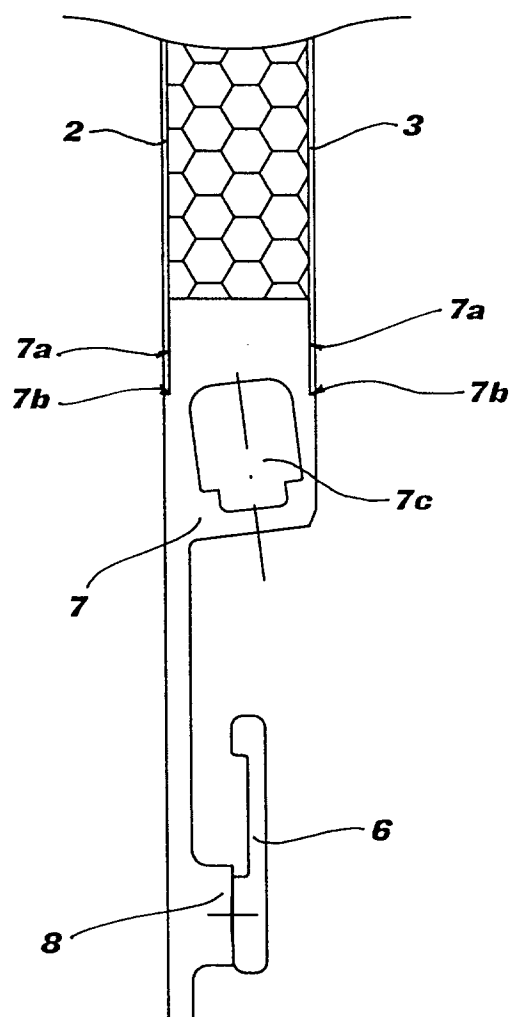
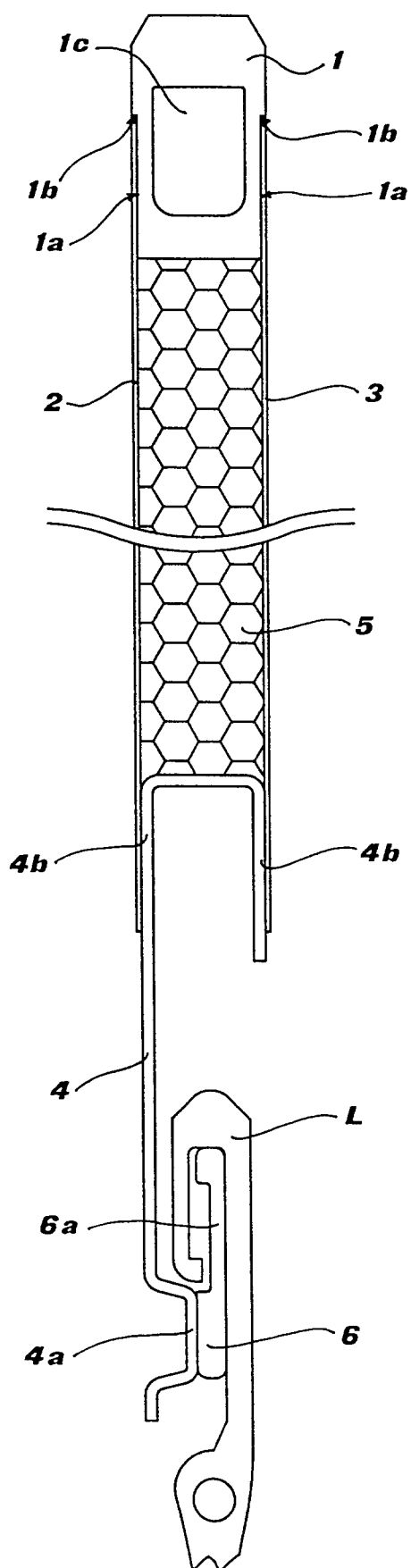


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number
EP 96 11 6603

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.6)
Y A	EP 0 496 054 A (GROB & CO AG) 29 July 1992 * column 2, line 27 - column 3, line 51; figure 1 * ---	1-7,9-15 8	D03C9/06
Y A	EP 0 457 210 A (CARRARA ELIO) 21 November 1991 * column 2, line 49 - column 3, line 51; figures * ---	1-7,9-15 15	
X A	US 4 484 604 A (KRAMER CHARLES F ET AL) 27 November 1984 * column 3, line 59 - column 5, line 9 * ---	1,2,4,7, 10,11 8,9	
A	EP 0 504 102 A (SULZER AG) 16 September 1992 * page 1, line 18 - line 39; figure 3 * ---	1,2,10, 11	
A	EP 0 302 798 A (STEEL HEDDLE MFG CO) 8 February 1989 ---		
A	US 4 633 916 A (RAST JOHN L) 6 January 1987 ---		
A	US 4 404 995 A (BOWEN JAMES B ET AL) 20 September 1983 -----		TECHNICAL FIELDS SEARCHED (Int.Cl.6) D03C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 February 1997	Examiner Rebiere, J-L
CATEGORY OF CITED DOCUMENTS 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 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			

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