Jan. 29, 1963 H. LÜBKE 3,075,610

CONVERTIBLE FURNITURE ARTICLE

Filed Feb. 23, 1960 3 Sheets-Sheet 1

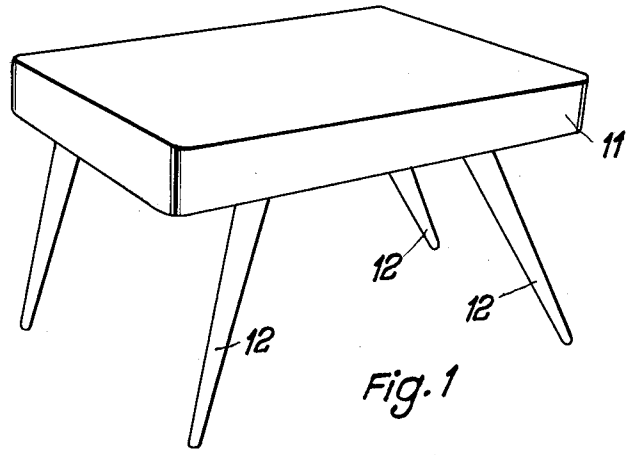


Fig. 1

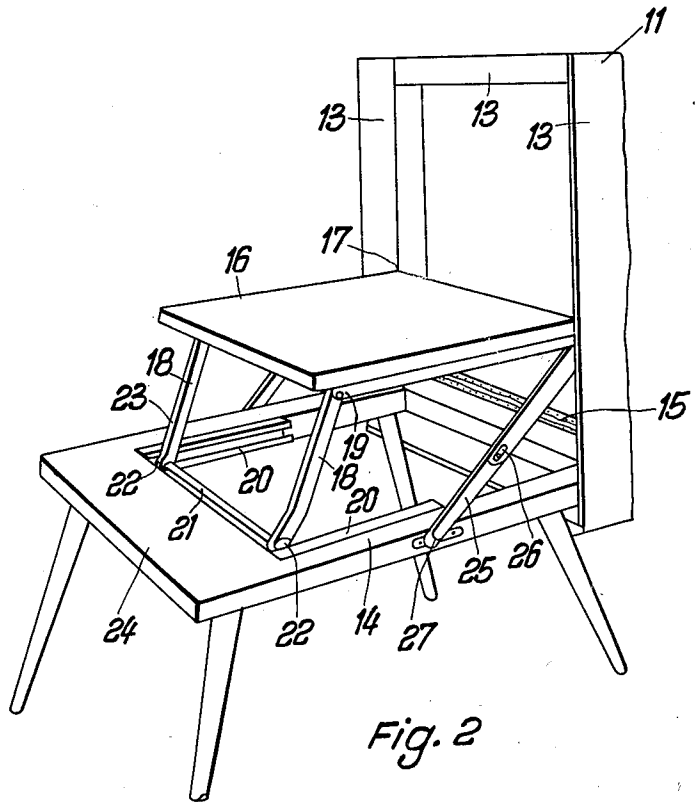


Fig. 2

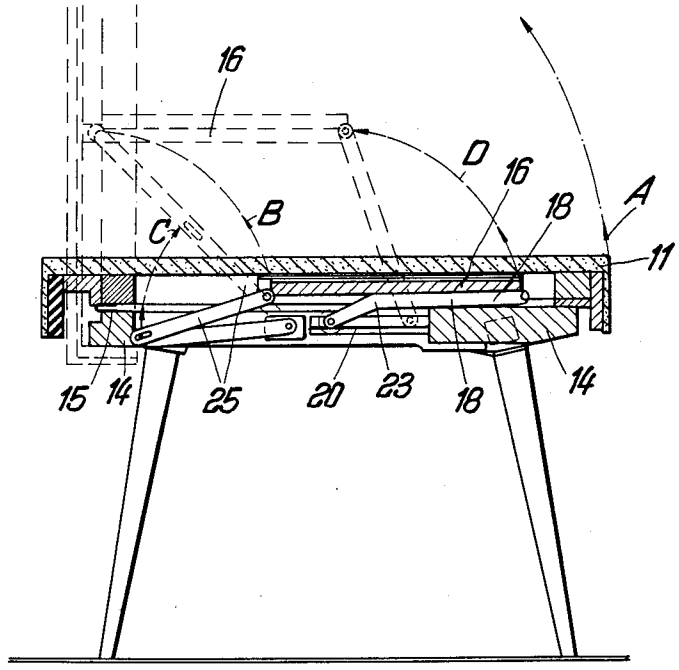
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Fig. 3



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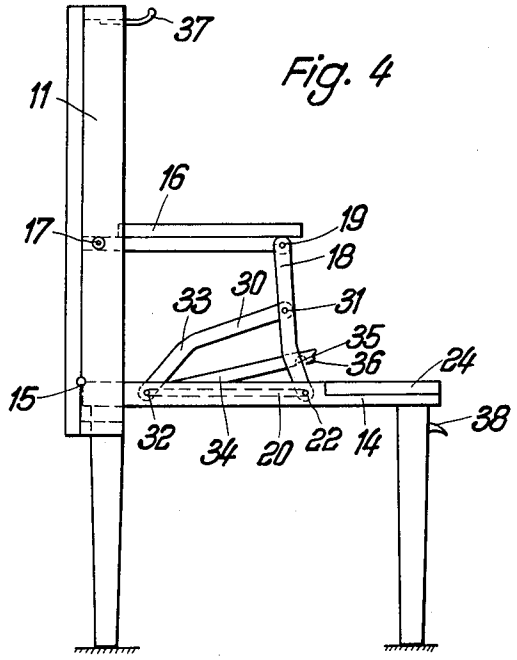


Fig. 4

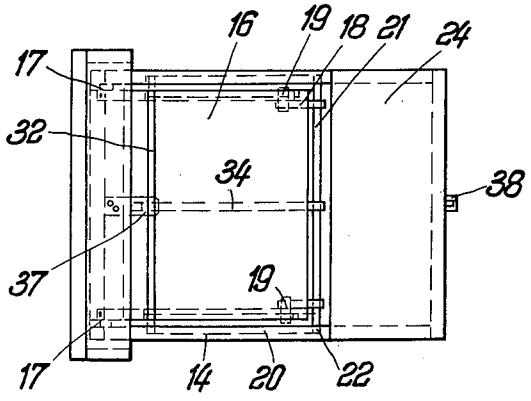


Fig. 5

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CONVERTIBLE FURNITURE ARTICLE

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3 Claims. (Cl. 182—28)

The present invention relates to an article of furniture, and more particularly to a stool, low table, or the like which is quickly convertible into a step-ladder as required especially in households.

The general idea of providing a chair, stool or the like which may be converted into a step-ladder is quite old. All of the known furniture articles of this type have, however, the disadvantage that they are either of a rather crude appearance or of a relatively complicated construction. When they are in the stool or chair position, the step or steps of the ladder extension as well as the various connecting and operating elements thereof are located underneath the seat and between the legs of the chair or stool and are therefore always visible which gives the article an unsightly appearance. Most of them are also rather difficult to operate and such operation requires several special manipulations. Generally they are also not safely locked when they are in the ladder position, or the locking device, if any, becomes easily defective after it has been used for some time, with the result that the step-ladder may collapse.

It is an object of the present invention to provide a stool, stand, low table, or the like which may be easily and quickly converted into a step-ladder and overcomes the above-mentioned disadvantages of similar furniture articles of previous designs.

More particularly, it is an object of the invention to provide a stool, stand, low table, or the like which, when in its normal position, does not reveal its second purpose.

Another object of the invention is to provide a stool, stand, or low table, such as a cocktail table, which may be easily converted into a step-ladder by a single manipulation and may be just as easily reconverted to its normal position as a stool, stand, or table, and which may be safely and reliably locked in the ladder position.

A further object of the invention is to provide a locking device for such a convertible piece of furniture which is of a design so as to resist considerable wear and which insures a secure locking of the ladder position even after prolonged use and even through some of the connecting members thereof have become slightly bent.

The principal features of the piece of furniture according to the invention, which, when normally intended to serve as a stool, may be provided with an upholstered seat, reside in the fact that the top or seat forms a shallow frame which is open at its lower side and is hinged near one end to an inner frame on which the legs of the stool or table are secured. Near the center of the top or seat, a board or plate is pivotably connected thereto at one end, while the other end of this plate is pivotably connected by a pair of lateral connecting rods to the inner frame at a point near the center thereof. The other ends of these connecting rods are slidably guided in suitable guiding slots along the inner edges of the inner frame so that the plate and the inner frame will form the two opposite sides of a pseudo-parallelogram and thus remain parallel to each other during their movement relative to each other and relative to the movement of the top and the connecting rods. The front end of the inner frame opposite to the end to which the top or seat is hinged is made of a greater extent in the forward direction to serve as the first step of a step-ladder, while the mentioned plate forms the second or upper step thereof.

According to a preferred embodiment of the invention, a pair of knee levers are pivotably secured at one end to the top and at the other end to the inner frame, and these levers are provided with a simple locking device to secure them in a straight position in order to lock the top in the open, substantially vertical position. According to another embodiment of the invention, a pair of bracing rods are pivotably connected to the connecting rods approximately at the center thereof, and the other ends of these bracing rods are likewise slidably guided within the guide slots along the inner edges of the inner frame. These slidable ends of the bracing rods are connected to each other by a crossbar and the slidable ends of the connecting rods are likewise connected by a crossbar. Furthermore, a locking bar is pivotably connected at one end to the crossbar of the bracing rods and is provided near its other end with a notch which is adapted to engage with the crossbar of the connecting rods when the top is tilted to its vertical position. The solid front part of the inner frame and the mentioned plate, which in the open position of the top form the two steps of a step-ladder, are preferably provided with a non-slip covering. The top and the lower frame are further preferably provided with associated releasable locking means whereby the top will be automatically locked to the frame when it is in the normal, closed position so that the top will then not flip open of its own accord and the entire piece of furniture may be lifted by its top. Suitable spring means may also be provided on the hinge of the top to facilitate either the opening or closing movements of the top, and these spring means may also be made of a strength so as to effect the opening movement of the top automatically when the locking device is released which normally holds the top in the closed position.

A still further object of the invention is to provide a stool, stand, table, or the like which may be easily converted into a step-ladder in which the upper step is of a width and height so as to permit a small child to sit thereon similarly as on a conventional high-chair at the proper level relative to a normal-sized table.

These and further objects, features, and advantages of the present invention will become more apparent from the following detailed description thereof, particularly when the same is read with reference to the accompanying drawings, in which—

FIGURE 1 shows a perspective view of a stool, stand, table, or the like according to the invention in the closed position;

FIGURE 2 shows a perspective view of the stool, stand, or table according to FIGURE 1 in the opened or ladder position;

FIGURE 3 shows a vertical cross section of the embodiment according to FIGURE 1, and it also indicates in dotted lines the opened or ladder position according to FIGURE 2;

FIGURE 4 shows a side view of a modification of the stool, stand, or table according to the invention in the ladder position; while

FIGURE 5 shows a plan view of the embodiment according to FIGURE 4.

Referring first to FIGURES 1 to 3 of the drawings, the stool, stand, table, or the like according to the invention, hereafter merely referred to as a stool, appears in its normal closed position to consist merely of a top 11 and four legs 12. The top 11 may be plain or provided with any desired surface embellishments, depending upon the normal purpose of the piece of furniture; thus, for example,

when intended as a stool, it may have a padded seat covering. The legs 12 may also be of any desired shape and be secured in any desired manner, and it is also possible to provide the stool with only three legs instead of the four legs as shown.

The four sides of top 11 are provided with a supporting or cover frame 13 as conventional in normal one-purpose furniture pieces of this type. This top 11 and frame 13 completely hide the various parts which are required for converting the stool into a step-ladder. The principal supporting element of the stool consists of a horizontal frame 14 on which also the legs 12 are secured. At one end of this frame 14, for example, on the rear edge thereof and within the outer frame 13, the top 11 is secured by a hinge strip 15 so as to be pivotable in the upward direction. Substantially at the center of the side walls of the outer frame 13 and at the inner side thereof, a plate 16 is pivotally secured at one end at 17, while the other end of this plate has a pair of connecting rods 18 mounted on its lower side which are pivotably secured at 19. The other ends of these rods 18 are interconnected by a crossbar 21 which extends through and projects slightly from connecting rods 18 and into U-shaped guide rails 20. In order to facilitate the movement of the ends of crossbar 21 within and along guide rails 20, these ends are provided with rollers 22. The upper and lower webs of the U-shaped guide rails 20 are of a sufficient width to insure that rollers 22 on crossbar 21 will never slip out laterally from the guide rails. Connecting rods are slightly bent at 23 for reasons which will be later described.

As illustrated particularly in FIGURE 2, the front end of supporting frame 14 is made of a considerably greater width than the rear end and forms the lower step of the step-ladder, while plate 16 forms the upper step. Each pivot 17 of plate 16 at the inside of the outer frame 13 also carries a knee lever 25 which may be locked at 26 in the straight position, and the lower arm of which is pivotably connected at 27 on the outside of frame 14 approximately at the center between hinge 15 of the top or seat 11 and the front end position of connecting rods 18 in guide rails 20.

The operation of the stool as described above will now be further explained with reference to FIGURE 3.

In this drawing, the stool is illustrated in the normal closed position in full lines and in the opened or ladder position in dotted lines. It will be seen that all movable and guiding elements are disposed directly underneath the top or seat 11 and are fitted into or upon each other and are hidden from a direct view at all sides by the cover frame 13 which, due to the particular mechanical design and compact construction of the ladder mechanism, does not even have to be of a greater width in the vertical direction than is customary in one-purpose furniture articles of a similar type. Thus, when in the closed position, the stool, stand, table, or the like has the same appearance as one of the conventional types and its special features are completely hidden from view.

When the top 11 is tilted upwardly about hinge 15 in the direction shown by the curved arrow A, pivots 17 of plate 16 on the cover frame 13 will be moved along arrow B. Since the upper ends of knee levers 25 are also connected to pivots 17, they will be moved likewise until the two arms of each of these levers are in a straight position in which they may be locked at 26. The direction and extent of the movement of the pivot and lock 26 between the two arms of each of levers 25 is indicated by the arrow C.

When the top is in the downward position, the lower pivot point of connecting rods 18 together with rollers 22 is disposed near the rear end of guide rails 20, while when top 11 is pivoted upwardly, plate 16 following the pivoting movement will pull the upper pivot 19 of connecting rods 18 upwardly and toward the rear, as indicated by arrow D. This will automatically result in a movement of the lower pivot point of connecting rods 18 together with crossbar 21 and rollers 22 in guide rails 20 toward the front end of these rails where, when top 11 has been pivoted to its farthest rear position, connecting rods 18 will also be rearwardly inclined so that their lower ends will be braced against the inner edge of the front part of frame 14 which serves as the lower step 24, while rollers 22 also abut against the front end of guide rails 20. Due to this inclined bracing position of connecting rods 18 and to the locking of levers 25 in the straight position, the upper step 16 will then be in a horizontal, rigidly locked position in which it will safely support even a heavy person.

Due to the shifting of the lower pivot points of connecting rods 18 in guide rails 20, the movement of the upper step 16 while being raised does not occur strictly within a parallelogram, but the pivot points 19 of connecting rods 18 on plate 16 describe a differently curved path than pivot points 17 on plate 16.

The stool is returned to its closed position in a manner reverse to what has above been described after the locking device 26 of knee lever 25 has been released. In the closed position, all parts fold closely between and over each other, as clearly illustrated in FIGURE 3 which also shows that the angle 23 in each connecting rod 18 insures that parts 18, 16, and 11 will lie immediately above each other. When the stool is being opened or closed, guide rollers 22 may be shifted in one or the other direction within the last part of rails 20 either by spring means or by hand.

A modification of the stool according to the invention is illustrated in FIGURES 4 and 5, in which the parts which correspond to those shown in FIGURES 1 to 3 are indicated by the same reference numerals. It will be seen that the top or seat 11 is hinged to the inner frame 14 and connected to plate 16 and connecting rods 18 in the same manner as shown in FIGURES 1 to 3, and that the connecting rods are also slidably guided at their lower ends in guide rails 20. However, in this case the knee levers 25 with the device 26 for locking them in the straight position are omitted, and instead of them bracing rods 30 are pivotably connected at 31 to connecting rods 18 substantially at the center thereof. These bracing rods 30 are connected to each other at their other ends at 32 by a crossbar 32, the two projecting ends of which are likewise guided in guide rails 20. Bracing rods 30 are bent at 33 similarly as connecting rods 18. At the center of crossbar 32, a locking bar 34 is pivotably mounted thereon and extends forwardly and projects in the opening position of the stool beyond the crossbar 21 of connecting rods 18. The front end of locking bar 34 has a locking recess 35 which then engages with crossbar 21 and thereby locks the stool in this open or ladder position. A short extension 36 on the end of locking bar 34 is provided for lifting the latter out of engagement with crossbar 21 when the stool is to be closed.

At its front end opposite to hinge 15, the outer frame 13 is provided with a latch 37 which is associated with a catch 38 on frame 14 or underneath the latter so as to lock the top or seat 11 thereto to permit the stool to be easily transported by being lifted at the top without danger that it will thereby open.

The operation of the last-mentioned embodiment of the invention is as follows:

In the closed position of the stool, all parts are again folded so as to lie closely above each other similarly as shown in FIGURE 3. Bracing rods 30 will then be pivoted so as to extend substantially horizontally and adjacent to guide rods 18. Their rear pivot points, that is, crossbar 32, will thereby be shifted only slightly in guide rails 20. When the seat 11 is being tilted upwardly, pivot points 17 and 19 of plate 16 will move practically along the same paths B and D as indicated in FIGURE 3. Pivot points 32 of bracing rods 30 will then at first be pressed against the rear ends of guide rails 20, and in

this position the connecting rods 18 will be positively guided by bracing rods 30 so that their pivot points 22 will move from the rear ends toward the front ends of guide rails 20 until, in the highest position of seat 11, the pivot points 22 of connecting rods 18 have reached the most forward position in guide rails 20 in which the locking recess 35 in locking bar 34 automatically engages with crossbar 21 near the lower end of connecting rods 18. While the stool is being opened to the ladder position, this locking bar 34 will slide freely along crossbar 21. Thus, when the stool is fully opened, the step-ladder which is then formed will be securely locked by the engagement of the locking bar. For closing the top, it is merely necessary to lift the locking bar slightly on its extension 36 so as to disengage the locking recess 35 from crossbar 21, whereupon the top or seat 11 may be tilted downwardly. During this movement, bracing rod 30 will guide the connecting rods 18 along guide rails 20, while crossbar 18 slides along locking bar 34 toward the rear until rods 18 and 30 are again properly folded together. In the fully closed position of the stool, latch 37 will again be in locking engagement with catch 38 so that the stool can be transported without danger that it may open of its own accord.

In addition to the advantages of a stool according to the invention as are apparent from the above description, it should be pointed out, that, when in the closed position, the top of the stool, stand, table, or the like, including its mechanical features, appears to consist only of a thick plate, and the entire piece of furniture does not distinguish from any other of the same kind. Since the top forms an unbroken surface, it may be provided with any desired design or be fully upholstered.

Since the legs 12 are directly secured to the inner frame 14, they may also be of any desired shape or extend at any desired angle. The entire stool and the individual parts thereof are preferably made of such dimensions that, when it is opened to the ladder position, the upper step 16 will be at the proper height to permit the stool to be used as a high-chair for small children to permit them to sit at a regular-sized table. When it is being opened, the stool will automatically lock in its ladder position in which the two steps 24 and 16 will be of a height which may be easily ascended, and in which both steps will be absolutely secure. The upper step 16 is of such a large size that a person can stand thereon with both feet fully resting thereon, permitting such a person also to turn around on step 16. Since the top 11 then stands vertically, the stool may also be placed directly against a wall or other object, and the top will then protect such a wall or object from being marred by the shoes of the person standing on the upper step 16.

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. A combination ladder stool comprising, a substantially flat base member having a longitudinally elongated opening in the center thereof, a plurality of legs connected to said base member for supporting it in a normally horizontal position, a cover piece hingedly connected to one end of said base member and movable with respect thereto from a first position wherein it encloses said frame member to a second position wherein it extends upwardly from said frame member at a right angle, a flat plate member pivotally connected at one end to said cover piece intermediate its length, said plate member being adapted to lie recessed within the opening in the base member when said cover piece is in its first position, guide means carried in said base member on opposite longitudinal sides of the opening therein, a pair of rods pivotally connected at one end to the free end of said plate member and slidably connected at the other end to said guide means and being movable in each of two opposite directions therein, the slidably connected ends of said rods being adapted to move in said guide means in a direction away from the hinged connection of said cover piece when it is moved to its second position whereby the other ends of said rods move said plate member to an extended position above and parallel to said base member, a pair of brace pieces pivotally connected at one end to said rods intermediate their length and slidably connected at the other end to said guide means, said rods and said brace pieces being folded in alongside-parallel relation to said base member when said cover piece is in its first position, and means for locking said plate member in its extended position.

2. A combination ladder stool in accordance with claim 1, wherein said locking means comprises a rod member extending between and supported in said guide means, a locking bar pivotally connected at one end to said rod member intermediate its length said locking bar having a notch therein adjacent its other end, and another rod member connected to and extending between the first mentioned pair of rods, the notch in said locking bar engaging on the last-mentioned rod member when said cover piece is moved to its second position whereby said plate member is locked in its extended position.

3. A combination ladder stool in accordance with claim 1, comprising a latch connected to said cover piece and a catch piece connected to said base member whereby said cover piece can be locked securely in its first position.

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