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(54) **METALLIC FRAME FOR CHAIRS WITH TUBULAR ELEMENTS**

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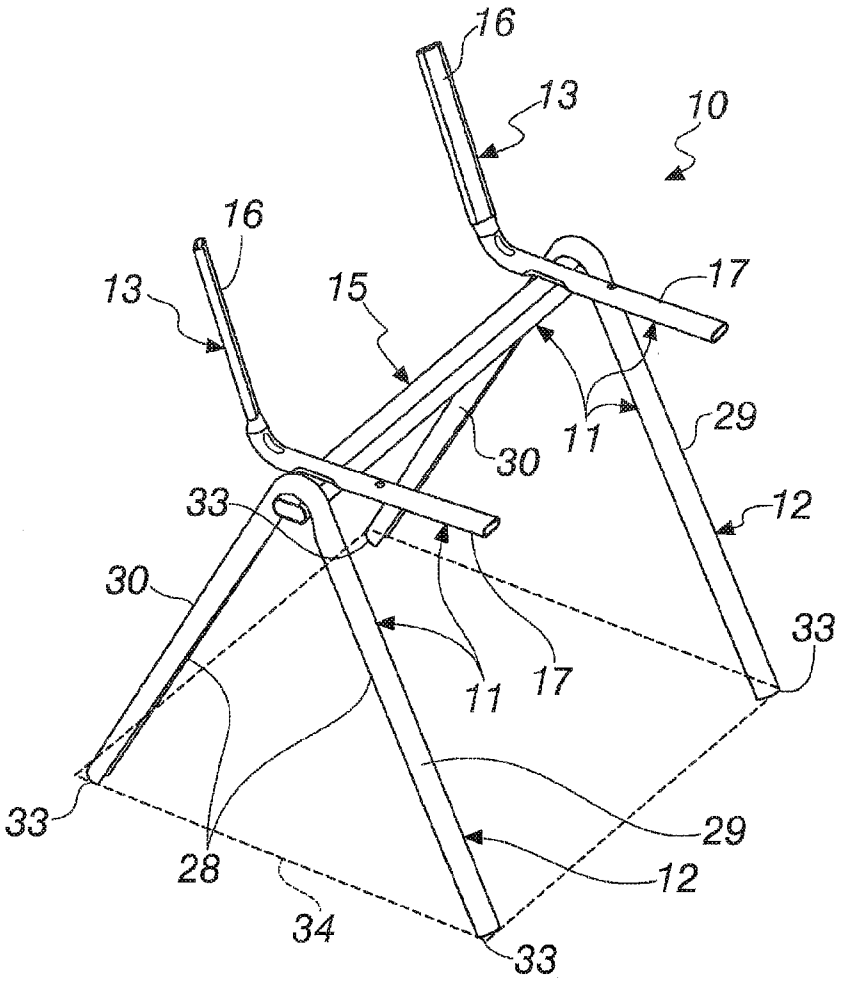
(57) **ABSTRACT**

A metallic frame for chairs with tubular elements, comprising two inverted V-shaped elements that form the legs of a chair, which are parallel and joined substantially at their inside curvature to a rod-like crossmember, two L-shaped elements connected by the crossmember on which they are arranged in a parallel configuration so as to form a support for the back and for the seat, respectively with their first portions, which are substantially vertical, and second portions, which are substantially horizontal.



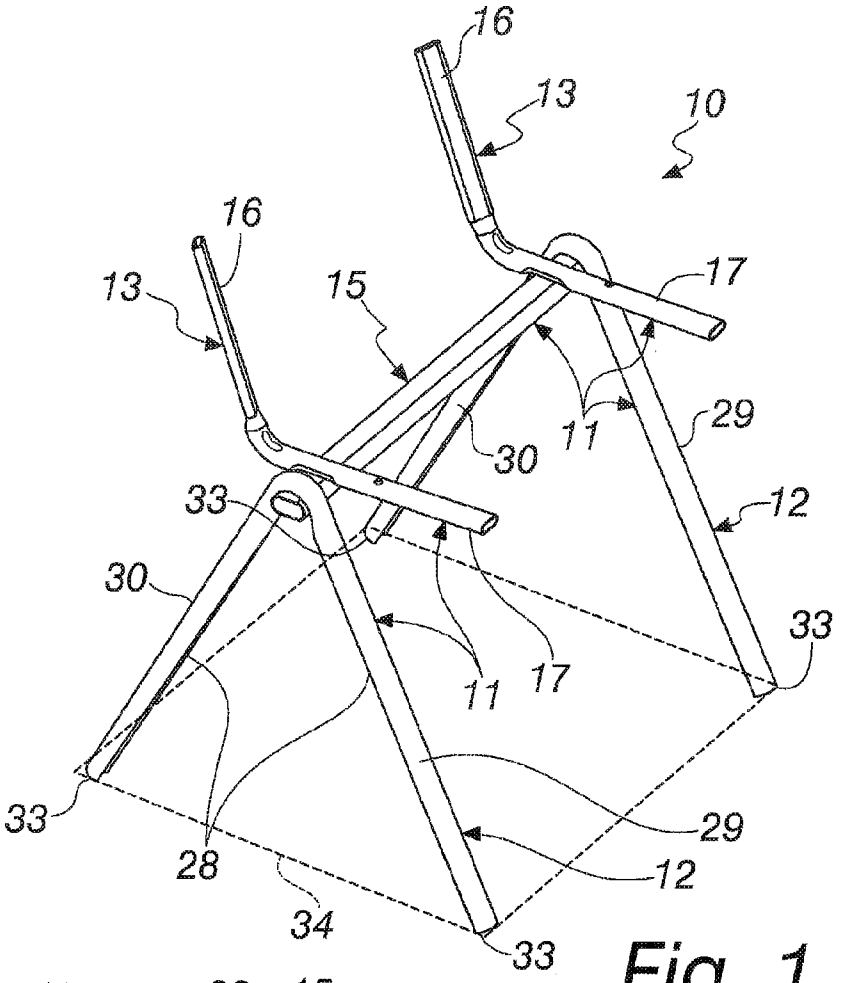

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Fig. 1

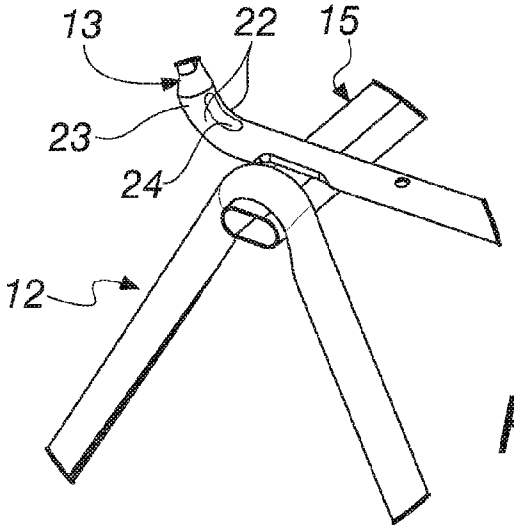
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Fig. 2

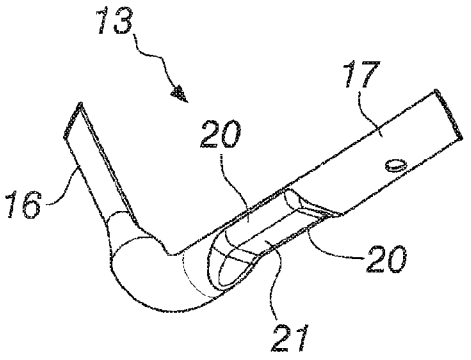

Fig. 3

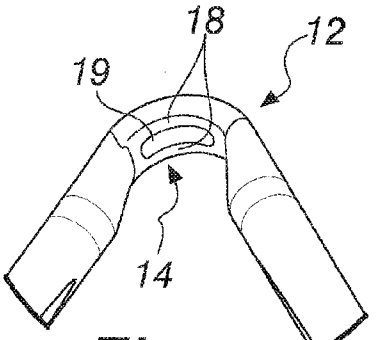

Fig. 4

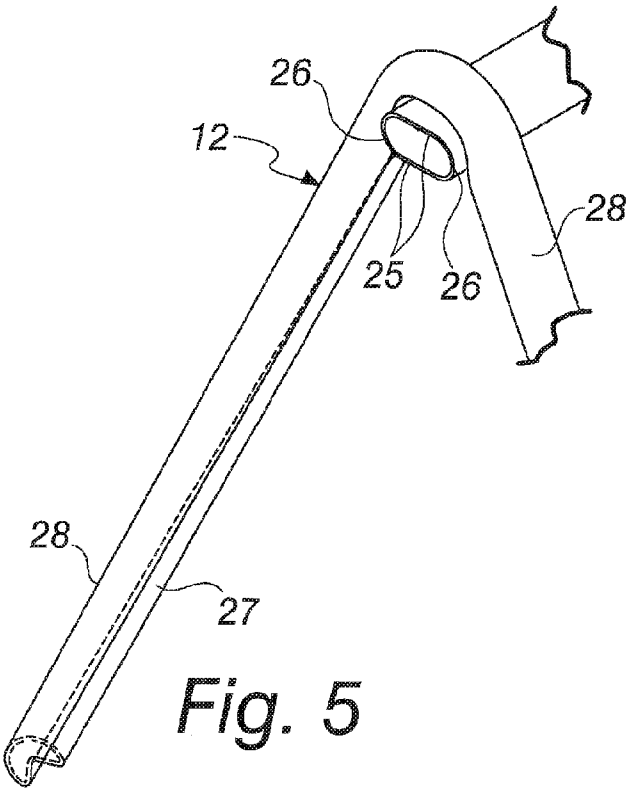

Fig. 5

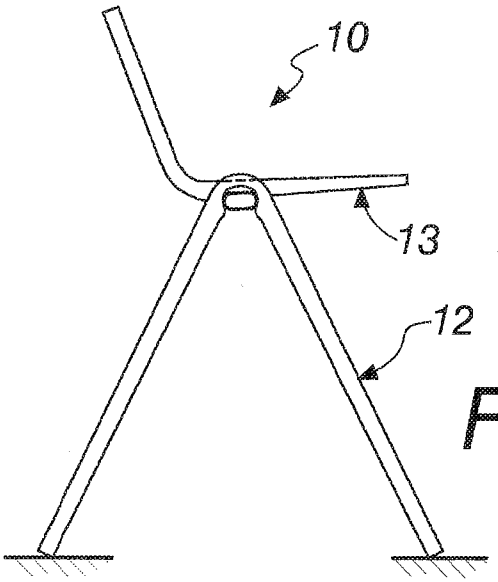

Fig. 6

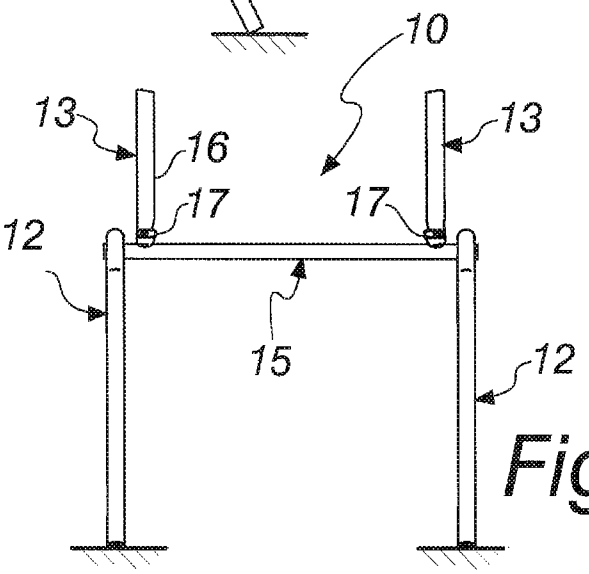

Fig. 7

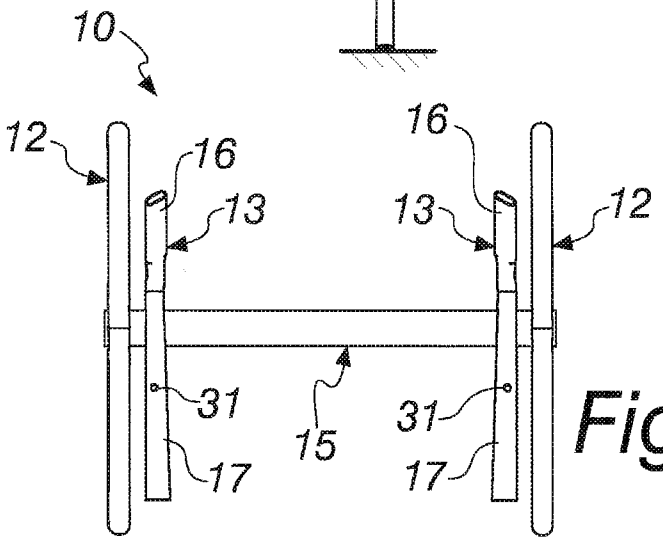

Fig. 8

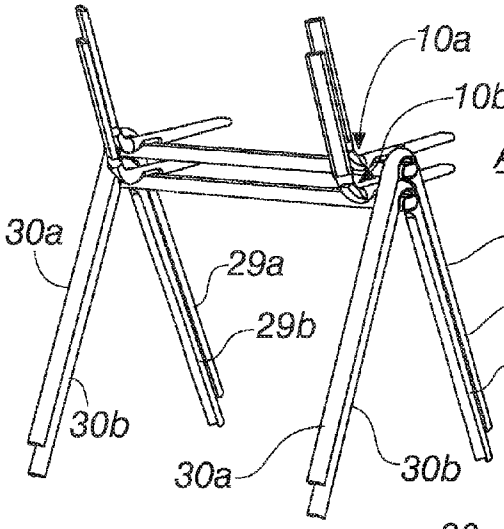

Fig. 9

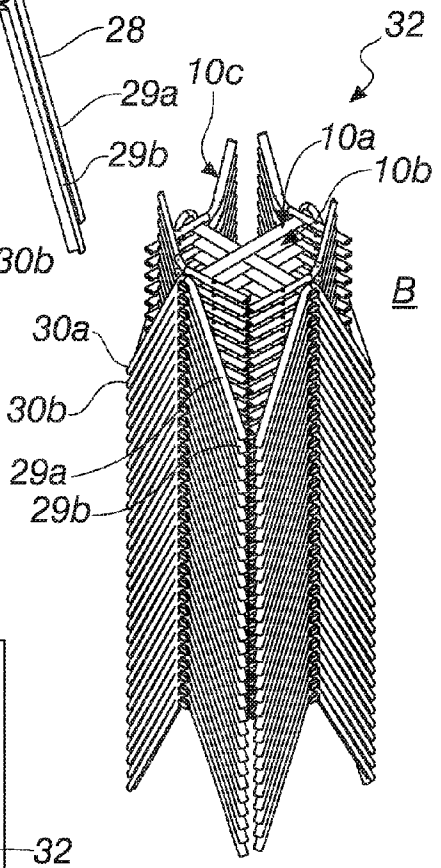

Fig. 10

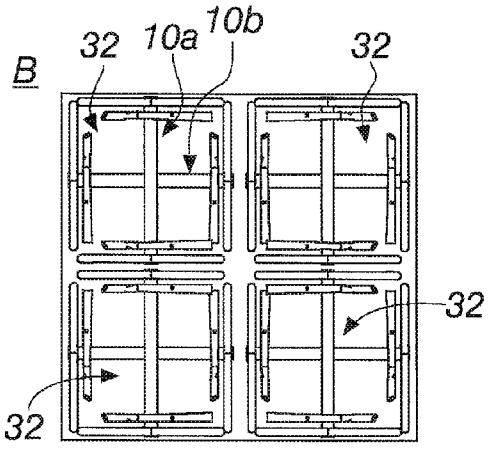

Fig. 11

METALLIC FRAME FOR CHAIRS WITH TUBULAR ELEMENTS

[0001] The present invention relates to a metallic frame for chairs with tubular elements.

[0002] Chairs with welded tubular elements are currently widespread which are of the type comprising two inverted U-shaped elements that form the legs, two L-shaped elements that form a support for the back and the seat, and two horizontal and mutually parallel rod-like crossmembers that join the inverted U-shaped elements and the L-shaped elements.

[0003] These elements are often joined by gas welding with the addition of material, and this entails rather long times to be dedicated to the assembly of the chairs and the consumption of added material for welding, as well as associated high costs.

[0004] A solution aiming at overcoming these drawbacks is proposed with the teaching contained in WO02054913 in the name of this same Applicant. This application proposes to replace welding with added material with welding of the projection type, thus reducing production costs and times in addition to reducing the weight of the frame, facilitating therefore its movement and transport. According to the teachings of the patent, the projection welding is performed advantageously at pairs of raised portions formed by recesses of the cross-section of the tubular elements.

[0005] However, since market demand for this kind of chair is rather high, the number of components to be assembled affects heavily the final production costs and the need is felt, therefore, to reduce these costs further and to also reduce further the production times, trying nonetheless to obtain a frame whose solidity is comparable to the preceding ones.

[0006] This type of structure is also designed so that it can be stacked easily for storage and transport on pallets.

[0007] The possibility of vertical stacking is achieved by superimposing the frames and alternating them turned by 90° with respect to each other. Currently, the need is also felt to increase the number of stacked chairs that can be transported, i.e., to increase their total number that can be carried within the same volume of a pallet in order to reduce the associated transport costs.

[0008] Another drawback is due to the fact that the inverted U-shaped elements, which constitute the legs of the chair for resting the frame on the floor, due to their very shape and to the distance between the front legs and the rear legs, are unable to ensure stable resting even when the chair is in use, i.e., to exclude the risk of tipping, because the back typically protrudes from the rear part of the chair with respect to the rear legs.

[0009] The aim of the present invention is to provide a metallic frame for chairs with tubular elements that is lighter than known frames and therefore can be handled more easily by a user and, when stacked with other identical frames, occupies with them a smaller volume than known frames.

[0010] Within this aim, an object of the invention is to provide a frame that is at least as solid as currently commercially available frames and that in particular is not subject to tipping problems.

[0011] Another object of the invention is to reduce the transport costs of frames for chairs with tubular elements.

[0012] Another object of the invention is to obtain a chair that has a different visual impact than known chairs.

[0013] This aim, as well as these and other objects which will become more apparent hereinafter, are achieved by a metallic frame for chairs with tubular elements, characterized in that it comprises two inverted V-shaped elements that form the legs of a chair, which are parallel and joined substantially at their inside curvature to a rodlike crossmember, two L-shaped elements connected by said crossmember on which they are arranged in a parallel configuration so as to form a support for the back and for the seat, respectively with their first portions, which are substantially vertical, and second portions, which are substantially horizontal.

[0014] Further characteristics and advantages of the invention will become more apparent from the description of a preferred but not exclusive embodiment of the frame according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

[0015] FIG. **1** is a perspective view of a frame according to the invention;

[0016] FIG. **2** is an enlarged-scale view of a detail of the frame of FIG. **1**;

[0017] FIG. **3** is a view of a detail of a portion of an L-shaped element;

[0018] FIG. **4** is an enlarged-scale view of a detail of a portion of an inverted V-shaped element;

[0019] FIG. **5** is an enlarged-scale view of another detail of another portion to of an inverted V-shaped element;

[0020] FIG. **6** is a side view of the frame according to the invention;

[0021] FIG. **7** is a front view of the frame according to the invention;

[0022] FIG. **8** is a top view of the frame according to the invention;

[0023] FIG. **9** is a perspective view of two frames according to the invention, stacked vertically according to a first stacking method;

[0024] FIG. **10** is a perspective view of a column of frames according to the invention, stacked vertically with a second stacking method;

[0025] FIG. **11** is a top view of four columns of frames stacked according to the method of FIG. **10**.

[0026] With reference to the cited figures, the frame, generally designated by the reference numeral **10**, is formed by tubular elements **11**, the mutual association of which is provided by welding.

[0027] The frame **10** as a whole is shown in FIG. **1**. It comprises two inverted V-shaped elements **12**, which form the legs of the chair, and two L-shaped elements **13**, which form a support for the back and the seat.

[0028] The two inverted V-shaped elements **12** are parallel and are joined substantially at their inside curvature **14**, shown in detail in FIG. **4**, to a rodlike crossmember **15**. The L-shaped elements **13** are connected by the crossmember **15** and are joined to it again by welding and are arranged thereon in a parallel configuration. In particular, they form a support for the back with their first portions **16**, which are substantially vertical, and form a support for the seat with their second portions **17**, which are substantially horizontal and mutually parallel.

[0029] FIG. **2** is an enlarged-scale view of the frame on the joining regions of an inverted V-shaped element **12** and of an L-shaped element to the crossmember **15**.

[0030] Each one of the inverted V-shaped elements **12** has a first pair of raised portions **18**, at the inside curvature **14**, which is formed by a corresponding first recess **19** of the cross-section obtained with a plastic compression deformation. Said first recess **19** is provided so that upon V-shaped

bending the excess material does not form wrinkles in the region of the inside curvature **14**.

[0031] The first pair of raised portions **18** and the first recess **19** are visible in the enlarged-scale view of FIG. **4**. Joining by welding occurs in the regions of contact of the first pair of raised portions **18** with the crossmember **15**, which consist of at least four points, but welding can extend, depending on the shape of the inside curvature **14** and of the crossmember **15**, up to one or two parallel lines that correspond to the two raised portions.

[0032] Each one of the L-shaped elements **13** advantageously has a second pair of raised portions **20**, formed by a corresponding second recess **21** on the lower side of the second portion **17** and so as to correspond to the region for joining to the crossmember **15**. The second pair of raised portions **20** is also provided specifically by plastic compression deformation and produces a localized contact region at which welding with the crossmember **15** occurs.

[0033] Advantageously, each one of the L-shaped elements **13** also has an additional pair of raised portions **22** at the curvature region **23**, which are formed by an additional recess **24** that is also obtained by plastic compression deformation, again to prevent that, as a consequence of the bending, the curvature region **23** of the L-shaped element **13** has wrinkles caused by an excess of material in the regions having a smaller radius.

[0034] The first portions **16** and the second portions **17** of the L-shaped elements conveniently have a flattened cross-section, in order to give the back and the seat a larger contact surface, and it can be noted, in particular from the perspective view shown in FIG. **1** and from the top view of FIG. **8**, that the first supporting portions **16** of the back are also rotated, adapting to the curvature of the back to be associated with the frame in order to compose the chair.

[0035] The crossmember **15** has an oval cross-section that can be seen clearly in FIG. **5**, with, in a sectional view, parallel sides **25**, joined by semicircular elements **26**, which form two parallel faces of the same crossmember **15**. Joining by welding with each one of the inverted V-shaped elements **12** and with each one of the L-shaped elements **13** occurs at the uppermost face of the two parallel faces.

[0036] The L-shaped elements **13** are joined by welding along at least one raised portion of the second pair of raised portions **20**.

[0037] As can be seen in FIG. **1** and in particular in the front view of FIG. **7**, the crossmember **15** is substantially rectilinear and therefore the welding of each one of the L-shaped elements **13** occurs at two parallel lines that are formed by the respective second pair of raised portions **20**, which are intended for contact with the crossmember **15**. However, if the crossmember **15** is not rectilinear but has for example a curvature or a bend in a downward direction that is contoured to the shape of the seat, the weld might still be performed validly in the same regions or along a single raised portion of the second pair of raised portions **20**.

[0038] It should be noted that the oval cross-section of the crossmember **15** allows welding the elements on larger regions of contact than in the case of the crossmember with circular cross-section as in known frames, making the weld more effective and durable.

[0039] Conveniently, as can be seen in the enlarged-scale view of FIG. **5**, each inverted V-shaped element **12** has a reinforcement recess **27** on the inner part of each one of the two rectilinear portions **28** that form respectively a front leg **29** and a rear leg **30** of the chair.

[0040] The reinforcement recess **27**, as is clearly visible, extends practically along the entire length of the leg and becomes gradually shallower in an upward direction. As shown in FIG. **9**, in the stacking of the frames **10** the internal surface of the rectilinear portion **28** of each front leg **29***a* or rear leg **30***a* of a frame **10***a* is coupled to the outer surface of the underlying leg, respectively the front leg **29***b* or the rear leg **30***b*, of the underlying frame **10***b*.

[0041] By way of non-limiting example, an angular aperture of the inverted V-shaped elements **12** of approximately 52° is to be preferred; an angle of approximately 109° between the first portion **16** and the second portion **17** is instead to be preferred, again merely by way of example, for the inclination of the L-shaped elements **13**.

[0042] With these solutions, the front legs **29** and the rear legs **30** of the frame **10** form, with their four resting points **33** at the base, a resting area **34**, shown in broken lines in FIG. **1**, within which every point of the L-shaped elements **13** lies.

[0043] Once the back is assembled, the back fitted on the L-shaped elements **13** also is such that every point thereof lies within the resting area **34**. These refinements allow producing a chair that is capable of passing any tipping prevention tests.

[0044] Each L-shaped element **13** is provided conveniently, at its second portion **17**, with a hole **31** for fixing the seat of the chair by means of screws. The back can be associated easily with the frame **10**, for example by making it slide from above onto the two first portions **16**, so that they enter adapted guides in said back.

[0045] The use of the frame according to the invention, in its stacking with other similar structures, is as follows.

[0046] The frame **10** can be stacked according to two possible stacking methods.

[0047] The first method is shown in FIG. **9** and the resulting configuration is designated by the reference letter A to distinguish it from a different configuration of stacked frames **10**, which can be obtained with a second method shown in the subsequent FIGS. **10** and **11** and is designated here by the reference letter B.

[0048] With the first stacking method, the frames **10** are superimposed vertically on each other according to the same orientation.

[0049] The inverted V-shaped elements **12** are inserted into each other and the reinforcement recesses **27**, which make the internal surface of the rectilinear portion **28** of each front leg **29***a* or rear leg **30***a* mate with the outer surface of the underlying leg, respectively the front leg **29***b* or the rear leg **30***b*, ensure stable and aligned stacking of the frames **10**. With the second stacking method, the frames **10**, other than with the preceding method, are superimposed vertically so that they are alternated with an orientation of 90° of one with respect to the following one. The stability of the stack of frames **10** is determined by the coupling of the internal surface of each front leg **29***a* or rear leg **30***a* of the frame **10***a* with the external surface of the underlying leg, the front one **29***b* or the rear one **30***b*, which is the leg of the frame **10***b* that is arranged with the same orientation and is spaced from the upper frame **10***a* by an intermediate frame **10***a* that is rotated by 90°.

[0050] By repeating the stacking for a larger number of frames **10**, one obtains the column **32** of frames **10** shown in FIG. **10**.

[0051] By grouping four columns **32** of frames **10** stacked according to the configuration B described above it is possible to fill a pallet without wasting space, as shown in FIG. **11**.

[0052] By way of example, it has been found that a pallet with maximum external dimensions of 115 cm×110 cm×235 cm can contain 56% more frames **10** than the traditional product.

[0053] It should be noted that with respect to known frames, since the legs are formed by an inverted V-shaped element **12** with flattened regions produced by reinforcement recesses **27** on the internal part over the entire length of the legs **29** and **30**, the line of the frame **10** is slenderer, as can be seen in particular in the side view of FIG. **6**, and is aesthetically new with respect to known chairs with U-shaped elements. At the same time, again thanks to the reinforcement recesses **27**, the frame **10** is also stronger and the stacking possibility is improved.

[0054] Moreover, the presence of a single crossmember **15** having an oval cross-section allows not only welding the components at larger regions of contact than would be the case with a circular cross-section, but also makes it possible to save material and to obtain a frame that is lighter and therefore easier to handle and transport than a frame provided with two crossmembers.

[0055] The difference in weight of course becomes more evident when the frames are stacked and grouped in large numbers in pallets for transport.

[0056] In practice it has been found that the invention achieves the intended aim and objects, providing a metallic frame for chairs with tubular elements that is lighter than known frames and therefore can be handled more easily and allows reducing and containing production times as well as production and transport costs.

[0057] The cost reduction in fact arises from the smaller amount of material to be used to provide the frame and from better utilization of the volume of the pallet by insertion of a larger number of frames therein.

[0058] Moreover, the frame is stable both when in use, provided with a seat and a back, passing anti-tipping tests, and when stacked with other identical frames, according to both configurations A and B.

[0059] Moreover, the frame has a different visual impact than traditional ones.

[0060] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0061] In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to the requirements and the state of the art.

[0062] The disclosures in Italian Patent Application no. PD2013A000084, from which this application claims priority, are incorporated herein by reference.

1-10. (canceled)

11. A metallic frame for chairs with tubular elements, comprising two inverted V-shaped elements that form the legs of a chair, which are parallel and joined substantially at their inside curvature to a rod-like crossmember, two L-shaped elements connected by said crossmember on which they are arranged in a parallel configuration so as to form a support for the back and for the seat, respectively with their first portions, which are substantially vertical, and second portions, which are substantially horizontal.

12. The frame according to claim **11**, wherein each one of said inverted V-shaped elements has a first pair of raised portions formed by a corresponding first recess of the cross-section obtained from a plastic compression deformation at said inside curvature.

13. The frame according to claim **11**, wherein each one of said L-shaped elements has a second pair of raised portions, formed by a corresponding second recess of the cross-section obtained in a downward region on said second portion and so as to correspond to the region for joining to said crossmember by plastic compression deformation.

14. The frame according to claim **11**, wherein each one of said L-shaped elements has an additional pair of raised portions formed by a corresponding additional recess of the cross-section obtained by plastic compression deformation at its curvature region.

15. The frame according to claim **11**, wherein said crossmember is rectilinear with an oval cross-section with parallel sides, joined by semicircular elements, that form two parallel faces for said crossmember.

16. The frame according to claim **12**, wherein each one of said inverted V-shaped elements is joined to said crossmember by welding at regions of contact of said first pair of raised portions with said crossmember.

17. The frame according to claim **13**, wherein each one of said L-shaped elements is joined to said crossmember by welding at at least one raised portion of said second pair of raised portions.

18. The frame according to claim **11**, wherein each one of said inverted V-shaped elements has a reinforcement recess on the inner side of each one of two straight portions that form a front leg and a rear leg of said frame.

19. The frame according to claim **18**, wherein it can be stacked with other similar frames, the possibility of stacking being determined by the coupling of an internal surface of said rectilinear portion of each front leg or rear leg of one frame with the outer surface of a rectilinear portion of each front leg or rear leg of an underlying frame.

20. The frame according to claim **11**, wherein said front legs and said rear legs form, with their four resting points at the base, a resting area within which every point of the L-shaped elements lies.

* * * * *