Jan. 27, 1970 E. L. WITTNER ET AL 3,492,046

SYSTEM OF LATERALLY ARRANGED FOLDING CHAIRS

Filed Jan. 31, 1968

Fig. 1

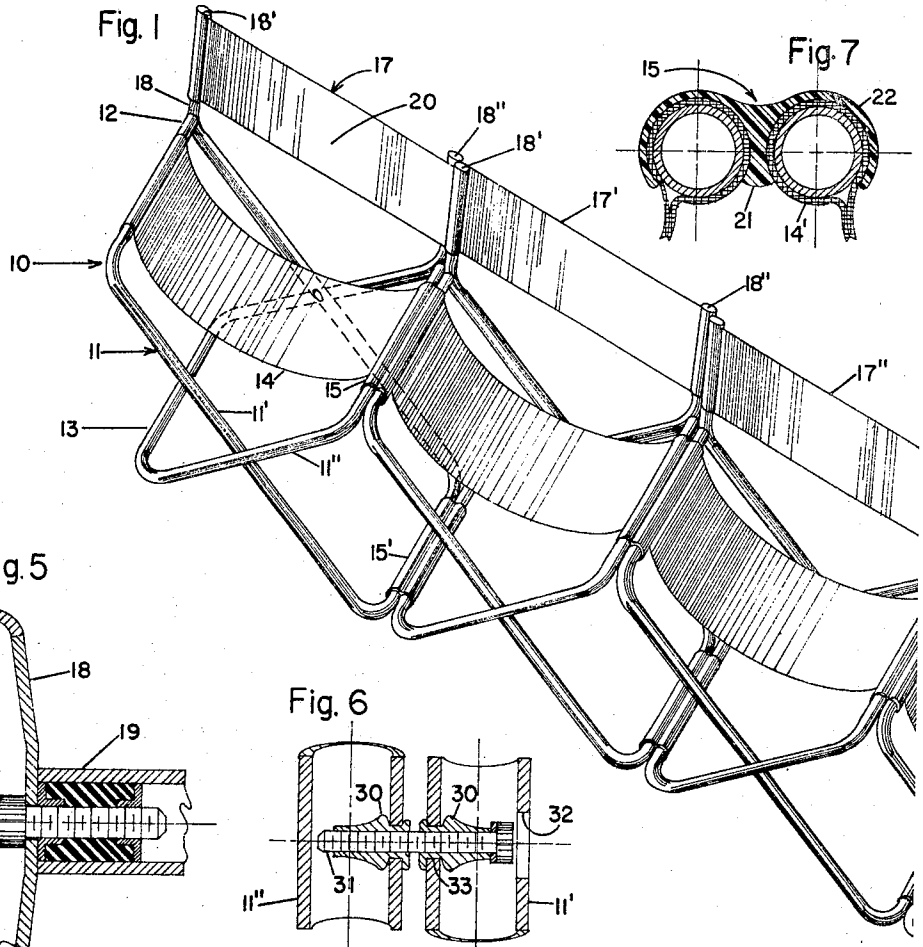


Fig. 7

Fig. 5

Fig. 6

Fig. 2

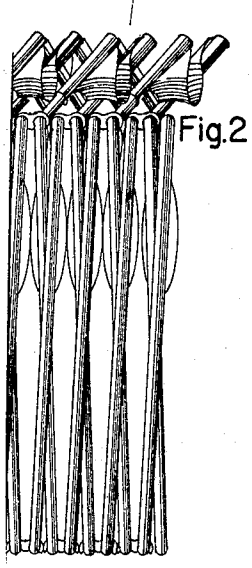


Fig. 3

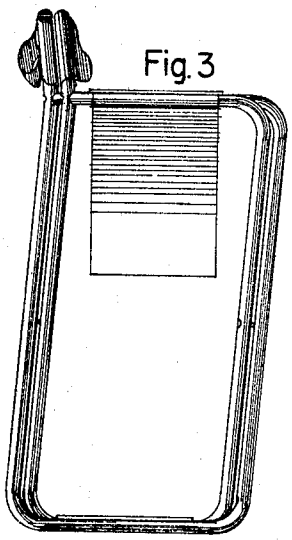
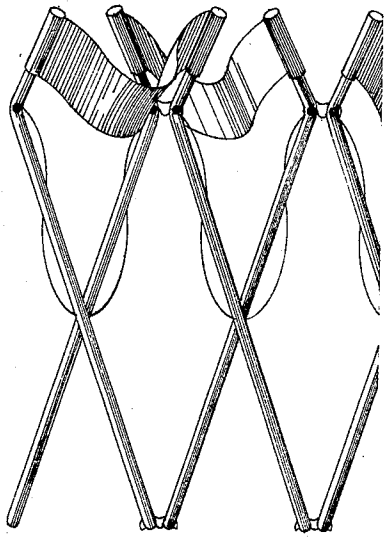


Fig. 4



United States Patent Office 3,492,046
Patented Jan. 27, 1970

3,492,046

SYSTEM OF LATERALLY ARRANGED FOLDING CHAIRS

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Filed Jan. 31, 1968, Ser. No. 701,997
Int. Cl. A47c *1/124, 4/28*
U.S. Cl. 297—248 10 Claims

ABSTRACT OF THE DISCLOSURE

A system providing a series of laterally arranged folding chairs which may be opened and closed like "lazy tongs," separated at any desired points of joinder between chairs by the removal of resilient clasp means, and may be constructed with a minimum number of parts designed for easy assembly and manufacture.

The invention relates to a system of plural, separable, laterally arranged, and simultaneously foldable and unfoldable adjacent chairs, and has for its object a device which is light in weight, cheap to manufacture, of strong construction, and foldable within a small compass for storing, shipping and the like. separable into a plurality of units of one or more chairs, the device being particularly adapted for use in multi-purpose rooms, conference rooms, assembly halls and the like.

A further object is to provide a system of this character in which no superfluous strut members are required to maintain stability since this is achieved by the novel design of the component parts as well as their arrangement.

A further object of the invention is to provide a system related folding chairs in which the flexible seats are enabled to hang freely in substantially catenary form.

A further object of the invention is to provide an arrangement of chairs which when folded have the seats and backs thereof neatly, compactly, and availably arranged to permit cleaning thereof with conventional cleaning machines and implements.

A further object is to provide the chairs of the invention with hidden, pivotally connected leg joints utilizing explosively positioned bearings.

A further object is to provide a resilient clamp by plastic extrusion which is adapted for releasably holding the upper or lower horizontal chair leg portions of the chairs in a system of the character set forth above.

A further object is to provide a chair system having easily installed and removable seats and backs of integral construction with lateral openings in the ends thereof to receive horizontal leg portions of the chair frames and back frame members, respectively.

With the above and other objects in view, the invention resides in the combination and arrangement of parts as hereinafter set forth, shown in the drawings, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings:

FIGURE 1 is a perspective view of the system of chairs in their open, operative position.

FIGURE 2 is a front, vertical view of the chair system in closed position.

FIGURE 3 is an end view of the chair system shown in FIGURE 2.

FIGURE 4 is a view similar to that of FIGURE 2 but with the chairs in a partially opened position.

FIGURE 5 is a vertical sectional view of a separable but rigid joint between seat support elements and back support elements of the chair frames.

FIGURE 6 is a sectional view taken through one of the pivotal connections of a pair of chair legs.

FIGURE 7 is a vertical sectional view taken through one of the plastic, resilient clamp members in position over seat and frame portions of adjacent chairs in the system.

Referring to the drawings, the numeral **10** designates generally one of a plurality of laterally folding chairs arranged in a side by side, or lateral, manner. Each chair **10** has a pair of pivotally connected leg members **11**. Each pair of leg members **11** is made by pivotally connecting an inner leg member **11'** to an outer leg member **11''** at a suitable location intermediate the horizontal portions **12**, **13** of said leg members providing thereby an axis about which said leg members **11' 11''** pivot. Along said axis, in facing portions of said leg members are provided openings **33**, **33**. In each opening is placed a conventional explosively set, or positioned, bearing member **30** available from Goodyear Rubber Co. under T.M. "Rivnut." Aligned with said openings **33** is an opening **32** on the inner side of the inner member **11'**. A pin **31** having a partially or entirely threaded shank is inserted through opening **32** and in the case of the partially threaded shank is threaded into the bearing member **30** in the outer leg member **11''** but turns freely in the bearing **30** in the leg member **11'**. Where the pin **31** is threaded entirely the pin may turn freely in one or the other or both of said bearing members if said bearing members are provided with female threaded portions to receive the pin **31**. Details of one such connection are best seen in FIGURE 6 of the drawing. In the preferred embodiment, each inner leg member **11'** has integrally formed therewith an upper portion **18** which has a back frame member **18'** extending upwardly therefrom. Each outer leg member has integrally formed therewith an upper portion **18** which has a back frame member **18'** extending upwardly therefrom. Each outer leg member has integrally formed therewith an upper portion **18** which has a back frame member **18''** extending upwardly therefrom. The upper horizontal portions **12** are each connected to the corresponding upper portions **18**, as seen in FIGURE 5, at numeral **19**, by a conventional releasable connection **40** of the bolt operated, expanding head type which may be released by a suitable tool inserted through opening **41** in upper portion **18**. To mount seats **14** on the horizontal portions **12**, the connections **40** are released and the looped ends **14'** are slipped over the free ends of the corresponding horizontal portions **12** of each corresponding leg member **11'**, **11''**. Each connection **40** is then put back in place and expanded in the corresponding horizontal portions **12**. In the preferred embodiment, the back members are fitted over the back frame members in a preferred arrangement. Thus, back member **17** is looped over inner back frame members **18'**; the next successive back member **17'** is looped over outer back frame members **18''**; and the succeeding back members are looped in similarly alternating inner and outer positions over corresponding back frame members. When closed, the back members tend to fold as seen in FIGURES 2, 3, and 4, on opposite sides of the back frame members to permit easy access thereto for cleaning. The adjacent chairs are connected to each other by a plurality of resilient clamps **15**, **15'** made from a flexible and resilient plastic by extrusion. As best seen in FIGURE 7, each clamp has a relatively heavy web **21** extending longitudinally, centrally thereof. From the upper portion thereof extend transversely and in opposite directions two clasp portions **22** arranged to resiliently and pivotally hold adjacent chair portions. Clamps **15** and **15'** are alike. Thus, when used as the upper clamp **15**, the clasp portions **22** are placed over the seat loop portions **14'** on

the horizontal portions **12**. When used as the lower clamp **15'**, said portions **22** are directly in contact with horizontal portions **13**. The resilience of portions **22** permits such accommodation and provides an economical feature of the invention. While the form of the clamp **15** shown in FIGURE 7 is preferable in the system illustrated in the drawings, it is contemplated that other forms may find utility in this form of the invention as well as in modifications also covered by the claims. For example, sheet metal may be suitably cut and formed to an approximation of the illustrated clamp and heat treated, if necessary, to provide the necessary resilience and flexibility. Such a clamp could also be made in two parts so that the web portion is a hinge pivoted at its bottom portion. A pivoted hinge type of clamp would enable the leg members to have a cross section other than circular, since the pivoting would then be taken care of by the clamp alone. Removal of any corresponding pair of upper and lower clamps **15** by easy manipulation thereof enables separation of the chairs into any desired combination of chairs.

The invention having been set forth what is claimed as new and useful is:

1. In a system of plural, separable, laterally arranged, and simultaneously foldable adjacent chairs; a plurality of pairs of pivotally connected leg members; said leg members comprising upper and lower elongated horizontal portions; a flexible seat connected between the upper elongated horizontal portions of each pair of pivotally connected leg members; first means for releasably and pivotally connecting adjacent upper elongated horizontal portions of said adjacent chairs between the ends thereof, and second means for releasably and pivotally connecting adjacent lower elongated horizontal portions of said adjacent chairs between the ends thereof, whereby said plurality of chairs may be simultaneously folded or unfolded, and said chairs may be selectively separated.

2. In a system as set forth in claim **1**, said system further comprising means for limiting the extent to which said plurality of chairs may be unfolded so as to permit the seats to hang freely.

3. In a system as set forth in claim **2**, said means for limiting the extent to which said chairs may be unfolded comprising back frame members extending upwardly from and rigidly connected to the back ends of said upper horizontal portions; removable, flexible backs extending between laterally spaced back frame members, said back members adapted when fully stretched between said back frame members to limit separation of said leg members to permit said seats to hang freely.

4. In a system as set forth in claim **2**, said means for limiting the extent of unfolding comprising in each chair an inner and outer, pivotally connected, pair of angularly bent leg members, said leg members comprising upper portions comprising back frame members, said angularly bent leg members, when in fully opened position, present said upper portions and back frame members in a substantially vertically upward direction; and removable, flexible backs releasably connected to said back frame members.

5. In a system as set forth in claim **4**, in which the first of successive back members in said laterally arranged system is connected to succeeding inner upper leg portions at the back frame portions thereof, and the second of succeeding back members is connected to succeeding outer upper leg portions at the back frame portions thereof, the remainder of said back members being alternatingly mounted thusly to the last back member so that said back members will be free of each other when said chair system is closed.

6. In a system as set forth in claim **5**, wherein said means for releasably and pivotally connecting the horizontal leg portions comprises an integrally extruded clamp of resilient and flexible plastic.

7. In a system as set forth in claim **6**, said clamp comprising an elongated body having a transversely central, thick web joined at its upper portion to transversely extending portions arranged to resiliently clasp the adjacent horizontal portions of the leg members and the surrounding ends of the seats connected thereto.

8. In a system as set forth in claim **7**, said clamp being sufficiently resilient to serve as a clasp for either the upper or the lower horizontal portions of the chair legs.

9. In a system as set forth in claim **1**, said pivotally connected legs comprising a hidden pivotal connection provided by explosively positioned bearings and a threaded pin received in axial openings in said bearings; at least one of said bearings in each leg positioned in axial alignment with the cooperating bearing in the other leg.

10. In a system as set forth in claim **3**, said back frame members being rigidly connected to said upper horizontal portions by a releasable connection to permit easy mounting of said seats on said horizontal portions, and said seats are provided with looped openings laterally thereof to receive said upper horizontal portions.

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U.S. Cl. X.R.

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