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### Folding chair construction

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#### Abstract

A folding chair for movement between a folded condition and an unfolded erect condition, includes a frame member and support member pivotally connected to each other, a seat member pivotally mounted to the frame member, and two arrangements for preventing longitudinal sliding movement of two of the chairs stacked upon one another and two arrangements for preventing transverse longitudinal sliding movement of two of the chairs stacked upon one another.

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## Background/Summary

## BACKGROUND OF THE INVENTION

(1) The present invention relates generally to folding chairs, and more specifically, to folding chairs constructed of synthetic polymeric materials and having structural features enabling lighter weight, greater strength, increased comfort and safety, with the ability to be stacked, when folded, in uniform, stable stacks with a wide arrangement of different folding chairs.

(2) Folding chairs have found widespread use in supplying temporary seating for varying numbers of attendees at functions held at many different sites. When not in use, these chairs are folded and then stacked for storage and transportation. The more desirable of these folding chairs have essentially the same appearance so that when multiple like chairs are set-up at a particular function, these multiple chairs present an aesthetically pleasing uniform arrangement of seats.

(3) For many years, the folding chair of choice has been constructed mainly of wood, with a uniform finish. These wooden folding chairs provide a combination of comfortable seating and aesthetic appearance found to be most desirable among audiences attending a wide variety of functions. However, such wooden chairs lack long-term durability and require frequent attention in order to maintain both comfort and appearance, as well as safety through structural integrity. Moreover, these wooden chairs are more difficult to stack in effective, stable stacks.

(4) More recently, folding chairs have been constructed of synthetic polymeric materials in an effort to overcome the shortcomings of wooden folding chairs. Generally, these plastic chairs have proven to be more durable than wooden chairs. In addition, the added flexibility in construction has enabled the incorporation of structural features which allow convenient and effective stacking. However, the cost of materials, as well as strength, weight and safety considerations, has hampered the ability to simulate, in chairs constructed of suitable synthetic polymeric materials, the desired aesthetic appearance, comfort and safety provided by the now-traditional wooden chairs.

(5) U.S. Pat. No. 6,890,026, by the same inventor herein, and the entire disclosure of which is incorporated herein by reference, overcomes the above-outlined shortcomings of wooden folding chairs and previously available synthetic polymeric chairs, in a chair construction readily manufactured of synthetic polymeric materials.

(6) As such, the invention of this patent provides the following objects and advantages: a) provides a folding chair constructed for ready manufacture of a synthetic polymeric material, while simulating closely the aesthetic appearance and seating comfort of previous folding chairs constructed of wood; b) provides folding chairs of synthetic polymeric materials constructed to conserve material and weight while attaining enhanced strength, comfort and safety, as well as a desired aesthetic appearance; c) militates against injury to a seated person or damage to a seated person's clothing; d) prevents damage to like chairs which otherwise could result from contact among such like chairs, either when arranged at the site of a function or when stacked for storage and transportation; e) enables effective stacking, when folded, in stable, compact and uniform stacks for ready storage and transportation; f) provides folding chairs of increased strength and durability, while more closely simulating the aesthetic appearance of traditional wooden folding chairs; g) facilitates the operation of a folding chair for increased ease of erection and folding; and h) enables the economical manufacture of folding chairs requiring less maintenance over an increased service life.

(7) However, in the flattened or closed state of the chair, stacking is generally limited to the same type of chair. In other words, different constructions of certain similar types of chairs cannot be stacked with the chair of this patent.

(8) It would therefore be desirable to provide a chair of the type of this patent that has more universal stacking ability in a closed or flattened state, with different constructions of certain similar types of chairs.

## OBJECTS AND SUMMARY OF THE INVENTION

(9) Accordingly, it is an object of the present invention to provide a folding chair that overcomes

the aforementioned problems.

(10) It is another object of the present invention to provide a folding chair that includes multiple arrangements to prevent relative longitudinal movement of the folding chairs in a stacked configuration.

(11) It is still another object of the present invention to provide a folding chair that includes multiple arrangements to prevent relative transverse movement of the folding chairs in a stacked configuration.

(12) In accordance with the present invention, a folding chair for movement between a folded condition and an unfolded erect condition, includes a frame member extending in a frame member lengthwise direction between a base and an opposite top. The frame member includes a pair of side rails extending in parallel, spaced apart relation in the lengthwise direction, each side rail extending longitudinally between a basal end at the base of the frame member and a top end at the top of the frame member, a back rest extending in a lateral direction between the side rails, adjacent the top ends of the side rails, the back rest connected at opposite ends thereof with the side rails, a basal brace extending in the lateral direction between the side rails adjacent the basal ends of the side rails, and a frame brace extending laterally between the side rails intermediate the basal end and the top end of each side rail.

(13) The folding chair further includes a support member extending in a support member lengthwise direction thereof between a foot and an opposite head. The support member includes a pair of side supports extending in parallel, spaced apart relation in the support member lengthwise direction, each side support extending longitudinally between a foot end at the foot of the support member and a head end at the head of the support member, a foot brace extending laterally between the side supports adjacent the foot end of each side support and a support brace extending laterally between the side supports intermediate the foot end and the head end of each side support.

(14) A first pivotal mounting arrangement mounts the support member to the frame member for pivotal movement of the support member between a folded position and an erect unfolded position. The first pivotal mounting arrangement includes a first pivot placed at a first pivot location adjacent the head end of each side support and pivotally mounting a respective side support to a corresponding side rail intermediate the back rest and the frame brace such that the support member is nested within the frame member, between the side rails, when in the folded position, and the support member makes an acute angle with the frame member, to space the foot ends of the side supports transversely from corresponding basal ends of the side rails, thereby establishing a chair basal support configuration when in the erect position.

(15) A seat member includes a front section, a rear section and opposite seat side sections extending between and connected to the front and rear sections, the seat member having a seat surface and an opposite undersurface. A second pivotal mounting arrangement mounts the seat member to the frame member, with the seat member positioned between the side rails of the frame member, for movement between a retracted position and an extended position. The second pivotal mounting arrangement includes a second pivot placed intermediate the front section and the rear section of the seat member and pivotally mounts the seat member to the side rails at a second pivotal location juxtaposed with the frame brace such that the seat member is nested within the frame member, laterally between the side rails, when in the retracted position corresponding to the folded position, and the undersurface of the seat member rests upon the frame brace when in the extended position corresponding to the erect unfolded position.

(16) A coupling arrangement couples the rear section of the seat member with the support member for securing the seat member in the extended position when the chair is in the erect unfolded position.

(17) In accordance with a first aspect of the present invention, there are at least one first stacking rib extending along and projecting orthogonally from one of a rear surface of the foot brace, rear surfaces of the side supports, or both the rear surface of the foot brace and the rear surfaces of the

side supports, at a position adjacent the foot of the support member; and second stacking ribs extending along and projecting orthogonally from the rear surfaces of the side supports in spaced apart relation from the at least one first stacking rib, to define a gap between the at least one first stacking rib and the second stacking ribs, for receiving the basal brace of another chair stacked thereon, to preclude relative movement between the stacked chairs in longitudinal directions thereof, whereby the stacked chairs establish a uniform stable stack of like chairs.

(18) Preferably, the at least one first stacking rib includes a single stacking rib extending along and projecting orthogonally from both the rear surface of the foot brace and the rear surfaces of the side supports.

(19) In accordance with a second aspect of the present invention, there is a coupling arrangement coupling the rear section of the seat member with the support member for securing the seat member in the extended position when the chair is in the erect unfolded position, the coupling arrangement including a guide wall extending upwardly from the rear section of the seat member. The guide wall includes an extension wall extending outwardly from the guide wall and past the plane of rear surfaces of the side supports when the chair is in its folded condition, for releasably engaging with the support brace in the unfolded erect condition of the chair to releasably retain the chair in the unfolded erect condition.

(20) Also, a restraining bar extends downwardly from the rear section of the seat member for engaging with the extension wall of another chair when the chairs are provided one on top of another in a stacked relation, to preclude relative movement between the stacked chairs in longitudinal directions thereof, whereby the stacked chairs establish a uniform stable stack of like chairs.

(21) The extension wall extends upwardly from a free end of the guide wall and is shorter than the guide wall, as measured in the transverse direction of the chair, the extension wall having a front surface spaced slightly inwardly from the front surface of the guide wall, so as to define a shoulder at the connection of the guide wall with the extension wall at the front surfaces thereof, such that the support brace of another stacked chair thereon engages the front surface of the extension wall, and is limited by the shoulder.

(22) Preferably, the extension wall has a rear surface which is coplanar with a rear surface of the guide wall.

(23) In addition, each side support of the support member includes a track confronting a corresponding side of the seat member. The seat member includes a follower projecting from each side of the seat member and engaged with a corresponding track for effecting simultaneous movement of the seat member between the retracted position and the extended position and of the support member between the folded position and the erect position, the terminal end of each track confronting and spaced away from a corresponding follower when the seat member is in the unfolded erect position so as to preclude engagement of the follower with the terminal end when the seat member is in the erect position.

(24) Preferably, the followers project from ends of the guide wall.

(25) In accordance with a third aspect of the present invention, there is an arrangement for preventing transverse relative movement between two the chairs stacked one upon another. The arrangement includes restraining fingers extending outwardly from an undersurface of the opposite seat side sections of the seat member, each restraining finger extending in the lengthwise direction of the seat side sections, the restraining fingers fitting within and positioned immediately adjacent and in juxtaposition to inner surfaces of the side supports of another the chair stacked thereover, to prevent transverse relative movement between the stacked chairs.

(26) The arrangement further includes at least one first stacking rib extending along and projecting orthogonally from one of rear surfaces of the side supports, or both a rear surface of the foot brace and the rear surfaces of the side supports, at a position adjacent the foot of the support member, the at least one first stacking rib having opposite rib ends. In conjunction therewith, there are inwardly

facing raised bosses at inner surfaces of the side supports such that, in a stacking arrangement of two the chairs, the at least one first stacking rib of one the stacked chair fits between the inwardly facing raised bosses of another the stacked chair, with the opposite rib ends of the stacking rib in close proximity to the raised bosses of the other chair, to prevent transverse movement of the stacked chairs relative to each other.

(27) Preferably, the inwardly facing raised bosses are provided at the inner surface of each side support at a position immediately above the basal brace. The above and other objects, features and advantages of the invention will become readily apparent from the following detailed description thereof which is to be read in connection with the accompanying drawings.

(28) In accordance with a fourth aspect of the present invention, the support member further includes a projection on a front facing surface of at least one said side support at a position slightly below the support brace which causes the rear section of the seat member to forcibly ride thereover when moving the chair from the folded condition to the unfolded erect condition, to retain the chair in the folded configuration. Preferably, there is one projection on the front facing surface of both side supports.

(29) The above and other objects, features and advantages of the invention will become readily apparent from the following detailed description thereof which is to be read in connection with the accompanying drawings.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

- (1) FIG. 1 is a front perspective view of a folding chair constructed in accordance with the present invention, with the chair in an erected, unfolded operative position;
- (2) FIG. 2 is a rear perspective view of the folding chair of FIG. 1;
- (3) FIG. 3 is a side elevational view of the erected chair of FIG. 1;
- (4) FIG. 4 is a front elevational view of the folding chair of FIG. 1;
- (5) FIG. 5 is a rear elevational view of the folding chair of FIG. 1;
- (6) FIG. 6 is a front perspective view of the frame member of the chair;
- (7) FIG. 7 is a rear perspective view of the frame member of the chair;
- (8) FIG. 8 is a front perspective view of the support member of the chair;
- (9) FIG. 9 is a rear perspective view of the support member of the chair;
- (10) FIG. 10 is a top perspective view of the seat member of the chair;
- (11) FIG. 11 is a bottom perspective view of the seat member of the chair;
- (12) FIG. 12 is a perspective view of the underside of the seat cushion;
- (13) FIG. 13 is a front perspective view of the chair in a folded condition;
- (14) FIG. 14 is a rear perspective view of the chair in the folded condition;
- (15) FIG. 15 is a plan view of the chair in the folded configuration;
- (16) FIG. 16 is a perspective view of two chairs stacked upon one another;
- (17) FIG. 17 is a perspective view of two chairs stacked upon one another from a different angle;
- (18) FIG. 18 is a perspective view of two chairs stacked upon one another;
- (19) FIG. 19 is a longitudinal cross-sectional view of the two stacked chairs of FIG. 17, taken along line 19-19 thereof;
- (20) FIG. 20 is a longitudinal cross-sectional view of the two stacked chairs of FIG. 18, taken along line 20-20 thereof.

### DETAILED DESCRIPTION

(21) Referring to the drawings, and initially to FIGS. 1-3 thereof, a folding chair 20 of synthetic polymeric material constructed in accordance with the present invention is shown in an erected or opened configuration and includes a frame member 22 extending in a longitudinal direction

between a base **24** and a longitudinally opposite top **26**. Frame member **22** includes a pair of side rails **30** which extend longitudinally essentially parallel to one another and are spaced apart laterally from one another, each side rail **30** extending longitudinally between a basal end **32** at base **24** of frame member **22** and a top end **34** at top **26** of the frame member **22**. A back rest **36** extends in lateral directions between and is connected to side rails **30**, adjacent top ends **34** of side rails **30**. A frame brace **38** extends laterally between side rails **30** intermediate basal end **32** and top end **34** of each side rail **30**, and a basal brace **39** extends laterally between side rails **30** adjacent basal ends **32** of side rails **30**.

(22) A support member **40** extends in a longitudinal direction between a foot **42** and a longitudinally opposite head **44**. A pair of side supports **50** extend longitudinally essentially parallel to one another and spaced apart laterally from one another, each side support **50** extending longitudinally between a foot end **52** at foot **42** of support member **40**, and a head end **54** at head **44** of support member **40**. A foot brace **56** extends laterally between side supports **50**, adjacent foot end **52** of each side support **50**, and a support brace **58** extends laterally between side supports **50** intermediate foot end **52** and head end **54** of each side support **50**, but arranged closer to head end **54**. Support brace **58** includes a cut-out recess **59** on the rear surface thereof, which is open at the lower end **59a** thereof and which extends to about one-half the height of support brace **58**, terminating at an upper shoulder **59b** at the upper end thereof, as best shown in FIG. 9.

(23) A seat member **60** has a generally square or rectangular shape, with a front section **62**, a rear section **64** and two parallel, spaced apart, laterally opposite seat side sections **66** connecting together front section **62** and rear section **64**, in surrounding relation to a square or rectangular opening **61** defined therein. Seat member **60** includes an upper seat surface **70** and an opposite lower undersurface **72**.

(24) The inner surface of front section **62** includes two spaced apart recesses **63**, which are open at a lower end **63a** thereof, and the inner surface of rear section **64** includes two spaced apart recesses **63**, which are open at a lower end thereof, as best shown in FIGS. 10 and 11. Each recess **63** defines an upper shoulder **63b** thereat.

(25) A seat cushion **74** (FIG. 12) is affixed to the seat member **60** at the upper seat surface **70** and provides a seat upon which a person may be seated with comfort and safety when chair **20** is in the erected or unfolded, open configuration shown in FIGS. 1-3.

(26) Seat cushion **74** has a generally square or rectangular shape and sits on upper seat surface **70** of seat member **60** in covering relation to opening **61**. Seat cushion **74** is made from a synthetic polymeric material and has four resilient catches **75** that extend downwardly from the lower surface thereof in positions corresponding to recesses **63**, each catch **75** having a hook portion **75a** at the free end thereof for extending through opening **61** and engaging within a respective recess **63**, such that each hook portion **75a** releasably locks with an upper shoulder **63b**, to releasably secure seat cushion **74** on seat member **60**. To remove seat cushion **74** from seat member **60**, it is only necessary to apply an inwardly directed finger biasing force to each catch **75** to release the hook portion **75a** thereof from the respective upper shoulder **63b**.

(27) In addition, two parallel, spaced apart walls **77** extend transversely along the lower surface of seat cushion **74**, the purpose for which will be understood from the discussion hereafter.

(28) Lastly, a cushion material **79** is positioned on the upper surface of seat cushion **74** and is draped over the lower surface of seat cushion **74** and secured thereto by staples **81**.

(29) Chair **20** is capable of being folded from the erected open configuration of FIGS. 1 and 2 into the folded configuration of FIGS. 13 and 14. To this end, a first pivotal mounting arrangement pivotally mounts support member **40** to frame member **22** for pivotal movement between the folded position shown in FIGS. 13 and 14 and the erected open position shown in FIGS. 1 and 2. The first pivotal mounting arrangement includes first pivots, each shown in the form of a pivot pin **80** placed at a first pivot location **82** adjacent head end **44** of each side support **50** and pivotally mounting a respective side support **50** to a corresponding side rail **30** at a position intermediate

back rest **36** and frame brace **38** such that support member **40** is nested within frame member **22**, between side rails **30**, when in the folded position, as shown in FIGS. **13** and **14**. Support member **40** makes an acute angle **A** with frame member **22** in the erect open configuration, to space foot ends **52** of side supports **50** transversely from corresponding basal ends **32** of side rails **30**, thereby establishing a chair basal support configuration at **83** (FIG. **3**).

(30) A second pivotal mounting arrangement mounts seat member **60** to frame member **22**, with seat member **60** extending laterally between side rails **30** of frame member **22**, for movement between the extended open position shown in FIGS. **1-3** and a retracted folded position or closed position shown in FIGS. **13** and **14**. The second pivotal mounting arrangement includes second pivots, shown in the form of a pivot rod **84** placed intermediate front section **62** and rear section **64** of seat member **60** and which spans seat member **60** between side sections **66** of seat member **60** to engage side rails **30** of frame member **22** at second pivot locations **88** juxtaposed with the frame brace **38** such that seat member **60** is pivotally mounted to side rails **30** at second pivotal locations **88** for being nested within frame member **22**, laterally between side rails **30**, when in the retracted folded position shown in FIGS. **13** and **14**, and for extending in a generally horizontal seating position in the extended operative position, with undersurface **72** of the seat member **60** resting upon frame brace **38**, as shown in FIGS. **1-3**.

(31) It will be appreciated that spaced apart walls **77** of seat cushion **74** engage pivot rod **84** therebetween when seat cushion **74** is secured on seat member **60**.

(32) A coupling arrangement couples rear section **64** of seat member **60** with support member **40** for securing seat member **60** in the extended open or operative position when chair **20** is erected, and for maintaining chair **20** in this open operative position, with support member **40** and frame member **22** at the angle **A**. The coupling arrangement includes a guide wall **90** having a generally rectangular parallelepiped shape, extending laterally across and upwardly from rear section **64** of seat member **60**, such that guide wall **90** is positioned between side supports **50** at all times.

(33) In order to provide for this arrangement, each side support **50** includes an elongated track recess **100** extending longitudinally along the inner wall of the respective side support **50**, with track recesses **100** of side supports **50** facing each another. Guide wall **90** includes a cylindrical follower nub **102** projecting from each end of wall **90** and engaged within a corresponding track recess **100**, riding up and down within the respective track recess **100** when chair **20** is moved between the open and folded configurations.

(34) Guide wall **90** includes an extension component, namely, an extension wall **91** of a generally rectangular parallelepiped configuration, extending upwardly from the free end of guide wall **90** and extending outwardly past the plane of the rear surfaces of side supports **50** when the chair is in its folded condition. Extension wall **91** is slightly shorter than guide wall **90** as measured in the widthwise or transverse direction of chair **20**. The rear surface of extension wall **91** is flush with, that is, coplanar with, the rear surface of guide wall **90**, while the front surface of extension wall **91** is spaced slightly inwardly from the front surface of guide wall **90**, so as to define a shoulder **93** at the connection of guide wall **90** with extension wall **91** at the front surfaces thereof.

(35) When chair **20** is moved to its open operative configuration, the upper end of extension wall **91** at the front surface thereof moves past the lower end **59a** of cut-out recess **59**, causing extension wall **91** to be positioned within cut-out recess **59** of support brace **58**. The front surface of each side support **50** includes a slight rounded half-cylindrical projection **300**, as best shown in FIG. **8**. When extension wall **91** is moved into recess **59**, the rear end of rear section **64** of rides over and snaps into position, and this functions to releasably lock folding chair **20** in its open operative configuration. In this configuration of folding chair **20**, the upper edge of extension wall **91** is limited by shoulder **59b**, and the undersurface **72** of seat member **60** rests on the upper surface of frame brace **38** which extends laterally between side rails **30**.

(36) It will be appreciated that prior known chairs locked the chairs in the open, operative configuration by a friction fit of extension wall **91** to recess **59**. However, due to different



tolerances in molding and due to wear, tear and warping over time, this may not align properly, making it difficult to open or close chair **20**. The present invention does not provide such a friction fit, but rather, uses rounded projections **300** to lock the chair in the open, operative configuration, which makes opening and closing of the chair **20** much easier.

(37) It is noted that each track recess **100** has an upper terminal end **104**, and each terminal end **104** is spaced slightly away from the respective follower nub **102** engaged within track recess **100** when chair **20** is in the open operative configuration with a person seated on the fully extended seat member **60**. As a result, engagement between each follower nub **102** and terminal end **104** of each track **100** is precluded, thereby assuring that stresses induced by the seating of a person on seat member **60** are not transmitted to follower nubs **102** and follower nubs **102** are protected against being damaged and even sheared from seat member **60** by such stresses.

(38) Each side support **50** of the respective support member **40** has an L-shaped cross-sectional configuration providing a forwardly facing, reinforcing flange **110** along the length of the side support **50** for added support strength. Seat member **60** includes a notch **112** located at each intersection between the rear section **64** and the side sections **66** of seat member **60**, and each notch **112** is complementary to a corresponding flange **110**. When chair **20** is placed in the open operative configuration, each flange **110** is seated within a corresponding notch **112** to lend rigidity to chair **20**, especially in lateral directions.

(39) In the preferred construction of chair **20**, each of frame member **22**, support member **40** and seat member **60**, is molded of a synthetic polymeric material, such as polypropylene, each being unitary for strength as well as for economy of manufacture. In order to conserve material and reduce weight, while still maintaining sufficient structural strength and the desired aesthetic appearance which simulates the appearance of a traditional wooden folding chair, at least frame member **22** and support member **40** preferably are formed of hollow structural elements as shown in U.S. Pat. No. 6,890,026.

(40) For increased strength and safety, pivot pins **80** and pivot rod **84** are constructed of a high-strength material, such as steel, and extend through side rails **30**, with pivot pins **80** extending through side supports **50**, and pivot rod **84** extending through the seat member **60**, as described above.

(41) As with U.S. Pat. No. 6,890,026, chair **20** is constructed for ready stacking with like chairs **20**, when in the folded configuration. However, in order to prevent sliding movement of the stacked chairs, a restraining system is required.

(42) As with U.S. Pat. No. 6,890,026, folding chair **20** herein includes an elongated first stacking rib **210** extending rearwardly from the upper portion of foot brace **56** of support member **40** and extending along the length thereof and also extending to a position to the rear of side supports **50** and connected therewith. Thus, stacking rib **210** extends almost the entire width of folding chair **20**.

(43) Stacking rib **210** is preferably molded integrally as one piece with foot brace **56** and side supports **50**. Thus, stacking rib **210** projects from foot brace **56** in an orthogonal direction to the rear of foot brace **56**, and extends rearwardly of side supports **50**, for juxtaposition with the upper edge of basal brace **39** of the next adjacent chair **20** in the stack, as shown in FIG. **16**. This functions to restrict sliding movement of the upper chair **20** of the stack in a direction toward top **26** of the lower chair on which the upper chair **20** is stacked.

(44) It is noted that, as described at column 10, lines 20-34 of in U.S. Pat. No. 6,890,026, it was necessary to provide a laterally extending slot in basal brace **39**, as well as opposed shoulders at the ends of the slots at the inner surface of each side rail **30** immediately above the respective basal brace **39** for receiving ends of the stacking rib **210**. The problem with this arrangement is that it makes construction more difficult, and limits stacking only to chairs of the same type show in U.S. Pat. No. 6,890,026.

(45) In the present invention, the slot within basal brace **39** as well as corresponding shoulders at the ends of the slot for receiving ends of the stacking rib **210**, are eliminated.

(46) Rather, in place thereof, a second stacking rib **211** extends outwardly from the rear surface of each side support **50** at a position below and spaced from elongated stacking rib **210**.

(47) With such arrangement, when one chair **20** is stacked upon another chair **20**, the basal brace **39** of the upper chair **20** fits in a gap **212** between first elongated stacking rib **210** and second stacking ribs **211**, as shown in FIGS. **16** and **17**. As a result, sliding movement of the upper chair **20** in the longitudinal direction, upwardly or downwardly, on the lower chair **20** is prevented.

(48) More importantly, since most folding chairs of this type include a basal brace **39** at the same position, even if other elements of the chairs are different, the present invention provides more universal stacking of different manufactures or constructions of folding chairs.

(49) Further, because there is a gap or space **250** between the outer surfaces of side supports **50** and the inner surfaces of side rails **30**, as best shown in FIG. **15**, each chair **20** further includes an inwardly facing raised boss **51** at the inner surface of each side support **50** at a position immediately above basal brace **39**, such that, in a stacking arrangement of chairs **20**, the elongated stacking rib **210** of another stacked chair **20** fits between inwardly facing raised bosses **51** with opposite rib ends **214** of the stacking rib **210** in very close proximity to raised bosses **51**, as shown in FIG. **16**, with very little play, to prevent lateral or transverse movement of the stacked chairs **20** relative to each other. In such case, the rib ends **214** of elongated stacking rib **210** of one chair **20** will be positioned immediately adjacent raised bosses **51** of another stacked chair.

(50) It will be appreciated that first elongated stacking rib **210** can be replaced with two first stacking ribs extending outwardly only from the rear surface of each side support **50** at a position above and spaced from second stacking ribs **211**, which would be sufficient to trap the basal brace **39** of a stacked chair therein.

(51) In addition, in accordance with another important aspect of the present invention, a restraining bar **95** extends downwardly from rear section **64** of seat member **60** at a position slightly forwardly of extension bar **91** and is molded integrally with rear section **64**. In this manner, when folded chairs **20** are stacked upon one another, restraining bar **95** is in abutment with and hugs the forward facing surface of extension bar **91** of the next lower chair in the stack, with the free end of restraining bar **95** being limited by shoulder **93**, as best shown in FIG. **19**.

(52) As such, extension bar **91** has a two-fold function, that is, releasably fixing the chair in the unfolded, open or operative position, as well as engaging with restraining bar **95** when stacked with other chairs in the folded position.

(53) With this arrangement, not only are the chairs restricted in longitudinal movement relative to each other due to basal brace **39** of the upper chair **20** fitting between first elongated stacking rib **210** and second stacking ribs **211**, but also, by engagement of restraining bar **95** of one chair with extension bar **91** of the next stacked chair **20**.

(54) In this manner, because of the above arrangements, relative longitudinal movement of the stacked chairs relative to each other is prevented, not only for chairs **20** of this identical type but for stacking with a wide range of other folding chairs of different constructions.

(55) With the present invention, relative movement of the stacked chairs in the transverse direction is also prevented.

(56) In order to further restrict such lateral or transverse movement between stacked chairs **20**, restraining fingers **65** extend outwardly (downwardly) from the undersurface of laterally opposite seat side sections **66** of each seat member **60**, each restraining finger **65** extending in the lengthwise direction of seat side sections **66** at an inner portion thereof and immediately adjacent rear section **64**.

(57) When chairs **20** are stacked one upon another, restraining fingers **65** fit within and are positioned immediately adjacent and in juxtaposition to inner surfaces of side supports **50** of the next stacked chair **20**, to prevent lateral or transverse relative movement between the stacked chairs.

(58) It will be appreciated that, because the widths of folding chairs of this type are generally the

same, elongated stacking rib **210** and restraining fingers **65** function to prevent lateral or transverse relative movement between the present folding chair **20** and other widely sold folding chairs.

(59) In addition to the above arrangement, each chair **20** includes two pair of spaced apart stacking fingers **220** molded integral with seat member **60** and projecting from the undersurface **72** of the seat member **60** in an orthogonal direction, relative to the longitudinal and lateral directions set forth above, to extend beyond the rear surface of side supports **50** of the respective chair **20**.

(60) Preferably, stacking fingers **220** extend outwardly in the lateral direction a smaller distance than restraining fingers **65** so as to better stack with chairs of different configurations. However, stacking fingers **220** may extend outwardly in the lateral direction to the same extent as restraining fingers **65** so as to prevent lateral movement between stacked chairs **20**, that is, stacking fingers **220** fit within and are positioned immediately adjacent and in juxtaposition to inner surfaces of side supports **50** of the next stacked chair **20**, to prevent lateral or transverse relative movement between the stacked chairs.

(61) In addition, as shown best in FIG. **1**, one stacking finger **220** on each side engages the front facing surface of frame brace **38** in the open, operative configuration, which provides greater structural rigidity of the chair and can permit up to 950 pounds pressure in a static load test, to prevent breaking of the chair when a person sits thereon.

(62) Further, since there are two spaced apart stacking fingers **220** on each side, a support brace **58** of prior known chairs will fit therebetween to prevent longitudinal movement of the stacked chairs.

(63) In this manner, a uniform, compact stack of folding chairs of different types is formed easily and is conveniently and effectively stabilized for facilitating storage and transportation of the folding chairs in the folded configuration.

(64) It will be seen that the present invention attains all of the objects and advantages summarized above, namely: provides a folding chair constructed for ready manufacture of a synthetic polymeric material, while simulating closely the aesthetic appearance and seating comfort of previous folding chairs constructed of wood; provides folding chairs of synthetic polymeric materials constructed to conserve material and weight while attaining enhanced strength, comfort and safety, as well as a desired aesthetic appearance; militates against injury to a seated person or damage to a seated person's clothing; prevents damage to like chairs which otherwise could result from contact among such like chairs, either when arranged at the site of a function or when stacked for storage and transportation; enables effective stacking, when folded, in stable, compact and uniform stacks for ready storage and transportation; provides folding chairs of increased strength and durability, while more closely simulating the aesthetic appearance of traditional wooden folding chairs; facilitates the operation of a folding chair for increased ease of erection and folding; enables the economical manufacture of folding chairs requiring less maintenance over an increased service life.

(65) Having described a specific preferred embodiment of the invention with reference to the accompanying drawings, it will be appreciated that the present invention is not limited to that precise embodiment and that various changes and modifications can be effected therein by one of ordinary skill in the art without departing from the scope or spirit of the invention.

## Claims

1. A folding chair for movement between a folded condition and an unfolded erect condition, comprising: a frame member extending in a frame member lengthwise direction between a base and an opposite top, the frame member including: a pair of side rails extending in parallel, spaced apart relation in said lengthwise direction, each side rail extending longitudinally between a basal end at the base of the frame member and a top end at the top of the frame member, a back rest extending in a lateral direction between the side rails, adjacent the top ends of the side rails, the back rest connected at opposite ends thereof with the side rails, a basal brace extending in said lateral direction between the side rails adjacent the basal ends of the side rails, and a frame brace

extending laterally between the side rails intermediate the basal end and the top end of each side rail; a support member extending in a support member lengthwise direction thereof between a foot and an opposite head, the support member including: a pair of side supports extending in parallel, spaced apart relation in said support member lengthwise direction, each side support extending longitudinally between a foot end at the foot of the support member and a head end at the head of the support member, a foot brace extending laterally between the side supports adjacent the foot end of each side support and a support brace extending laterally between the side supports intermediate the foot end and the head end of each side support; a first pivotal mounting arrangement mounting the support member to the frame member for pivotal movement of the support member between a folded position and an erect unfolded position, the first pivotal mounting arrangement including a first pivot placed at a first pivot location adjacent the head end of each side support and pivotally mounting a respective side support to a corresponding side rail intermediate the back rest and the frame brace such that the support member is nested within the frame member, between the side rails, when in the folded position, and the support member makes an acute angle with the frame member, to space the foot ends of the side supports transversely from corresponding basal ends of the side rails, thereby establishing a chair basal support configuration when in the erect position; a seat member including a front section, a rear section and opposite seat side sections extending between and connected to the front and rear sections, the seat member having a seat surface and an opposite undersurface; a second pivotal mounting arrangement mounting the seat member to the frame member, with the seat member positioned between the side rails of the frame member, for movement between a retracted position and an extended position, the second pivotal mounting arrangement including a second pivot placed intermediate the front section and the rear section of the seat member and pivotally mounting the seat member to the side rails at a second pivotal location juxtaposed with the frame brace such that the seat member is nested within the frame member, laterally between the side rails, when in the retracted position corresponding to the folded position, and the undersurface of the seat member rests upon the frame brace when in the extended position corresponding to the erect unfolded position; a coupling arrangement coupling the rear section of the seat member with the support member for securing the seat member in the extended position when the chair is in the erect unfolded position; at least one first stacking rib extending along and projecting orthogonally from one of: a rear surface of the foot brace, rear surfaces of the side supports, or both the rear surface of the foot brace and the rear surfaces of the side supports, at a position adjacent the foot of the support member; and second stacking ribs extending along and projecting orthogonally from the rear surfaces of the side supports in spaced apart relation from the at least one first stacking rib, to define a gap between the at least one first stacking rib and the second stacking ribs, for receiving the basal brace of another chair stacked thereon, to preclude relative movement between the stacked chairs in longitudinal directions thereof, whereby the stacked chairs establish a uniform stable stack of like chairs.

2. A folding chair according to claim 1, wherein said at least one first stacking rib includes a single stacking rib extending along and projecting orthogonally from both the rear surface of the foot brace and the rear surfaces of the side supports.

3. A folding chair between a folded condition and an unfolded erect condition, comprising: a frame member extending in a frame member lengthwise direction between a base and an opposite top, the frame member including: a pair of side rails extending in parallel, spaced apart relation in said lengthwise direction, each side rail extending longitudinally between a basal end at the base of the frame member and a top end at the top of the frame member, a back rest extending in a lateral direction between the side rails, adjacent the top ends of the side rails, the back rest connected at opposite ends thereof with the side rails, a basal brace extending in said lateral direction between the side rails adjacent the basal ends of the side rails, and a frame brace extending laterally between the side rails intermediate the basal end and the top end of each side rail; a support member extending in a support member lengthwise direction thereof between a foot and an opposite head,

the support member including: a pair of side supports extending in parallel, spaced apart relation in said support member lengthwise direction, each side support extending longitudinally between a foot end at the foot of the support member and a head end at the head of the support member, a foot brace extending laterally between the side supports adjacent the foot end of each side support and a support brace extending laterally between the side supports intermediate the foot end and the head end of each side support; a first pivotal mounting arrangement mounting the support member to the frame member for pivotal movement of the support member between a folded position and an erect unfolded position, the first pivotal mounting arrangement including a first pivot placed at a first pivot location adjacent the head end of each side support and pivotally mounting a respective side support to a corresponding side rail intermediate the back rest and the frame brace such that the support member is nested within the frame member, between the side rails, when in the folded position, and the support member makes an acute angle with the frame member, to space the foot ends of the side supports transversely from corresponding basal ends of the side rails, thereby establishing a chair basal support configuration when in the erect position; a seat member including a front section, a rear section and opposite seat side sections extending between and connected to the front and rear sections, the seat member having a seat surface and an opposite undersurface a second pivotal mounting arrangement mounting the seat member to the frame member, with the seat member positioned between the side rails of the frame member, for movement between a retracted position and an extended position, the second pivotal mounting arrangement including a second pivot placed intermediate the front section and the rear section of the seat member and pivotally mounting the seat member to the side rails at a second pivotal location juxtaposed with the frame brace such that the seat member is nested within the frame member, laterally between the side rails, when in the retracted position corresponding to the folded position, and the undersurface of the seat member rests upon the frame brace when in the extended position corresponding to the erect unfolded position; a coupling arrangement coupling the rear section of the seat member with the support member for securing the seat member in the extended position when the chair is in the erect unfolded position, the coupling arrangement including a guide wall extending upwardly from the rear section of the seat member, said guide wall including an extension wall extending outwardly from the guide wall and past the plane of rear surfaces of the side supports when the chair is in its folded condition, for releasably engaging with the support brace in the unfolded erect condition of the chair to releasably retain the chair in the unfolded erect condition; and a restraining bar extending downwardly from the rear section of the seat member for engaging with the extension wall of another chair when the chairs are provided one on top of another in a stacked relation, to preclude relative movement between the stacked chairs in longitudinal directions thereof, whereby the stacked chairs establish a uniform stable stack of like chairs.

4. A folding chair according to claim 3, wherein the extension wall extends upwardly from a free end of the guide wall and is shorter than the guide wall, as measured in the transverse direction of the chair, the extension wall having a front surface spaced slightly inwardly from the front surface of the guide wall, so as to define a shoulder at the connection of the guide wall with the extension wall at the front surfaces thereof, such that the support brace of another stacked chair thereon engages the front surface of the extension wall, and is limited by the shoulder.

5. A folding chair according to claim 4, wherein the extension wall has a rear surface which is coplanar with a rear surface of the guide wall.

6. A folding chair according to claim 3, wherein each side support of the support member includes a track confronting a corresponding side of the seat member; and the seat member includes a follower projecting from each side of the seat member and engaged with a corresponding track for effecting simultaneous movement of the seat member between the retracted position and the extended position of the support member between the folded position and the erect position, the terminal end of each track confronting and spaced away from a corresponding follower when the seat member is in the unfolded erect position so as to preclude engagement of the follower with the

terminal end when the seat member is in the erect position.

7. A folding chair according to claim 3, wherein the followers project from ends of the guide wall.

8. A folding chair according to claim 3, further comprising: at least one first stacking rib extending along and projecting orthogonally from one of: a rear surface of the foot brace, rear surfaces of the side supports, or both the rear surface of the foot brace and the rear surfaces of the side supports, at a position adjacent the foot of the support member; and second stacking ribs extending along and projecting orthogonally from the rear surfaces of the side supports in spaced apart relation from the at least one first stacking rib, to define a gap between the at least one first stacking rib and the second stacking ribs, for receiving the basal brace of another chair stacked thereon, to preclude relative movement between the stacked chairs in longitudinal directions thereof, whereby the stacked chairs establish a uniform stable stack of like chairs.

9. A folding chair according to claim 8, wherein said at least one first stacking rib includes a single stacking rib extending along and projecting orthogonally from both the rear surface of the foot brace and the rear surfaces of the side supports.

10. A folding chair for movement between a folded condition and an unfolded erect condition, comprising: a frame member extending in a frame member lengthwise direction between a base and an opposite top, the frame member including: a pair of side rails extending in parallel, spaced apart relation in said lengthwise direction, each side rail extending longitudinally between a basal end at the base of the frame member and a top end at the top of the frame member, a back rest extending in a lateral direction between the side rails, adjacent the top ends of the side rails, the back rest connected at opposite ends thereof with the side rails, a basal brace extending in said lateral direction between the side rails adjacent the basal ends of the side rails, and a frame brace extending laterally between the side rails intermediate the basal end and the top end of each side rail; a support member extending in a support member lengthwise direction thereof between a foot and an opposite head, the support member including: a pair of side supports extending in parallel, spaced apart relation in said support member lengthwise direction, each side support extending longitudinally between a foot end at the foot of the support member and a head end at the head of the support member, a foot brace extending laterally between the side supports adjacent the foot end of each side support and a support brace extending laterally between the side supports intermediate the foot end and the head end of each side support; a first pivotal mounting arrangement mounting the support member to the frame member for pivotal movement of the support member between a folded position and an erect unfolded position, the first pivotal mounting arrangement including a first pivot placed at a first pivot location adjacent the head end of each side support and pivotally mounting a respective side support to a corresponding side rail intermediate the back rest and the frame brace such that the support member is nested within the frame member, between the side rails, when in the folded position, and the support member makes an acute angle with the frame member, to space the foot ends of the side supports transversely from corresponding basal ends of the side rails, thereby establishing a chair basal support configuration when in the erect position; a seat member including a front section, a rear section and opposite seat side sections extending between and connected to the front and rear sections, the seat member having a seat surface and an opposite undersurface; a second pivotal mounting arrangement mounting the seat member to the frame member, with the seat member positioned between the side rails of the frame member, for movement between a retracted position and an extended position, the second pivotal mounting arrangement including a second pivot placed intermediate the front section and the rear section of the seat member and pivotally mounting the seat member to the side rails at a second pivotal location juxtaposed with the frame brace such that the seat member is nested within the frame member, laterally between the side rails, when in the retracted position corresponding to the folded position, and the undersurface of the seat member rests upon the frame brace when in the extended position corresponding to the erect unfolded position; an arrangement for preventing transverse relative movement between two said chairs stacked one upon another,

said arrangement comprising: restraining fingers extending outwardly from an undersurface of the opposite seat side sections of the seat member, each restraining finger extending in the lengthwise direction of the seat side sections, the restraining fingers fitting within and positioned immediately adjacent and in juxtaposition to inner surfaces of the side supports of another said chair stacked thereover, to prevent transverse relative movement between the stacked chairs; and at least one first stacking rib extending along and projecting orthogonally from one of: rear surfaces of the side supports, or both a rear surface of the foot brace and the rear surfaces of the side supports, at a position adjacent the foot of the support member, the at least one first stacking rib having opposite rib ends; and inwardly facing raised bosses at inner surfaces of said side supports such that, in a stacking arrangement of two said chairs, the at least one first stacking rib of one said stacked chair fits between the inwardly facing raised bosses of another said stacked chair, with the opposite rib ends of the stacking rib in close proximity to the raised bosses of the other chair, to prevent transverse movement of the stacked chairs relative to each other.

11. A folding chair according to claim 10, wherein the inwardly facing raised bosses are provided at the inner surface of each side support at a position immediately above the basal brace.

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