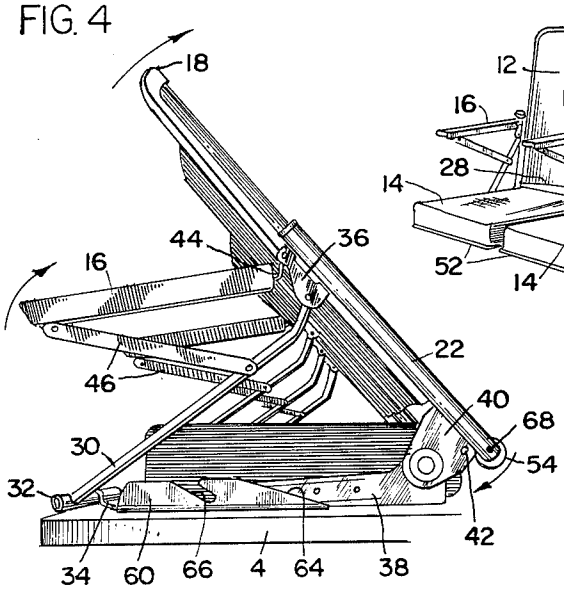
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FOLDING CHAIR ASSEMBLY

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FIG. 4



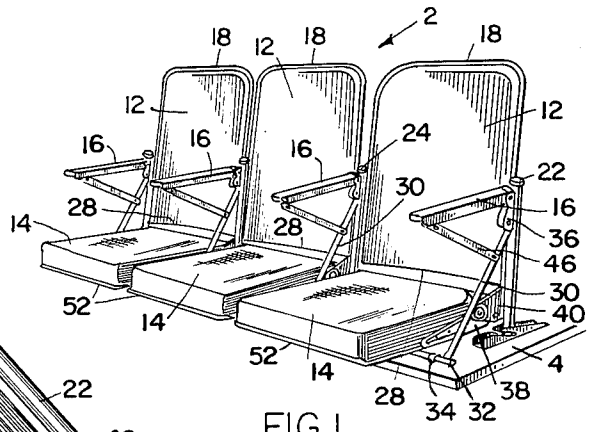


FIG. 1

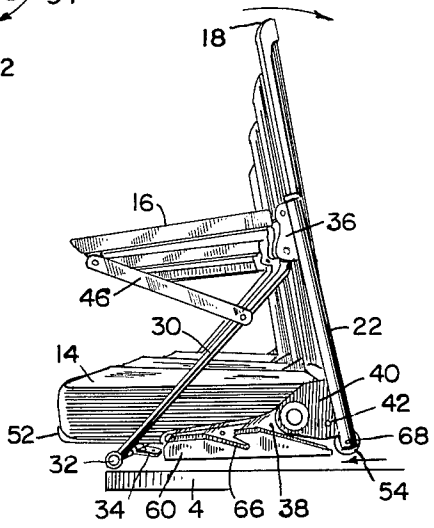


FIG. 5

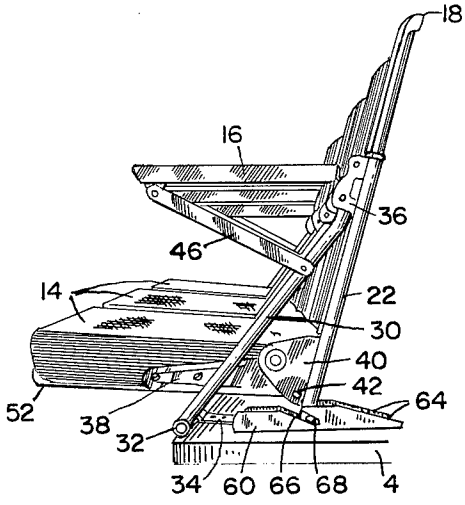


FIG. 6

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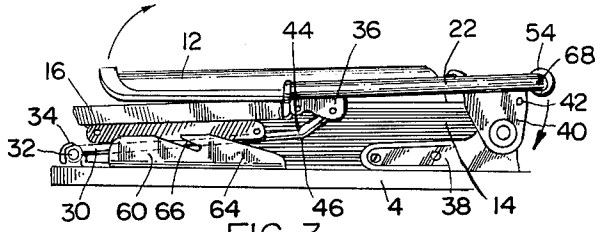


FIG. 3

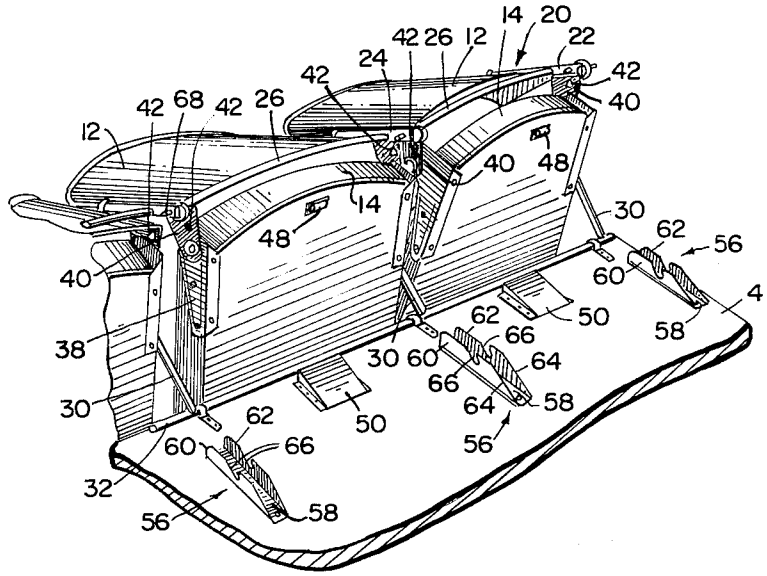
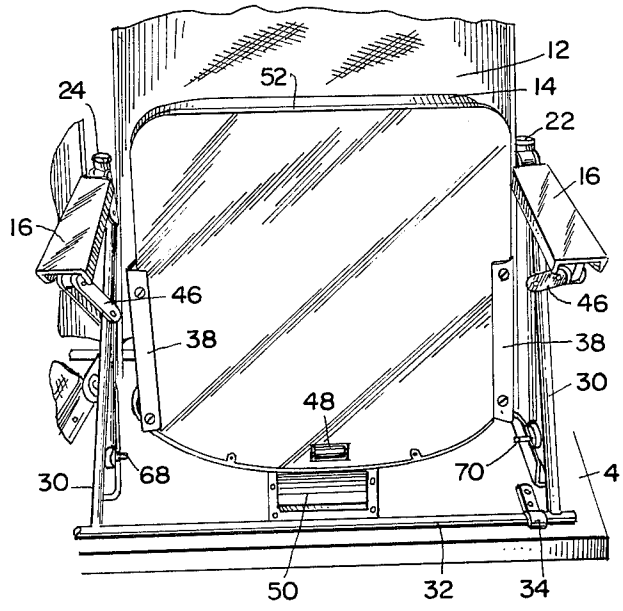


FIG. 7



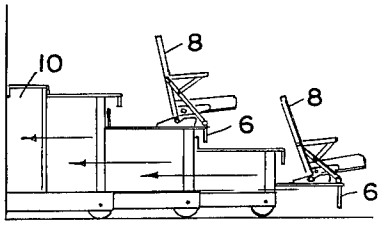


FIG. 2

FIG. 8

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FOLDING CHAIR ASSEMBLY

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Filed Feb. 7, 1964, Ser. No. 343,272
3 Claims. (Cl. 297—35)

This invention relates to seating units and more particularly to a folding chair assembly for use in auditoriums, arenas and the like.

The seating facilities in auditoriums, arenas, gymnasiums and similar public places can be divided for purposes of classification into two general categories which are distinguishable by the relative permanence of the particular seating installation. The first category includes the substantially permanent chair installations employed in school auditoriums, theaters, movie houses and similar public halls. The seating installations in these places usually comprise units of two or three or more chairs secured together and fastened to the floor by means of bolts or similar fastening means. Although these units can be removed from the theater or auditorium, their removal entails a considerable expenditure of time and labor, and hence is a costly and infrequent operation.

In contrast to the relatively permanent theater type chair installations, there are numerous examples of so called "temporary and portable" seating installations. Familiar examples would of course include the ubiquitous folding chair and the temporary bleacher installations found in school gymnasiums and occasionally on the football field.

The temporary seating installations, as the name implies, are designed to provide temporary seating facilities which can be disassembled after use and stored in some convenient location until they are needed again. The primary advantage of temporary seating facilities, in contrast to the more permanent installations, is the comparative ease with which a public space can be converted from one activity to another. For example, the bleachers in a high school gymnasium can be dismantled and removed to provide a considerably enlarged area for dances and other events which require the full floor space of the gymnasium. However, even the erection and dismantling of portable bleachers and similar temporary installations are time-consuming and laborious operations which require the services of a number of persons and therefore are relatively expensive. With the rising cost of labor, it is apparent that the inherent advantages of temporary seating arrangements have been partially negated.

Recently a compromise seating arrangement has gained considerable acceptance for use in school gymnasiums and similar multiple purpose public areas. The new seating arrangement utilizes the best features of both the temporary and permanent seating installations and is descriptively termed a "telescoping" bleacher or stand. Each riser section of the telescoping bleacher is mounted on wheels or rollers so that the entire bleacher can be telescoped into a narrow vertical storage unit or pushed back against a wall. Since the telescoping action of the bleacher sections allows the bleachers to be stored in a relatively narrow area, this seating arrangement affords the maximum utilization of floor space with a concomitant minimum expenditure of labor and money.

The principle of telescoping seating facilities can be adapted to other multiple purpose areas besides gymnasiums. In such cases, it is usually desirable to have a more comfortable seating arrangement than that provided by the flat boards of a bleacher. Theater type

paddled chair assemblies can be mounted on telescoping bases in the same manner as bleacher seats, but the number of rows of chairs is severely limited by the vertical space requirement imposed by the construction of a conventional chair. However, if each row of chairs can be folded into a substantially horizontal position, the number of chair rows for a given telescoping assembly can be increased appreciably. It is therefore a primary object of the present invention to provide a folding chair assembly for use in telescoping seating facilities.

It is another object of the invention to provide a folding chair assembly which has a low silhouette and which occupies a minimum amount of vertical space in its folded position.

It is still another object of the invention to provide a multiple-unit folding chair assembly which can be operated by a single person.

It is a further object of the present invention to provide a multiple-unit folding chair assembly which is securely retained in its operative position yet can be folded easily into storage position or tilted forward to provide access for cleaning, maintenance and other purposes.

These objects and other objects of the invention will best be understood and appreciated from a more detailed description of the preferred embodiment thereof, selected for purposes of illustration, and shown in the accompanying drawing in which:

FIG. 1 is a perspective view of a multiple unit folding chair assembly;

FIG. 2 is a diagrammatic side elevation of the telescoping seating installation;

FIGS. 3–6 are perspective views from the side showing the sequential opening of the chair assembly from its horizontal storage position to its fully upright seating position;

FIG. 7 is a view in perspective showing the multiple unit chair assembly tilted forward for cleaning and other maintenance purposes; and,

FIG. 8 is a perspective view showing a single chair of the multiple-unit folding chair assembly.

Turning now to the drawings, FIG. 1 depicts in perspective a multiple-unit folding chair assembly indicated generally as **2** which is shown in its unfolded seating position. The chair assembly **2** as shown seats three people, however, the novel features of the disclosed folding chair assembly are equally applicable to single chairs as well as to multiple units, and hence, it is not intended to limit the invention to a particular number of seating units.

The multiple-unit folding chair assembly **2** is mounted on a base indicated generally as **4**. The base **4** represents the horizontal portion or "tread" of a telescoping stand **6** shown diagrammatically in FIG. 2. The telescoping stand **6** is depicted in its extended position with chairs **8** fully erected in each row. When it is desired to push the stand back into its wall storage compartment **10**, the chairs **8** are collapsed and the stand is telescoped in the direction shown by the arrows in FIG. 2.

The folding chair assembly **2** is constructed in a conventional manner with regard to its seating function. Thus each individual seating position has a chair back **12**, chair seat **14** and arm rests **16**. It is a feature of the folding chair assembly that from the standpoint of the occupant, the chair provides a degree of comfort which is normally associated only with fixed theater type chair installations. The chair seat **14** and the chair back **12** are both padded with a suitable cushioning element such as polyurethane foam and are upholstered with one of the well known conventional covering materials. Although the width of the seat **14** and height of the chair back **12** conform to the standard dimensions employed in the seating industry, these dimensions can be varied to accommodate the re-

quirements imposed by a particular seating installation. In addition to meeting the dimensional standards in the seating industry, the folding chair assembly **2** also conforms to the normal degree of back pitch and seat pitch. These features of the folding chair assembly **2** have been mentioned to emphasize the fact that folding chair assembly **2** is essentially the equivalent of a conventional theater type fixed chair installation and as such provides the occupant with the same comfortable seating support expected from a theater chair. However, the folding chair assembly **2** has a critical difference i.e., it can be folded from an upright or seating position into a horizontal or storage position.

The collapsible feature of the folding chair assembly **2** is illustrated in FIGS. 3–6 which depict the sequential opening of the chair assembly from its storage position (FIG. 3) to its upright or seating position (FIG. 6). It is a feature of the folding chair assembly **2** that in its storage position the chair assembly has a compact and low silhouette. As mentioned previously, the low silhouette of the chair assembly permits an appreciable increase in the number of horizontal rows of chairs which can be telescoped and stored in a given vertical space. The elements of the folding chair assembly **2** and the cooperative relationship therebetween which produce the compact silhouette will be discussed after a brief description of the opening and erection of the chair assembly.

Referring now to FIGS. 3 through 6, the sequence of opening the chair assembly **2** is shown therein with the direction of movement of the various components of the chair assembly indicated by arrows in the respective figures. Looking specifically at FIG. 3 it can be seen that if the chair back **12** is grasped by its upper edge **18** and lifted upwardly, the upper edge **18** will follow an arcuate path shown by the arrow in FIG. 3. After the chair back **12** is raised to the intermediate position shown in FIG. 4, the direction of movement is changed by pushing backwardly on the upper edge of the chair back **12** thereby causing the upper edge **18** to trace a generally arcuate path in an upward and rearward direction as shown by the arrow in FIG. 4. When the chair back **12** reaches the substantially vertical position depicted in FIG. 5, the upper edge **18** of the chair is pushed downwardly and rearwardly until the chair locks in place as shown in FIG. 6.

Having thus described the unfolding of the chair assembly **2**, I will now discuss in detail the structure of the chair assembly and the folding mechanism thereof. The chair assembly or single chair unit as the case may be, is constructed around an H-shaped frame indicated generally as **20**. The frame **20** consists of two upright members **22** and **24** which are maintained in spaced relation by a gently curved cross bar **26**, a portion of which is visible in FIG. 1 and which is clearly shown in FIG. 7. The chair back **12** is secured to and between the upright members **22** and **24** and projects a substantial distance above the upper extremities thereof. The chair back **12**, upright members **22** and **24**, and cross bar **26** as depicted form an integral unit having a considerable degree of structural rigidity. The strength and rigidity of this unit greatly simplifies the opening and closing of the chair assembly because the necessary force can be applied to the readily accessible edges of the chair back **12** instead of to the less accessible frame **20**. Referring back for a moment to the previous explanation of the opening of the chair assembly **2**, it should be noted that the entire opening force was applied to the upper edge **18** of chair back **12**. The chair assembly **2** is closed in a similar manner except that the lower edge **28** of the chair back **12** is grasped and pulled towards the operator. It is thus possible to both open and close the chair assembly from the front of the assembly merely by pulling or pushing on the appropriate edge of the chair back **12**. This feature of the folding chair assembly facilitates the erection, disassembly and maintenance of the folding chair seating installation with a concomitant reduction in labor cost involved in these operations.

The structural relationship between the chair assembly **2** and the base member **4** is shown in all of the figures, however, the following discussion can best be understood by referring specifically to FIGS. 3 and 4. The chair assembly **2** is pivotally mounted on base **4** by means of links **30** which are secured to a pivot rod **32** journalled in base journals **34**. The upper ends of links **30** are pivotally secured to the corresponding upright members of each seating unit. The pivotal connection between the links **30** and upright members **22** and **24** can be accomplished in a variety of conventional ways known to those skilled in the art. In the embodiment of the chair assembly **2** shown for purposes of illustration, the links **30** are pivotally mounted in a U-shaped bracket **36** which extends outwardly and forwardly from each upright member. Since the bracket **36** is either integrally fabricated with the upright member or rigidly mounted thereon, mechanically the links **30** are pivotally secured to the upright member and the folding chair assembly **2** can be defined in terms of an upright member and a link pivotally secured thereto.

The pivotal action of pivot rod **32** within base journals **34** and the concomitant movement of the chair assembly itself has been described previously with respect to the sequential opening of the chair assembly shown in FIGS. 4–6. However, it should also be noted that the pivotal movement of the rod **32** allows the chair assembly to be tilted forward as shown in FIG. 7. With the chair assembly in the tilted position, the entire underneath surface of the chair assembly and the corresponding base area are exposed for cleaning, repair and any other maintenance work which may be required.

Each seating position as mentioned previously is provided with a chair seat **14** and a pair of arm rests **16** although in multiple installations the intermediate arm rests will of course serve as a common arm rest for two seating positions. The chair seat **14** is secured to and supported by two L-shaped arms **38** pivotally connected to a bracket **40** which is rigidly mounted on each of the upright members. The forward projection of bracket **40** and the location of the chair supporting arm pivot point in the bracket are designed to permit the chair back **12** to overlie the chair seat **14** when the chair assembly **2** is folded into its horizontal position as shown in FIG. 3.

When the chair assembly **2** is opened into its seating position, the amount of pivotal rotation of the chair seat **14** is limited by a stop member **42** positioned on each bracket **40** to engage the chair seat supporting arm **38** thereby preventing the seat from rotating beyond a substantially horizontal position. The stop member **42** is integrally fabricated with the bracket **40** and can best be seen in FIGS. 6 and 7. This particular arrangement is of course but one way of limiting the pivotal movement of the chair seat and supporting arms and obviously other arrangements can be employed to maintain the seat in a horizontal position when the folding chair assembly is fully extended.

Each chair arm **16** is pivotally secured to bracket **36** by means of a short curved rod **44** rigidly attached to one end of the arm **16**. Since the curved rod **44** is merely an extension of the chair arm **16** and bracket **36** is fixed with respect to the upright member, the chair arm **16** is in effect pivotally secured to the upright member. Since other methods which vary only in detail can be employed to pivotally connect the chair arm to the upright member, it is not intended to limit the disclosed folding chair assembly to the particular configuration of the chair arm **16**, rod **44**, upright member brackets **36** and upright members illustrated in the drawings.

When the folding chair assembly **32** is opened to its seating position as shown in FIGS. 1 and 6, the chair arm **16** is maintained in a horizontal position by an intermediate link **46** which is pivotally secured at one end to the

chair arm **16** near the forward edge thereof and at the other end to the connecting link **30** at a point intermediate of the ends of link **30**. Referring to FIG. 3, it can be seen that when the chair assembly **2** is folded into its horizontal or storage position the connecting link **30**, intermediate link **46** and chair arm **16** lie in nested superposed relation. This relationship and the resulting reduction in the folded vertical dimension of the chair assembly are produced by the unique linkage arrangement of the chair assembly and the cross-sectional profile of the chair arm **16** and intermediate link **46**. Both the arm **16** and link **46** are constructed with an elongated and inverted U-shaped cross-section so that link **30** will nest within the channel of the intermediate link **46** while the intermediate link nests in turn within the arm rest **16**.

It has already been pointed out that the folding chair assembly **2** can be opened or closed by a single person with a minimum amount of effort. This is possible only because the friction between the various components of the folding chair assembly has been reduced to a minimum. Referring to the sequential opening of the chair assembly **2** as shown in FIGS. 3–6, it can be seen that the bottom surface of the chair seat **14** and the lower ends of the upright members **22** and **24** slide along the base **4**. The frictional contact between these elements is lessened by utilizing rolling friction instead of sliding friction. Thus each chair seat **14** has a small roller **48** mounted therein with a portion of the roller **48** extending below the bottom surface of the chair seat **14** to provide a rolling contact with the base **4**. The roller **48** can best be seen in FIGS. 7 and 8 along with a ramp **50** which is mounted on the base **4** in alignment with the roller **48** (FIG. 8). As the chair assembly opens, the rounded forward edge **52** of the chair seat **14** strikes the ramp **48** thereby lifting the forward edge of the seat so that the edge will clear the pivot rod **32** as the seat moves forward (FIG. 5) while at the same time pushing the rear edge of the chair seat in a downward direction so that the roller **48** contacts the base **4**. In this manner the rear edge of the chair seat **14** is in rolling frictional contact with the base **4** while the forward edge is in sliding frictional contact with the ramp **50**. The forward chair seat edge **52** is rounded to reduce the frictional contact between the chair edge **52** and the ramp **48**.

The frictional contact between the base **4** and upright members **22** and **24** is limited to rolling friction by mounting a wheel **54** within each upright member at the lower end thereof. As shown in FIGS. 3–5, the wheel **54** extends beyond the lower extremity of the upright member to provide rolling friction between the base **4** and each upright member.

It is apparent that the cooperative relationship between the forward chair seat edge **52** and the ramp **48** and the rolling friction of rollers **48** and wheels **54** significantly reduce the frictional contact between the components of the folding chair assembly **2**, and hence, facilitates the erection of a multiple unit chair assembly by a single person. However, if the inherent advantages of the folding chair assembly are to be fully realized, the assembly must have a disengageable means for locking the chair in an upright position and if two or more chairs are mounted together, the locking means for each chair should be disengageable as a unit to eliminate the necessity of unlocking each individual chair before folding the unit.

Referring now to FIGS. 3, 4, 5, 6 and 7, the disengageable locking means comprises a U-shaped channel member, indicated generally as **56**, which is mounted on the base **4** in alignment with the corresponding upright member for engagement therewith during the erection of the folding chair assembly. Each channel member **56** has a bottom element **58** and two side walls **60** and **62** which extend upwardly from the bottom element **58**. The rear edge of each side wall is tapered to form an inclined ramp **64** with the base **4**. In addition each side wall also has a slot **66** which extends downwardly from the upper edge of the side wall and in substantially parallel relation to the slope of the inclined ramp **64**. Since each channel member **56** is aligned with a corresponding upright member, the upright member will roll into the channel **56** when the chair assembly **2** is unfolded. Each upright member has a pair of outwardly extending lugs **68** and **70** which may be either integrally fabricated with the upright member or secured thereto by any well known method.

Referring back to the sequential opening of the folding chair assembly depicted in FIGS. 3–6, it can be seen that as each upright member rolls into the respective channel **56**, lugs **68** and **70** will strike the inclined ramp **64** of side walls **60** and **62** thereby forcing the chair to pivot about the pivot point of the links **30** and bracket **36**. Further pressure on the upper edge **18** of the chair back **12** (FIG. 5) forces the lugs onto the upper edge of the side walls **60** and **62** and then forwardly until the lugs engage the corresponding slots **66** as shown in FIG. 6. Once the lugs **68** and **70** have engaged the slots **66**, the entire chair assembly **2** is rigidly held in an upright position. It is a feature of my invention that although the chair assembly is securely held in the upright position by the channel member **56** and lugs **68** and **70**, the entire chair assembly can be collapsed merely by pulling on the lower edge **28** of chair back **12**. As the lower edge **28** is pulled forward, the lugs **68** and **70** ride up the slope of the backing slots **66** until they are disengaged from the slots. At this point the lower edge **18** is lifted slightly and then pushed backwards to collapse the chair assembly.

If the chair assembly consists of more than one chair, e.g., the three chair unit shown in FIG. 1, the entire unit can be collapsed by pulling on the lower edge of one chair back, preferably the center chair. By pulling on the lower edge of the center chair back, all of the chairs in the unit are disengaged from their respective channel members without requiring the worker to bend over and individually unlock each chair. This feature of my invention greatly simplifies the folding of the chair assembly and, hence, permits a single worker to fold a maximum number of chairs in a minimum amount of time.

It is also a feature of my invention that the chair assembly **2** cannot be collapsed from the rear. If pressure is applied to the back of the chair seat **12**, as for example, by a youth placing his feet on the upper rear portion of the chair seat and pushing forwardly, the only effect on the chair assembly is to more securely lock the assembly in an upright position because the forward pressure on the upper portion of the chair back moves the lower portion of the assembly in a rearward direction thereby forcing the lugs **68** and **70** to seat more securely in the locking slots **66**.

Since numerous modifications of the folding chair assembly will now be apparent to those skilled in the art, it is not my intention to confine the invention to the precise form shown herein, but rather to limit it in terms of the appended claims.

Having thus described and disclosed a preferred embodiment of my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A folding chair assembly collapsibly mounted on a base comprising: a frame having first and second upright members, said upright members each having a pair of lugs extending outwardly from said member normal to the longitudinal axis thereof; a wheel rotatably mounted on each upright member with a portion of said wheel extending below the lower end of said upright member; a chair back secured to said upright members; a chair seat having a rounded lower front edge, said seat being pivotally secured to said upright members; means for limiting the pivotal movement of said chair seat; a roller rotatably mounted in said chair seat with a portion of said roller extending below the lower surface of said seat; a ramp member mounted on said base in alignment with said roller whereby said roller contacts said ramp during the

opening and closing of said collapsible chair assembly; first and second links each having one end thereof pivotally secured to said base and the other end thereof pivotally secured respectively to said first and second upright members; first and second chair arms each having one end thereof pivotally connected respectively to said first and second upright members above the pivot point of said links; first and second intermediate links each having one end thereof pivotally connected respectively to said first and second chair arms and the other end thereof pivotally connected respectively to said first and second links intermediate of the ends of said links; a plurality of channel members mounted on said base with the longitudinal axis of said channel members in alignment with corresponding upright members, said channel members each comprising: a bottom element and upwardly extending side walls integrally fabricated therewith, said side walls each having the end thereof in proximity to said corresponding upright member tapered to form an inclined ramp with said base and a slot extending downwardly from the upper edge of said side wall in substantially parallel relation to said inclined ramp whereby when said chair assembly is unfolded from its horizontal storage position said lugs will slide upwardly along the inclined ramp of said channel member walls and forwardly until the lugs engage the respective slots in said walls thereby locking said chair assembly in an upright position.

2. A folding chair assembly collapsibly mounted on a base comprising: a back member having lugs extending outwardly from the sides of the back member at the lower end thereof and a seat pivotally secured thereto, said back member being pivotally secured to the base by a single link on each side of the back member, said links having one end thereof pivotally secured to the back member, and the other end thereof pivotally secured to the base for rotation upwardly and forwardly from a substantially horizontal storage position to a seating position and forwardly and downwardly to a cleaning position; and releasable lug engaging means mounted on said base for maintaining the back member in a substantially vertical seating position, said means comprising a plurality of upright lug engaging members mounted on said base in alignment with the corresponding back member lug, said lug engaging members having the end thereof in proximity to said corresponding lug tapered to form an inclined ramp with said base and a slot extending downwardly from the upper edge thereof in substantially parallel relation to said inclined ramp whereby when said chair assembly is unfolded from its horizontal storage position to its seating position, said lugs will slide upwardly along the inclined ramp of the corresponding lug engaging member and forwardly until they engage its slot therein locking said chair assembly in a substantially upright seating position.

3. A folding chair assembly collapsibly mounted on a base comprising: a chair frame having first and second upright members, said upright members each having a pair of lugs extending outwardly therefrom; a chair back positioned between and secured to said upright members; a chair seat pivotally secured to said upright members; chair arms pivotally secured to said upright members; first and second links pivotally secured at one end to said first and second upright members, respectively, and at the other end to said base for rotation upwardly and forwardly from a substantially horizontal storage position to a seating position and forwardly and downwardly to a cleaning position; and releasable lug engaging means mounted on said base for maintaining said chair frame in a substantially upright seating position, said means comprising a plurality of channel members mounted on said base with the longitudinal axis of said channel members in alignment with the corresponding upright members, said channel members each comprising: a bottom element and upwardly extending side walls integrally fabricated therewith, said side walls each having the end thereof in proximity to said corresponding upright member tapered to form an inclined ramp with said base and a slot extending downwardly from the upper edge of said side wall in substantially parallel relation to said inclined ramp whereby when said chair assembly is unfolded from its horizontal storage position, said lugs will slide upwardly along the inclined ramp of said channel member walls and forwardly until the lugs engage the respective slots in said walls thereby locking said chair assembly in a substantially upright position.

References Cited by the Examiner

UNITED STATES PATENTS

1,349,162	8/1920	Kronheim	5—43
2,634,429	4/1953	Hopeman	5—43
3,025,106	3/1962	Evans	297—248

FOREIGN PATENTS

756,366	9/1933	France.
194,939	3/1923	Great Britain.
702,386	1/1954	Great Britain.

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