

[54] FOLDING CHAIR

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[51] Int. Cl. A47c 3/04

[58] Field of Search 297/55, 58, 16, 239, 284, 297/338, 337, 452; 248/157

[56] References Cited

UNITED STATES PATENTS

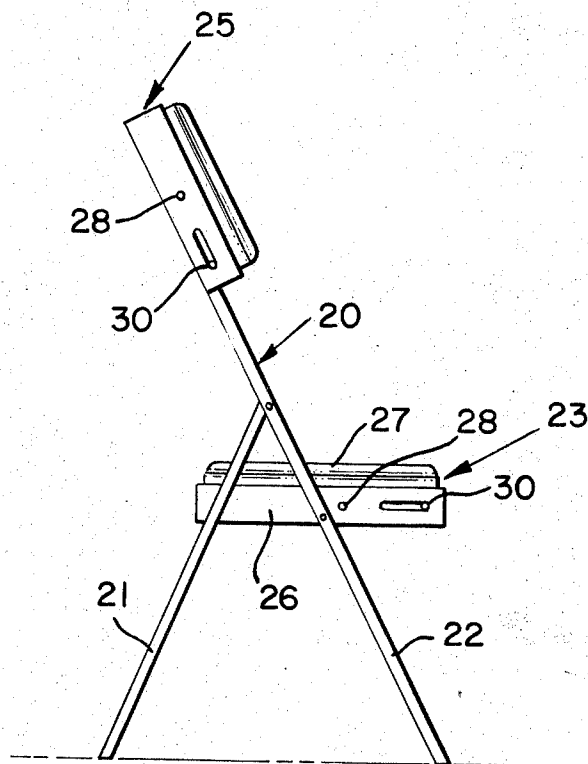
449,355	3/1891	Suchland	297/338 X
2,044,675	6/1936	Erwin	248/157
2,498,935	2/1950	Woods	297/58 X
3,021,175	2/1962	Norquist	297/58
3,203,732	8/1965	Hoffman	297/338 X

Primary Examiner—Francis K. Zugel

[57] ABSTRACT

There is disclosed a folding chair having a seat cushion that is retractable into a surrounding frame so that the cushion does not consume space when the chairs are folded and stacked and it is protected from damage during stacking and unstacking, but when in use a comfortable cushioned seat is provided. The seat cushion is movable to protrude beyond the frame by simultaneous extension of four telescoping corner elements that are held extended with a releasable catch and by moving a number of cam elements into operative position where they are held by a releasable catch. The seat cushion is retracted into the frame by the action of springs when the catches are released.

5 Claims, 16 Drawing Figures



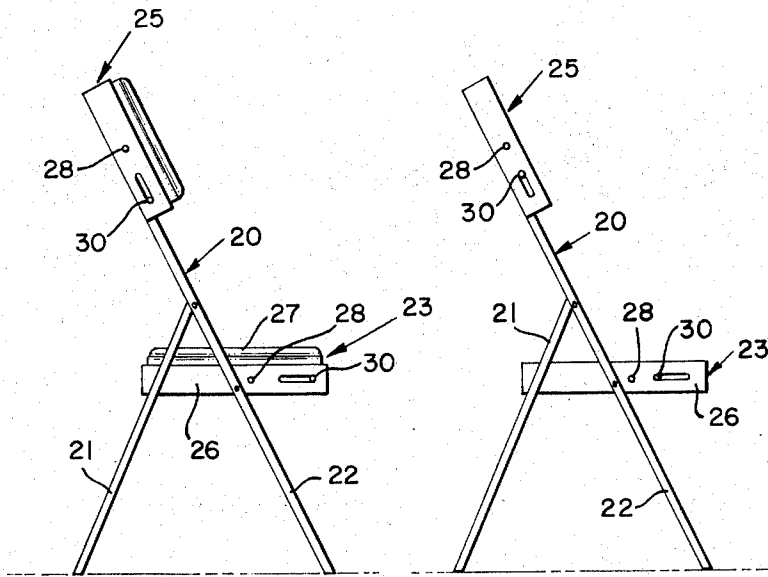


FIG. 1

FIG. 2

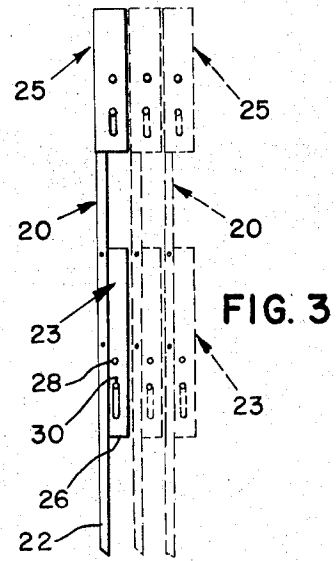


FIG. 3

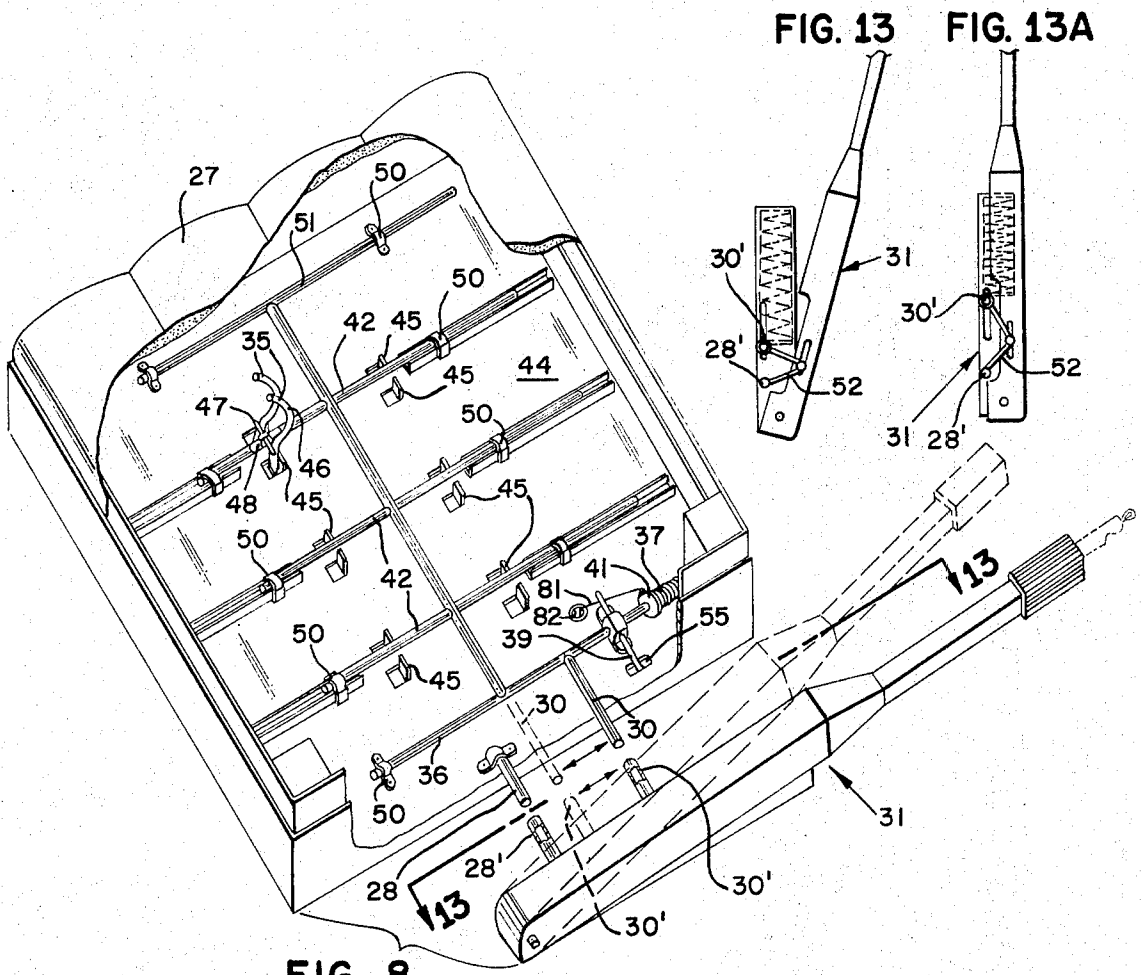


FIG. 8

FIG. 13

FIG. 13A

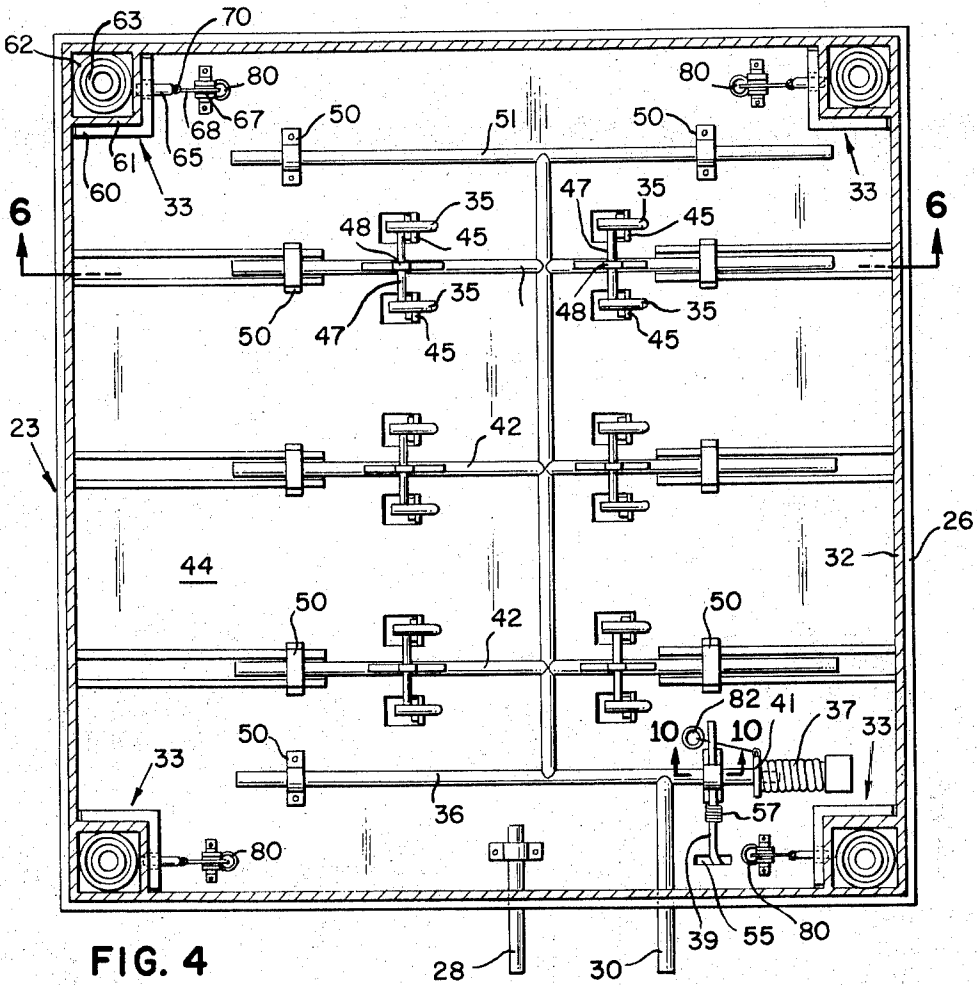


FIG. 4

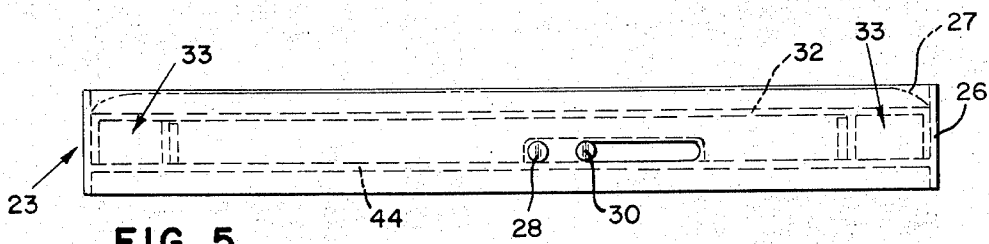


FIG. 5

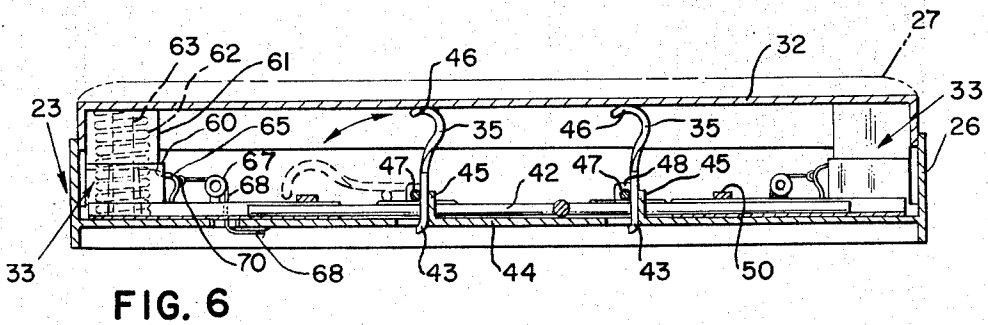


FIG. 6

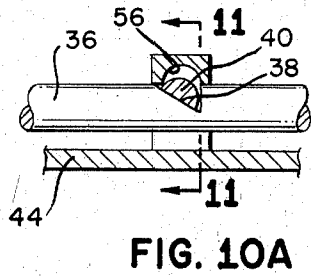
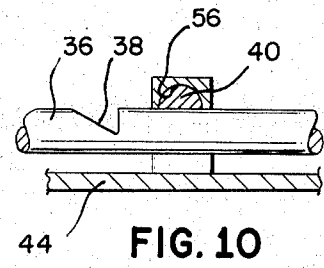
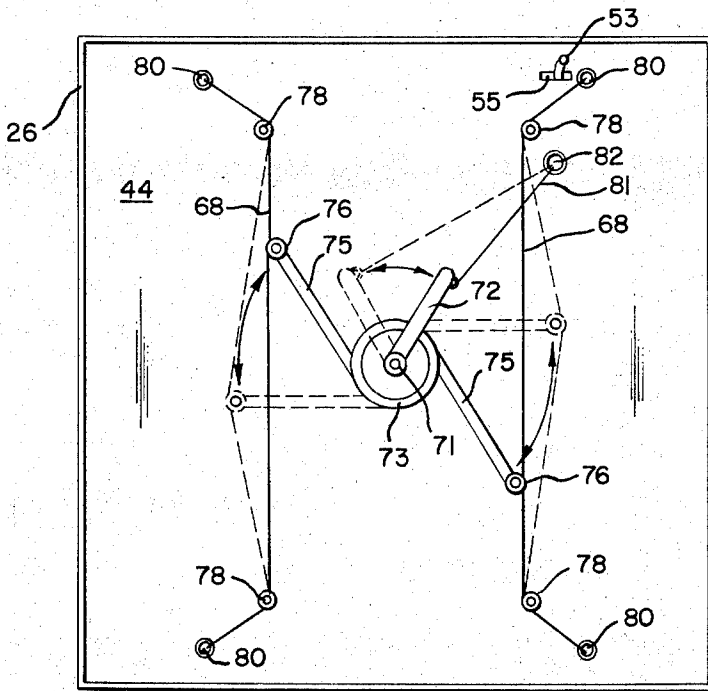


FIG. 7

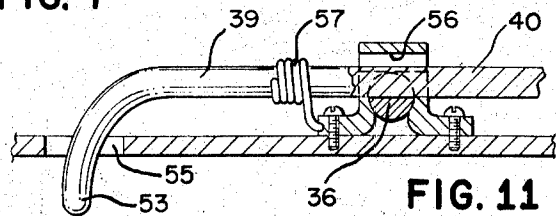


FIG. 11

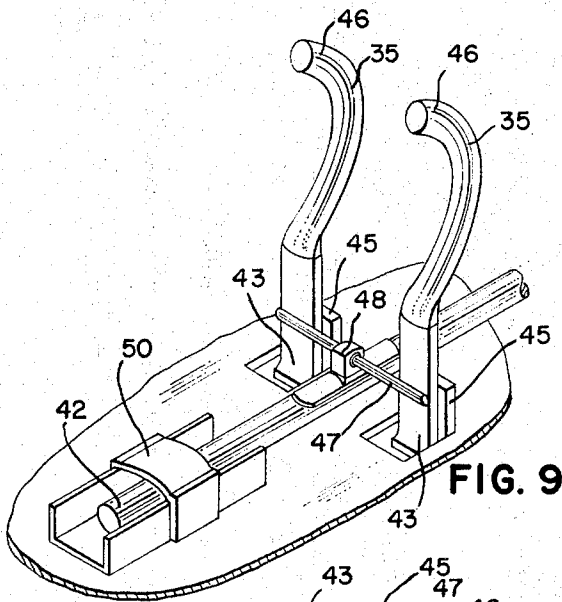


FIG. 9

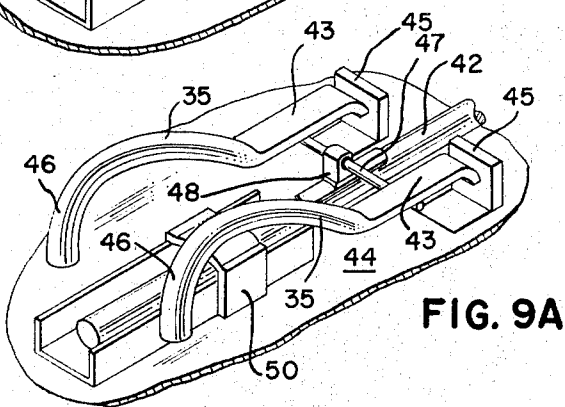


FIG. 9A

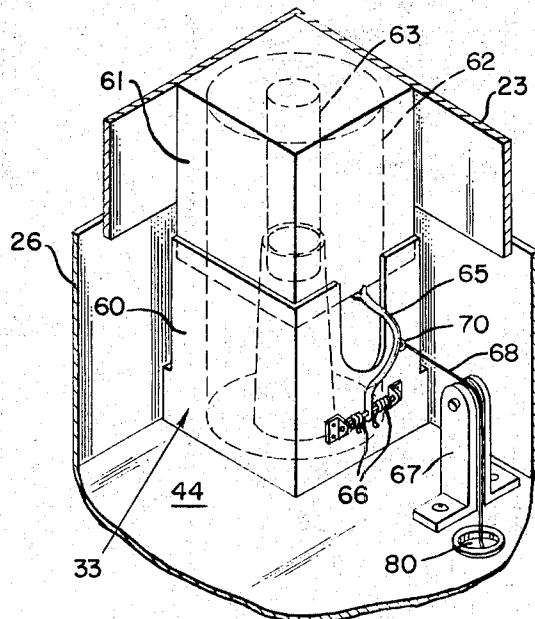


FIG. 12

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FOLDING CHAIR

BACKGROUND OF THE INVENTION

Folding chairs have been employed for many years. They are normally used to provide temporary seating for large numbers of persons where limited storage space is available. The conventional design of modern folding chairs is one where the legs, seat, back and framework all lie substantially flat when the chair is folded.

The comfort of folding chairs may be greatly increased by providing a padded or cushioned seat. The seat of a cushioned chair is generally constructed of a metal frame which has enough vertical depth to be rigid during use with the cushion resting on the frame so that it protrudes above it and is thereby capable of performing its function.

A problem associated with cushioned folding chairs is that the thickness of the cushion prevents compact stacking of such chairs. Where large numbers of folding chairs are employed as in auditoriums, theaters, churches, etc., the folding chairs are generally stacked to be vertically oriented and in a horizontal line on racks that are on caster wheels. Folding chairs that are stored and moved on such devices or any equivalent devices have two serious problems when such folding chairs have cushioned seats. One problem is that the cushion consumes storage space. For example, if chairs are provided with $\frac{1}{2}$ inch thick cushions on their seats, the thickness of the cushions would consume a foot of linear storage space for each 24 chairs stored. A linear foot of storage space usually is enough to stack six more chairs.

Another problem in stacking cushioned chairs is that the stacking and unstacking operations cause sliding of cushions against bare metal framework which frequently causes tears in the cushion upholstery and at least causes serious abrasion damage by the intense pressure of sliding a soft upholstery material against a hard metal framework. In such environments, most of the wear of the upholstery material is caused by the stacking and unstacking manipulations rather than wear caused by a person sitting on the chair.

It is evident, of course, that folding chairs having cushioned backs are more comfortable than folding chairs without cushioned backs, and that a cushion protruding from the back of the chair will also be subject to severe wear by stacking and unstacking manipulations and will consume storage space.

THE INVENTION

The present invention avoids or greatly mitigates the above noted problems by providing a folding chair in which the seat cushion retracts into a surrounding metal framework during storage but protrudes beyond the surrounding metal framework during ordinary use. In the protruding position the cushion provides a thick, soft, upholstered seat that is comfortable for use, while in the retracted position the thickness of the cushion is completely contained in the surrounding framework and does not consume storage space. Additionally, in the retracted position the upholstery material is shielded from the intense and abrasive contact with adjacent stored chairs during stacking and unstacking manipulations and therefore it receives substantially no

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detrimental wear and tear from manipulations of stacking and unstacking when the chair is folded.

The folding chair of this invention is one that has the usual legs, back and cushioned seat which are in the form of a chair when in use but which lie substantially flat when folded. The folding chair of the present invention has a seat including a cushion that has a rigid bottom support, a frame surrounding the cushion and having enough vertical dimension oriented as when the chair is in normal use, to provide a chamber that is large enough to contain the cushion and the rigid bottom support. Within the frame and fixed to it are four telescoping corner elements which are adapted to support the corners of the rigid bottom support of the cushion and which are constructed with a portion fixed to be unmovable with respect to the frame, and a portion that slides up and down with respect to the fixed portion and is movable with respect to the frame. The corner elements may be fixed directly to the frame or they may be fixed to be supported by a partial or complete floor element under the frame.

The center portion of the cushion is supported by cam-like elements that are movable to two positions. One of the positions is in an operative position wherein these cam elements hold the cushion in its protruding position with respect to the frame by bearing against the rigid bottom support of the cushion when the cushion is in its uppermost or most protruding position with respect to the frame. The cam elements also may be in an inoperative position wherein they are lying flat within the frame so that the cushion may retract within the frame in that the cam elements do not provide support for the rigid bottom support of the cushion.

These supporting elements, that is, the cam element and the telescoping corner element, are spring-biased to move to a position where the cushion can move into its retracted position within the frame. Upon collapsing, the corner elements pull the cushion into its retracted position. The elements are also provided with releasable catches which hold them against the spring pressure in their most extended positions where the cushion protrudes beyond the frame and provides a comfortable seat for a user. A means may also be provided on the frame to simultaneously release all the catches so that the corner telescoping elements retract at the same time that the cam elements assume their inoperative position. Finally, a tool-operated means is provided on the frame which may be engaged by a hand tool to urge the cam elements and the telescoping corner elements respectively into their operative position and extended position so that the catches may engage them and hold them with the seat cushion protruding from the frame.

DETAILED DESCRIPTION OF THE INVENTION

The invention may be best described with reference to the accompanying drawings which are presented to define the invention more clearly without limiting the invention to the particular embodiments illustrated.

FIG. 1 is an elevation view of a folding chair embodying this invention with the cushion of the seat and back protruding and ready for use.

FIG. 2 illustrates the chair of FIG. 1 with the seat and back cushions retracted and ready for stacking.

FIG. 3 illustrates three chairs as shown in FIG. 2 which are folded and stacked.

FIG. 4 is a plan view of a mechanism within the seat frame for moving a cushion between retracted and protruding positions.

FIG. 5 is an elevation view of a seat and frame with the seat in retracted position.

FIG. 6 is an elevation view taken along the line 6-6 of FIG. 4 showing the cushion in protruding position.

FIG. 7 is a view of the underside of the cushion of FIG. 4 showing a suitable catch-release mechanism.

FIG. 8 is a perspective view partly cut away showing some of the operative elements of FIG. 4 as well as a suitable tool for moving the cushion from retracted to protruding position.

FIGS. 9 and 9-A show a perspective view of suitable cam elements respectively in their operative and their inoperative positions.

FIGS. 10 and 10-A illustrate a sectional view taken along the line 10-10 of FIG. 4 of a suitable catch for the cam elements respectively in its inoperative and operative positions.

FIG. 11 shows a sectional view taken along the line 11-11 of FIG. 10-A illustrating a suitable catch release mechanism.

FIG. 12 is a perspective view of a telescoping corner element in extended position.

FIGS. 13 and 13-A are elevation views taken along the line 13-13 of FIG. 8 illustrating the position of the tool for moving the cushion to protruding position, respectively before and after the cushion is moved to protruding position.

FIGS. 1 and 2 illustrate folding chairs 20 which are constructed of a leg member 21, a leg and back member 22, a seat member 23 and a back rest member 25. The various members are connected together by pivots and sliding elements not all of which are shown but which are conventional in the prior art so that the chairs may be employed as stable chairs suitable for seating people or folded as illustrated in FIG. 3 suitable for compact storage.

The seat member 23 includes a frame 26 and a cushion 27 which is not visible in FIG. 2 because it is retracted into the frame. On the frame there are shown a fixed stub 28 and a movable stub 30 which may be moved apart with a suitable tool 31 to cause the cushion to protrude above the frame as described hereinafter. Tool 31 is shown in FIGS. 8, 13 and 13-A.

FIGS. 4, 5 and 6 illustrate an embodiment of the seat member of this invention. The seat member 23 is illustrated with a frame 26, a cushion 27 and a cushion support 32. The cushion is supported in its protruding position by four telescoping corner elements 33 and by cam elements 35, only one set of which is illustrated in FIG. 4 for convenience, but in actual use two other sets of cam elements 35 would be included in the structure in the obvious positions.

The cushion is moved to its protruding position from its collapsed position by moving stud 30 away from fixed stud 28. This the position illustrated in FIGS. 4 and 6. When studs 28 and 30 are moved apart, the operating rod 36 is moved correspondingly to compress the cam operating spring 37 which is restrained in its compressed position by a catch comprising a notch 38 and a half-round catch element 40 which are best illustrated in FIGS. 10 and 10-A. A washer 41 is welded to rod 36 to provide a suitable backing for compressing the spring 37.

Upon movement of the operating rod 36, cam-lifting rods 42 move correspondingly to move the cam elements 35 from their inoperative position illustrated in FIG. 9-A to their operative position illustrated in FIG. 9.

This position change is effected when cam-lifting rods 42 slide in the direction of compressing the spring 37 and move so that the bottom extensions 43 of cam elements 35 are forced against stops 45 on the floor 44 of the frame. The motion causes the cushion-engaging elements 46 of the cam elements 35 to bear against the bottom of the cushion support 32 and raise it. The cam operating bars 47 are welded to an intermediate portion of each cam element 35 and connected through a free rotating pivot 48 to the cam-lifting rod 42.

Suitable guides 50 cause the cam-lifting rods 42 to move axially while an alignment rod 51 is provided to keep the entire mechanism square upon movement of the stud 30. Alignment rod 51 and operating rod 36 also are provided with guides 50.

The perspective view of FIG. 8 illustrates the mechanism with the cushion in protruding position. FIG. 8 also illustrates the use of the tool 31 for effecting the movement of the cushion to protruding position. The tool 31 as shown in FIG. 8 is shown in phantom as it would appear with the seat cushion retracted. The tool as illustrated has two sockets, 28' and 30' that are suitably sized and spaced to receive the studs 28 and 30. With the cushion retracted the stud 30 is shown in phantom. In use, the tool as illustrated in phantom in FIG. 8 and in full in FIG. 13 is placed so that studs 28 and 30 are each received in a socket after which the tool is moved to the position illustrated in FIG. 13-A and in full view in FIG. 8 whereby operation of the toggle 52 causes the sockets to separate and the spring 37 to be depressed. When the studs are separated, the catch illustrated in FIGS. 10 and 10-A is engaged, and the cam elements 35 are raised to their upright position as illustrated in FIG. 6.

FIG. 11 illustrates a mode for releasing the cam elements so that the spring 37 will urge them into their inoperative position shown in FIG. 9-A. A release trigger 53 is formed on the end of the rod 39 that includes half-round 40, and it is positioned to protrude through an opening 55 in the floor 44 of the frame. When the trigger 53 is moved to rotate rod 39 and half-round 40, the half-round 40 is moved into its receiving socket 56 thereby being removed from engagement with notch 38 so that the operating rod 36 may be moved by the expansion of the spring 37, and the cam elements 35 are then moved to their position as illustrated in FIG. 9-A. A torsion spring 57 is fixed to the rod 39 to urge it into the position illustrated in FIG. 10-A.

The telescoping corner elements 33 are best illustrated in FIG. 12. The telescoping corner elements comprise a fixed outer segment 60 which is illustrated fixed to the floor 44 and a relatively movable inner segment 61 that may move into and out of the fixed segment 60. A telescope operating spring 62 is fixed within the telescoping element 33 to urge it toward its telescoped or retracted position. The telescoping segments preferably include an alignment core 63 to prevent the spring 62 from canting within the corner element. A hook-like catch 65 is fixed to the outer segment 60 through a spring 66 so that it is urged to push against the wall of inner segment 61. A pulley 67 and cable 68 are adjusted so that cable 68 engages eye 70 on the back of hook-like catch 65 so that pulling on the cable

68 will increase the tension in spring 66 and will move the catch in the direction opposite the direction in which it is urged.

The fixed outer segment 60 is firmly attached to floor 44 while the movable segment 61 is firmly attached to the cushion support 32. Accordingly, when studs 28 and 30 are moved apart and cam elements 35 raise the cushion assembly to its protruding position, movable segment 61 is correspondingly raised to a point where catch 65 is urged beneath the lower edge of segment 61 thereby holding it in its extended position. When the catch 65 is pulled back by the cable 68, the upper segment 61 is released so that the spring 62 may return it to its retracted position.

FIG. 7 illustrates the underside of frame 26 and a suitable release mechanism for retracting the cushion. The floor 44 is provided with a central axle 71 on which an operating handle 72 is mounted through a wheel 73. A strong torsion spring is connected beneath wheel 73 to turn it counterclockwise as viewed in FIG. 7 with sufficient force to move tangential arms 75 acting through pulley wheels 76 into a position as shown in phantom whereby tension on cable 68 pulls catch 65 from engagement with movable inner segment 61. Cable 68 passes through holes 80 which are provided with a suitable smooth grommet to make sliding of the cable easy.

Thus, unless otherwise restrained, the spring which drives wheel 73 will prevent the corner elements from remaining in their protruding position. However, the cable 81, connecting an eye on operating handle 72 to an eye on washer 41, is provided so that when the cam operating spring 37 is held compressed, the restrained position of the operating handle 72 prevents the extended corner elements from being released.

Accordingly, when the cushion is in protruding position and release trigger is operated, not only are the cam elements 35 urged to inoperative position, but the movement of washer 41 releases operating handle 72 so that the four telescoping corner elements 33 are also allowed to collapse.

The invention also includes a back rest cushion that moves between protruding and collapsed positions as illustrated in FIGS. 1 and 2. A complete description of a suitable back rest mechanism is redundant because it has the same elements which operate in the same manner as the seat cushion. To set up a chair having both a seat cushion and a back rest in accordance with the description herein, the chair will be unfolded to stand as in FIG. 2 and the tool 31 will be employed to separate studs protruding from both the seat cushion and the back rest cushion. To fold the chair, a handle 72 on both the back rest and the seat cushion will be rotated whereby both cushions will move to retracted positions.

What is claimed is:

1. A folding chair comprising legs, a back and a cushioned seat all capable of being folded with said legs, back and cushioned seat lying substantially flat, said cushioned seat including a cushion with a rigid bottom support, a frame surrounding said cushion and enclosing a chamber sufficiently large to contain said cushion, telescoping corner elements fixed at each corner of said frame and adapted to support the corners of said rigid bottom support with the telescoping elements movable from a collapsed position wherein they sup-

port said cushion retracted into said frame to an extended position wherein they support said cushion to protrude above said frame, cam elements within said frame and movable from an inoperative position wherein said rigid support may move into said chamber so that said cushion is retracted within the frame to an operative position wherein said cam elements support said cushion to protrude above said frame, springs biasing said corner elements to a collapsed position and said cam elements to an inoperative position, releasable catches to hold said corner elements in an extended position and said cam elements in an operative position, catch release means to release all catches, and tool operated means for simultaneously moving said corner elements to extended position and said cam elements to operative position.

2. The folding chair of claim 1 wherein the corner elements comprise a portion fixed to be immovable with respect to said frame and a portion that is movable with respect to said frame, and releasable catches to hold said corner elements which comprise a spring-urged catch fixed to said fixed portion and urged to engage a portion of said movable portion which is adapted to receive said catch when said movable portion is in extended position.

3. The folding chair of claim 1 wherein the cam elements are moved to operative position by action of longitudinally movable bars connected to each cam element through a pivot around which the cam element rotates upon contacting a relatively unmoving portion of said frame, said releasable catch includes a half-round element rotated on its axis and positioned to engage a cutout in at least one bar that is movable with said longitudinally movable bar when said cam elements are in operative position.

4. The folding chair of claim 2 wherein a trigger extending beneath said frame is connected to release the catch of said cam elements, and means actuated by said release of the cam elements releases all four corner elements.

5. The folding chair of claim 1 wherein said back comprises a cushion with a rigid bottom support, a frame surrounding said cushion and enclosing a chamber sufficiently large to contain said cushion, telescoping corner elements fixed at each corner of said frame and adapted to support the corners of said rigid bottom support with the telescoping elements movable from a collapsed position wherein they support said cushion retracted into said frame to an extended position wherein they support said cushion to protrude above said frame, cam elements within said frame and movable from an inoperative position wherein said rigid support may move into said chamber so that said cushion is retracted within the frame to an operative position wherein said cam elements support said cushion to protrude above said frame, springs biasing said corner elements to a collapsed position and said cam elements to an inoperative position, releasable catches to hold said corner elements in an extended position and said cam elements in an operative position, catch release means to release all catches, and tool operated means for simultaneously moving said corner elements to extended position and said cam elements to operative position.

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