Feb. 18, 1941. W. BOARDMAN 2,232,205

FOLDING CHAIR

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Fig. 1.

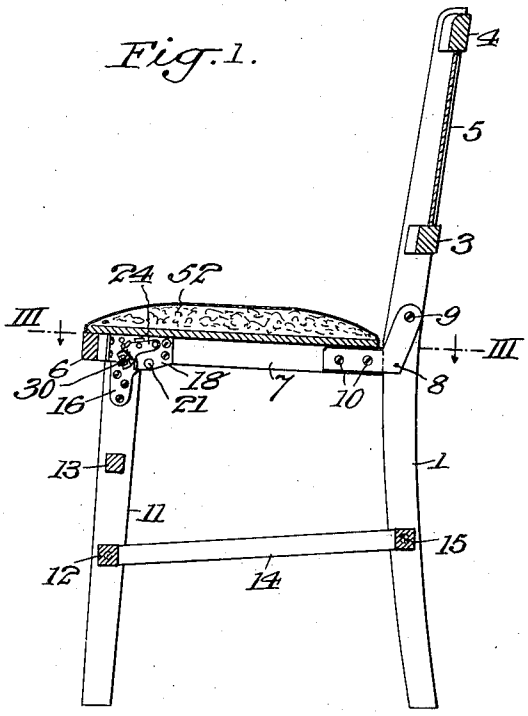


Fig. 2.

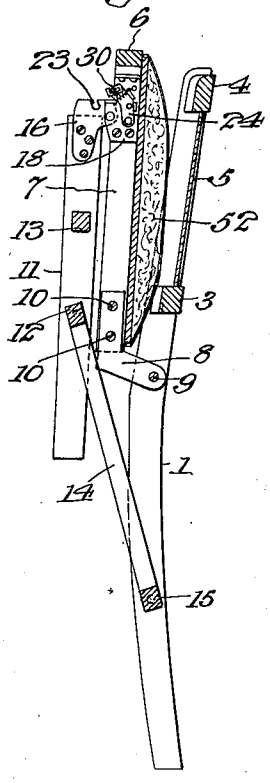
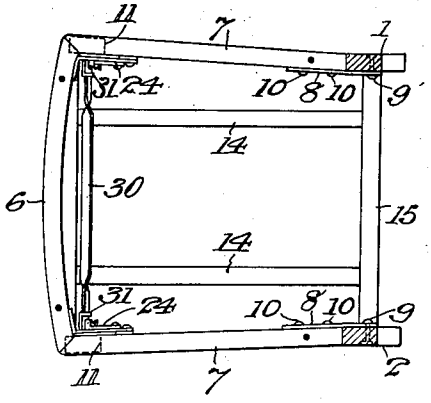


Fig. 3.



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FOLDING CHAIR

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Fig. 4.

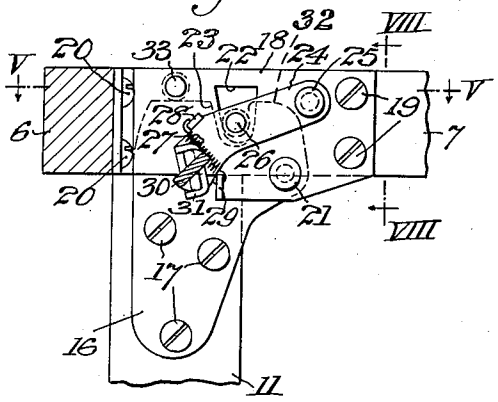


Fig. 7.

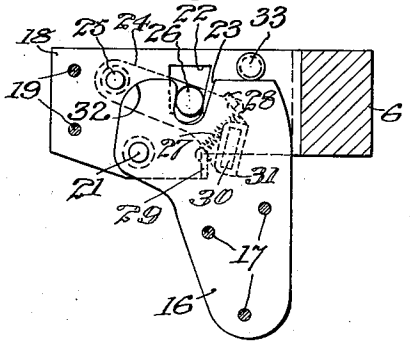


Fig. 5.

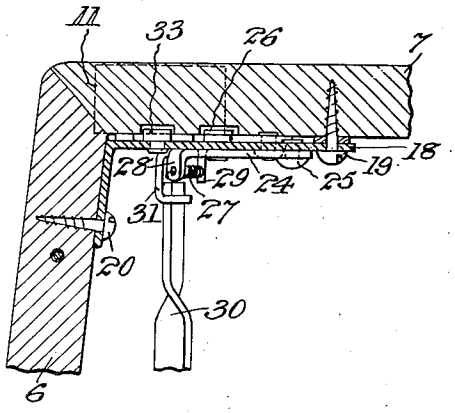


Fig. 8.

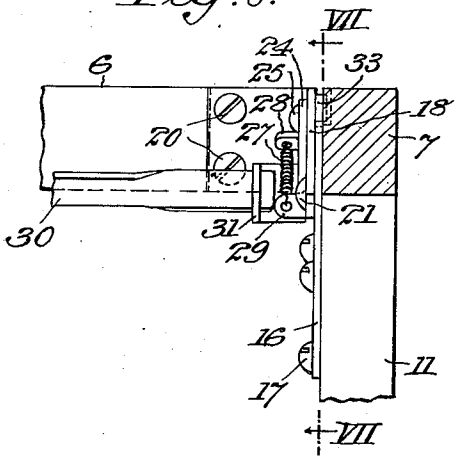
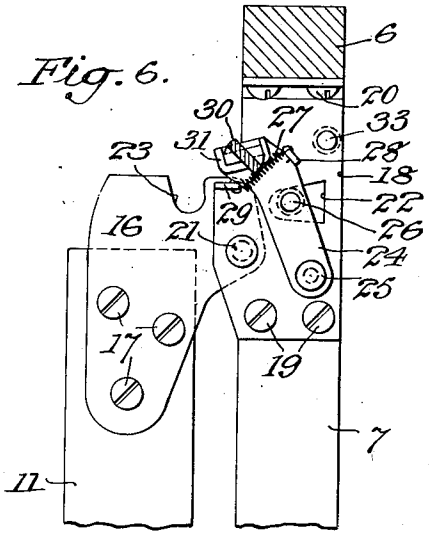


Fig. 6.



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Fig. 11.

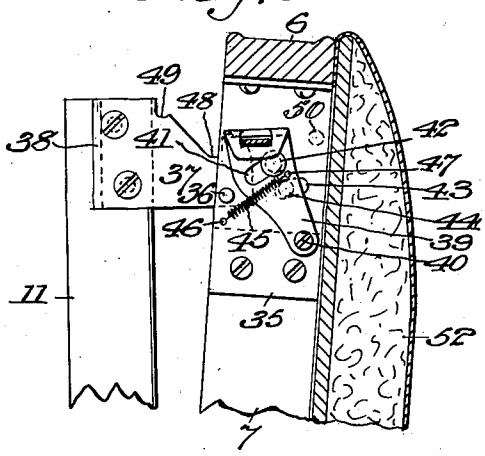


Fig. 9.

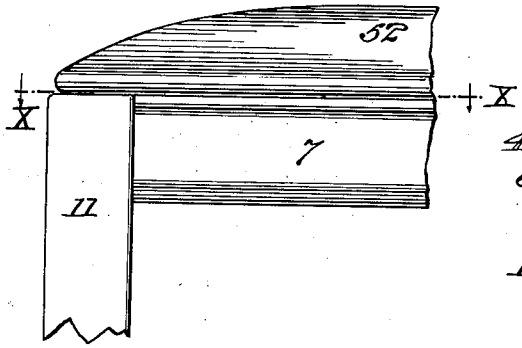


Fig. 12.

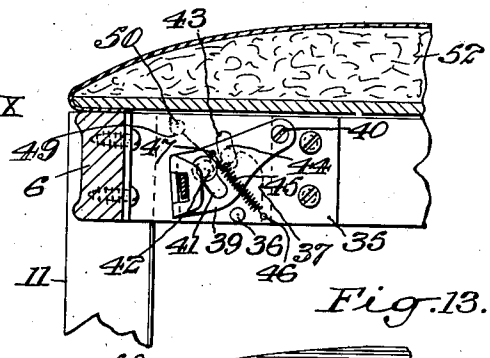


Fig. 13.

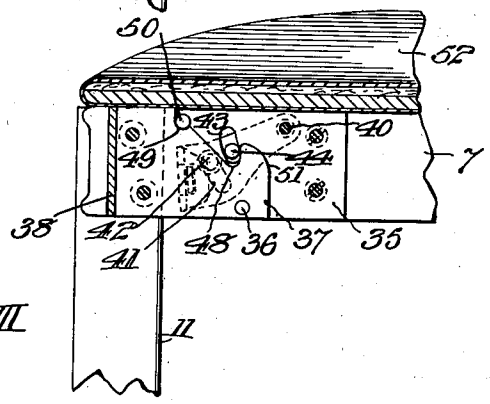
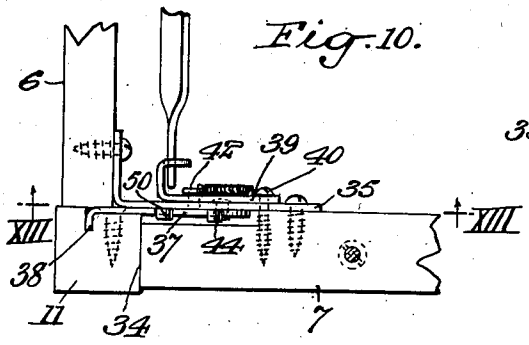


Fig. 10.



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Patented Feb. 18, 1941 2,232,205

UNITED STATES PATENT OFFICE

2,232,205

FOLDING CHAIR

Whitlock Boardman, Hoboken, N. J., assignor to Ferguson Brothers Manufacturing Company, Hoboken, N. J., a corporation of New Jersey

Application April 22, 1939, Serial No. 269,318

8 Claims. (Cl. 155—141)

This invention relates to an improvement in folding chairs and has for an object to provide a chair which may be very readily folded and unfolded, and which will be unusually rigid when in use.

Another object consists in providing a folding chair which has manually releasable locking mechanism for holding it in unfolded position, which mechanism is effectively operable regardless of the point at which manual force is applied to the releasing mechanism.

Another object consists in providing such a folding chair in which assembly of the locking mechanism is facilitated and its effectiveness insured regardless of slight variations that may exist in the dimensions of the framework of a plurality of chairs.

Another object consists in providing such a chair in which the locking mechanism is so arranged as to enable the positioning of the front chair legs approximately at the extreme front ends of the side seat frame members, whereby the balance of the chair and its resistance to forward tilting are improved.

Another object consists in providing such a chair in which the front chair legs are arranged to extend to the top of the seat frame at the extreme front corners thereof, whereby the style, appearance and steadiness of the chair are enhanced.

Another object consists in providing certain improvements in the form, construction, material and arrangement of the several parts whereby the above named and other objects may effectively be attained.

Practical embodiments of the invention are represented in the accompanying drawings, in which—

Fig. 1 represents a vertical section, from front to rear, through the preferred form of chair in its unfolded position ready for use;

Fig. 2 represents a similar view showing the chair in folded position;

Fig. 3 represents a horizontal section taken substantially in the plane of the line III—III of Fig. 1, looking in the direction of the arrows;

Fig. 4 represents an enlarged detail section, partly in elevation, showing the locking mechanism at one corner of the seat frame, with the parts in unfolded position;

Fig. 5 represents a detail horizontal section taken in the plane of the line V—V of Fig. 4, looking in the direction of the arrows;

Fig. 6 represents a view similar to Fig. 4, but with the parts in folded position;

Fig. 7 represents a detail section, partly in elevation, taken in the plane of the line VII—VII of Fig. 8, looking in the direction of the arrows;

Fig. 8 represents a detail section, partly in elevation, taken in the plane of the line VIII—VIII of Fig. 4, looking in the direction of the arrows;

Fig. 9 represents a detail side elevation of a modified form;

Fig. 10 represents a detail horizontal section taken in the plane of the line X—X of Fig. 9, looking in the direction of the arrows, the parts being shown in full lines owing to the removal of the seat cushion;

Fig. 11 represents a detail vertical section, with the parts in folded position;

Fig. 12 represents a view similar to Fig. 11 with the parts in unfolded position; and

Fig. 13 represents a view taken in the plane of the line XIII—XIII of Fig. 10, looking in the direction of the arrows.

The chair comprises rear legs and back side frame members, which are preferably formed in single pieces and marked 1, 2. Upper parts of these members, constituting the back side frames, may be connected by cross bars 3, 4, and by intermediate strips 5 in any desired or approved form or manner, as the particular construction of these elements constitutes no part of the present invention.

A rectangular seat frame which may be composed of front member 6, and like side members 7, 7 is pivoted to the back side frame members by similar metallic straps 8, 8 that are fastened to the back side frame members for pivotal movement by screws 9, 9 and are rigidly fastened to the seat side frame members 7, 7 by screws 10.

Front legs, denoted by 11, 11 are braced with respect to each other by cross bars 12, 13, the former of which is pivoted to the front legs and is connected by braces 14, 14 with a rear cross bar 15 that is pivoted to the rear legs.

The subject matter of the present invention is embodied in the locking mechanism which connects the front legs with the front corners of the seat frame. There is one such locking mechanism associated with each front leg and, as the two are identical in structure and operation, only one will be described in detail.

Referring now particularly to Figs. 4 to 8 inclusive, which disclose on an enlarged scale the locking mechanism used in the preferred form of chair, it will be observed that a flat metallic plate 16 is fastened by screws 17 to the upper inside of front leg 11; while an angle plate 18

is fixed by screws 19 to the inside front portion of a seat frame side member 7, and is also secured by screws 20 to the adjacent inside of seat frame front member 6.

The plate 16 extends between plate 18 and the seat frame side member, and is secured to the plate 18 by a rivet 21, or the like, to provide a pivot about which the front leg may swing in moving to and from unfolded position. Thus the plate 18 constitutes a brace for securing the front seat frame member to a side seat frame member, and it also serves as a pivotal mounting for a front leg.

The portion of the angle plate 18 which is fast to the seat frame side member has an opening 22 formed therein which is flared from the bottom toward the top, so as to be substantially V-shaped, as is well shown in Figs. 4, 6 and 7. The upper portion of plate 16 is provided with a notch 23, that overlaps the opening 22 when the front leg is in unfolded position. The left hand side wall of the notch 23, when looking at Fig. 4, is practically straight and flares somewhat from the bottom of the notch, but the right hand wall of the notch is formed with a slight bulge, for a purpose to be hereinafter described. Fig. 7 also shows this formation of the notch very clearly, although, in that figure, the plate 16 is in a reversed position as compared with Fig. 4, so that the notch wall with the bulge is on the left hand side.

A locking lever 24 is pivoted at 25 to angle plate 18 and it carries a laterally projecting stud 26 that extends through opening 22 and notch 23. The lever 24 is yieldingly held in the downward position shown in Fig. 4 by a retractile coil spring 27 that is secured to the lever at 28 and to angle plate 18 at 29. The action of the said spring tends to urge stud 26 downwardly in opening 22 and notch 23 when the leg is unfolded, and the overlapping arrangement of the said opening and notch is such that the stud engages one flared side of the opening 22 and the bulging side of the notch 23, as clearly shown in Figs. 4 and 7. In this position of the parts, the downward pressure on stud 26, under the influence of spring 27, is such as continuously to force and hold the leg in firm, unfolded position by reason of the cooperative shape of the wall of the opening and wall of the notch that are engaged by the stud. The bulge of one wall of the notch, to which reference has heretofore been made, not only acts in the capacity just named, but it also has a tendency to assist the spring in urging the stud downwardly in the opening 22 and notch 23 so as to reinforce the locking function. In manufacturing the locking mechanism, a certain amount of space will be allowed between the stud 26 and the bottoms of the opening 22 and notch 23, so as to provide for continued rigidity of lock in spite of wear upon the opening, notch and stud.

In order to break the lock, and swing the leg to the folded position shown, for instance, in Fig. 6, the lever 24 is swung on its pivot 25 against the tension of spring 27 so as to remove stud 26 from notch 23, and permit the leg to be swung on pivot 21. In practice this is accomplished by manual pressure on a trigger rod 30 which has its end loosely set in a slotted flange 31 that is formed on the free end of lever 24. As heretofore mentioned, there are two similar locking mechanisms at each corner of the seat frame of the chair, and it should be stated that the trigger rod 30 extends from one such locking mechanism to the other and has its opposite ends in the slotted flanges on each of the locking levers, such as 24. By preference, the trigger rod is made of metal which is flat in cross section so as to lie, without the possibility of turning, in the slotted flange 31 and, in order to impart rigidity to the said trigger rod, it is preferably twisted, as well shown in Fig. 5, which twisting also presents a long intermediate portion of the trigger rod in such a position that one of its flat sides will be grasped by the fingers of the occupant of the chair when the hand is passed downwardly and rearwardly under the front seat frame member. This motion of the hand naturally leaves the thumb on the outside of the front seat frame member, and a squeezing or gripping of the hand will move the trigger rod in such a direction as to lift the locking lever 24 and move its stud 26 out of notch 23, so as to permit the front leg to be folded as indicated in Figs. 2 and 6.

It will, of course, be understood that both front legs move together, and it is of some importance to have the trigger rod 30 twisted, or otherwise provided with rigidity, so as to insure the simultaneous operation of both locking mechanisms, whether the chair occupant grasp the trigger rod near its central portion or near either end. It is also of some importance to have the ends of the trigger rod seated freely in the slotted flanges on the locking levers 24, with a little play at either end, as this facilitates assembly of the parts and also allows for reasonable variations in dimensions of the chair seat frame that carries the locking mechanisms.

When it is desired to move the parts from folded to unfolded position, it is merely necessary to seize some part of the front leg structure and pull in the correct direction. This swings the front leg structure around pivot 21 of the locking mechanism until the curved or cam-like face located at 32 on plate 16 engages stud 26 and lifts it from the bottom of opening 22 where it rests under the influence of spring 27 when the chair is folded. As this movement is continued, the upper edge of plate 16 will ride along under stud 26 until notch 23 comes in line with the stud, whereupon the action of spring 27 will immediately pull the stud down in notch 23 and opening 22 with its wedging and locking effect upon a wall of the opening and the bulging wall of the notch, as hereinabove explained.

In order further to promote rigidity of the parts in unfolded position, a stop 33 is formed on angle plate 18 in such position as to be in abutment with the top of plate 16 when the front legs are unfolded and locked.

It will be observed that, in the preferred form which has been described, the tops of the front legs contact with the underside of the seat frame when the chair is unfolded. In the modified form, represented in Figs. 9 to 13 inclusive there is a difference in structure which resides in the fact that the front ends of the seat frame side members 7, are cut away as shown at 34 in Fig. 10, so as to permit the front legs to extend up to the top of the seat frame when the chair is unfolded, as shown in Fig. 9. This provides an appearance which is highly desirable under certain circumstances, and it also brings the front legs at the extreme corners of the seat frame so as to enlarge the floor area and seat area that is embraced within the confines of the legs and thereby improve the steadiness or non-tiltable characteristic of the chair. This last named fea-

ture is largely inherent in the preferred form that has previously been described, but it is carried to its limit of advantage in the modified form. In this modified form, the angle plate, which is screwed to a seat side frame member and the seat front member, is marked **35**, and to it is pivoted at **36** another plate **37** which is screwed to a front leg, and has its edge bent and set thereinto as indicated at **38**. The locking lever **39** is pivoted at **40** to plate **35**, and it is provided with a curved slot **41** that mates with a headed pin **42** which projects laterally from plate **35**. Another curved slot **43** is formed in plate **35** for cooperation with a pin **44** that is fixed on lever **39**. A retractile coil spring **45** has one end fixed to the plate **35** at **46** and the other end fast to lever **39** at **47**, so that the normal tendency of the spring is to hold the lever depressed with headed pin **42** at the top of slot **41** and with pin **44** near the bottom of slot **43**.

The plate **37** is formed with a notch **48**, and a seat **49**, as clearly shown in Fig. 13. One side of notch **48**, which is at the right in Fig. 13, is formed with a curve or bulge for contact with pin **44**, and the slot **43** is set at such an angle that, when the front leg is open and the lever **39** is depressed by spring **45**, as shown in Figs. 12 and 13, pin **44** is cramped between the said curved or bulged side of notch **48** and one side of slot **43**; the action being similar to the effect of notch **23** and slot **22** upon stud **26** in the preferred form. In this position of the front leg, seat **49** on plate **37** rests snugly against a stop **50** that projects from angle plate **35** and definitely limits the upward movement of the front leg in relation to the seat frame.

It will be understood of course that this modified form has two locking mechanisms such as that just described, as is the case with the preferred form; and manual releasing means like that of the preferred form is also provided for moving the levers **39** against the tension of their springs in order to move pins **44** out of notches **48** and permit the front legs to be folded into the position shown in Fig. 11. The operation of unfolding the front legs is the same in the modified form as in the preferred form, and, when the front legs are swung around their pivots **36** toward unfolded position, the curved or cam-like edge of plate **37**, which is marked **51**, rides under pin **44** in a manner similar to the action of edge **32** of plate **16** in the preferred form, until notch **48** reaches such a position that stud **44** snaps down into it as lever **39** is pulled downwardly by spring **45**. As in the case of the preferred form, a reasonable space is initially left between the bottom of slot **43** and pin **44** when the front leg is unfolded, in order to allow for wear of the adjacent parts and continue the effect of pin **44** on notch **48** which constantly urges the front leg to rigid unfolded position.

The very attractive appearance provided, in the modified form, by the extension of the front legs to the top of the seat frame, is well shown in Fig. 9; and it should be stated that in both forms the seat frame may, if desired, be provided with a suitable cushion **52**.

As the operation has been described in connection with the preferred form, and also largely set forth when detailing the mechanism of both forms, it is believed that there is no occasion to repeat the same in regard to the modified form; but it may be noted that, in both forms, the two front legs move together as a unit so that, when the foregoing description has referred to a front leg in the singular, the language is equally applicable to the other leg since each front leg cooperates with its locking mechanism in the same manner and at the same time as the other.

It will be understood that various changes may be resorted to in the form, construction, material and arrangement of the several parts without departing from the spirit and scope of my invention; and hence I do not intend to be limited to the details herein shown and described except as they may be included in the claims.

What I claim is:

1. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including locking levers pivotally mounted at each side of the seat frame, plates secured at the top of each said leg, said levers being provided with studs and said plates having notches in their edges positioned to receive said studs for locking engagement, means for normally urging said studs into said notches, and a manually operable releasing member connecting said levers for moving said studs out of said notches.

2. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including locking levers pivotally mounted at each side of the seat frame, plates secured at the top of each said leg, said levers and plates being formed to provide them with cooperating locking elements, means for normally urging said levers into locking engagement with said plates, said levers having slots in their free ends, and a manually operable lock-releasing member having its ends mounted in said slots so as to permit a slight longitudinal movement of said member with respect to said levers.

3. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including locking levers pivotally mounted at each side of the seat frame, plates secured at the top of each said leg, said levers being provided with studs and said plates having notches in their edges positioned to receive said studs for locking engagement, means for normally urging said studs into said notches, said levers having slots in their free ends, and a manually operable lock-releasing member having its ends mounted in said slots so as to permit a slight longitudinal movement of said member with respect to said levers.

4. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including locking levers pivotally mounted at each side of the seat frame, plates secured at the top of each said leg, said levers and plates being formed to provide them with cooperating locking elements, means for normally urging said levers into locking engagement with said plates, said levers having slots in their free ends, and a manually operable lock-releasing member having its ends mounted in said slots so as to permit a slight longitudinal movement of said member with respect to said levers, said slots being elongated and said releasing member being elongated in cross section to prevent turning of said

member in said slots, and said releasing member being twisted intermediate its ends to increase its resistance to bending and thereby insure the operation of both levers by manual force applied to any part of the said member, and to provide a flat surface for manual gripping.

5. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including locking levers pivotally mounted at each side of the seat frame, plates secured at the top of each said leg, said levers being provided with studs and said plates having notches in their edges positioned to receive said studs for locking engagement, means for normally urging said studs into said notches, said levers having slots in their free ends, and a manually operable lock-releasing member having its ends mounted in said slots so as to permit a slight longitudinal movement of said member with respect to said levers, said slots being elongated and said releasing member being elongated in cross section to prevent turning of said member in said slots, and said releasing member being twisted intermediate its ends to increase its resistance to bending and thereby insure the operation of both levers by manual force applied to any part of the said member, and to provide a flat surface for manual gripping.

6. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including plates secured to the seat frame, plates secured to the upper ends of the legs and pivoted to the seat frame plates, said leg plates having upward extensions to slide between the seat frame plates and the seat frame when the legs are swung, notches in said upward extensions of the leg plates, openings formed in said seat frame plates, spring actuated levers pivoted on said seat frame plates and carrying studs that pass through said openings in the seat frame plates for cooperation with said notches in the leg plates under the influence of the lever springs when the legs are unfolded, and a manual releasing member connecting said levers for moving said studs out of said notches when it is desired to fold the legs.

7. In a folding chair, a seat frame, front legs pivoted thereto for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including plates secured to the seat frame, plates secured to the upper ends of the legs and pivoted to the seat frame plates, said leg plates having upward extensions positioned to slide between the seat frame plates and the seat frame when the legs are swung, notches in said upward extensions of the leg plates, openings formed in said seat frame plates, spring actuated levers pivoted on said seat frame plates and carrying studs that pass through said openings in the seat frame plates for cooperation with said notches in the leg plates under the influence of the lever springs when the legs are unfolded, a manual releasing member connecting said levers for moving said studs out of said notches when it is desired to fold the legs, and means on said leg plate extensions for contacting said studs to move said levers against the tension of their springs to permit said notches to be brought into coincidence with said studs when the legs are unfolded.

8. In a folding chair, a seat frame including side members and a front member, means for securing said members to each other, front legs pivoted to the inside of said side frame members for swinging into folded and unfolded positions, and means for locking the said legs in unfolded position, said means including locking levers pivotally mounted at each side of the seat frame, plates secured at the top of each said leg, said levers being provided with studs and said plates having notches in their edges positioned to receive said studs for locking engagement, means for normally urging said studs into said notches, and a manually operable releasing member connecting said levers for moving said studs out of said notches, the said side and front seat frame members having their adjacent ends spaced from each other for the reception of the upper ends of the legs when in unfolded locked position so as to permit the legs to extend to the top of the seat frame and constitute finished corners visible from the front and sides of the chair.

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