

Feb. 1, 1966

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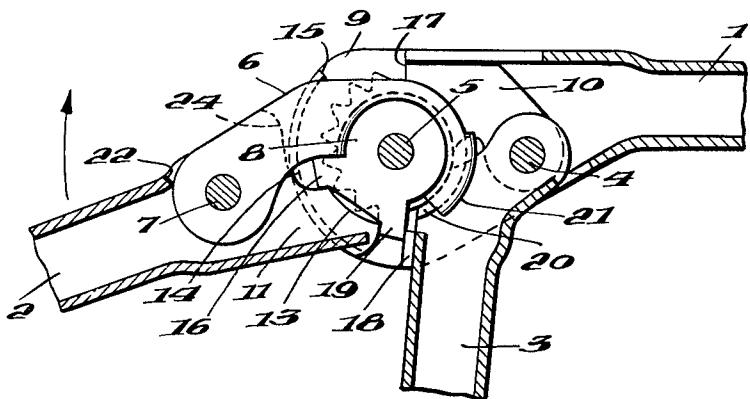
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ADJUSTABLE HINGE FITTING FOR COLLAPSIBLE  
STANDS, RECLINING CHAIRS, AND THE LIKE

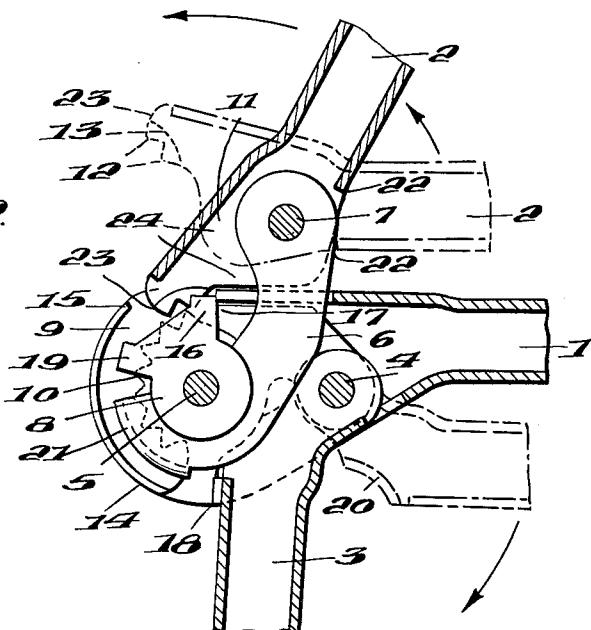
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*Fig. 1.*



*Fig. 2.*



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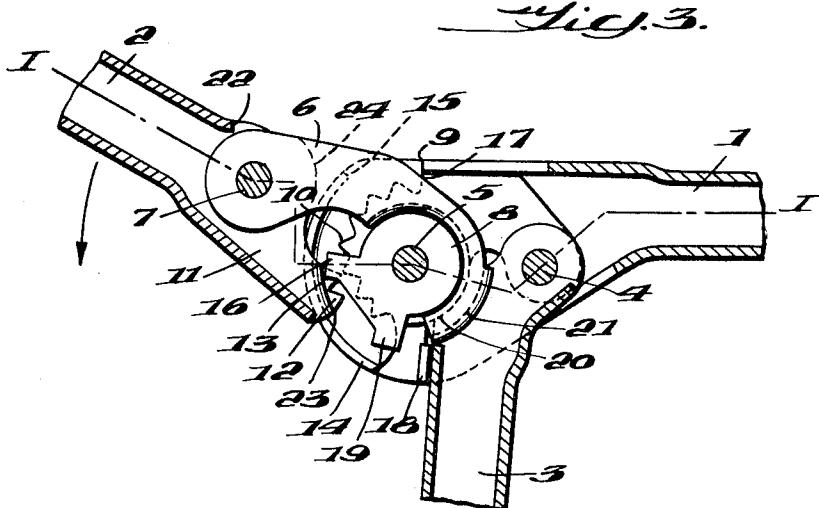
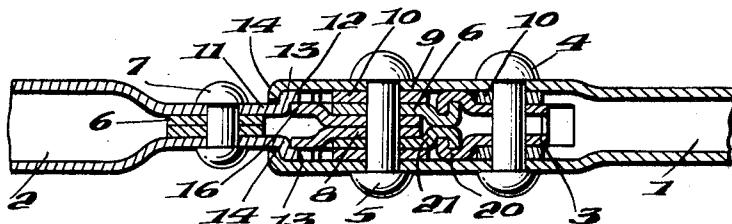


Fig. 4.



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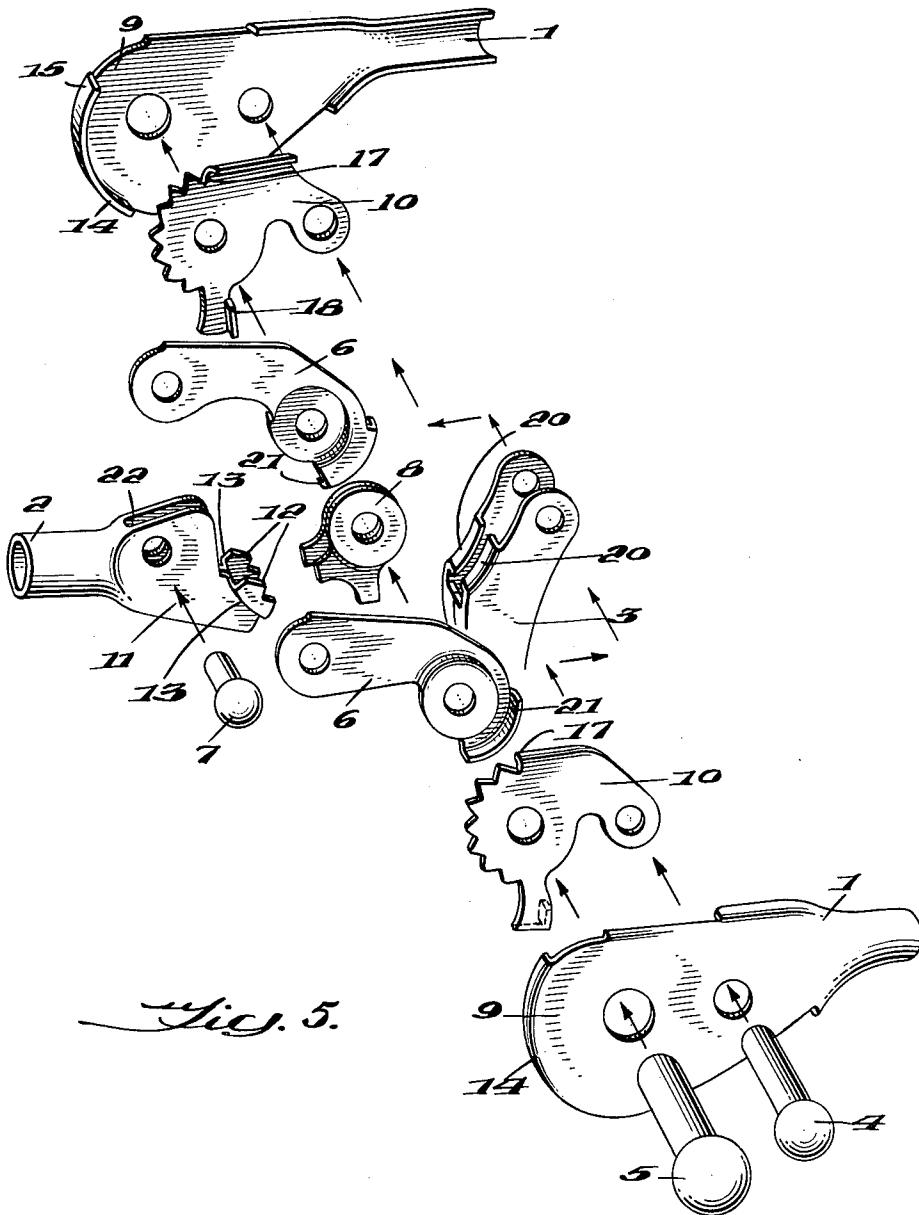
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## ADJUSTABLE HINGE FITTING FOR COLLAPSIBLE STANDS, RECLINING CHAIRS, AND THE LIKE

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The present invention relates to an adjustable hinge fitting for collapsible stands or frames, especially of chairs, reclining chairs, camping equipment, sales stands, frames, or the like which consists of a pair of hinge arms which are adjustable to different angular positions relative to each other and are connected to each other by means of a strap which is pivotably mounted at both ends, and of a locking member on one hinge arm which in its operative positions automatically produces a locking action in association with a counterpart on the other hinge member.

The conventional hinge fittings of this type when applied, for example, on reclining chairs or the like, especially of the kind as used for camping purposes which have a one-piece cover, have the disadvantage that it may easily occur that the adjustable back rest will suddenly be released so as to jump upwardly so that a person who is sitting down on the central part of the chair and thereby tightens the cover may then be hit on the head. This is due to the fact that the locking devices of the known hinge fittings which are automatically engageable and disengageable exert a locking action in only one pivoting direction, whereas those locking devices which lock in both directions do not act automatically, but must be engaged or disengaged every time by a hand lever. This is a very serious and annoying disadvantage of collapsible furniture such as reclining chairs for camping, since it is almost impossible for a person when adjusting or folding together the stand or frame simultaneously to operate the locking device. It may also easily happen that the engagement of the locking device is forgotten which thereby results in accidents, or at the very least in damage to the other hinges of the chair.

Furthermore, the pivotable locking pawl of the known hinge fittings is moved to the inactive position by an automatically acting device in cooperation with a spring, in which position it is then arrested until the back rest is again swiveled back to its original position. Consequently, if this spring breaks or fails to work, the automatic device is also inoperative.

It is an object of the present invention to provide a hinge fitting which overcomes the above-mentioned disadvantages, is of a simple construction and desirable shape and absolutely reliable in actual use, and which is easily mass-produced. According to the present invention, one hinge arm of the new hinge fitting forms a double arm, and the short arm thereof carries a locking member and a bracing surface, while the other hinge arm is provided with a contact surface, for example, of an arcuate shape, in such a position that, when the adjustable hinge arm is pivoted upwardly from its lowest to its highest operative position, the bracing surface will engage against and then slide along the inner or outer side of the contact surface. The contact pressure produced by the lever action then results in a braking effect which prevents any sudden unintentional upward swiveling of the adjustable back rest. This braking effect also depends upon the frictional resistance produced when the strap is pivoted about the axis of rotation of the hinge arm which carries the counterpart. There is also no need for any locking pawl or pawl spring since the lock-

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ing member enters into its counterpart under the lever action of the adjustable hinge arm.

The hinge fitting is preferably designed so that the strap is provided adjacent to the pivoting point with a sector-shaped locking edge which is, for example, of a U- or L-shape either by being bent or by being provided with a suitable recess. This locking edge is adapted to cooperate with at least one locking projection on a further hinge arm which is pivotably connected to the fixed hinge arm and is adapted to be locked against a pivoting movement in either direction. The locking edge will then release the locking projection only if the adjustable hinge arm is pivoted against the fixed hinge arm. Thus, if a person sits down on the central part of the reclining chair which is connected to the fixed hinge arm, and if the one-piece cover of the chair is thereby suddenly tightened, a strong braking action will be exerted upon the strap and thus also upon the back rest.

The control means of a hinge fitting according to the invention which operate automatically without a spring and are adapted to prevent the locking effect during the return movement of the adjustable back rest to its lowest operative position, may be made of a very simple construction which is very reliable in operation. Furthermore, the hinge fitting according to the invention forms a very compact unit which does not show any projections even when the adjustable back or foot rest is in a downwardly inclined operative position, and which does not noticeably project beyond the seating or reposing surface.

The above-mentioned as well as other objects, features, and advantages of the present invention will become more clearly apparent from the following detailed description thereof, particularly when the same is read with reference to the accompanying drawings, in which:

FIGURE 1 is a longitudinal view of an adjustable and lockable hinge fitting according to the invention, taken along a line extending through the axes of the hinge arms and at right angles to the hinge axis, and it illustrates the hinge fitting in the operative position of a reclining chair or the like when the back or foot rest thereof is in its lowest operative position;

FIGURE 2 shows a view similar to FIGURE 1 of the hinge fitting in which the hinge arms are indicated in dot-and-dash lines, are disposed in the collapsed position of the reclining chair, while the full lines illustrate the operative position of the chair leg or of the lockable hinge arm and the upper pivoted position of the adjustable back or foot rest before it is pivoted downwardly;

FIGURE 3 shows another view similar to FIGURE 1 in which the adjustable back or foot rest is disposed in an uplocked intermediate position while being swiveled downwardly to its lowest operative position and while the chair leg is locked;

FIGURE 4 shows a cross section taken along line I—I of FIGURE 3;

FIGURE 5 is an exploded view.

In the drawings, the hinge fitting according to the invention is shown to consist of a fixed hinge arm 1 which may be secured, for example, to the central part of a reclining chair, a second hinge arm 2 which is adjustable to different angular positions and may be secured to the back rest or to the foot rest of the chair, and a third hinge arm 3 which serves as a leg of the reclining chair and may be locked to prevent any pivotal movement thereof in either direction.

The fixed hinge arm 1 carries a rivet 4 on which hinge arm 3 which is adapted to be locked is pivotably mounted, and separately herefrom it also carries at the main pivoting axis of the hinge fitting a rivet 5 on which two straps 6 are pivotably mounted which, in turn, are pivotably connected at their other ends by a rivet 7 to the adjust-

able hinge arm 2. Rivet 5 also serves as a bearing pin for the control levers 8 which are rotatable between the straps 6. Rivet 5 and rivet 4 also have rigidly secured thereto a pair of ratchet disks 10 which are disposed between the two side walls 9 of hinge arm 1 and at both sides of straps 6 or of hinge arm 3, respectively. In the modification according to FIGURE 5, these ratchet disks 10 are omitted.

The short lever arm 11 of hinge arm 2 is provided with serrated or wedge-shaped locking members 12 and laterally directed supporting or bracing surfaces 13. The edges of side walls 9 of hinge arm 1 up to their upper edges 15, as shown in FIGURES 1 and 2, are bent inwardly and form arcuate contact surfaces 14. The inner faces of bracing surfaces 13, in turn, can engage with the outer tips of bracing arm 16 on control levers 8. Arms 16 can also engage with the upper stop portion 17 on ratchet disk 10, as shown in FIGURE 2, while the lower stop portion 18 on ratchet disk 10 can be engaged by the stop arm 19 on control lever 8.

Hinge arm 3 which is adapted to be locked is provided at the area of straps 6 with a pair of arcuate, inwardly bent locking projections 20 which, in the operative position of hinge arm 3, engage into the sector-shaped locking edges 21 of straps 6 which are both of a U-shaped cross section, as shown in FIGURE 4. At the point where the adjustable hinge arm 2 changes from a U-shaped to a round cross section, it is provided with a stop portion 22 which is associated with straps 6 and limits the range of the pivotal movement of hinge arm 2 about rivet 7 in a clock-wise direction (FIGURE 2). The end of the short lever arm 11 of hinge arm 2 is also beveled in the direction toward the center of straps 6 so that, when hinge arm 2 is pivoted toward the rear (counterclockwise in FIG. 2), the point 23 of arm 11 from the axis of rotation on rivet 7 will first engage with the teeth of ratchet disc 10.

The manner of operation of the new hinge fitting is as follows:

From the fully collapsed position of the reclining chair in which the hinge arms 2 and 3 extend parallel to each other, as shown in dot-and-dash lines in FIGURE 2, first the hinge arm 3 which is associated with the leg of the chair is pivoted slightly more than 90° in the direction as shown by the arrow to its operative position, as shown in full lines. The adjustable back rest or leg rest is then pivoted with hinge arm 2 in a counterclockwise direction, as shown by the arrow. Hinge arm 2 then turns at first about rivet 7 to the position as shown in full lines until its bracing surface 13 engages against the ends of bracing arm 16 of control lever 8 which is then located in its uppermost position against stop portion 14a. Point 23 on the end of lever arm 11 then moves past the outer edge 15, and locking member 12 enters into the area between side walls 9 only to such an extent that it will not as yet engage into the teeth of ratchet disk 10, being held away from locking position by arms 16. Since rotation on rivet 7 is now blocked, strap 6 will be taken along during the further downward movement of arm 2, about the axis of rivet 5, and will carry with it by frictional engagement the control lever 8. Shortly before reaching the lowest operative position, control lever 8 engages with its stop arm 19 against the lower stop portion 18 so that it can no longer be taken along in the rotation, and the bracing surfaces 13 will then slide over the end of bracing arm 16 and be finally freed. Locking member 12, since bracing portion 13 can enter the gap between arms 16 and 19, will then engage the teeth of ratchet disk 10 and be in its lowest operative position, as shown in FIGURE 1. At the same time, when strap 6 is turning about rivet 5, its locking edges 21 engage into the locking projections 20 on hinge arm 3 and thereby automatically lock the latter against rotation.

The adjustable hinge arm 2 which may be secured for example, to the back rest of the reclining chair, by being pivoted in the upward direction, as shown by the arrow in FIGURE 1, since it carries control lever 8 along with it, may now be adjusted from this lowest operative position to any of the angular positions in accordance with the teeth of the ratchet disks 10. In this action, hinge arm 2 turns at first about rivet 7 until the outer end of its bracing surface 13 engages against the inside of the contact surface 14 and then slides along the same, at which time the pivot point on rivet 7 becomes inoperative and straps 6 instead pivot together with control lever 8 about rivet 5. When hinge arm 2 is in the desired angular position and is then pivoted slightly downwardly either by hand or by a load, locking member 12 engages into the locking disk 10.

If a person sits down on the central part of the reclining chair which is connected to the fixed hinge arm 1, and thereby suddenly tightens the one-piece cover of 20 the chair, the tension which is then produced tends to pivot the adjustable hinge arm 2 in the upward clockwise direction as indicated by the arrow in FIGURE 1. The first sudden tightening or tension impulse of the chair cover is then taken up by the small pivoting movement of hinge arm 2 about rivet 7 from the respective operative position of locking member 12 up to the engagement of bracing surfaces 13 against contact surfaces 14. At the same time, due to the lever action caused by the sudden heavy load on the central part of the chair 30 together with hinge arm 1, and thus also on hinge arm 3 which is in its opened operative position, the locking projections 20 of arm 3 will also be pressed against the locking edges 21 of straps 6 and act as a brake thereon. This braking action in cooperation with the friction on 35 rivet 5 around which hinge arm 3 can alone continue to pivot, results in an increased pressure of bracing surfaces 13 against contact surfaces 14, whereby the residual tightening impulse of the chair cover will be practically eliminated or at least reduced or retarded to such an extent that the back rest and hinge arm 2 cannot hit against the head of the respective person.

When the adjustable hinge arm 2 is further pivoted beyond the uppermost operative position, bracing arms 16 of control lever 8, which so far has been taken along frictionally, is arrested by engagement with the upper stop portion 17 (see FIGURE 2), and the bracing surfaces 13 then engage over the bracing arms 16. From this position it is now possible to pivot the adjustable hinge arm 2 according to FIGURE 3 back to its lowest 50 operative position according to FIGURE 1. If the reclining chair is, however, folded together so that hinge arm 2 is further pivoted to the position as shown in FIGURE 2 in dot-and-dash lines, bracing surfaces 13 and point 23 on lever arm 11 disengage from the outer edge 15 of contact surfaces 14, so that rotation of strap 6 on rivet 5 stops, while hinge arm 2 continues to turn about rivet 7 until its stop portion 22 engages against straps 6 and pivots the same to their final position, hinge arm 3 in the meanwhile having been unlocked by disengagement of projections 20 from projections 21.

By this arrangement of the outer edge 15, of point 23, and of stop portion 22, it will be insured that, when the adjustable hinge arm 2 is pivoted in the directions as shown by the arrows in FIGURE 2, the bracing surfaces 13 or the locking members will at first enter into the area between the side walls 9 as shown in solid lines in FIGURE 2 and then slide along the inner sides of contact surfaces 14 or engage against bracing arm 16.

As illustrated in FIGURE 4, hinge arm 3 which is 70 adapted to be locked is provided with a pair of inversely similar locking projections 20. It is therefore also possible also to mount on rivet 5 two locking hinge arms 3, each of which has only one locking projection 20 which is inversely similar to the other, and in such a 75 manner that these hinge arms may be pivoted either

separately or together to their operative or inoperative positions and many also be locked in either direction of movement. Similarly, it is also possible to mount each of two inversely similar hinge arms 2, which are adjustable independently of each other, individually on at least one strap 6 which is inversely similar to the other strap. These straps 6 may then together be pivotably mounted at their other end on the fixed hinge arm 1 by means of rivet 5, and hinge members 2 will then be operatively associated with inversely similar control means 8 or 14 and stop members 17 and 18. This embodiment of the invention may be applied particularly to collapsible frames for sales stands, sport utensils, tent frames, or the like.

If desired, the two-armed hinge member 2 may also be utilized as a fixed hinge arm.

The hinge fitting according to the invention may be made of steel or plastic, or partly of one and partly of the other material. When it is made of plastic, it is also possible to reinforce it by steel inserts which are embedded therein.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. In combination with first and second arms, means mounting the first arm on the second arm for adjustment with respect thereto to a plurality of operative positions and an inoperative position comprising a strap member, first means pivotally securing one end of said strap member to the first arm and second means spaced from said first means pivotally securing the other end of said strap member to said second arm, a control lever having spaced first and second elements, pivotally mounted on said first pivotally securing means and frictionally engaging said strap member for normally moving therewith, a part fixed to said first arm having a first locking section thereon, said second arm having a second locking section rigid therewith engageable with said first locking section upon turning of the second arm about said second pivotally securing means in a first direction, said first arm having first stop means thereon engaged by the first element of said control lever as said second arm approaches its furthest operative position in the direction opposite the first direction, whereby said second arm turns with respect to said control lever in said opposite direction, said second arm having shoulder means thereon displaced

out of the plane of said second locking section and said first element of said control lever having cooperating means thereon engageable with said shoulder means by relative turning movement of said second arm with respect to said control lever in said opposite direction when said second arm reaches its furthest position in said opposite direction to form a means to limit turning of said second arm about said second pivotally securing means to prevent engagement of said locking sections during movement of said second arm from such furthest position in said opposite direction to its furthest position in such first direction whereby said arm and strap member turn together about said first pivotally securing means carrying along said control lever, said first arm having second stop means thereon engaged by said second element of said control lever when said second arm approaches its furthest position in said first direction to stop movement of said control lever, whereby further movement of said second arm with respect to the control lever in said first direction releases said turning limiting means, so that said second arm can be pivoted in said first direction about the second pivotally securing means at any point in its travel in said opposite direction to engage said locking sections to prevent movement of the second arm in said first direction.

2. In a device as claimed in claim 1, said locking sections having interengaging ratchet teeth thereon.

3. In a device as claimed in claim 1, a third arm pivotally mounted on said first arm for movement between operative and inoperative positions, said strap and said third arm having cooperating means thereon to lock said third arm in operative position when said strap turns in said first direction about said first pivot means.

4. In a device as claimed in claim 1, said first and second elements comprising spaced projections on said control lever having a gap therebetween, said shoulder means being movable into said gap when said turning limiting means are released.

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