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K. EGER

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SUPPORTING FRAME

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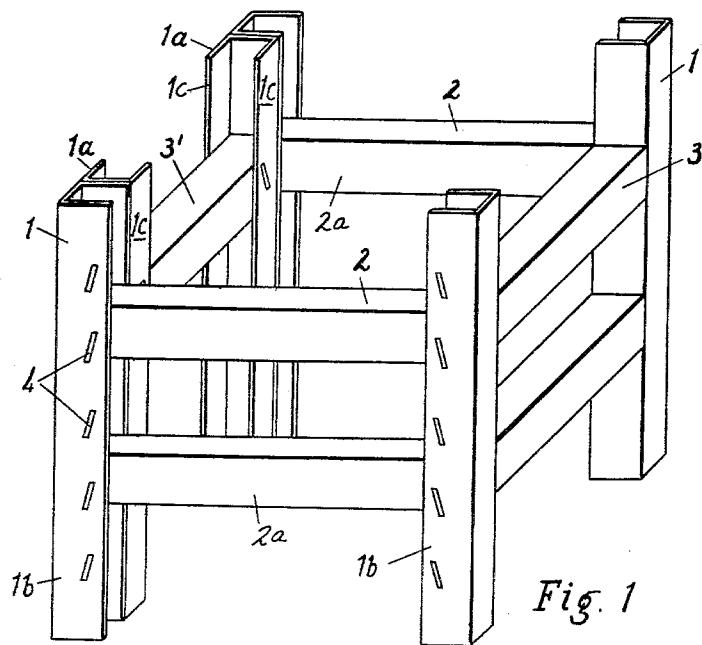


Fig. 1

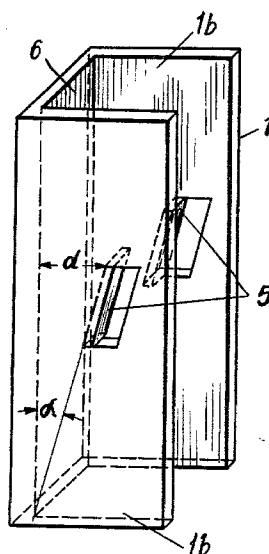


Fig. 2

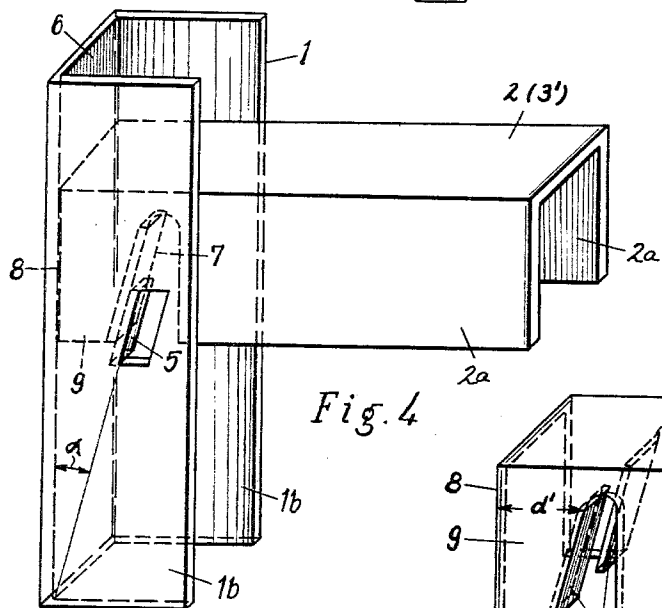


Fig. 4

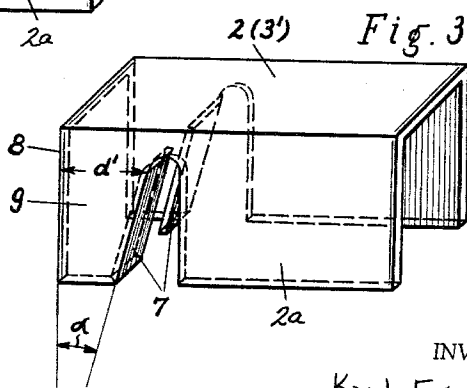


Fig. 3

INVENTOR

Karl Eger

Dicke & Craig

BY

ATTORNEYS

1

3,237,779

SUPPORTING FRAME

Karl Eger, Boheimstrasse 47a, Stuttgart, Germany

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7 Claims. (Cl. 211-177)

The present invention relates to a frame which consists of vertical posts and horizontal longitudinal and transverse bars and may be employed for producing or supporting stands, tables, racks, brackets, and the like.

It is an object of the invention to produce a stable and rigid but inexpensive frame or stand which may be quickly assembled of the individual frame members, i.e., the vertical posts and horizontal bars, without need of any tools and may be just as quickly disassembled. Another object of the invention is to provide a frame of the mentioned type which in the disassembled condition may be very easily transported.

A feature of the invention for attaining the above-mentioned objects consists in making the vertical posts and horizontal bars at least partly of a U-shaped material, preferably channel iron, in designing the horizontal U-shaped bars so as to engage between the webs of the vertical channel-shaped posts, and in providing the ends of the webs of the U-shaped horizontal bars with inclined slots so as to form wedge-shaped end portions which are inserted into downwardly tapering sockets which are provided on the vertical posts and are formed by the central webs of the U-shaped posts and by inwardly projecting tabs or the like which are secured to the inner sides of the flanges of the posts. The wedge-shaped end portions of the U-shaped horizontal bars are wider at their upper ends than the upper opening of the tapering sockets on the vertical posts so that these parts will rest only with their inclined surfaces on the tabs of the sockets.

A frame which is designated in this manner may be quickly assembled without the use of any special tools and may also be taken apart very easily by simply lifting the horizontal bars. Because of the wedge-shaped connection between the horizontal bars and vertical posts, the frame when assembled forms a rigid unit which can also be heavily loaded without danger of tilting or of being distorted.

Another feature of the invention consists in enlarging the inclined contact surfaces of the slots in the horizontal bars by providing them with inwardly directed inclined tabs or the like. These inclined slots and tabs are produced according to the invention by punching out apertures in the flanges of these bars in a manner so as to sever the material on all sides except one inclined side and then to bend the tab which is thus formed inwardly about the aforesaid inclined unsevered side. The same procedure may be followed for producing the tabs which are provided near the ends of the flanges of the vertical posts and, together with the inner surfaces of the central webs, form the sockets for the horizontal bars. The sole connecting elements for securing the vertical posts and horizontal bars to each other therefore consist of the tabs on the flanges of the bars and posts which may be punched out and bent inwardly by a single operation. The costs of production of the frame according to the invention are therefore very low.

If the frame according to the invention is to be used, for example, as a stand for supporting a plurality of shelves which should be adjustable to different elevations and thus to different distances from each other, the flanges of the U-shaped vertical posts may be provided with a larger number of inclined tabs in corresponding positions vertically above each other on the individual posts.

It is also possible, for example, for building a rack, to weld the transverse bars to the vertical posts, while the longitudinal bars may be connected to the posts in the manner according to the invention so as to be easily

2

removable therefrom. Each of the vertical posts may, however, also be made of a pair of channel irons which extend at right angles to each other so that the central web of one channel iron is secured to one flange of the other U iron. In such a case it is easily possible to secure both the longitudinal and transverse bars to the vertical posts by the wedge-shaped connections according to the invention so that all of them may again be easily removed from each other.

If several stands or tables which are made of the frame according to the invention are to be assembled to form a large unit, the abutting vertical posts of two adjacent frames may be connected to each other by clamps which pass through the apertures which are formed when the tabs are punched out. These clamps may then be applied upon the inner side of each frame so as to be covered by the vertical posts and not to be noticeable from the outside.

The above-mentioned and additional features and advantages of the present invention will become more clearly apparent from the following detailed description thereof which is to be read with reference to the accompanying drawings, in which:

FIGURE 1 shows a perspective view of a supporting frame according to the invention;

FIGURE 2 shows a perspective view of a part of a vertical post with inwardly bent tabs thereon;

FIGURE 3 shows a perspective view of the end portion of a horizontal bar with inclined slots and inwardly bent tabs on its flanges; while

FIGURE 4 shows a perspective view of the connection between a longitudinal bar and a vertical post.

The frame according to the invention as illustrated in FIGURE 1 consists of the vertical posts 1 of a U-shaped cross section and the horizontal longitudinal bars 2 having flanges 2a and flanged transverse bars 3 and 3'. The ends of the longitudinal bars 2 engage between the flanges 1b of the posts 1 and are supported thereon by inwardly projecting tabs which are punched out of these flanges at all but one side whereby the apertures 4 are formed and the tabs are at the same time bent inwardly. While according to one embodiment of the invention the transverse bars 3 at the right side of the frame are welded together with the posts 1, the transverse bar 3' at the left side of the frame according to another embodiment of the invention engages between the flanges 1c of two other posts 1a in a similar manner as the longitudinal bars 2 engage between the posts 1. These posts 1a are rigidly secured to the posts 1, for example, by welding.

FIGURE 2 shows a part of a vertical post 1 from the flanges 1b of which inwardly projecting tabs 5 are punched out which are inclined at an angle α relative to the inner surface of the central web 6 and form together with the latter a socketlike support which has an upper opening of a width d .

FIGURE 3 shows an end portion of a horizontal bar 2 or 3' from which tabs 7 are punched out and bent inwardly about the unpunched edge. These tabs 7 are inclined relative to the vertical outer edge 8 at the same angle α as the tabs 5 are inclined relative to the central web of the posts 1 in FIGURE 2. Together with the end portion of the web this tab 7 forms a wedge-shaped part 9 the upper width d' of which is greater than the width d of the socket in FIGURE 2.

FIGURE 4 illustrates the manner of connecting a horizontal bar 2 with the post 1. Bar 2 rests with its tab 7 on the inclined surface of the tab 5 on the post 1 and its outer edge 8 is thus wedged against the central web 6 of post 1. The two rear webs of bar 2 and post 1 are wedged together in the same manner. By these two wedge connections on each end it is possible to clamp the bars 2 securely to the posts 1 without any additional connecting means, while the lateral webs of posts 1 pre-

vent the bars 2 from shifting in the lateral directions. By lifting the horizontal bars 2, it is, however, easily possible to loosen them again from the posts 1.

The stability of the frame according to the invention increases when it is heavily loaded since the horizontal bars and vertical posts are then more firmly wedged and clamped together, and every additional horizontal bar further increases the stability of the frame.

The present invention is not limited to the particular frame construction as illustrated with vertical posts and horizontal bars, but the posts and bars may also extend at other than right angles to each other, provided the end surfaces of the bars 2 are cut so as to extend parallel to the central webs 6 of the posts 1.

In certain cases, especially when the frame is only intended to support a light load, it will suffice if the tabs are only provided on one of the flanges of each post and bar. Preferably they are then provided on the inner webs so that no apertures will be visible on the posts on the outside of the frame.

The new manner of connecting U-shaped posts and horizontal bars to each other may also be employed for many other purposes, for example, for producing brackets. This may be done, for example, in such a manner that two vertical U-shaped posts are spaced at a certain distance from each other and are secured to each other in any suitable manner by crossbars and that a pair of horizontal channel bars are hung with one end into the forwardly open side of the U-shaped posts in the same manner as shown in FIGURE 4. A horizontal board may then be secured to the upper sides of these bars to serve as a shelf or the like.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A supporting frame for producing a stand, table, bracket, or the like comprising at least two substantially vertical posts and at least one substantially horizontal bar, each of said posts having at least a part of a U-shaped cross section with the open sides of said parts facing each other, and at least one inwardly projecting tab on the inner side of at least one flange of each of said posts and at substantially the same height on both posts, said tab being inclined to the central web of said part and together with said central web forming the walls of a downwardly tapering socket, said bar having ends of a U-shaped cross section, the outer surfaces of the flanges of said ends being spaced from each other at a distance slightly smaller than the distance between the inner surfaces of the flanges of said U-shaped part of said post so as to permit said ends of said bar to be inserted between said flanges of said posts in a position in which said flanges of said ends of said bar extend downwardly from the central web thereof, said bar having a slot in at least one flange near each end thereof, said slot being inclined to and spaced from the adjacent end surface of said flange at an angle and distance substantially equal to the inclination and distance of said tab to the central web of one of said posts so that the end portions between said inclined slots and the adjacent end surfaces of said bar have a wedgelike shape fitted from above into said sockets on said posts and tightly wedged therein when a load is exerted upon said bar.

2. A supporting frame as defined in claim 1, in which the upper end of said slot is spaced at a greater distance from the adjacent end of said bar than the upper end of said tab is spaced from the central web of said post, so that said wedgelike end portions of said bar rest with only their inclined surfaces on the inclined tabs of said posts.

3. A rectangular supporting frame for producing a stand, table, or the like comprising two substantially

vertical corner posts each consisting of two channel irons with one flange of one channel iron being secured to the central web of the other channel iron so that the flanges of both channel irons extend at right angles to each other the open sides of the corresponding channel irons of each pair of adjacent posts facing each other, each of said channel irons having a plurality of substantially equal inwardly projecting tabs on the inner side of at least one of its flanges and integral therewith and above and spaced from each other and at substantially equal distances from the central web of said iron, each of said tabs being inclined to said central web and together with said central web forming the walls of a downwardly tapering socket, and substantially horizontal bars also consisting of channel irons having flanges with outer surfaces spaced from each other at a distance slightly smaller than the distance between the inner surface of the flanges of the channel irons of said posts so as to permit the ends of said bars to be inserted between said flanges of said posts in a position in which the flanges of said bars extend downwardly from the central webs thereof, each of said bars having a slot in at least one flange near each end thereof, said slot being inclined to and spaced from the adjacent end surface of said flange at an angle and distance substantially equal to the inclination and distance of said tabs to the central web of one of the channel irons of said posts so that the end portions between said inclined slots and the adjacent end surfaces of said bar have a wedgelike shape fitted from above into said sockets on said posts and tightly wedged therein when a load is exerted upon said bar.

4. A supporting frame as defined in claim 3, further comprising an inwardly projecting tab on the inner side of and integral with the flange of said bar containing said inclined slots and directly adjacent to and inclined at the same angle as one inclined edge of each of said slots, the corresponding inclined surfaces of the tabs on said bars and on said channel irons of said posts engaging substantially flatly with each other.

5. A supporting frame as defined in claim 4, in which all of said tabs are formed by severing a part at all sides except one from the flanges to be provided with said tabs and by bending said parts inwardly about the unsevered sides, thus leaving an aperture in each flange adjacent to said tab of a size at least equal to the size of said tab, said apertures adapted to be used for passing connecting elements therethrough for securing said frame to at least one adjacent frame to form a larger frame unit.

6. A supporting frame for producing a stand, table, bracket, or the like comprising at least one post and at least one bar, said post having at least a part of a U-shaped cross section and at least one inwardly projecting tab on the inner side of at least one flange of said part, said tab being inclined to the central web of said part, and together with said central web forming the walls of a downwardly tapering socket, said bar having at least one end part of a U-shaped cross section, the outer surfaces of the flanges of said end part being spaced from each other at a distance slightly smaller than the distance between the inner surfaces of the flanges of said U-shaped part of said post so as to permit said end part of said bar to be inserted between said flanges of said post in a position in which said flanges of said end part of said bar extend downwardly from the central web thereof and said bar extends longitudinally at an angle to said post, while the end surfaces of said flanges of said end part of said bar extend parallel to the central web of said post, said bar having a slot in at least one flange of said end part, said slot being inclined to and spaced from the adjacent end surface of said flange at an angle and a medium distance substantially equal to the inclination and medium distance of said tab to the central web of one of said posts so that the end portions between said inclined slots and the adjacent end surfaces of said bar have a wedgelike shape fitted from above into said sockets on said posts

5

and tightly wedged therein when a load is exerted upon said bar, said tab being integral with said flange of said bar and formed by severing a part at all sides except one from said flange and bending said part inwardly about the unsevered side, thus leaving an aperture in said web of a size at least equal to the size of said tab.

7. A supporting frame for producing a stand, table, bracket, or the like comprising at least one post and at least one bar, said post having at least a part of a U-shaped cross-section and at least one inwardly projecting tab on the inner side of at least one flange of said part, said tab being inclined to the central web of said part and together with said central web forming the walls of a downwardly tapering socket, said bar having at least one end part of a U-shaped cross section, the outer surfaces of the flanges of said end part being spaced from each other at a distance slightly smaller than the distance between the inner surfaces of the flanges of said U-shaped part of said post so as to permit said end part of said bar to be inserted between said flanges of said post in a position in which said flanges of said end part of said bar extend downwardly from the central web thereof and said bar extends longitudinally at an angle to said post, while the end surfaces of said flanges of said end part of said bar extend parallel to the central web of said post, said bar having a slot in at least one flange of said part, said slot being inclined to and spaced from the adjacent end surface of said flange at an angle and a medium distance substantially equal to the inclination and medium

6

distance of said tab to the central web of said post so that the end portion between said inclined slot and the adjacent end surface of said bar has a wedge-like shape adapted to be fitted from above into said socket on said post and to be tightly wedged therein when a load is exerted upon said bar, an inwardly projecting tab on the inner side of the flange of said bar containing said inclined slot and directly adjacent to and inclined at the same angle as one inclined edge of said slot, both of said tabs being formed by severing a part at all sides except one from each flange to be provided with one of said tabs and by bending said part inwardly about the unsevered side, thus leaving an aperture in said web of a size at least equal to the size of said tab.

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CLAUDE A. LE ROY, *Primary Examiner.*