

(19)



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(11)

**EP 0 761 134 B1**

(12)

**EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention  
of the grant of the patent:  
**05.06.2002 Bulletin 2002/23**

(51) Int Cl.7: **A47B 96/02**

(21) Application number: **96113830.2**

(22) Date of filing: **29.08.1996**

(54) **Shelf, particularly for metal sets of shelves**

Regal, insbesondere für Metallregaleinheiten

Etagère, en particulier pour des unités d'étagères métalliques

(84) Designated Contracting States:  
**AT BE CH DE ES FR GB GR IT LI LU NL PT**  
Designated Extension States:  
**SI**

(30) Priority: **06.09.1995 IT PD950075 U**

(43) Date of publication of application:  
**12.03.1997 Bulletin 1997/11**

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(56) References cited:  
**BE-A- 781 831 DE-U- 9 307 955**  
**DE-U- 29 501 559 US-A- 3 643 607**

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## Description

**[0001]** The present invention relates to a shelf, particularly but not exclusively useful for metal sets of shelves. BE-A-781 831 discloses a shelf having a combination of structural elements as defined in the appended claim 1.

**[0002]** Metal sets of shelves of various shapes, models, and sizes are currently increasingly widespread and are particularly useful both in the industrial field and in household appliances.

**[0003]** These metal sets of shelves have the advantage of rather good overall lightness combined with high mechanical strength.

**[0004]** Especially in the industrial and commercial fields, however, constant research is in progress to produce metal sets of shelves wherein the shelves, despite maintaining excellent lightness characteristics, achieve ever better mechanical load resistance characteristics.

**[0005]** A variety of structural reinforcements has been conceived for this purpose, ranging from various kinds of folding of the edges of the shelves to the application of auxiliary reinforcements constituted substantially by longitudinal profiles or tubular elements fixed below said shelves.

**[0006]** As regards the shaping of the edges of the shelves, one or more edges are currently conventionally folded so as to form a box-like reinforcement having a quadrangular cross-section, the edge flap whereof is welded, usually by spot welding, to the lower surface of the corresponding shelf.

**[0007]** Practical experience and structural studies conducted on these reinforcements have shown that the spot welds are subjected, during operation, to shearing tensions that cause the breakage of the spot welds in the presence of particularly heavy loads.

**[0008]** As regards auxiliary reinforcements, they are currently constituted, as described above, by longitudinal elements that are usually supported by appropriately shaped edges of the shelf.

**[0009]** The most commonly used cross-section is omega-shaped, with its base wings arranged against the upper surface of the shelf.

**[0010]** A negative consequence thereof is the tendency of the wings to open out when the shelf is loaded.

**[0011]** Longitudinally arranged reinforcement elements, furthermore, are also generally fixed by welding, with the consequent mentioned problems.

**[0012]** The aim of the present invention is to solve the described drawbacks of conventional models of sets of shelves, particularly by providing a shelf that offers a high ratio between mechanical strength and weight.

**[0013]** Accordingly, an object of the present invention is to provide a shelf the production whereof does not require welds with their corresponding drawbacks.

**[0014]** Another object of the present invention is to provide a shelf that can be produced in a wide variety of models and dimensions, and the structure whereof

can be adapted to the different requirements to which it can be assigned.

**[0015]** Another object of the present invention is to provide a shelf in which any auxiliary reinforcement means can be applied in a stable manner and easily without however having position-shifting problems.

**[0016]** Another object of the present invention is to provide a shelf that can be installed easily and the manufacture whereof does not require specialized labor.

**[0017]** In accordance with the invention, there is provided a shelf as defined in the appended claims.

**[0018]** The particular characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a perspective view of the shelf according to the present invention, taken from below;

figure 2 is a view of a detail of the shelf according to the invention;

figure 3 is an exploded view of another detail of the shelf of figure 1;

figure 4 is a sectional view of the shelf of figure 1;

figure 5 is a partially sectional lateral view of the shelf of figure 1 during a step of its production.

**[0019]** With particular reference to figures 1 to 5, a shelf, particularly for metal sets of shelves, of the type obtained by cutting and plastic deformation from metal plate, according to the invention, is generally designated by the reference numeral 10.

**[0020]** In the shelf 10 there are provided edge regions 11 of two mutually opposite reinforcement sides 12, each edge region being shaped so as to form three parallel longitudinal folds 13, 14, and 15, forming a corresponding structural reinforcement designated by the reference numeral 16.

**[0021]** The structural reinforcement 16 has a cross-section shaped like a right-angled triangle with one side 17 parallel to said shelf 10.

**[0022]** A fourth fold 18 of the free end 19 of each one of the edge regions 11 forms an edge flap 20 that abuts against the lower surface of the shelf 10.

**[0023]** In this embodiment, the reinforcement sides 12 correspond to the longer sides of the shelf 10, which has a rectangular shape.

**[0024]** The shelf 10 also comprises two complementary sides 21, in this case the shorter sides, that are C-shaped and have their concavities 22 directed inwards.

**[0025]** Each one of the complementary sides 21 has a corresponding edge flap 23; means for anchoring to a corresponding structural reinforcement 16 are formed at the ends of said edge flap 23 and are constituted in this case by two tabs 24 formed by cutting.

**[0026]** More specifically, each one of the two tabs 24 is formed at one of the ends of the corresponding edge flap 23; upon assembly, it is deformed so as to enter a

through hole 25, formed in a flap 26 that corresponds to the side 17, and lock therein.

**[0027]** Each one of the structural reinforcements 16 furthermore comprises a flap 27 that is perpendicular to the shelf 10 and a diagonal flap 28 that ends at the inner part of the fold 13, which forms the flap 27 with respect to the shelf 10.

**[0028]** The shelf 10, in this embodiment, also comprises auxiliary reinforcement means constituted by three identical longitudinal supporting elements 29.

**[0029]** Each one of the supporting elements 29 has a cross-section that is shaped like an isosceles trapezoid and is open at the shorter parallel side, designated by the reference numeral 30.

**[0030]** The open side of each one of the supporting elements 29 that corresponds to the shorter parallel side 30 is in contact, upon assembly, with the lower surface of the shelf 10.

**[0031]** Furthermore, the corresponding ends of each one of the supporting elements 29 are inserted in, and supported by, the complementary sides 21.

**[0032]** More specifically, each one of the supporting elements 29 is shaped so as to form, at each one of its ends and at the surface corresponding to the longer parallel side 31, a seat 32 that is formed by plastic deformation and in which a corresponding stud 33, also formed by plastic deformation in the corresponding edge flap 23 of a corresponding complementary side 21, fits upon assembly.

**[0033]** The longitudinal opening of the shorter parallel side 30 has curled edges so as to form two opposite and substantially parallel flaps 34 directed towards the inside of the supporting element 29.

**[0034]** The isosceles-trapezoid shape of the supporting element 29 and its particular arrangement below the shelf 10 causes it to tend to close, with a consequent increase in strength, as the load increases.

**[0035]** As regards the execution of the structural reinforcements 16, with particular reference to figure 5, each reinforcement is formed by providing the folds 18, 13, 14, and 15 according to a preset sequence.

**[0036]** More specifically, the folds 14 and 15 and part of the fold 18 are formed simultaneously.

**[0037]** The fold 18 is in fact completed only after forming the fold 13.

**[0038]** In practice it has been observed that the present invention has achieved the intended aim and objects.

**[0039]** In particular, it should be noted that the structural reinforcements of the sides, besides not requiring any kind of welding for their production, close spontaneously, by virtue of their particular shape, as the load carried by the corresponding shelf increases.

**[0040]** It should also be noted that they are easy to manufacture in the technological field, since said structural reinforcements can be obtained substantially by folding.

**[0041]** Mention should also be made of the obvious

economic advantages as regards both the elimination of troublesome welding operations and the short production times required by the shelf according to the invention.

**[0042]** It should also be noted that the auxiliary reinforcement means that can optionally be used in the shelf according to the invention can be placed very easily by the operator but at the same time have extreme positional stability even if they are subjected to considerable and intense loading and unloading cycles of the corresponding shelf.

**[0043]** The present invention is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

**[0044]** All the details may furthermore be replaced with other technically equivalent elements.

**[0045]** The materials and the dimensions may be any according to the requirements.

**[0046]** Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. A shelf (10), particularly for metal sets of shelves of the type produced by cutting and plastic deformation from metal plate, each one of the edge regions (11) of at least two mutually opposite reinforcement sides (12) of the shelf (10) being shaped so as to form three longitudinal parallel folds (13,14,15), forming a structural reinforcement (16) having a cross-section and in which one side (17) is parallel to said shelf (10), a fourth fold (18) of the free end (19) of each one of said two edge regions (11) forming an edge flap (20) that abuts against the lower surface of said shelf (10), the shelf (10) further comprising two sides (21) that are complementary to said reinforcement sides (12) and are C-shaped with their concavity (22) directed inwards, the shelf (10) being **characterized in that** said cross-section of said structural reinforcement (16) is triangular with a flap (27) lying at right angles to said shelf (10) and a flap (28) that is diagonal to said shelf (10), said diagonal flap (28) ending at the inner part of the fold (13) that forms said plane (27) that is perpendicular to said shelf (10), and said fourth fold (18) being arranged at said fold (13) that forms said plane (27) perpendicular to said shelf (10), and said edge flap (20) that abuts against the lower surface of said shelf (10) extends from said fourth fold (18) and is not welded to said lower surface of said shelf (10) such that the particular shape of said structural reinforcement (16) obtained substantially by folding

closes spontaneously as the load carried by the shelf (10) increases.

2. A shelf (10) according to claim 1, **characterized in that** each one of said complementary sides (21) has said corresponding edge flap (23) in which means (24) are formed for anchoring to a corresponding said structural reinforcement (16). 5
3. A shelf (10) according to claim 2, **characterized in that** said anchoring means comprise, at one of the ends of the edge flaps (23) of said complementary sides (21), a tab (24) that is formed by cutting said edge flap (23) and is deformed, upon assembly, so as to enter a through hole (25) formed in the flap (20) of said structural reinforcement (16) that is parallel to said shelf (10) and provide a locking action. 10 15
4. A shelf (10) according to claim 2, **characterized in that** it comprises auxiliary reinforcement means (29). 20
5. A shelf (10) according to claim 4, **characterized in that** said auxiliary reinforcement means comprise at least one longitudinal supporting element (29) having a cross-section that is shaped like an isosceles trapezoid and is open at the shorter parallel side (30), which upon assembly is in contact with the lower surface of said shelf (10), said at least one supporting element (29) having its ends inserted in, and supported by, said complementary sides (21). 25 30
6. A shelf (10) according to claim 5, **characterized in that** said at least one supporting element (29) comprises, at each one of its ends, and at the surface corresponding to the longer parallel side (31), a seat (32) formed by plastic deformation and in which a corresponding stud (33), formed by plastic deformation in the corresponding edge flap (23) of a corresponding complementary side (21), fits upon assembly. 35 40
7. A shelf (10) according to claim 5, **characterized in that** the longitudinal opening of said shorter parallel side (30) has curled edges so as to form two opposite and substantially parallel flaps (34) that are directed towards the inside of said at least one supporting element (29). 45

#### Patentansprüche

1. Regal (10), insbesondere für Metaliregalsätze des Typs, der durch Schneiden und plastische Verformung aus einer Metallplatte hergestellt wird, wobei jeder der Kantenbereiche (11) von mindestens zwei zueinander entgegengesetzten Verstärkungsseiten (12) des Regals (10) so geformt ist, daß drei 55

parallele Längsfalze (13, 14, 15) ausgebildet sind, die eine sbührelle Verstärkung (16) mit einem Querschnitt bilden, und wobei eine Seite (17) zum Regal (10) parallel ist, wobei ein vierter Falz (18) des freien Endes (19) von jedem der zwei Kantenbereiche (11) einen Kantenflügel (20) bildet, der an der unteren Oberfläche des Regals (10) anliegt, wobei das Regal (10) ferner zwei Seiten (21) umfaßt, die zu den Verstärkungsseiten (12) komplementär sind und C-förmig sind, wobei ihre Konkavität (22) nach innen gerichtet ist, wobei das Regal (10) **dadurch gekennzeichnet ist, daß** der Querschnitt der strukturellen Verstärkung (16) dreieckig ist mit einem Flügel (27), der in rechten Winkeln zum Regal (10) liegt, und einem Flügel (28), der zum Regal (10) diagonal liegt, wobei der diagonale Flügel (28) am inneren Teil des Falzes (13) endet, der die Ebene (27) bildet, die zum Regal (10) senkrecht ist, und der vierte Falz (18) am Falz (13) angeordnet ist, der die Ebene (27) bildet, die zum Regal (10) senkrecht ist, und der Kantenflügel (20), der an der unteren Oberfläche des Regals (10) anliegt, sich vom vierten Falz (18) erstreckt und nicht an die untere Oberfläche des Regals (10) geschweißt ist, so daß sich die spezielle Form der strukturellen Verstärkung (16), die im wesentlichen durch Faltung erhalten wird, spontan schließt, wenn die vom Regal (10) getragene Last zunimmt.

2. Regal (10) nach Anspruch 1, **dadurch gekennzeichnet, daß** jede der komplementären Seiten (21) den entsprechenden Kantenflügel (23) aufweist, in dem eine Einrichtung (24) zum Verankern an einer entsprechenden strukturellen Verstärkung (16) ausgebildet ist.
3. Regal (10) nach Anspruch 2, **dadurch gekennzeichnet, daß** die Verankerungseinrichtung an einem der Enden der Kantenflügel (23) der komplementären Seiten (21) einen Vorsprung (24) umfaßt, der durch Schneiden des Kantenflügels (23) ausgebildet wird und bei der Montage verformt wird, um in ein Durchgangsloch (25) einzutreten, das in dem Flügel (20) der strukturellen Verstärkung (16), der zum Regal (10) parallel ist, ausgebildet ist, und eine Verriegelungswirkung bereitzustellen.
4. Regal (10) nach Anspruch 2, **dadurch gekennzeichnet, daß** es eine Hilfsverstärkungseinrichtung (29) umfaßt. 50
5. Regal (10) nach Anspruch 4, **dadurch gekennzeichnet, daß** die Hilfsverstärkungseinrichtung mindestens ein Längsstützelement (29) mit einem Querschnitt umfaßt, der wie ein gleichschenkliges Trapez geformt ist und an der kürzeren parallelen Seite (30) offen ist, welche nach der Montage mit der unteren Oberfläche des Regals (10) in Kontakt

steht, wobei das Ende des mindestens einen Stützelements (29) in die komplementären Seiten (21) eingesetzt ist und von diesen abgestützt wird.

6. Regal (10) nach Anspruch 5, **dadurch gekennzeichnet, daß** das mindestens ein Stützelement (29) an jedem seiner Enden und an der Oberfläche, die der längeren parallelen Seite (31) entspricht, einen Sitz (32) umfaßt, der durch plastische Verformung ausgebildet wird und in den sich eine entsprechende Nase (33), die durch plastische Verformung im entsprechenden Kantenflügel (23) einer entsprechenden komplementären Seite (21) ausgebildet wird, bei der Montage einfügt. 5
7. Regal (10) nach Anspruch 5, **dadurch gekennzeichnet, daß** die Längsöffnung der kürzeren parallelen Seite (30) gekrümmte Kanten aufweist, um zwei gegenüberliegende und im wesentlichen parallel Flügel (34) auszubilden, die zur Innenseite des mindestens einen Stützelements (29) gerichtet sind. 10 15 20

#### Revendications

1. Une tablette (10), particulièrement pour des jeux métalliques de tablettes du type fabriqué par découpe et déformation plastique de plaque métallique, chacune des zones de bord (11) d'au moins deux faces de renforcement (12) mutuellement opposées de la tablette (10) présentant une configuration de sorte à former trois plis longitudinaux parallèles (13,14,15) en formant un renforcement structurel (16) présentant une section transversale et dans lequel une face (17) est parallèle à ladite tablette (10), un quatrième pli (18) de l'extrémité libre (19) de chacune desdites deux zones de bord (11) formant un volet de bord (20) qui vient en butée contre la surface inférieure de ladite tablette (10), la tablette (10) comprenant en outre deux faces (21) qui sont complémentaires desdites faces de renforcement (12) et sont en forme de C avec leur concavité (22) dirigée vers l'intérieur, la tablette (10) étant **caractérisée en ce que** ladite section transversale dudit renforcement structurel (16) est triangulaire avec un volet (27) situé à angle droit par rapport à ladite tablette (10) et un volet (28) qui est diagonal par rapport à ladite tablette (10), ledit volet diagonal (28) se terminant sur la partie intérieure du pli (13) qui forme ledit plan (27) qui est perpendiculaire à ladite tablette (10) et ledit quatrième pli (18) étant disposé sur ledit pli (13) qui forme ledit plan (27) perpendiculaire à ladite tablette (10), et **en ce que** ledit volet de bord (20) qui vient en butée contre la face inférieure de ladite tablette (10) s'étend depuis ledit quatrième pli (18) et n'est pas soudée à ladite surface inférieure de ladite tablette (10), de sorte 30 35 40 45 50 55

que la forme particulière dudit renforcement structurel (16) obtenue pour l'essentiel par pliage se referme spontanément lorsque la charge portée par la tablette (10) augmente.

2. Une tablette (10) selon la revendication 1, **caractérisée en ce que** chacune desdites faces complémentaires (21) comporte ledit volet de bord correspondant (23) dans lequel sont formés des moyens (24) pour l'ancrage audit renforcement structurel correspondant (16).
3. Une tablette (10) selon la revendication 2, **caractérisée en ce que** lesdits moyens d'ancrage comprennent, à l'une des extrémités des volets de bord (23) desdites faces complémentaires (21), une languette (24) qui formée en découpant ledit volet de bord (23) et qui est déformée, à l'assemblage, de façon à pénétrer dans un trou traversant (25) formé dans le volet (20) dudit renforcement structurel (16) qui est parallèle à ladite tablette (10) et assure un effet de verrouillage.
4. Une tablette (10) selon la revendication 2, **caractérisée en ce qu'elle** comprend des moyens auxiliaires (29) de renforcement. 25
5. Une tablette (10) selon la revendication 4, **caractérisée en ce que** lesdits moyens auxiliaires de renforcement comprennent au moins un élément longitudinal de support (29) dont la section transversale est en forme de trapèze isocèle et est ouverte sur la face parallèle la plus courte (30), qui après assemblage est en contact avec la surface inférieure de ladite tablette (10), ledit au moins un élément de support (29) ayant ses extrémités insérées dans, et supportées par, lesdites faces complémentaires (21).
6. Une tablette (10) selon la revendication 5, **caractérisée en ce que** ledit au moins un élément de support (29) comprend, à chacune de ses extrémités, et sur la surface correspondant à la face parallèle la plus longue (31), un siège (32) formé par déformation plastique et dans lequel se loge à l'assemblage, un tenon correspondant (33), formé par déformation plastique dans le volet de bord correspondant (23) d'une face complémentaire correspondante (21).
7. Une tablette (10) selon la revendication 5, **caractérisée en ce que** l'ouverture longitudinale de ladite face parallèle plus courte (30) présente des bords recourbés, de façon à former deux volets (34) opposés et sensiblement parallèles, qui sont dirigés vers l'intérieur dudit au moins un élément de support (29).



