United States Patent [19]

Faiks et al.

[11] **3,838,884**

[45] **Oct. 1, 1974**

[54] **GANGING MEANS FOR CHAIR**

[75] Inventors: **Frederick S. Faiks,** Comstock Park; **Randall P. Buhk,** Wyoming, both of Mich.

[73] Assignee: **Steelcase Inc.,** Grand Rapids, Mich.

[22] Filed: **Oct. 25, 1972**

[21] Appl. No.: **300,594**

Related U.S. Application Data

[62] Division of Ser. No. 111,429, Feb. 1, 1971, Pat. No. 3,724,897.

[52] **U.S. Cl.** **297/248,** 297/239

[51] **Int. Cl.** **A47c 3/04,** A47c 1/124

[58] **Field of Search** 297/239, 248, 445; 312/108, 111

[56] **References Cited**

UNITED STATES PATENTS

3,028,207	4/1962	Darnell	312/111
3,278,227	10/1966	Rowland	297/248 X

FOREIGN PATENTS OR APPLICATIONS

750,742	1/1967	Canada	297/248

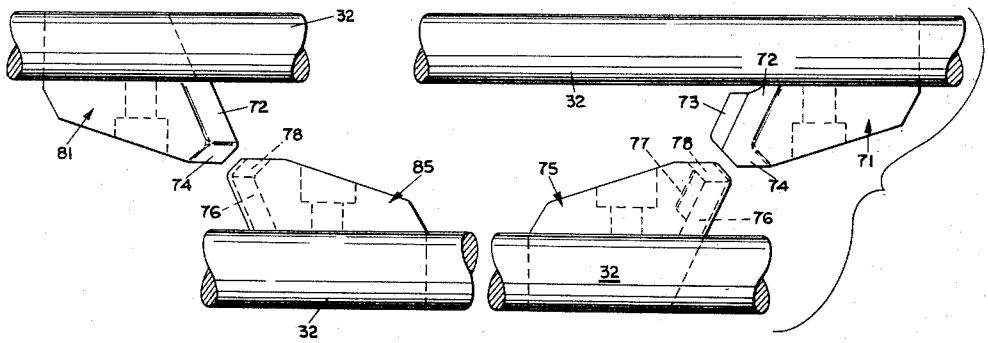
Primary Examiner—Casmir A. Nunberg

Attorney, Agent, or Firm—Price, Heneveld, Huizenga & Cooper

[57] **ABSTRACT**

The specification discloses a chair having a seat, back and wire rod frame. The chair rests on four glides, all of which have fastening intelligence such that the chairs of this invention can be ganged together. The glides on one runner have facing fastening intelligence while those on the other runner have fastening intelligence facing away from one another, such that fore and aft and lateral movement of joined chairs is eliminated.

4 Claims, 16 Drawing Figures



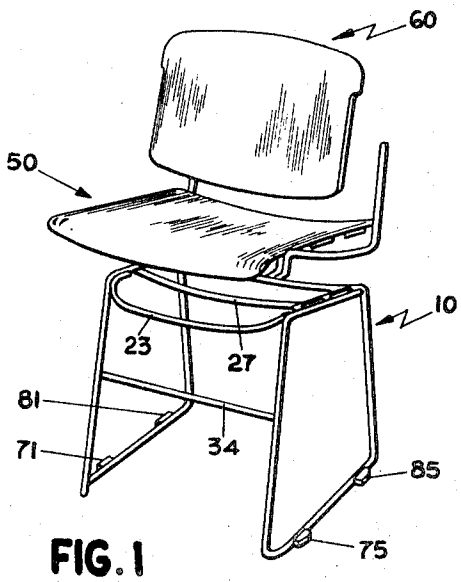


FIG. 1

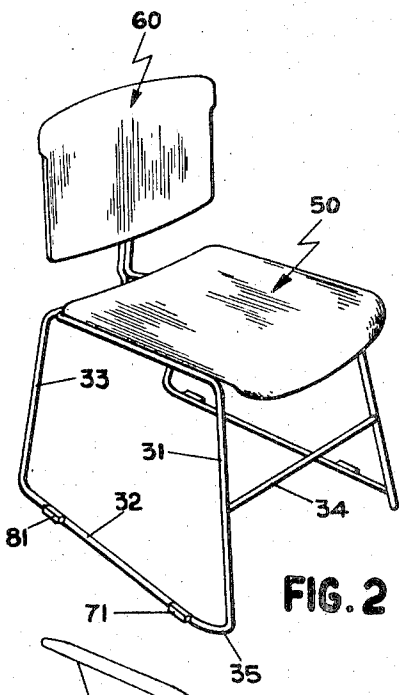


FIG. 2

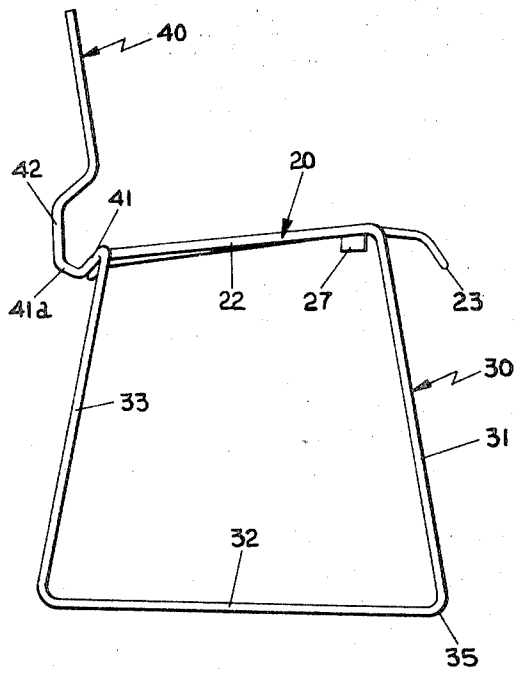


FIG. 3

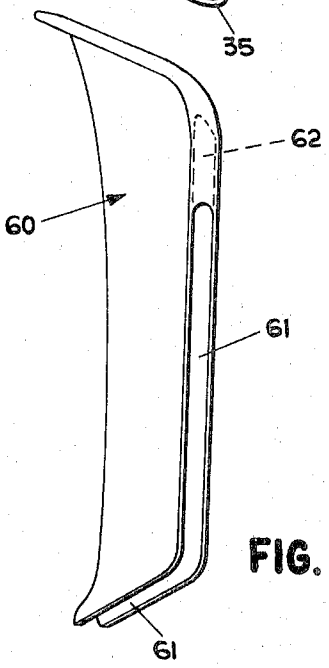


FIG. 7

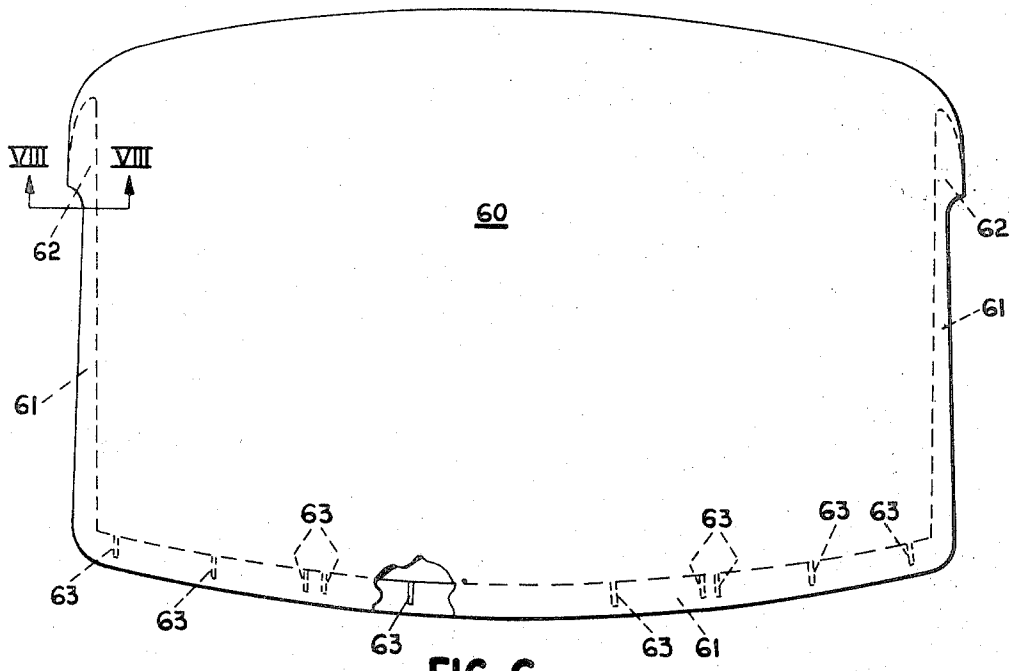


FIG. 6

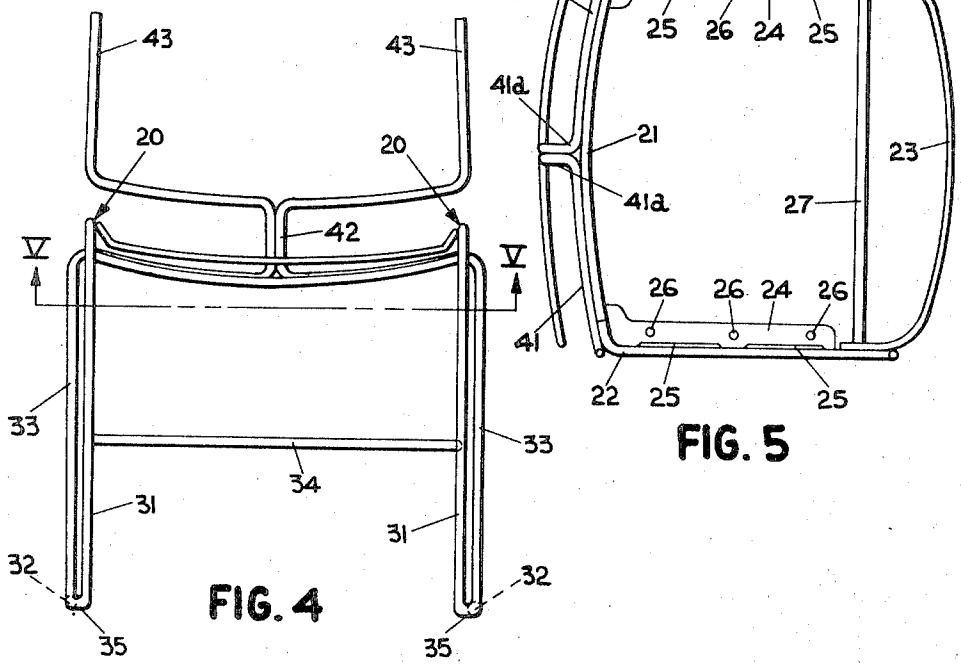


FIG. 4

FIG. 5

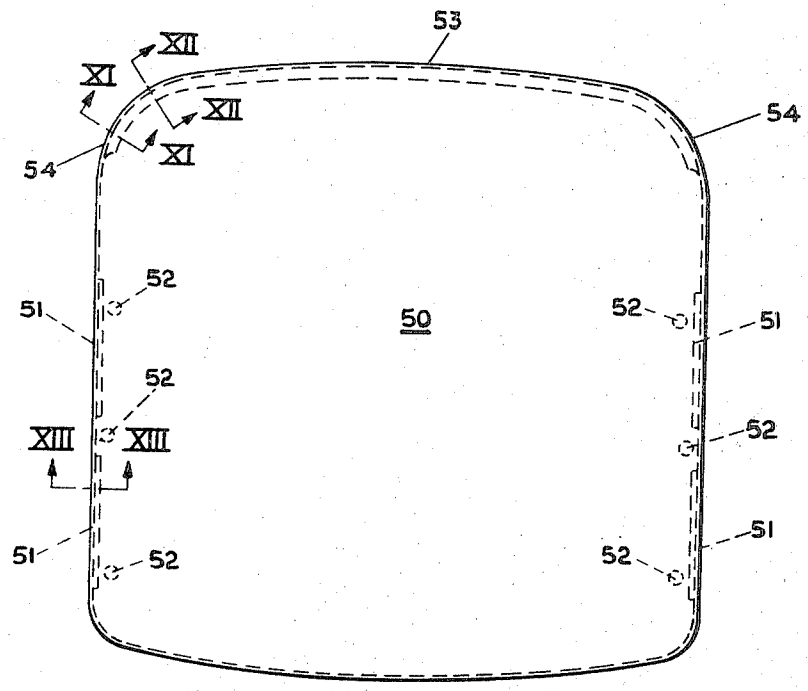


FIG. 9

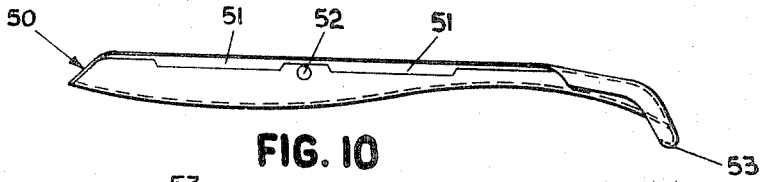


FIG. 10

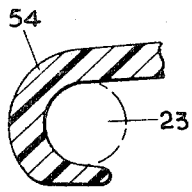


FIG. 11

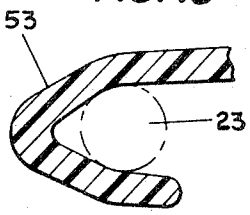


FIG. 12

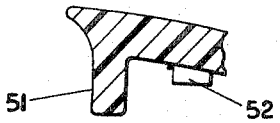


FIG. 13

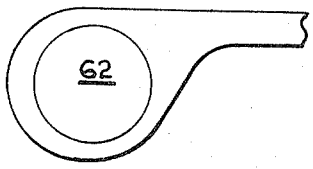
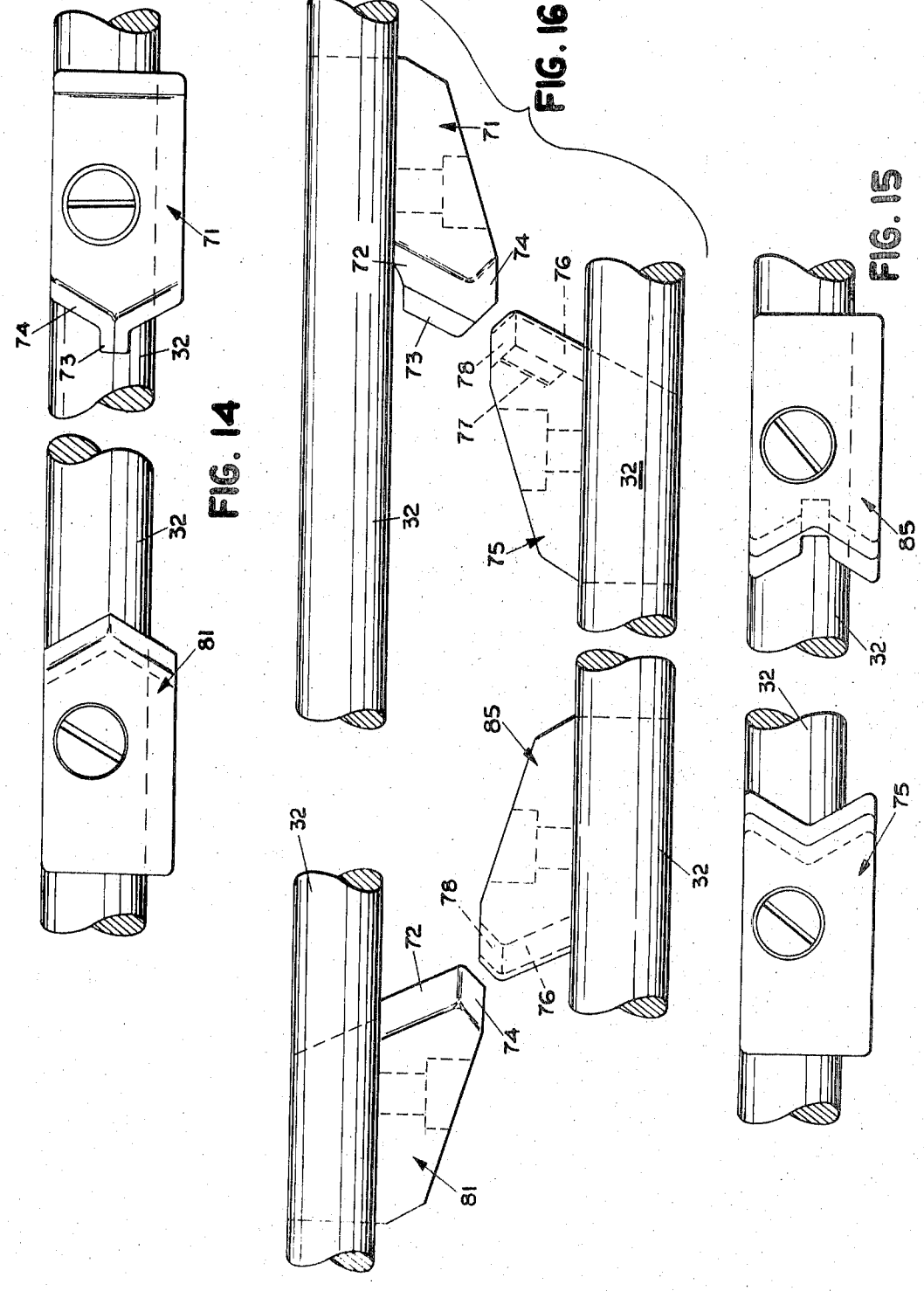


FIG. 8


71
74
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FIG. 14
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FIG. 16
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FIG. 15
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GANGING MEANS FOR CHAIR

CROSS REFERENCE TO RELATED APPLICATION

This is a divisional application of parent application Ser. No. 111,429, filed Feb. 1, 1971, and entitled Ganging Means For Chair, now U.S. Pat. No. 3,724,897.

BACKGROUND OF THE INVENTION

This invention relates to chairs, particularly chairs having wire rod frames. In its more specific aspects, it relates to such chairs which can be ganged together or stacked vertically.

The fastening means provided for ganging prior art wire rod chairs together suffer from numerous drawbacks. For example, the chair disclosed in U.S. Pat. No. 3,278,227 utilizes a fastening member located near the front of a bottom runner and a second fastening member located on the side of the rear leg. If the chair warps slightly with age, considerable pressure is put on each of these two fastening members, and it is very possible for one of them to spring loose. Indeed, it is possible that only one of them may be fastenable after the chair has warped. Furthermore, an independent glide member is required near the rear of the runner on the chair.

SUMMARY OF THE INVENTION

The chair of the present invention embraces a number of related concepts which obviate the difficulties and drawbacks set forth above. A pair of wire rods form an integral rear leg and back support assembly. Each of the rods extends generally vertically to form a rear leg, and both of the rods then diverge inwardly from the tops of the rear legs along the rear edge of the seat. These portions meet and then extend vertically upwardly together, rigidly joined, to form an upright portion. The rods then diverge outwardly and upwradly from this upright portion to form a back support having a generally U-shaped configuration. This centrally located upright portion, connecting the chair back to the chair seat, provides for increased flexibility in the back, and accordingly increased comfort.

In another of its aspects, the invention contemplates the use of a wire rod frame having an integral seat support, leg assembly and back support. The seat support comprises a wire rod extending laterally along the rear edge of the seat and forwardly along each side thereof. The leg assembly comprises downwardly depending front and rear legs joined together by a bottom runner, the front legs extending downwardly from the front edge of each forwardly extending portion of the seat support. The back support comprises a converging portion formed by wire rods converging inwardly from the tops of the rear legs and extending along the rear edge of the seat. These converging rod portions join to form the upright portion and outwardly diverging U-shaped back support referred to above. The converging portions are rigidly joined to the laterally extending portion of the seat support. To enhance the beauty of the chair, this integral frame can be formed out of a single continuous wire rod, or a plurality of rods welded together in endwise abutment to give the appearance of a continuous wire rod.

The chair back contemplated by this invention includes a groove in its bottom edge and extending partially up its side edge. The shape of the back outlined by these grooved edges conforms to that of the generally U-shaped back support referred to above such that the groove embraces the wire rod back support.

The chair set includes a downwardly depending tab at either side thereof which enters into mating engagement with a slot in a flange which depends inwardly from the forwardly extending side rods of the seat support referred to above. The front of the chair seat comprises a lip which curls downwardly over a front rod which is welded at its ends to the forwardly extending side portions of the seat support. This front lip has a generally V-shaped cross section such that the base of the "V" does not actually contact the wire rod unless force is applied to the seat. This results in secure fastening and a slight flexibility for absorbing shocks, such as are frequently applied to chair seats.

In the chair of the present invention, glides are provided which positively prevent fore and aft movement. The chair includes wire rods extending along the floor between the front and rear legs to define chair runners.

Each of the chair runners includes front and rear glides. Those on one runner have facing fastening intelligence, while those on the second runner have fastening intelligence facing away from one another. The glides on the second runner are more closely spaced, such that they can be mated with the glides on the first runner of an adjacent chair to prevent fore and aft movement.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of this invention will be understood and appreciated by reference to the appended specification and drawings wherein:

FIG. **1** is an exploded perspective view of the chair back, seat and wire rod frame;

FIG. **2** is a perspective view of the assembled chair;

FIG. **3** is a side view of the wire rod frame;

FIG. **4** is a front view of the wire rod frame;

FIG. **5** is a bottom plan view of the wire rod frame taken along plane V—V of FIG. **4**;

FIG. **6** is a front view of the chair back;

FIG. **7** is a side view of the chair back;

FIG. **8** is a view taken along line VIII—VIII of FIG. **6**;

FIG. **9** is a plan view of the chair seat;

FIG. **10** is a side view of the chair seat;

FIG. **11** is a view taken along line XI—XI of FIG. **9**;

FIG. **12** is a view taken along line XII—XII of FIG. **9**;

FIG. **13** is a view taken along line XIII—XIII of FIG. **9**;

FIG. **14** is a broken side view of a first one of the two runners on the wire rod frame;

FIG. **15** is a broken side view of the second one of the two runners on the wire rod frame; and

FIG. **16** is a broken plan view of adjacent runners on adjacent chairs as they are being moved into mating engagement.

PREFERRED EMBODIMENT

In the preferred embodiment, the chair of this inven-

tion comprises a frame **10**, a chair seat **50**, a chair back **60** and four ganging glides **71, 75, 81** and **85** (FIG. **1**). Frame **10** has been divided into three sub-assemblies, including a seat support **20**, a leg assembly **30**, and a back support **40** (FIG. **3**).

It has been found that frame **10** can be conveniently constructed of five separate wire rods. However, the beauty of the frame is greatly enhanced by welding three of these rods together in endwise abutment to form, or at least give the appearance of a single continuous wire rod. Two of these three rods form the right side and left side of the chair respectively. Thus, each rod defines side rod **22** of seat support **20**, front leg **31**, runner **32**, rear leg **33** and half of back support **40**. The third rod defines the rear support **21** of seat support **20**. One of the remaining two rods, a front seat support rod **23** is hidden from view in the fully assembled chair as can be seen by comparing FIGS. **1** and **2**. Seat stretcher **27** is also hidden from view. Thus, the fully assembled chair appears to be constructed of one continuous wire rod and a single brace rod **34** (FIG. **2**).

Seat support **20** comprises a rear support rod **21** which extends laterally across the back edge of the seat area (FIG. **5**). Side support rods **22** then extend forwardly from the ends of rear rod **21** along the side edges of the seat area. While side support rod **22** is preferably only a portion of a rod, it is referred to as "a rod" for purposes of convenience and because it could in fact be a single rod welded to other rods. A front support rod **23** is welded at its end edges to side rods **22** and extends laterally across the front of seat **50** to provide support therefor. A flange **24** is rigidly secured, as by welding, to each side rod **22** and extends inwardly therefrom. Each flange **24** includes a pair of slots **25** and holes **26** which facilitate the securance of seat **50** to seat support **20**. Preferably, slot **25** is formed at that portion of flange **24** which is narrower such that when flange **24** is welded to side rod **22**, a slot remains, defined by side rod **22** on one side and flange **24** on the other. Finally, stretcher **27** extends from one side support **22** to the other, near the front thereof.

Seat **50** is molded of any suitable plastic such as polypropylene so as to conform to the shape of the human buttocks. It includes a pair of downwardly depending tabs **51** on either side thereof (FIGS. **9, 10** and **13**). Tabs **51** are dimensioned and located such that they fit into mating engagement with slots **25** when seat **50** is placed on seat support **20**.

Seat **50** also includes three bosses **52** on either side thereof and between adjacent tabs **51** (FIG. **9**). These correspond in position to the holes **26** in flanges **24** such that when seat **50** is in position on seat support **20**, screws can be passed upwardly through holes **26** and into bosses **52** to further facilitate the securance of seat **50** to seat support **20**.

Seat **50** also includes a front lip **53** which extends across the front edge thereof (FIG. **9**) and which curls down around front support rod **23** in the manner shown in FIG. **12**. Lip **53** extends around the front corners to form side lip portions **54** (FIG. **9**) which also curl down around front support rod **23**, but in the manner indicated in FIG. **11**. Front lip **53** and side lips **54** not only act to hide front support rod **23** from view, but also cooperate with front support rod **23** to hold seat **50** securely in place.

As can be seen by reference to FIG. **12**, front lip **53** has a generally V-shaped cross section such that the base of the "V" does not actually abut rod **23**. Rather, only the sides of the "V" embrace rod **23**. However, when force is applied to seat **50**, as when a person sits or bounces thereon, lip **53** expands slightly and slides rearwardly on rod **23**, the base of the "V" moving toward abutment with rod **23**. Thus, this generally V-shaped cross section for front lip **53** provides seat **50** with a slight shock absorbing resiliency.

Leg assembly **30** includes a pair of front legs **31** which extend downwardly from the front of side rods **22** of seat support **20** (FIG. **3**). Runner **32** then extends rearwardly from the bottom of front leg **31** and rear leg **33** extends upwardly from the rear of runner **32**. The junction between the base of front leg **31** and the front of runner **32** is made through an outwardly bent portion **35**. Bent portion **35** sets runners **32** to the outside of the outer dimensions of seat support **20** and thereby facilitates the stacking of the chairs of this invention, one on top of the other. Leg assembly **30** is completed by a brace rod **34** extending laterally between the front legs **31** in order to give the entire frame **10** additional strength and rigidity.

Back support **40** begins with a converging portion **41** (FIG. **5**). The rods which form rear legs **33**, as well as the right and left sides of the chair generally, are bent at the top of rear legs **33** so as to converge inwardly along the rear edge of seat **50**, closely adjacent to rear seat supporting rod **21** (FIG. **5**). The converging portions **41** meet near the rear center of the chair and are bent upwardly in abutting fashion to form an upright portion **42** (FIG. **4**). The abutting rods are rigidly secured together as by welding at this point. The converging portions **41** bend outwardly slightly at **41a** before actually being joined together to form upright portion **42** (FIGS. **5** and **3**). This keeps upright portion **42** from engaging a person's buttocks or lower back. The rod portions **43** then diverge outwardly and upwardly from the top of upright **42** to thereby form a generally U-shaped back frame to which back **60** may be secured.

Outwardly and upwardly diverging rod portions **43** are adapted to receive and secure back **60**. Back **60** is molded of a suitable plastic material such as polypropylene. The mold is designed to provide back **60** with a gradually curving contour to support the human back (FIG. **7**). Additionally, back **60** includes a groove **61** extending across its bottom edge and up its side edges (FIGS. **6** and **7**). Groove **61** terminates at either side edge in a downwardly opening hole **62** (FIGS. **6, 7** and **8**). Back **60** is then slipped down onto diverging and upwardly extending rod portions **43** with grooves **61** embracing these rods and with the ends of rods **43** extending upwardly into holes **62**. Groove **61** is reinforced by ribs **63**, at least some of which have arced bottom edges to receive rods **43**. Preferably, a small amount of epoxy or other suitable adhesive is placed in holes **62** prior to assembly such that the ends of rods **43** remain firmly embedded therein. A mechanical fastening would also be acceptable at this point.

The chair is provided with unique fastener glides **71, 75, 81** and **85** which are fastened to runners **32** by means of screws (FIGS. **14, 15** and **16**). Glides **71** and **81** have male fastening intelligence and are referred to as front male glide and rear male glide respectively. Glides **75** and **85** have corresponding female fastening intelligence and are referred to as the front female glide and rear female glide respectively. Front male glide **71**

and rear male glide **81** are fastened on one of the runners **32** with their fastening intelligence facing each other. Front female glide **75** and rear female glide **85** are fastened on the other runner **32,** more closely together than are glides **71** and **81,** and with their fastening intelligence facing away from each other. In this manner a pair of female fastener glides **75** and **85** on the rail of one chair fit snuggly to the insides of male glides **71** and **81** on the rail of an adjacent chair to thereby hold both chairs together, and prevent their fore and aft movement with respect to each other. It should be noted that since FIGS. **14** and **15** are both side views, the front of runner **32** in FIG. **14** appears on the right while the front of runner **32** in FIG. **15** appears on the left.

The male fastening intelligence of front male glides **71** comprises a projection **72** of "V" shaped cross section and having a tab **73** forming the leading edge thereof (FIG. **14**). Projection **72** and tab **73** extend away from runner **32** at an acute angle thereto (FIG. **16**). However, the projection **72** and tab **73** eventually reach a turning point and turn sharply away to form a bumper portion **74** which is inclined at an obtuse angle to rod **32.** Bumper portion **74** also has a generally "V" shaped cross section. Rear male glide **81** similarly includes a projection **72** and bumper portion **74** inclined at an acute angle and obtuse angle respectively with respect to runner **32.** Because of the similarity in parts, the numbers used for these parts are the same for both front male glide **71** and rear male glide **81.** However, rear male glide **81** does not include a projecting tab **73.**

Front female fastening glide **75** includes a recess **76** of a generally V-shaped cross section for mating with projection **72** of glide **71** on the runner **32** of an adjacent chair (FIG. **15**). Additionally, it includes a slot **77** at the base of recess **76** for receiving tab **73.** Recess **76** and slot **77** are disposed an an acute angle to their runner **32** in the same manner as are projection **72** and tab **73** (FIG. **16**). Finally, front female glide **75** includes a recessed bumper portion **78** which is inclined at an obtuse angle to runner **32.** Rear female glide **85** includes a similar recess **76** and bumper portion **78,** but does not include a slot **77.**

FIG. **16** shows the adjacent runners **32** of a pair of adjacent chairs, made in accordance with the preferred embodiment of this invention, being moved toward each other in an abutting manner. The bumper portions **74** and **78** of the adjacent glides are the first portions to abut. These have V-shaped cross sections corresponding to the generally V-shaped cross sections of projections **72** and recesses **76** and thereby act to guide the adjacent fastening glides into proper mating engagement. When engagement is completed, tab **73** of front male glide **71** will reside in slot **77** of front female glide **75.** Similarly, projection **72** will reside within recess **76.** Engagement of rear male glides **81** and rear female glides **85** is comparable.

Because of the fact that both female fastening glides **75** and **85** have intelligence facing outwardly while both male fastening glides **71** and **81** have intelligence facing inwardly, the adjacent chairs are firmly held together and are prevented from moving fore and aft. Lateral movement is prevented by the fact that the mating portions **72** and **76** of mating glides are inclined at an acute angle to their respective runners. The tab **73** on front male glide **71** acts to provide added, positive engagement. It should be noted that various ones of the glides could be relocated, so long as both of the glides on a given runner **32** either faced away from each other or toward each other.

Thus, in accordance with this invention, a wire rod chair is provided having a number of unique features, including the wire rod frame itself. The beauty of the frame is greatly enhanced by the fact that it appears, when the chair is assembled, that the frame is made of only two continuous wire rods, one being brace rod **34.** The chair seat can be readily secured to the frame with the unique seat fastening means. Similarly, the back can readily be fastened to the back support portion of the frame. The back includes a unique groove which not only facilitates this fastening operation, but which also lends a decorative, half-hidden appearance to the wire rod frame. Furthermore, the unique back support construction of the frame gives the back more flexibility than exists in current wire rod chairs in that the back is supported on a central, upwardly extending upright portion about which the back can twist slightly. The chairs can be stacked, since runners **32** are disposed to the outside of the side seat supports **22** due to the bend **35** at the bottom of front legs **33.**

Finally, the unique combination fastening and glide means outlined above is yet another significant contribution of this invention. By providing two fasteners on a straight rod portion of the wire rod frame, the continued workability of the fasteners is insured, regardless of whether or not the wire rod frame warps slightly with old age. Warpage will take place mainly at bent portions, not along straight rod portions. Furthermore, positive fastening is provided even though each of the combination glide-fasteners includes fastening intelligence on only one side thereof. Finally, by providing two combination glide-fasteners on each runner, applicant has eliminated the necessity of any additional glides or fasteners.

It will be understood that the above is merely a preferred embodiment of the invention and that many changes and alterations can be made thereof without departing from its spirit and broader aspects.

The embodiment of an invention in which an exclusive property or privilege is claimed are defined as follows:

1. A chair comprising: a wire rod frame having a pair of runners at the sides thereof from which the front and rear legs of said chair extend upwardly; said runners including front and rear glides thereon, each glide on a first runner having fastening intelligence facing the other glide, and each glide on a second runner having fastening intelligence pointed away from the other glide; said second runner glides being positioned closer to one another than said first runner glides whereby when two chairs are placed in closely adjacent fashion, said fastening intelligence on said first runner glides on one chair cooperate with said fastening intelligence on said second runner glides on the other chair to hold the chairs together and prevent their fore-and-aft and lateral movement with respect to each other.

2. The chair of claim **1** in which the front glide on one runner and the rear glide on one runner are male fasteners whose fastening intelligence comprises a projection from one end thereof which is inclined at an acute angle to said runner; said front glide on the other runner and the rear glide on the other runner comprises a female fastener whose fastening intelligence comprises

a recess for mating said projection, said recess being inclined at approximately the same acute angle to said runner.

3. The chair of claim **2** in which said projection on said front male glide includes a tab forming the leading edge of said projection and said recess on said front female glide comprises a mating slot at the base of said recess for receiving said tab.

4. The chair of claim **3** in which each of said male and female glides comprises a bumper portion extending outwardly from said projection and recess respectively, said bumper portion being inclined at an obtuse angle to said runner; said bumper portions of adjacent male and female glides on adjacently positioned chairs being the first portions of said adjacent glides to abut when said fasteners are forced together, and said abutting bumper portions acting to guide the fasteners into mating engagement at said acute angel portions.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

Certificate

Patent No. 3,838,884 Patented October 1, 1974

Frederick S. Faiks and Randall P. Buhk

Application having been made by Frederick S. Faiks and Randall P. Buhk, the inventors named in the patent above identified, and Steelcase Inc., Grand Rapids, Mich., the assignee, for the issuance of a certificate under the provisions of Title 35, Section 256, of the United States Code, deleting the name of Randall P. Buhk as a joint inventor, and a showing and proof of facts satisfying the requirements of the said section having been submitted, it is this 28th day of April 1981, certified that the name of the said Randall P. Buhk is hereby deleted from the said patent as a joint inventor with the said Frederick S. Faiks.

FRED W. SHERLING,
Associate Solicitor.