

March 19, 1935.

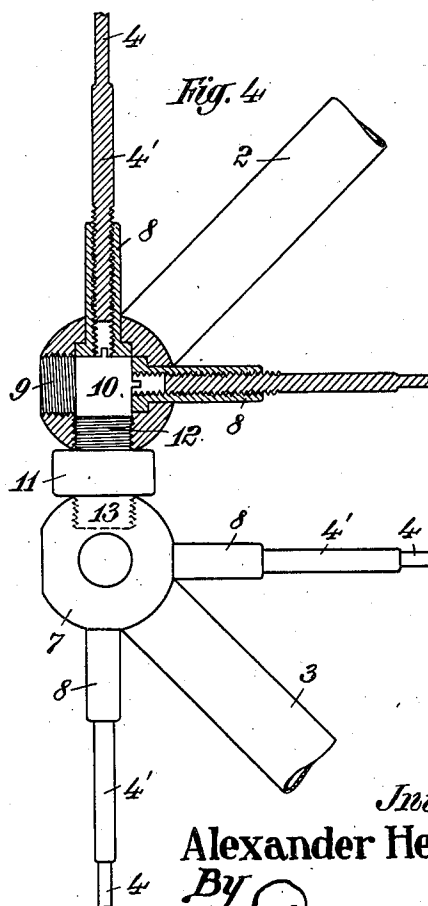
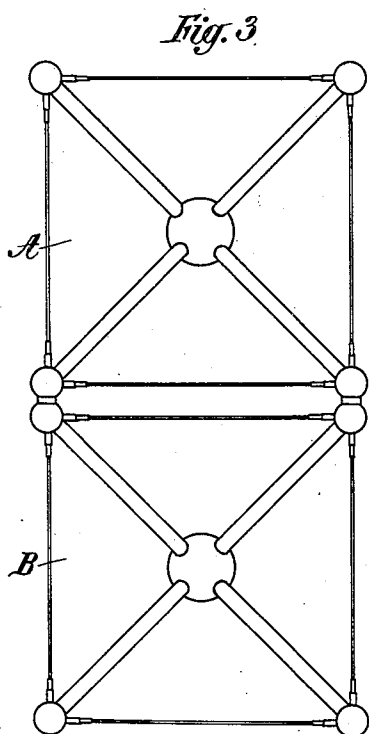
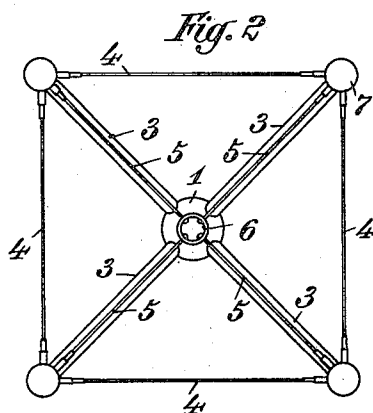
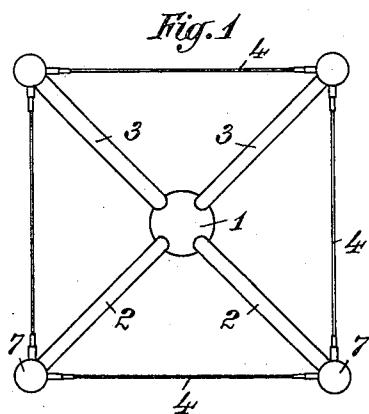
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1,995,248

CARRIER CONSISTING OF A BRACED METAL FRAME

Filed Jan. 20, 1933

2 Sheets-Sheet 1



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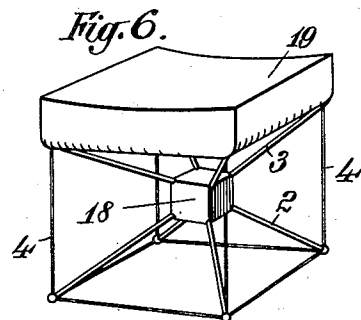
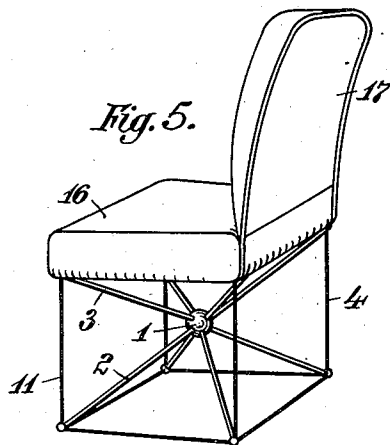
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CARRIER CONSISTING OF A BRACED METAL FRAME

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UNITED STATES PATENT OFFICE

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CARRIER CONSISTING OF A BRACED
METAL FRAME

Alexander Herman, Berlin, Germany

Application January 20, 1933, Serial No. 652,749
In Germany July 8, 1930

4 Claims. (Cl. 189—34)

This invention relates to a carrier consisting of a braced metal frame and capable of many uses.

The invention aims at providing a carrier constituting a self-contained structure disclosing a peculiar distribution of forces, which may be used either alone or combined with carriers of the same or similar type, and one of the main objects of the invention is to unite the greatest possible load-carrying capacity and a high degree of stiffness with extraordinarily low weight.

The invention attains its objects by inserting in a center member of any desired form metal struts constituting the diagonals through the space of a prismatic body, preferably a cube, and being connected at their free ends by initially tensioned wires or rods.

In this way a carrier unit will be produced that is distinguished by a peculiar and very advantageous distribution of forces, the bending strains acting on the metal struts of such a carrier when loaded being so small that comparatively weak elements, such as thin-walled pipes or the like, may be employed. The center part too may have a simple form and, in particular, may be hollow and thin-walled. Notwithstanding their very low weight, such carriers are nevertheless capable of supporting extraordinarily large loads.

If exposure of the metal struts to bending strains is to be avoided entirely while fully utilizing their compressive strength and breaking resistance, the struts are articulated to their joint central member at their point of intersection.

The invention may be applied for example to iron frame superstructures, in which the bracings hitherto employed comprised rolled profiles of various kinds which were united by riveting, it being possible now to replace these heavy structures by constructions made up of carrier units according to the invention.

If subjected to some alterations involving, in the main, mere dimensional adaptations, the carrier unit according to the invention may serve also as a commodity for various purposes and be used, for instance, as a table or a chair or a supporting frame in shops or the like.

By way of example, the invention is illustrated in the accompanying drawings which show different embodiments and features thereof.

Figure 1 is an elevation of a carrier unit constructed according to the invention; Fig. 2, a top view thereof; Fig. 3 shows how two carrier units can be combined; Fig. 4 is a section on an enlarged scale of details of the combination of units and of the bracing; Figs. 5 and 6 represent an-

other application of the carrier unit and are perspective views, respectively, of a chair with back having as base a carrier unit according to the invention, and of a stool.

Referring to the drawings, the central part of the carrier unit shown in Figs. 1 and 2 consists of a solid or hollow ball 1, which may be made of metal, and to which eight metal struts produced, for instance, of thin-walled tubing may be firmly connected. The struts 2 and 3 constitute the diagonals through the space of a cube and, in this construction, are therefore of equal length.

By altering the length of the metal struts it is possible, without trouble, to produce bodies having other outlines, such as rectangular columns, obliquely cut triangular prisms, obelisks or other bodies.

The free ends of the struts are interconnected by the bracing wires 4 which form the edges of the cube. If a carrier unit of very large dimensions is to be built up, solid rods instead of wires may serve as bracing members, the point of chief importance in either case being the bracing of the individual struts in three directions by members to which a certain initial tension has been imparted.

The initial tension of the wires has, in the main, only an upper limit, i. e., the tensile strength of the material of which the bracing wires are made, and the best effect is attained if initial tension is chosen so that at the loading of the carrier unit the bending strains acting on the struts are reduced to a minimum. All wires are preferably given the same amount of tension by known means.

Instead of inserting in the central part eight metal struts forming separate structural elements, four continuous struts may be used.

The ends of the metal struts are suitably connected with the metal balls 7, for instance by means of screws. The metal balls 7 possess bores 9 and 10 which cross each other. A collar constructed to fit the bores supports sleeve-like tightening nuts 8 which are freely rotatable in the bores and may have slotted heads to facilitate the application of a screw-driver or similar tool. The nuts 8 are internally threaded and are adapted to engage a corresponding thread on a thickened projection 4' of the bracing wires or wire spokes 4.

It is possible of course to use a differently constructed bracing device. The wires may have a thickened head portion secured in the spherical ends of the metal struts 2, 3 with suitable turn-buckles interposed between the points of juncture.

Or the ends of the metal struts engaged by the bracing wires may have another form and be constructed, for instance, as annular grooves.

In addition to the bracing wires 4 constituting the edges of the cube-like carrier unit, diagonal bracings 5, as shown in Fig. 2, may be provided at one or several or all limiting surfaces, and secured to a ring 6 while their ends engage again tightening nuts 8 supported in the spherical ends 7 of the metal struts 2, 3.

The form of the central part 1 and the manner of bracing the wires may be altered without deviating from the spirit of the invention.

The individual self-contained carrier units or structural elements may be combined to form all sorts of bracings.

Figs. 3 and 4 are detail views of one of many possible connections of two units.

The four spherical ends 7 of the carrier units A, B to be joined together face each other and are provided with threaded bores engaged by the threaded portions 12, 13 of the screw nipples 11. It is evident that connection may be effected also by a number of other known means.

The various units may be connected in one plane and in different directions or they may be superposed in various directions and interconnected to form bonds of all sorts, such as front walls which may then be faced, or girders, vaults, or tower-like superstructures, the invention being not limited in any way in this direction.

Figs. 5 and 6 show two other forms of application of the invention in so far as the new carrier unit serves as chair frame. Like parts have like reference characters, and, as the structure of the frame corresponds to that of the carrier unit according to Figs. 1 and 2, it will suffice to refer to this. The superior feature of such a chair is that the frame itself weighs very little but is capable of carrying loads which considerably exceed the load limits of existing chair frames.

By suitable means, such as hooks or the like, a seat 16 is secured to the chair and, in the construction shown in Fig. 5, fitted with a back 17.

The construction shown in Fig. 6 coincides with that of the chair according to Fig. 5 in so far as four leg struts and four seat struts are connected with a central part, but the latter is in Fig. 6 constructed as a cube-like metal member 18 and, furthermore, a plain seat cushion 19 is secured to the chair frame.

By providing for diagonal braces in the seat and foot planes the possibility of bending strains may be reduced still more in these constructions also.

I claim:—

1. A carrier unit, comprising a central member, a plurality of metal struts inserted in said central member, said struts forming the diagonals through the space of a prismatic body and having spherical ends provided with bores, a plurality of initially tensioned bracing wires for connecting the free ends of said struts, additional diagonally extending bracings on all limiting surfaces of the carrier, and tightening nuts supported in the bores of said struts and engaging said bracing wires.

2. In a carrier unit according to claim 1 coupling members in the spherical ends of the struts for connecting a plurality of independent carrier units.

3. A parallelepipedal skeleton frame unit comprising: a hub member defining the center of the frame, a plurality of straight, rigid strut members anchored to said hub member at their inner ends and symmetrically radiating therefrom to terminate at and define the respective corners of said frame, and a plurality of tensioned tie members connecting the outer ends of said strut members, defining the external edges of said frame and maintaining each of said strut members under initial longitudinal compressive stress.

4. A parallelepipedal skeleton frame unit comprising: a hub member defining the center of the frame, a plurality of straight, rigid strut members anchored to said hub member at their inner ends and symmetrically radiating therefrom to terminate at and define the respective corners of said frame, a plurality of tensioned tie members connecting the outer ends of said strut members, defining the external edges of said frame and placing each of said strut members under initial longitudinal compressive stress, and supplemental means for bracing one face of said frame, said means comprising a plurality of tensioned tie members disposed in the plane of said face and interconnecting the outer ends of the stay members disposed in said plane.

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