

Nov. 8, 1955

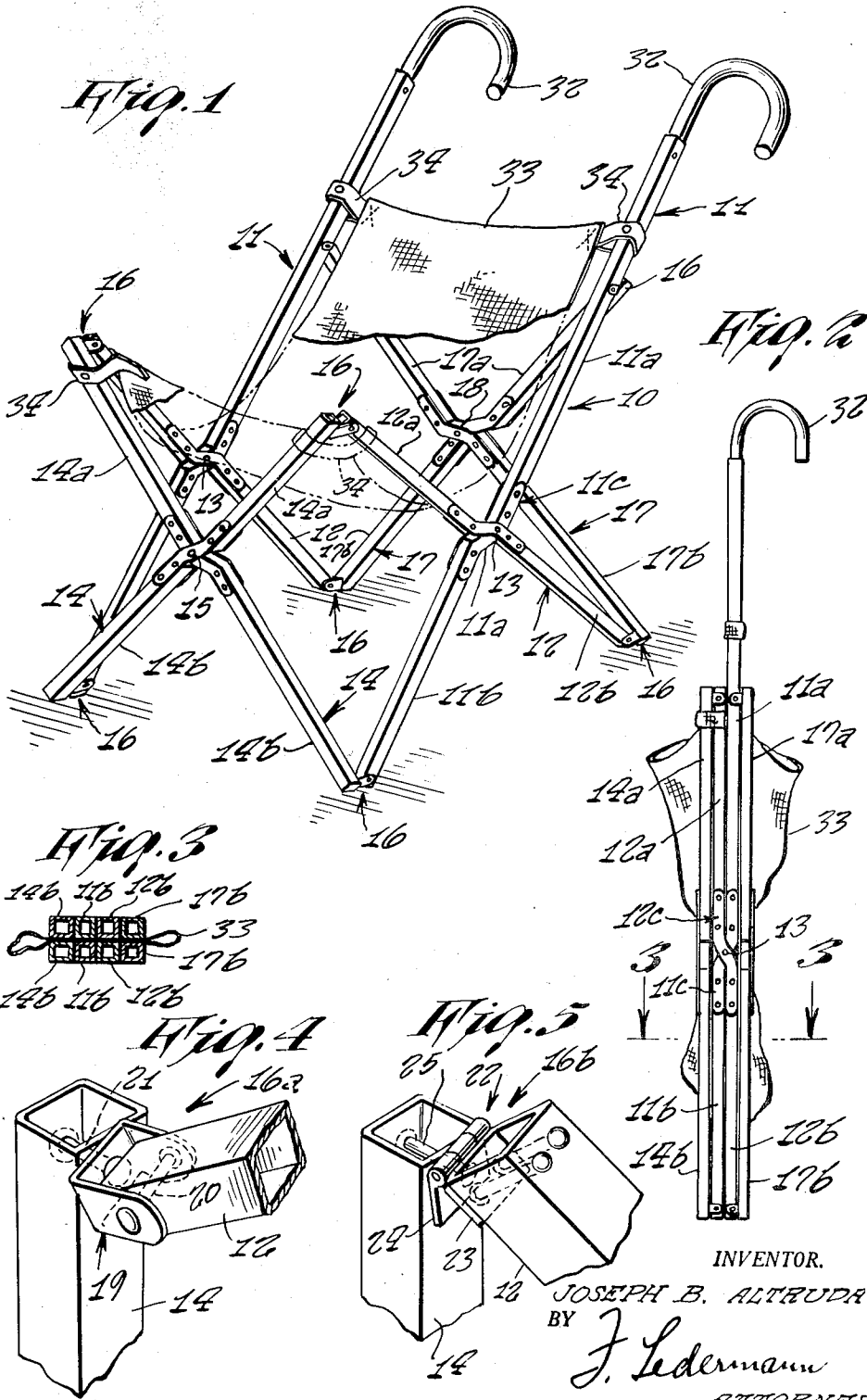
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COLLAPSIBLE FRAMES OR CHASSIS

Filed May 28, 1954

2 Sheets-Sheet 1



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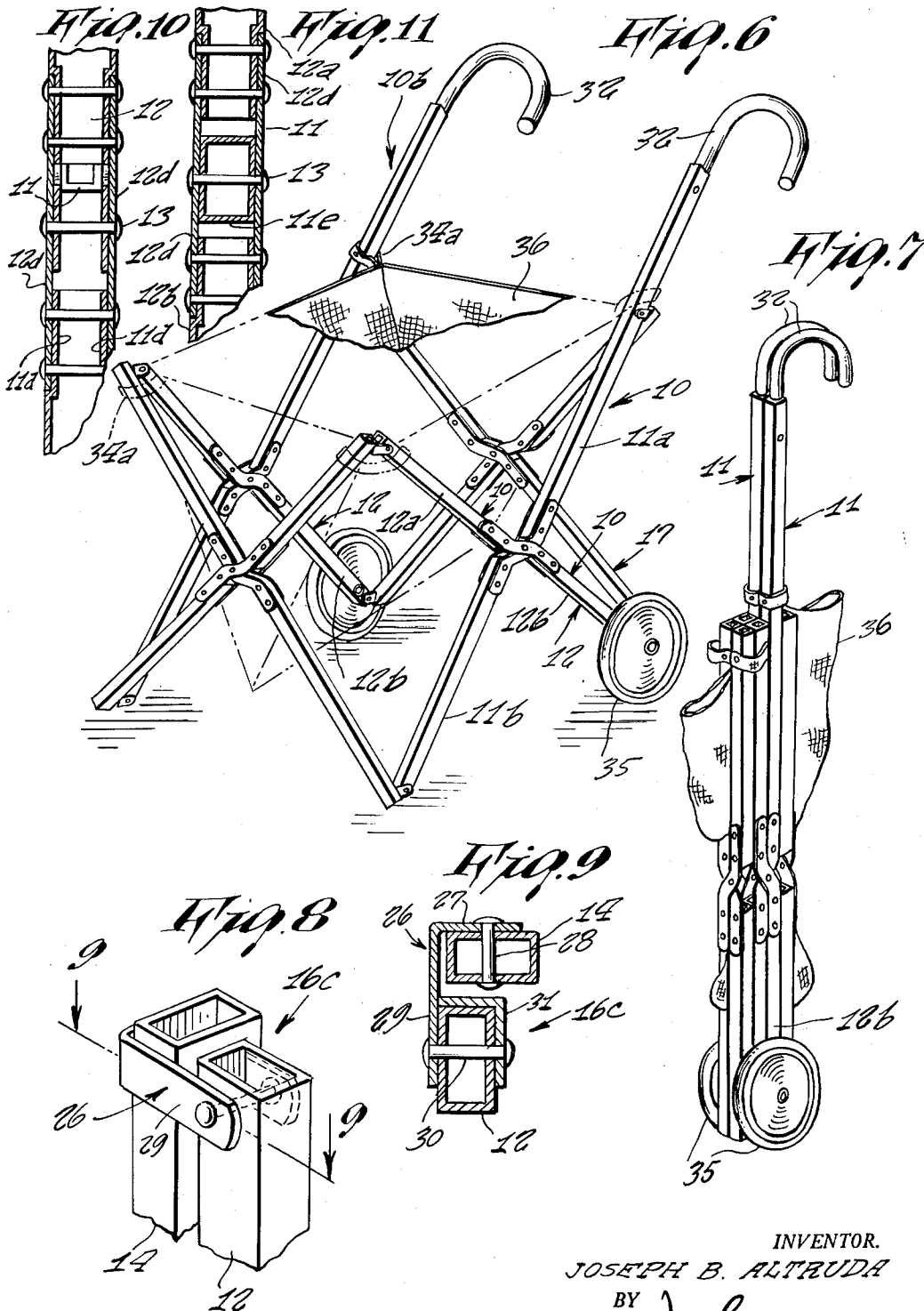
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1

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COLLAPSIBLE FRAMES OR CHASSIS

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Application May 28, 1954, Serial No. 432,985

1 Claim. (Cl. 155—140)

This invention relates to a collapsible frames or chassis adapted for various applications, included among which are a collapsible chair and a collapsible shopper's cart or carryall both of which are herein illustrated.

One object of the invention is the provision of certain new and useful improvements in such collapsible frames whereby their utility and practicability in the particular application thereof are substantially enhanced, both in extended condition ready for use or in collapsed condition ready for carrying or storage.

The above broad as well as additional and more specific objects will be clarified in the following description wherein characters of reference refer to like-numbered parts in the accompanying drawings. It is to be noted that the drawings are intended solely for the purpose of illustration and that it is therefore neither desired nor intended to limit the invention necessarily to the exact details of construction shown except insofar as they may be deemed essential to the invention.

Referring briefly to the drawings, Fig. 1 is a perspective view of the improved collapsible frame of the present invention as applied to a collapsible chair or seat.

Fig. 2 is an elevational view of the chair of Fig. 1 in collapsed condition in which it is adapted to be easily carried.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

Fig. 4 is an enlarged perspective view, with parts broken away and partly in section, of one of the swivel or universal joints forming elements of the frame.

Fig. 5 is a similar view of a modified form of swivel joint.

Fig. 6 is a perspective view of the collapsible frame as applied to a shopper's cart or carryall.

Fig. 7 is a perspective view of the carryall of Fig. 6 in collapsed condition, ready for carrying.

Fig. 8 is a perspective view of another modified form of swivel joint.

Fig. 9 is a sectional view taken on the line 9—9 of Fig. 8.

Fig. 10 is a sectional view taken on the line 10—10 of Fig. 6.

Fig. 11 is a sectional view similar to Fig. 10, showing, however, a modified construction of the pivotal intersecting engagement between the co-planar members of the frame.

Referring in detail to the drawings, the numeral 10 indicates a collapsible frame embodying the features of this invention. The various members composing the frame are shown substantially square in cross-section and hollow, indicating that they are primarily intended to be made of metal and, for lightness, preferably aluminum. Although the frame members are illustrated as of square cross-section, they could of course also be made circular in cross-section.

The frame in extended condition, as shown, for example, in Fig. 1, serves best to illustrate the structure thereof for the purposes of the description which follows. The frame comprises two elongated parallel side mem-

2

bers 11, and, pivoted thereto at 13 two shorter side members 12, the pivot point of each member 12 being positioned approximately at its midpoint and the pivot point on the member 11 being situated at a distance from its lower end equal approximately to one-half the length of the member 12.

Two front members 14, having approximately the same length as the members 12, are pivoted together at 15 at their midpoints. The lower ends of the members 14 are connected to the lower ends of the members 11 by universal or swivel joints 16; the upper ends of the members 14 are likewise connected to the upper ends of the members 12 by swivels 16. Two rear members 17, also similar to the two front members 14, are pivoted together at their midpoints 18; their lower ends are joined by swivels 16 to the lower ends of the members 12, and their upper ends are likewise swivel-attached to the members 11.

Each of the members of the various pairs of mutually pivoted members mentioned above, i. e., the pairs 11—12, the pair 14—14 and the pair 17—17, are all deformed as follows. Each such member is deformed, in the area of and adjacent to its pivot, into an elongated Z-shape; the two members of each pair are mutually reversely so deformed or bent, so that when they are mutually swung about the pivot into side by side relationship, the combined thickness of the two members is equal to the sum of their individual thicknesses. Taking members 11 and 12 as an example, and considering the former as composed of two sections 11a and 11b joined by the deformed intermediate or pivot section 11c, and also considering member 12 as composed of two sections 12a and 12b joined by the deformed pivot section 12c, the two members 11 and 12 when folded together about the pivot 13 assume the relationship illustrated in Fig. 2.

To achieve the folded-together relationship of members 11 and 12 just described, each member 11 may be made of two separate sections 11a and 11b and each member 12 may be made of two separate sections 12a and 12b, as stated, with each deformed pivot section such as 11c and 12c formed of two identical Z-shaped plates or strips 11d and 12d, respectively, having their ends secured to opposite sides of their respective sections, the juxtaposed ends of the sections 11a and 11b being reduced in thickness so that the spaced plates 11d may rotate between the spaced plates 12d. However, as an alternative construction, in the case of every pair of mutually pivoted members of the frame, only one member, such as, for example, member 12, need be made of two sections 12a and 12b joined by the Z-plates 12d, the other member 11 of the pair being merely a continuous length of tube having the pivot portion provided with a Z-deformation 11e of reduced thickness and positioned between the Z-plates 12d on the pin 13. The same construction is provided for each of the members 14 and 17 at their pivots.

As is apparent from Fig. 1, the two members 14 will pivot in a common plane, as will also the two members 17, and these two planes are always mutually parallel.

Similarly, each member 11 and its pivotally attached member 12 will rotate in a common plane, and these two planes are also always mutually parallel and at right angles to the previously mentioned two planes.

In order to permit the rotation of mutually pivoted members in the common planes just mentioned, it is necessary that the junctions of the extremities of all members to each other, including the upper extremities of the members 17 to the members 11, be in the form of universal joints or swivels 16, as is obvious. Applicant has devised several forms of swivels 16, illustrated in Figs. 4, 5 and 8 and designated as 16a, 16b, and 16c respectively. For the sake of simplicity, these swivels are indi-

3

cated as being applied to the junctions of the members 14 and 12 in all the examples illustrated.

In the form of swivel shown at 16a, a yoke 19 has the end of the member 12 registering pivotally therein on a pivot pin 20. A pivot pin 21 extending through and at right angles to the saddle of the yoke passes pivotally through the end of the member 14. Thus, the two pivots 20 and 21, mutually at right angles, permit of universal movement of the members 12 and 14.

In the modification shown in Fig. 5, a hinge 22 has one leaf 23 secured against the side of the member 12. The other leaf 24 of the hinge has a pin 25 extending at right angles thereto and pivoted therein, and further extending through and being secured to the member 14.

In the form of swivel shown at 16c, an L-shaped connector or angle 26 is provided, having a pivot pin 28 pass through the member 14 and extending from one arm 27 of the angle; the other arm 29 has a pivot pin 30 extending therefrom through the member 12. For reinforcement, a second, smaller angle 31 may be mounted on the member 12, as shown, extending around two sides of the member, one side being that opposite to the side against which the arm 29 of the angle 26 is positioned, with the pin 30 extending also through the angle 31, as shown.

To facilitate carrying of the collapsed frame, each of the members 11 is provided at its upper end with a suitable handle 32. Thus, when collapsed, the frame may be carried over the arm, in the manner of an umbrella.

For use as a chair, the frame is provided with a suitable fabric 33, substantially rectangular in conformation, with the corners provided with loops 34. The loops 34 at the upper end may be riveted to the members 11 near the upper ends of the latter, and the loops 34 at the lower end of the fabric may be riveted or even loosely engaged over the junctions of the 14 and 12 at the upper ends of the latter, all as illustrated in Fig. 1.

The frame may be used as a carry-all or shopper's cart, by the addition of wheels and substitution of a different fabric for the seat fabric 33, and such a cart is shown in Fig. 6, at 10b. Since the frame 10b is identical to the frame 10 shown in Fig. 1 and described above in detail, it will be described hereinafter only insofar as it differs from the showing of Fig. 1. On such a cart it is desirable to have only rear wheels, and since the planes of the two side members 12 remain mutually parallel at all times and are upright when the frame is extended for use, the wheels 35 are rotatably attached to the lower ends of the lower sections 12b of the members 12. Thus, when the frame 10b is extended as shown in Fig. 6, it is apparent that the device may readily be moved about on the wheels 35 in the manner of a cart. A sack or the like 36, having an open top and being relatively deep to provide ample compartment space to hold goods which have been bought, is provided with corner loops 34a which are attached to the frame members in a manner similar to the attachment of the seat fabric 33 previously described.

When either of the frames 10 or 10b is collapsed from the extended positions shown in Figs. 1 and 6, respectively, into the collapsed positions shown in Figs. 2 and 7, respectively, the co-planar members 14 and the parallel co-planar members 17 move toward each other, while

4

the co-planar members 11 and 12 on both sides also move toward each other, with each pair of C-planar members pivoting about each other. In completely collapsed position, these members assume the relative positions shown in Figs. 2 and 3. Thus, the entire frame is compressed into the rectangular cross-section shown in Fig. 3, with all of the sections composing the members lying in common or parallel planes. Hence the frame is collapsed into a minimum of volume as well as thickness, the volume constituting an elongated rectangular parallelepiped. The two handles 32 are also positioned close together, as shown, so that the collapsed frame is readily carried over the arm.

Obviously, modifications in form or structure may be made without departing from the spirit or scope of the invention.

I claim:

A collapsible normally upright frame rectangular in plan view having four sides each comprising a pair of intersecting cross-members pivoted together substantially intermediate their length and lying in a common plane, each of said members of the sides of the frame having the lower end thereof universally connected to the lower end of one of the members of each of the adjacent sides of the frame and having the upper end thereof universally connected to the upper end of the other of the members of said adjacent sides of the frame, each of said pairs of intersecting members comprising two end sections off-set with respect to each other and lying on opposite sides of and in contact with a common imaginary plane between the sections, said common imaginary plane lying at right angles to said first-named common plane and an approximately Z-shaped intermediate section joining said two sections, one of said pairs of intersecting members having a passage through said intermediate section thereof, the other of said pairs of intersecting members having said intermediate section thereof reduced in thickness and extending through said passage, and a pivot pin extending through said intermediate sections of said pair of intersecting members, each of said members of any of the four sides of the frame lying in a common plane with and being parallel to one of the members on the opposite side of the frame, said frame being collapsible into the volume of an elongated rectangular parallelepiped having a length equal to the length of said members and a transverse cross-section having one side thereof equal to twice the thickness of one of the members and the other side thereof equal to four times the said thickness of one of the members, and all said members being of equal length and of equal cross section for substantially the entire length thereof.

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