

Oct. 23, 1956

G. NELSON

2,767,775

COLLAPSIBLE SOFA

Filed Nov. 3, 1954

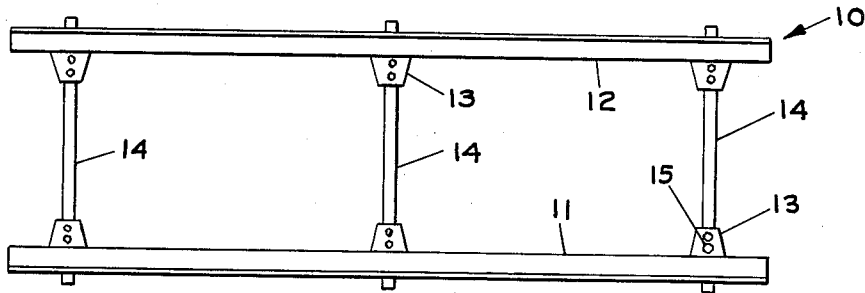


FIG. 1

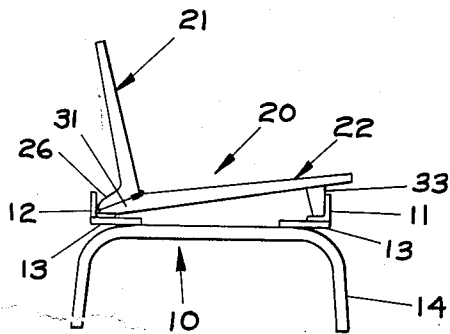


FIG. 2

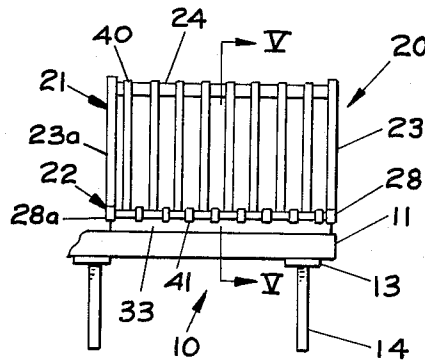


FIG. 3

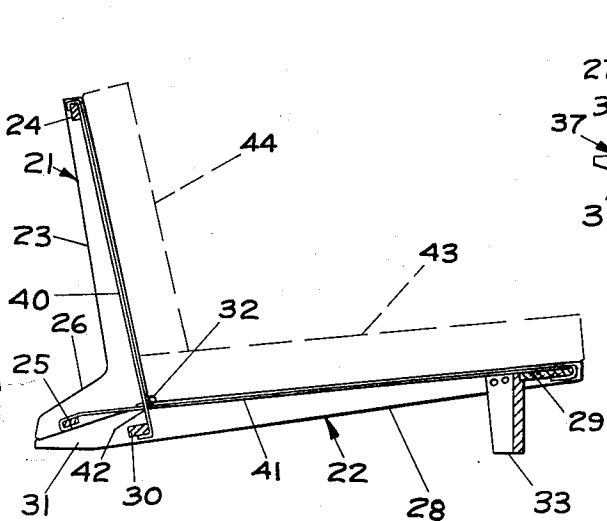


FIG. 4

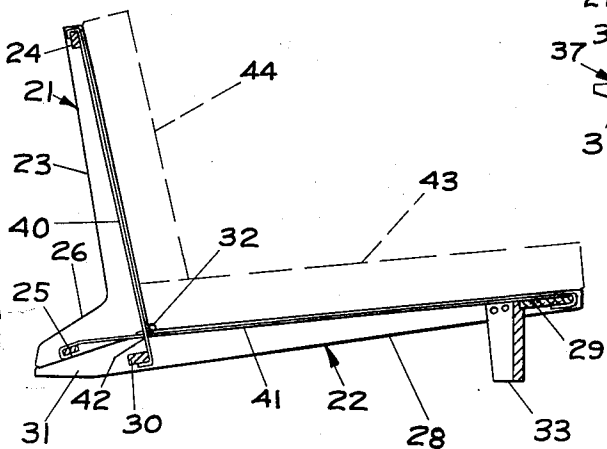


FIG. 5

INVENTOR
GEORGE NELSON

BY *Peter P. Price*
ATTORNEY

1

2,767,775

COLLAPSIBLE SOFA

George Nelson, Quogue, N. Y., assignor to Herman Miller Furniture Company, Zeeland, Mich., a corporation of Michigan

Application November 3, 1954, Serial No. 466,476

6 Claims. (Cl. 155—139)

This invention relates to furniture construction and particularly to the construction of a sofa specifically designed for shipment or storage as a flat, compact unit.

Furniture, in general, is an expensive item to ship because of its bulk and the high percentage of shipping space wasted when the unit is transported fully assembled.

It is the primary object of this invention to provide a sofa of sturdy and simple construction but which may be shipped in knocked-down condition as a flat, compact package.

It is a further object of this invention to provide a sofa unit which may be stored as a compact, relatively flat package thus effecting substantial savings in both factory and warehouse space.

Another object of this invention is to provide a furniture unit which may be quickly and easily erected by the purchaser with a minimum of tools and without requiring any special skills or knowledge to complete the erection.

A further object of this invention is to incorporate these advantages in the furniture without sacrifice of appearance or styling.

These and other objects and purposes of this invention will be immediately understood by those acquainted with furniture design upon reading the following specification and the accompanying drawings.

In the drawings:

Fig. 1 is a plan view of the supporting frame for my invention with the seat units removed.

Fig. 2 is an end elevation view of my invention.

Fig. 3 is a fragmentary, front elevation view of my invention.

Fig. 4 is an end elevation view of my invention in folded condition.

Fig. 5 is an enlarged, sectional view of the seat unit for my invention taken along the plane V—V of Fig. 3.

In executing the objects and purposes of this invention, I have provided a base frame consisting of a front rail and a back rail joined by detachable elements extending fore and aft of the frame. The seat portion of the sofa is divided into individual units each of which consists of a back frame assembly and a seat frame assembly hinged together so that they may easily be folded or erected. The seat frame assemblies support the cushions by means of webbing. This webbing is slightly elastic and acts as the means for positively holding the seat assembly in erected position. The number of seat assemblies utilized is dependent upon the length of the frame.

While this invention is described as applied to a sofa, it will be readily recognized that it may be, with equal facility, applied to a chair or other seating units. This invention is intended to embrace such units and the description of the invention in terms of a sofa is intended only to simplify the description and is not to be considered as a limitation.

In the following description, the terms "forwardly" and "rearwardly" are frequently used. The term "for-

2

wardly" is to be considered as toward the front of the seat or to the right as the invention appears in Fig. 2 and "rearwardly" away therefrom.

Referring specifically to the drawings, the numeral 10 indicates a base frame having a front rail 11 and a rear rail 12. The rails 11 and 12 are angle members extending lengthwise of the furniture unit each with its vertical leg on the outside of the rail. Secured to each of the rails and extending inwardly of the furniture unit are brackets 13. The brackets 13 are firmly secured to the rails 11 and 12 by suitable means such as welding. The inner end of each bracket 13 extends substantially inwardly beyond the rail to which it is attached. The inwardly projecting portions of the brackets 13 are apertured for mounting bolts. The brackets 13 on the front and back rails are aligned forwardly and rearwardly of the unit.

Detachably secured to each pair of the brackets 13 is a leg member 14. The leg members extend fore and aft of the furniture unit and are detachably secured by means of bolts 15. The leg members 14 provide the only forwardly and rearwardly extending means of attachment between the rails 11 and 12.

The leg members 14 have the general shape of an inverted U and in cross-section are preferably square. It will be recognized that round or other cross-sectional shapes may be employed if desired.

Resting on the base frame 10 are one or more seat assemblies 20. Each seat assembly 20 consists of a pair of frames, a back frame 21 and a seat frame 22.

The back frame consists of a pair of side members 23 and 23a joined by a top cross bar 24 and at the bottom by a bottom cross bar 25. Projecting rearwardly from the bottom of each of the side members 23 and 23a is an arm 26. The arms 26 extend rearwardly and slightly downwardly when the seat is in erected position. The bottom surfaces 27 of the arms 26 are flat.

The top bar 24 of the back frame 21 is located at the top of the frame. The bottom bar 25 is located near the lower, rearward end of the arms 26 and rearwardly of a vertical plane passing through the top bar 24 when the seat assembly is in erected position. Its location is slightly below the plane of the hereinafter described hinge joining the seat and back frames.

The seat frame consists of a pair of side members 28 and 28a joined by a front cross bar 29 and a rearward cross bar 30. The forward bar 29 of the seat assembly 22 is mounted adjacent the front end of the side frame members 28. The rearward bar 30 of the seat assembly 22 is mounted toward the rear of the seat frame but appreciably forward of a vertical plane passing through the top bar 24 of the back frame when the seat is erected. It is, however, slightly rearwardly of and below the hereinafter described hinge joining the seat and back frames. The purpose of this arrangement of the bars 24, 25, 29 and 30 will be fully described under "Operation."

The seat frame 22, like the back frame 21, has a rearwardly extending arm 31. The arm 31 has an upper surface 32 designed to abut the surface 37 of the arm 26 on the back frame 21. The rear bar 30 is located approximately at the juncture of the side members 28 and 28a and the arms 31. The back frame 21 and seat frame 22 are joined by means of a hinge 32 at the point where the forward and upper surfaces of these frames intersect and at the forward end of the surfaces 27 and 32 of the arms 26 and 31.

This hinge constitutes one of the two members holding the assembly together. The point of contact between the surfaces 27 and 32 slopes downwardly from the hinge 32. This permits the bottom bar 25 to be carried below the plane of the hinge 32 when the seat is fully erected.

Adjacent its rearward end, the bottom surface of the arm 31 is tapered so that when the seat assembly 20 is seated on the frame, it will provide a broad resting surface for the assembly on the rearward rail 12. At the forward end, the seat assembly 20 is supported by a short standard 33. The standard 33 is secured to the side members 28 and 28a of the seat assembly and projects downwardly to rest upon the forward rail 11 of the base frame 10.

Stretched between the bars of both frames are strips of webbing 40 on the back frames 21 and 41 on the seat frame 22. The webbing strips 30 of the back frame are interspaced between the webbing strips 41 of the seat frame, since these webbing strips intersect and one group passes between the others. The upper ends of the webbing strips 40 are secured to the top bar 24 of the back frame. The lower ends of the webbing strips 40 are secured to the back bar 30 of the seat frame 22. The forward ends of the webbing strips 41 are secured to the forward bar 29 of the seat frame. The rearward ends of the webbing strips 41 are secured to the bottom bar 25 of the back frame 21. Thus, the webbing strips 40 and 41 have a point of intersection 42.

The webbing strips 40 and 41 may be of any suitable material but must have a limited degree of elasticity in order properly to perform their intended functions. They serve as the locking means for the seat assembly as well as the support elements for the seat cushion 43 and the back cushion 44. For this purpose they may be either a closely woven, high strength fabric, in which case the weave of the fabric is relied upon to produce the desired elasticity. They may be of rubber or a similar somewhat elastic, plastic material wherein the inherent elastic qualities of the material itself are depended upon to provide the necessary elastic characteristics of the webbing strips.

The remainder of the structure may be constructed of any suitable material. It is contemplated that the back frame 21 and the seat frame 22 are preferably constructed of wood, while the base frame including the rails 11 and 12 and the legs 14 will be constructed of aluminum, magnesium or steel. Any suitable finish may be employed, depending upon the particular styling desired. The cushions 43 and 44 may be of any suitable design and are made completely detachable from the rest of the unit.

Operation

Assuming the sofa to be in folded condition such as it would be for shipment or storage, the cushions 43 and 44 are first removed. The seat assembly 20 is then erected. Erection of the seat assembly consists of pivoting the back frame 21 rearwardly until the surfaces 27 and 32 of the arms 26 and 31 abut. With this single, simple operation, erection of the seat assembly is completed.

As the back frame 21 is pivoted from a position accumbent on the seat frame 22, the point of intersection 42 of the webbing strips 40 and 41 moves rearwardly. When this point of intersection 42 is forward of the hinge 32, the tendency of the webbing strips is to hold the back frame 21 toward the seat frame 22 and thus fold the seat assembly 20. However, as the back frame 21 nears the limit of its permitted travel, the point of intersection 42 moves rearwardly of and below the hinge 32. As soon as the point of intersection 42 passes the pivot point of the hinge 32, the forces generated about the hinge reverse direction and thereafter the webbing strips 40 of the back frame and the webbing strips 41 of the seat frame urge separation of the seat and back frames. Movement under this urging is limited by contact between the surfaces 27 and 32 of the arms 26 and 41.

The webbing strips 40 are designed to be slightly shorter than the distance between the top bar 24 of the back frame 21 and the rear bar 30 of the seat frame

22 when the seat assembly 20 is in erected position. Similarly, the webbing strips 41 are designed to be slightly shorter than the spacing between the front bar 29 of the seat frame 22 and the bottom bar 25 of the back frame 21 when the seat assembly 20 is erected. Thus, as the back frame 21 approaches a position normal to the seat frame 22, these webs are stretched and this stretching is retained when the seat assembly is in fully erected position. The forces generated by the stretching of the webbing strips 40 and 41 are the forces relied upon to maintain the seat assembly in erected position.

It will be recognized that the normal use of the seat urges the back frame 21 away from the seat frame and thus cooperates with the webbing strips to maintain the seat assembly in erected position. The stretching of the webbing strips 40 and 41 also makes them resistant to the weight of the occupant and of the cushions 43 and 44, providing a firm foundation for these cushions. It is thus seen that the seat assembly is erected by one, simple operation requiring no tools. For shipment, the cushions 43 and 44 may be placed loosely, one on each side of the folded frame, as illustrated in Fig. 4. If desired, they may both be placed on the same side of the frame and the legs 14 placed on the other side. The particular way in which the cushions are arranged with relation to the seat assembly 20, when the unit is packed or stored, is immaterial to this invention.

The rails 11 and 12 of the base frame assembly 10 are designed to be shipped as a separate unit. They may be placed together and shipped as a long, thin package. The legs may be included with them or included with the seat assembly. When the base assembly has been erected by the simple operation of securing the legs 14 to the brackets 13 by means of the bolts 15, the seat assemblies 20 are placed thereon by nesting the rearward end of the arms 31 and 26 in the back rail 12 and seating the standard 33 in the forward rail 11. The upstanding flanges of the forward and rearward rails 11 and 12 prevent fore and aft shifting of the seat assembly, once it is in place.

It will be recognized that in the design of a unit of furniture such as a sofa as many of the seat assemblies 20 may be used as desired. Two, three or more of them may be placed on a single frame. If it is desired to use the unit as a chair, the frame assembly 10 is made shorter so it is only the width of a single seat assembly 20.

It will be further recognized that the seat assembly may be used apart from the specific base frame 10. Any suitable platform upon which the seat assembly may be placed will be adequate. The seat assembly may be removed from the sofa and placed on the floor, if so desired, since the seat assembly 20 is a self-contained, complete unit.

It will be recognized that various modifications of this invention may be made without departing from the principles set forth herein. Each of these modifications is to be considered as included in the hereinafter appended claims unless these claims, by their language, expressly state otherwise.

I claim:

1. As an article of manufacture, a folding seat in combination comprising: a seat frame; a back frame; each of said frames having rearwardly projecting arms, said arms adapted to contact each other when said seat is erected; hinge means for securing said back frame to said seat frame; webbing secured on one of its ends to the top of said back frame and on the other of its ends to a back cross bar on said arm on said seat frame rearwardly of said hinge means when said seat is erected; said webbing having elastic characteristics and a normal length less than the distance between the point of attachment to said back frame and the point of attachment to said arm of said seat frame; said webbing being rearwardly of said hinge means when said seat is erected whereby said webbing urges said seat to remain erected.

5

2. As an article of manufacture, a folding seat in combination comprising: a seat frame; a back frame; hinge means for joining said frames; arms on each of said frames projecting rearwardly from said hinge means; a webbing having elastic characteristics secured on one of its ends to the top of said back frame and on the other of its ends to a back cross bar on said arms on said seat frame; said webbing being shorter than the spacing between its points of attachment and being rearwardly of said hinge means when said seat is erected; said arms being adapted to contact each other when said seat is erected whereby they limit rearward movement of said back frame under the urging of said webbing.

3. As an article of manufacture, a folding seat in combination comprising: a seat frame; a back frame; hinge means for joining said frames; arms on each of said frames projecting rearwardly from said hinge means; a first webbing having elastic characteristics secured on one of its ends to the top of said back frame and on the other of its ends to a back cross bar on said arms on said seat frame; a second webbing having elastic characteristics secured on one of its ends to the front of said seat frame and on the other of its ends to a bottom back cross bar on said arms on said back frame; said webbings each being shorter than the spacing between their points of attachment when said seat is erected; said webbings intersecting, said point of intersection being rearward of and below said hinge means when said seat is erected; said arms being adapted to contact each other when said seat is erected whereby they limit rearward movement of said back frame under the urging of said webbing.

4. As an article of manufacture, a folding seat in combination comprising: a seat frame; a back frame; each of said frames having rearwardly projecting arms, said arms adapted to contact each other when said seat is erected; hinge means for securing said back frame to said seat frame; first webbing strips secured on one of their ends to the top of said back frame and on the other of their ends to a back cross bar on said arms on said seat frame rearwardly of said hinge means when said seat is erected; second webbing strips secured on one of their ends to the front of said seat frame and on the other of said ends to a bottom back cross bar on said arms on said back frame rearwardly of and below said hinge means when said seat is erected; said first webbing strips being arranged alternately of said second webbing strips whereby said strips may pass between each other to form a point of intersection; said first and second webbing strips having a length less than that required of them when said seat is erected; said webbing strips having elastic characteristics; said point of intersection of said first and second webbing strips being rearwardly of and below said hinge means when said seat is erected whereby said webbing strips urge said seat to remain erected.

5. As an article of manufacture, a folding seat in

6

combination comprising: a seat frame; a back frame; each of said frames having a pair of side members; a rearwardly projecting arm on each of said side members; the arms on the side members of said back frame adapted to contact the arms on the side members of said seat frame when said seat is erected; hinge means for securing said back frame to said seat frame; said arms being rearwardly of said hinge means; a top bar secured to and extending between the top ends of said side members of said back frame; a bottom bar secured to and extending between the arms of said back frame; a front bar secured to and extending between the front ends of said side members of said seat frame; a rear bar secured to and extending between the arms of said seat frame; first webbing strips secured on one of their ends to said top bar and on the other of their ends to said rear bar; second webbing strips secured on one of their ends to said front bar and on the other of their ends to said bottom bar; said first webbing strips being arranged alternately of second webbing strips whereby said strips may pass between each other to form a point of intersection; said first and second webbing strips having a length less than that required of them when said seat is erected; said webbing strips having elastic characteristics; said point of intersection of said first and second webbing strips being rearwardly of and below said hinge means when said seat is erected whereby said webbing strips urge said seat to remain erected.

6. As an article of manufacture, a folding seat in combination comprising: a seat frame; a back frame; each of said frames having rearwardly projecting arms, said arms adapted to contact each other when said seat is erected; hinge means for securing said back frame to said seat frame; webbing secured on one of its ends to the top of said back frame and on the other of its ends to a back cross bar on said arms on said seat frame rearwardly of said hinge means when said seat is erected; said webbing having elastic characteristics and a normal length less than the distance between the point of attachment of said back frame and the point of attachment to said arm of said seat frame; said webbing being rearwardly of said hinge means when said seat is erected whereby said webbing urges said seat to remain erected; a base frame; said base frame having spaced front and back rail members; said seat adapted to rest upon and extend between said rail members.

References Cited in the file of this patent

UNITED STATES PATENTS

| | | |
|-----------|---------|---------------|
| 78,472 | Neuhaus | June 2, 1868 |
| 108,314 | Bartels | Oct. 18, 1870 |
| 2,020,207 | Platter | Nov. 5, 1935 |
| 2,402,832 | Muller | June 25, 1946 |

FOREIGN PATENTS

| | | |
|---------|--------|--------------|
| 973,064 | France | Feb. 7, 1951 |
|---------|--------|--------------|