

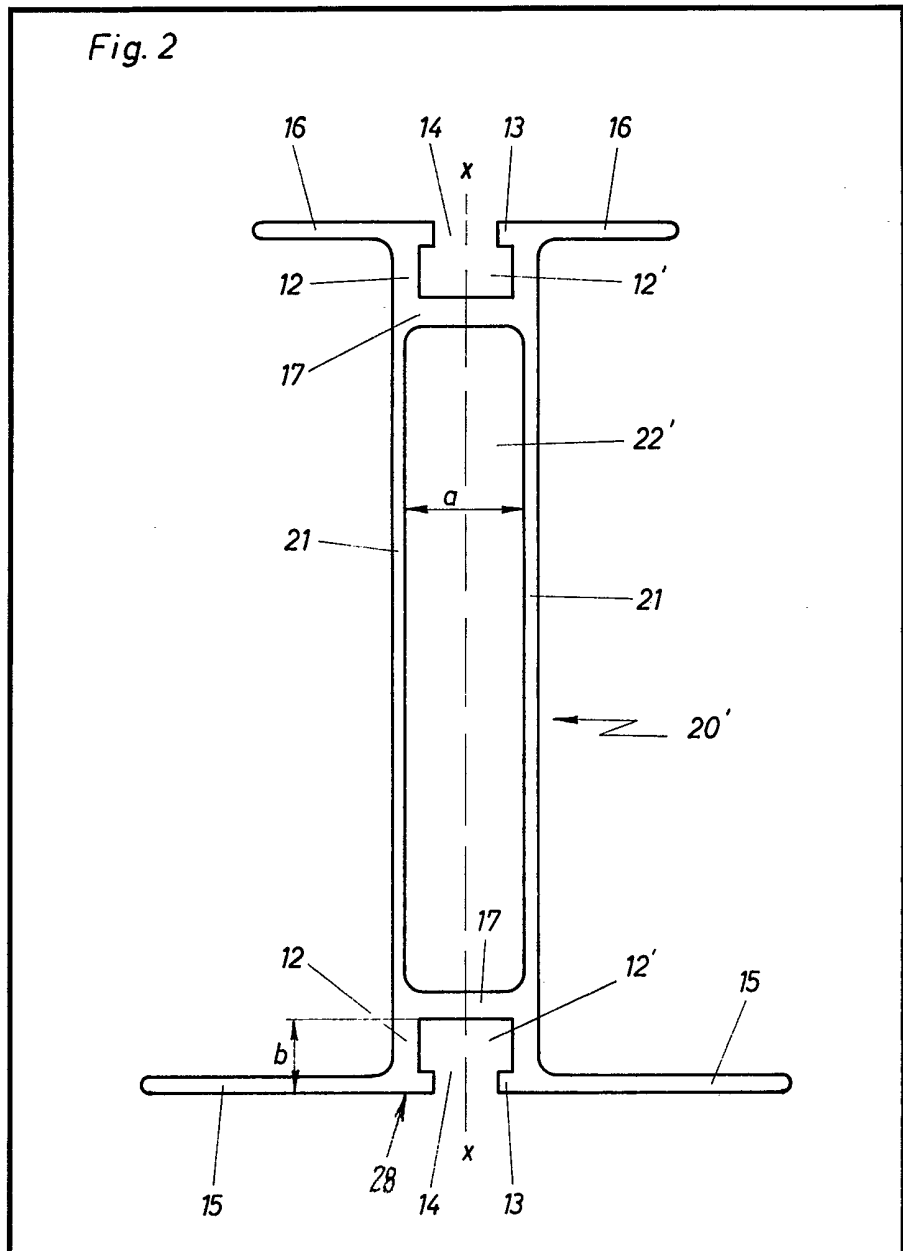
(12) UK Patent Application (19) GB (11) 2 036 150 A

- (21) Application No 7933465
- (22) Date of filing
27 Sep 1979
- (30) Priority data
- (31) 2850545
- (32) 22 Nov 1978
- (33) Fed Rep of Germany (DE)
- (43) Application published
25 Jun 1980
- (51) INT CL³ E04C 3/06
- (52) Domestic classification
E1K 1B1B 1B1F
- (56) Documents cited
GB 2000542A
GB 1462924
GB 1401647
GB 1258252
GB 999443
GB 946174
GB 668485
GB 640087
GB 591110
GB 516694
GB 501414
GB 448178
GB 362575
- (58) Field of search
E1K
E1W
- (71) Applicants
Eberhard Layher
Blankenhornstrasse 17
D-7129 Guglingen-
Eibensbach
Wrttemberg
Federal Republic of
Germany
Ulrich Layher
Im Lailen 16
D-7129 Guglingen-
Eibensbach
Wrttemberg
Federal Republic of
Germany
Ruth Langer
Ochsenbacher Strasse
D-7129 Guglingen-
Eibensbach
Wrttemberg
Federal Republic of
Germany
- (72) Inventors
Eberhard Layher
Ulrich Layher
Ruth Langer
- (74) Agents
Barlow Gillett & Percival

(54) **I-sectioned light metal girder**

(57) The girder, in the form of a light metal extrusion comprises parallel webs 21 disposed symmetrically relative to longitudinal centre plane x-x of the girder to form a rectangular box-like double-web structure which has integral outwardly-projecting flanges 15, 16 along its edges. The flanges may be grooved at 12' to receive adjoin

pieces (Fig. 3) whereby other structural components may be connected to the girder, or two of the girders may be connected to one another.



GB 2 036 150 A

Fig. 1

1/3

2036150

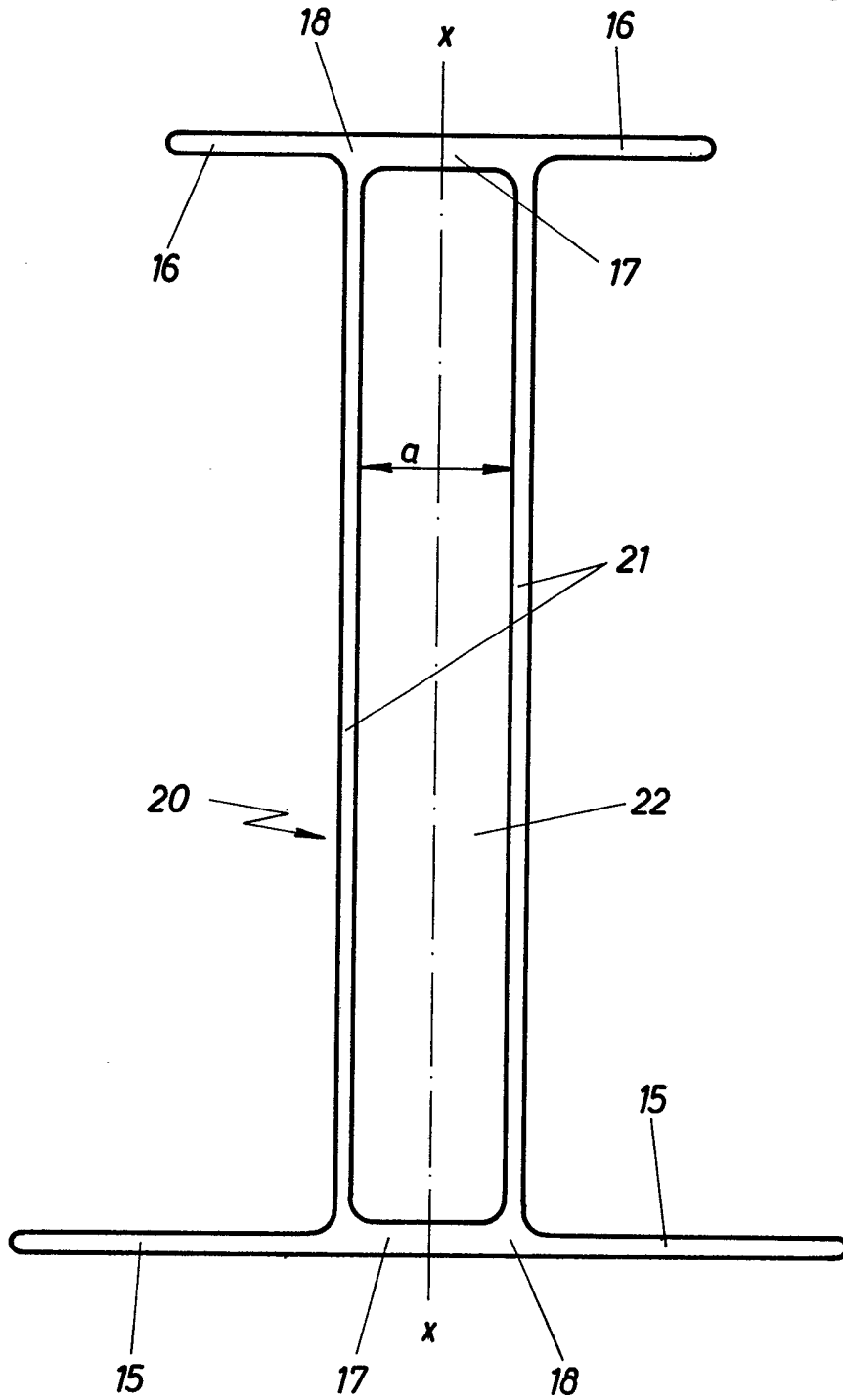


Fig. 2

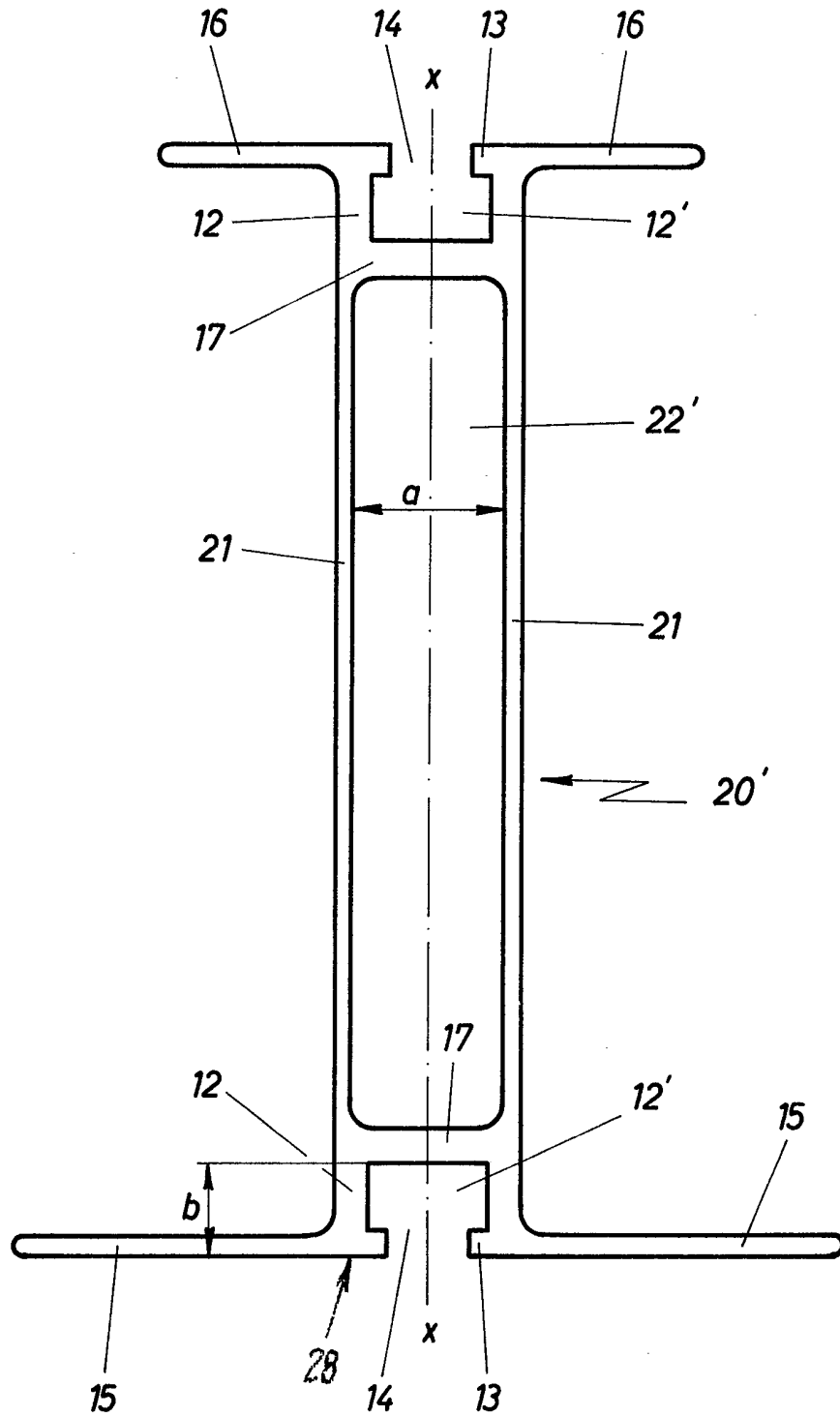
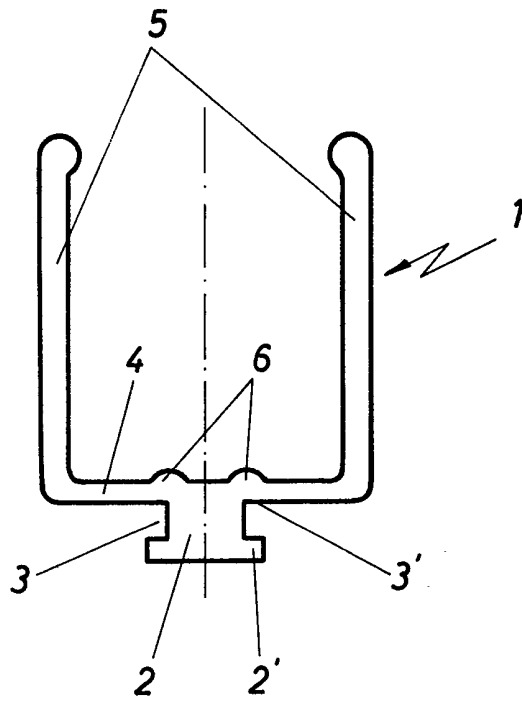


Fig. 3



SPECIFICATION

I-sectioned light metal girder

5 This invention relates to an I-sectioned light metal girder.

To bridge gate entrances, or to provide frameworks or scaffoldings in halls, churches and similar large spaces it is known to use
10 lattice girders made from steel tubes. However, these lattice girders have the disadvantage that they are not laterally stable and as a result of the danger of tilting cannot be installed independently as stiffening or structure.
15 It is also already known to use, for these purposes, T-girders made from steel. Since in this case only one web is present, and this, for reasons of weight saving, additionally is generally of comparatively slight dimensions,
20 the girder has to be strengthened by providing so-called bulkheads which, for example, comprise gusset plates welded in at specific intervals. However, such a procedure is complicated and expensive, apart from the fact
25 that the welding impairs the tensile strength of the material. Moreover, these known girders have the disadvantage of still being quite heavy, so that the handling thereof is quite difficult.

30 The task of the invention is now to provide a girder which, although having a relatively low weight, has the necessary strength.

In accordance with the invention, this problem is solved in that in that it provides an
35 I-sectioned girder, characterised in that it comprises light metal extrusion, in that it comprises, disposed symmetrically relative to its longitudinal central plane and at a spacing from one another, two webs which extend
40 parallel to one another and the corresponding longitudinal edge zones of which are connected by respective longitudinal ledges arranged substantially perpendicularly to the webs, thereby to form a box-shaped double
45 web structure, and in that integral with this box-shaped double web structure, at right angles to the said longitudinal central plane, along the web edges, are respective outwardly-extending flanges.

50 There is thus provided an I-sectioned girder which, although low in weight, has exceptionally great bending strength and tensile strength, thanks to the double web and which, moreover, upon being subject to
55 lateral loading, does not display any risk of buckling or bending of any kind. In addition to this, the girder of the invention has the particular advantage that it is possible to perform bolted connections thereto,
60 perpendicularly to the planes, determined by the flanges, between the two webs, that is to say in the longitudinal central plane of the section, for instance when using the girder for supporting shuttering boards for perpendicular
65 concrete walls. Moreover, the possibility exists

of connecting two of the girders to one another in such a way that in each case one flange of the one girder rests securely on a flange of the other section, whereby of course
70 a considerably higher carrying capacity of the resultant structure is achieved.

More especially in the latter case, it may possibly be disadvantageous if screw heads or nuts protrude at the flange surfaces. In order
75 to avoid this difficulty, in a further development of the invention there is provided, in the flanges, a respective groove, pointing in the direction of the respective web and which is outwardly open. These grooves can, for example
80 accommodate screw heads or nuts in such a way that they do not project beyond the planes determined by the flanges. Advantageously each groove is so dimensioned that, on the one hand, the outer surfaces of the two
85 webs and, on the other hand, the outer surfaces of the walls forming the grooves form respective planar surfaces extending from flange to flange. To increase strength, the side walls forming the grooves, and the ledges
90 connecting the webs can each have a greater thickness than the webs and the flanges.

It is particularly advantageous if each groove is provided towards the outside, at
95 both sides, with a narrow lip which projects by a slight amount into the groove, so that, as outward exit from the groove, a slot arises which is somewhat narrower than the width of the groove. In this way, the groove is given a
100 T-shaped cross-section, in which the two lips can serve as abutments for the head of a hammerbolt. Also a groove designed in this way can be utilised for the insertion of additional element provided with corresponding connecting means.

105 Such an additional element can for example be U-shaped in design and be provided, at its base web, which connects the two sides of the U, with a T-shaped outwardly-pointing adjoint-piece which is of such dimensions that
110 it can be inserted positively into the grooves provided on the flange side of the I-girder. Thus the possibility exists, if necessary, of using such an additional element to suspend the claws of planks or frame panels serving as
115 walkway or working surface.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

120 *Figure 1* is an end view of a first embodiment of the girder having a double web in accordance with the invention;

Figure 2 is a view, similar to Fig. 1, illustrating a second embodiment having longitudinal grooves therein; and

125 *Figure 3* is an end view of a U-sectioned additional element having an adjoint-piece for introduction into one or the other of the grooves of the I-sectioned girder of Fig. 2.

In Fig. 1 an I-sectioned girder 20 comprises
130 two webs 21 which extend at the spacing a

from one another parallel to and disposed symmetrically relative to the longitudinal central plane, indicated by the dot-dash line x-x, of the section 20. The webs 21 are connected to one another at their ends in each case by ledges 17, so that a rectangularly-profiled box-shaped double-web structure, having an inner space 22, arises. Situated along the edges 18 of this box-shaped structure, or of the webs 21 respectively, are outwardly-pointing flanges 15 or 16. To increase overall strength, in the illustrated case the ledges 17 are somewhat thicker in design than the outwardly-pointing flanges 15 and 16.

Shown in Fig. 2 is an I-sectioned girder 20' which is provided, at the two sides which carry the flanges 15, 16 with respective grooves 12'. The two side walls 12 forming each said groove are so arranged that their outer surfaces extend in the same plane as the outer surfaces of the two webs 21 which extend parallel to the longitudinal central plane indicated by the dot-dash line x-x and which are arranged at a spacing *a* from one another. The wall thickness of each side wall 12 is somewhat greater than the wall thickness of the webs 21. Because each ledge 17, is offset inwardly by a specific amount *b* from the outer surface 28 of the adjacent flange and at the same time forms the base surface of the respective groove 12', the interior space between the two webs 21 is closed off in such a way that a box-shaped interior space 22' arises similarly to that of the I-sectioned girder 20 in Fig. 1. Each ledge 17 has, like the side walls 12, a greater material thickness than, for example, the flanges 15 and 16, or the webs 21.

Provided along the outer edge of each groove 12' are lips 13 which extend along the entire length of the groove and which protrude by a certain slight amount towards the interior of the groove 12', so that there arises between them a longitudinal slot 14, the width of which is less than the width of the groove. Thus the possibility exists on the one hand of introducing into the ledges 17, forming the base surfaces of the groove 12' coaxial bores through which, for example, threaded rods can be engaged, for instance in order to connect a pair of girders for supporting opposed shuttering in the formation of a concrete wall. In this case, screw heads or nuts can be accommodated in the grooves 12', without their protruding beyond the outer surfaces of the flanges 15, 16. On the other hand, one can, without difficulty, for example, insert hammerbolts, or hammer-head screws, into the grooves and use these to bolt any desired constructional elements to the girder, with the heads of the hammerbolts butting from the insides of the grooves against the lips 13.

Finally, the possibility also additionally exists of securing appropriately-designed supple-

mentary elements, for example U-sections provided with a T-shaped adjoint-piece, in the grooves 12'. One such additional element is shown as an example in Fig. 3. This additional element, which can for example serve for suspension of claws provided on scaffolding frame boards or scaffolding planks, consists of a U-shaped section 1, on base web 4 of which there is disposed an adjoint-piece 2 which has a T-shaped section, in such a way that on both sides a flange-like ledge 2' is provided. Between the outer surface of the base web 4 and this ledge 2' there then arises, on both sides, a respective groove 3. Advantageously this adjoint-piece 2 is of such dimensions that it can be inserted positively into one or the other of the grooves 12' of the girder 20' and is secured there by the lip 13 which project into the groove 3. To increase strength, longitudinally-extending boards 6 can be provided on the inside of the base web 4 opposite the inner edges 3' of the grooves 3. Of course, such an additional element 1 can be secured in its position by providing bores in the side walls 12 forming the grooves 12', at specific intervals, which bores make possible screwed or bolted connections between the I-girder 20' and the additional element 1. The two flanges 5, pointing outwardly perpendicularly to the flanges 15 or 16 respectively, of the additional element then make possible for example the suspension of the claws present on frame boards or planks serving as a walk-way or a working surface.

Advantageously the bores serving for the screwing or bolting can be provided both in the ledges 17 and in the side walls 12 of the grooves 12', in standardised form at uniform intervals.

If, in the case of very great spans, two of the I-sectioned girders are to be connected together by a butt joint, then in this case the possibility exists of introducing a suitable connecting piece, for instance in the shape of a flat metal strip or a T-section, into the grooves 12' of the two I-sectioned girders to be joined, and of securing them by screws or bolts. In this way the girders can be connected securely and reliably to one another.

CLAIMS

1. An I-sectioned girder, characterised in that it comprises a light metal extrusion, in that it comprises, disposed symmetrically relative to its longitudinal central plane at a spacing from one another, two webs which extend parallel to one another and the corresponding longitudinal ledges arranged substantially perpendicularly to the webs thereby to form a box-shaped double web structure, and in that integral with said box-shaped double web structure, at right angles to the said longitudinal central plane, along the web edges, are respective outwardly-extending

flanges.

2. A girder as claimed in claim 1, characterised by the provision, in the flanges, of a respective groove which points towards the respective web and which is outwardly open.

3. A girder as claimed in claim 2, characterised in that the outer surfaces of the two webs and of the outer walls forming the grooves from respective planar surfaces extending from flange to flange.

4. A girder as claimed in claim 2 or 3 characterised in that the side walls forming the grooves, and the ledges connecting the webs, each have a greater material thickness than the webs and the flanges.

5. A girder as claimed in claim 2, 3 or 4 characterised in that the girder is provided with an exchangeable additional element which is insertable, by means of an adjacent-piece, of T-shaped profile, into the grooves provided in the flanges.

6. A girder as claimed in any preceding claim, characterised in that the ledges connecting the webs, and/or the side walls of the grooves (when provided) are provided at uniform intervals with bores.

7. A girder substantially as hereinbefore described with reference to and as illustrated in Fig. 1, in Fig. 2, or in Figs. 2 and 3 of the accompanying drawings.