Dec. 21, 1965 M. KING ETAL 3,224,530

STEP STOOL

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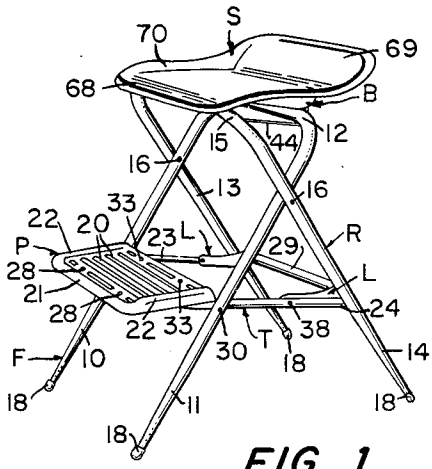


FIG. 1.

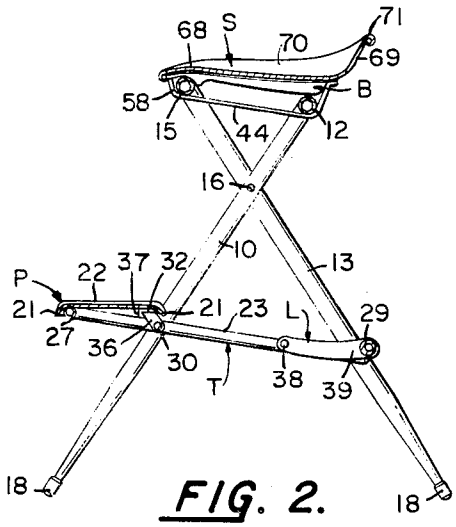


FIG. 2.

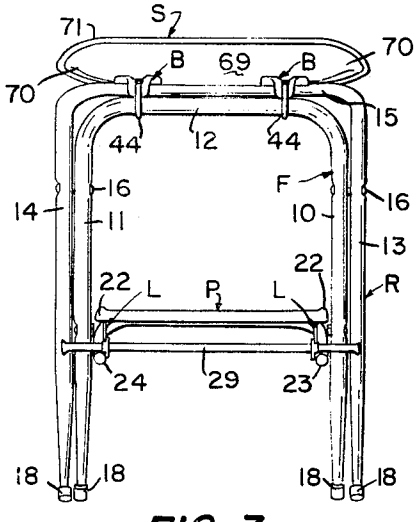


FIG. 3.

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STEP STOOL

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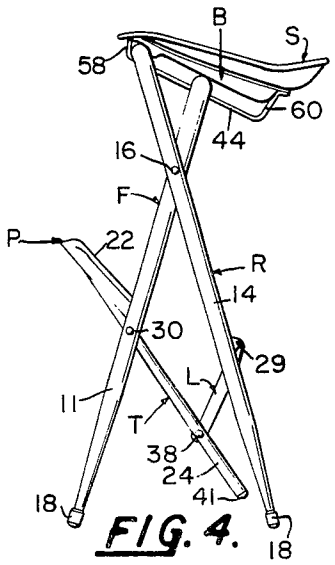


FIG. 4.

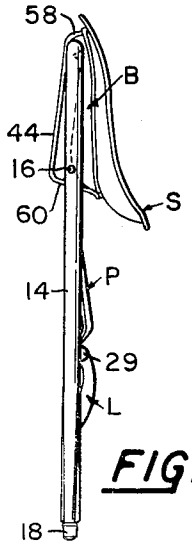


FIG. 5.

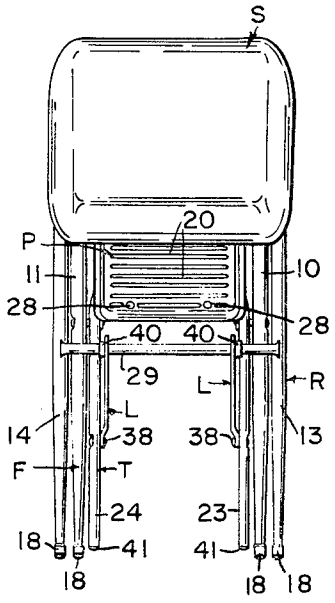


FIG. 6.

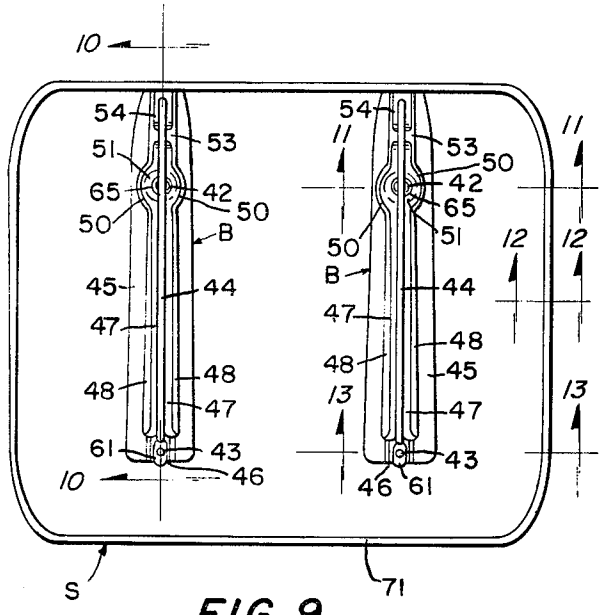


FIG. 9.

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STEP STOOL

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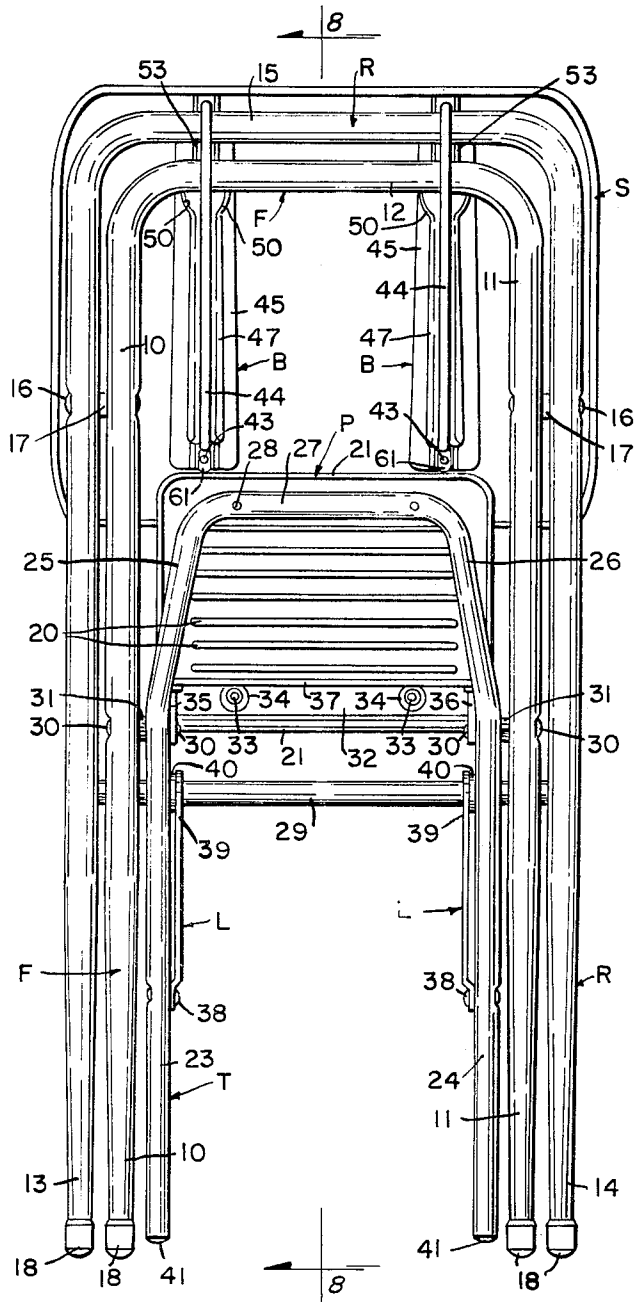


FIG. 7.

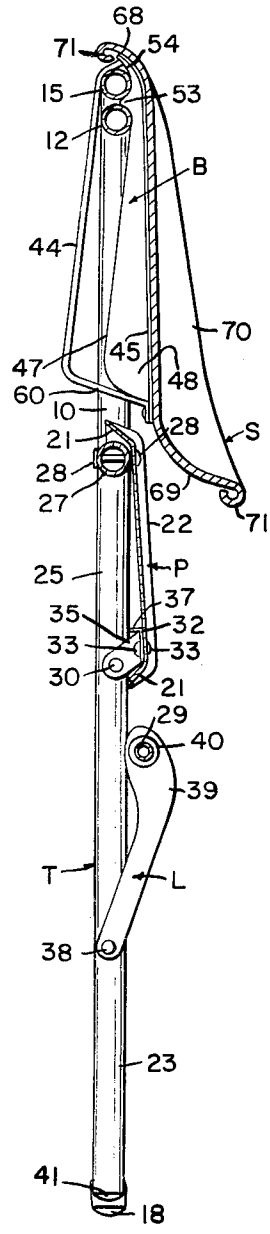


FIG. 8.

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STEP STOOL

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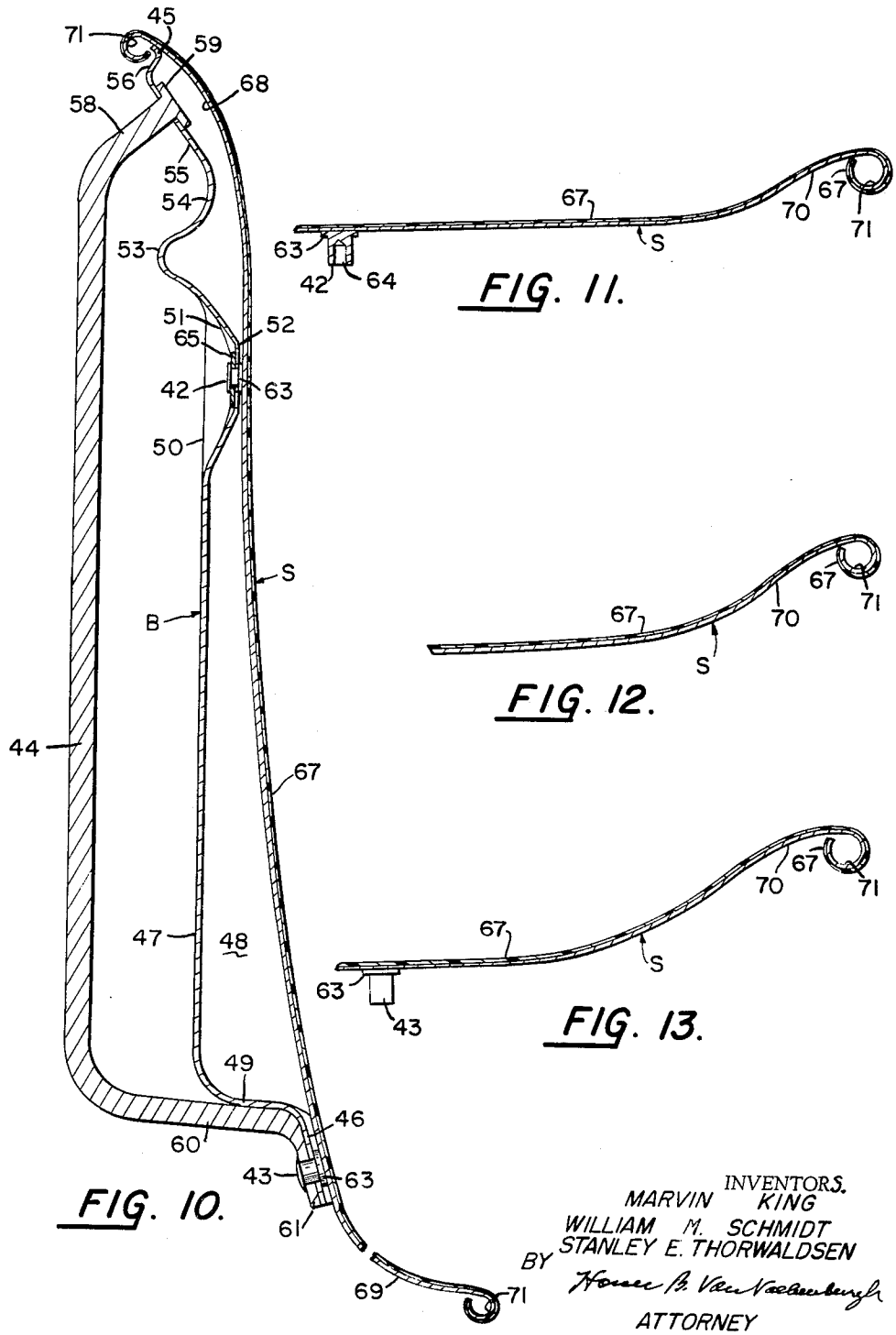


FIG. 10.

FIG. 11.

FIG. 12.

FIG. 13.

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3,224,530

STEP STOOL

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Filed Apr. 10, 1963, Ser. No. 271,909
4 Claims. (Cl. 182—33)

This invention relates to step stools, and more particularly to foldable step stools.

Among the objects of this invention are to provide a novel step stool; to provide such a step stool which may be folded when not in use; to provide such a step stool which is readily folded and unfolded; to provide such a step stool having at least one step and a seat; to provide such a step stool which cannot tip over when one is standing on a step; to provide such a step stool which is comfortable to sit on; to provide such a step stool which is easy to use; and to provide such a step stool which is of relatively simple construction, light in weight and economical to manufacture.

Additional objects and the novel features of this invention will become apparent from the description which follows, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front perspective view of a step stool of this invention;

FIG. 2 is a vertical section, taken through the center of the stool shown in FIG. 1;

FIG. 3 is a rear elevation of the step stool of FIG. 1;

FIG. 4 is a side elevation of the step stool of FIG. 1, but in partly folded or closed position;

FIG. 5 is a side elevation of the step stool in folded position;

FIG. 6 is a rear elevation of the step stool in folded position;

FIG. 7 is a front elevation, on an enlarged scale, of the step stool in folded position;

FIG. 8 is a vertical section, taken along line **8—8** of FIG. 7, showing further details of the construction of the step stool;

FIG. 9 is a bottom plan view, on an enlarged scale, of the seat of the step stool;

FIG. 10 is a vertical section, on a further enlarged scale, taken along line **10—10** of FIG. 9 and condensed at one end;

FIG. 11 is a fragmentary, vertical section, on a further enlarged scale, taken along line **11—11** of FIG. 9 but showing the seat prior to the attachment of a pair of brackets;

FIG. 12 is a fragmentary, vertical section, similar to FIG. 11, but taken along line **12—12** of FIG. 9; and

FIG. 13 is a fragmentary, vertical section, similar to FIG. 11, but take along line **13—13** of FIG. 9.

In accordance with this invention, a foldable step stool, as in FIGS. 1–3, includes a seat S supported by a rearwardly extending, front leg frame F and a forwardly extending, rear leg frame R, and a step P supported by a step frame T. During use, the lower end of front leg frame F rests on the floor at a position forwardly of the front edge of step P, as in FIG. 2, so that the weight of a person on step P, either standing thereon or stepping up onto seat S, will not overbalance the stool. Also, the seat S is contoured, as described later, to provide maximum comfort to the user, who may sit on the stool with his or her feet on step P, or may incline the legs forwardly to clear step P. When it is desired to fold the stool, as for storage, an upward force under the front edge of step P, as by one hand, will cause the step frame T and step P to pivot about the front leg frame F, as to the intermediate position of FIG. 4, and then to the folded position of FIG. 5. During such movement, the other hand may be placed on either the front or rear edge of seat S, the latter being preferable, since the seat S may thereby be assisted in pivoting about the upper end of rear leg frame R to the position of FIG. 4 and then to the position of FIG. 5. During such pivotal movement of step P and seat S, the lower ends of front leg frame F and rear leg frame R are moved together by a pair of links L, which pivotally interconnect step frame T and rear leg frame R. Simultaneously, the upper end of rear leg frame R slides forwardly in a pair of brackets B, mounted on the underside of seat S, from the position of FIG. 2 to the intermediate position of FIG. 4 and then to the folded position of FIG. 5.

As will be evident from FIGS. 6 and 7, in the folded position, the step P and step frame T fit within the front leg frame F, which in turn fits within the rear leg frame R, while the seat S overlaps the upper portions of the leg frames and step P. As will be evident from FIG. 5, the stool in folded position is quite narrow, from front to rear, and thus may occupy a relatively narrow space, as in a closet. For example, in the case of a stool in which the step P is about 10¼ inches from the floor and the center of seat S about 22½ inches from the floor in unfolded or use position, the folded stool is about 27½ inches in maximum height, about 18 inches in maximum width and about 5 inches thick at the point of maximum thickness, i.e., at the rear or lower edge of seat S. The stool may also be tipped against a wall, in which event, if the folded stool is visible, it may be preferred to place the front facing the wall, so that the rear is visible, as in FIG. 6, to provide a more pleasing appearance. For unfolding, the seat S may be lifted and the step P pushed downwardly also, as a reverse of the folding operation. Thus, the stool is readily folded or unfolded and also readily stored.

The front leg frame F, as in FIGS. 1–3, is generally U-shaped, having a pair of spaced front legs **10** and **11** connected at their upper ends by an integral cross bar **12**. Similarly, the rear leg frame R is generally U-shaped, having a pair of spaced rear legs **13** and **14** connected at their upper ends by an integral cross bar **15** which is wider than cross bar **12** so that front legs **10** and **11** will nest within rear legs **13** and **14** when the stool is folded, as described above. Conveniently, front leg frame F is pivoted to rear leg frame R, intermediate the step and seat, by means of rivet head, pivot pins **16**, while the leg frames are separated slightly, to insure easier pivotal movement, by bushings **17**, as in FIG. 7, through which the respective pivot pins extend. When the stool is in open position, as in FIG. 1, the front leg frame and rear leg frame will be crossed. Conveniently, the lower end of each of the stool legs is provided with a rubber or plastic foot **18** to prevent the stool from sliding on a floor or other surface, while the leg frames are conveniently formed from metal tubing.

Step P may be stamped from sheet metal to provide spaced, laterally extending ribs **20** and a downturned peripheral edge **21**, the lower end of which is curled back onto itself on the inside, to obviate sharp edges or corners. Also, a raised portion **22** at each side of the step may be provided to prevent the foot of a user from accidentally sliding off the step at either side. The step frame T is generally U-shaped and includes a pair of elongated, parallel legs or bars **23** and **24** which are spaced apart, such as a distance such that the centerlines thereof substantially coincide with the outer edges of step P, as in FIG. 7. From legs **23** and **24**, inwardly convergent portions **25** and **26**, respectively, extend beneath step P to an integral cross bar **27**, which is attached to the underside of step P adjacent the front end thereof, as by a pair of spaced rivets **28**, as in FIGS. 1, 7 and 8. The upper head of each rivet **28** is conveniently received

in a well formed in the upper surface of step P, so that the heads of the rivets will not protrude. In the open or use position, the step frame T angles upwardly at a small angle, from the rear to the front, as in FIG. 2, with the rear ends of legs **23** and **24** engaging the underside of a conveniently tubular cross rod **29**, as in FIG. 3, the ends of cross rod **29** being attached to rear legs **13** and **14**, as by being flattened and welded to the rear of the rear legs. The step frame T is also pivotally connected to front legs **10** and **11**, as by rivet head, pivot pins **30**, with bushings **31**, as in FIG. 7, through which the respective pins **30** extend, separating the front legs and step frame to insure easier pivotal movement. The rear of step P is reinforced by an angle **32**, extending across the underside of the step and attached thereto, as by a pair of spaced rivets **33**. The upper heads of rivets **33** are preferably countersunk in the upper surface of step P, while, at each rivet **33**, angle **32** is provided with a boss **34** to accommodate the well in the step. In order to support the rear of step P at a position level with the front, angle **32** is provided with depending flanges **35** and **36** at the opposite ends thereof, which flanges extend downwardly on the inside of legs **26** and **27**, respectively, of the step frame T, and are conveniently secured thereto by pivot pins **30**. In addition, inner flange **37** of angle **32** extends laterally beyond each end flange **35** and **36** and abuts angular portions **25** and **26** of step frame T, as in FIGS. 2 and 8.

Each link L, as in FIGS. 7 and 8, is pivotally connected at one end to leg **23** or **24** of step frame T, as by a pivot pin **38**, while the opposite end **39** is offset and provided with a collar **40** which is pivotal about rod **29**. Of course, during assembly, the collars **40** must be slipped onto rod **29** before the latter is welded in place. The rear end of each leg **23** and **24** of step frame T is conveniently closed by a plug **41**, as in FIGS. 4 and 6.

Each bracket B may be stamped from sheet metal, and is attached to the underside of seat S, as by rivets **42** and **43** of FIGS. 9 and 10, and cooperates with a rod **44**, the front end of which holds cross bar **15** of leg frame R in position and the remainder of which permits cross bar **12** of leg frame F to move between the positions of FIGS. 2 and 5. Rivets **42** and **43** are conveniently attached to seat S in a manner described later. As in FIG. 9, each bracket B has a peripheral flange **45** which extends around the bracket and engages the underside of seat S, conforming to the contour thereof, as in FIG. 8, except for a raised portion **46** at the rear, as in FIG. 10, at the position of rivet **43**. Each bracket is shaped to provide a flat, central land **47** which is engaged by cross bar **12** and is spaced from but slants away from the underside of seat S, from front to rear, as in FIG. 10. An inclined side wall **48** connects land **47** with flange **45** at each side, with a similar wall **49** at the rear. At the front, land **47** separates into two arcuate lands **50**, at each side of a well **51**, as in FIG. 9, at the flat bottom **52** of which, as in FIG. 10, rivet **42** is attached. Forwardly of well **51**, the bracket is upset to provide a knob **53**, which in cooperation with rod **44** retains cross bar **15** in a socket **54**, from which a flat **55** extends obliquely to an inclined front wall **56** of the bracket. Flat **55** is provided with a hole which receives the angular front end **58** of rod **44**, having an upset head **59** to connect the rod **44** with the bracket. As will be evident, the angular front end **58** and an adjacent portion of rod **44** hold cross bar **15** in socket **54**. Rod **44** parallels flat land **47** and arcuate lands **50**, as in FIG. 10, while adjacent its rear end, the rod **44** is bent to provide a nearly perpendicular portion **60** which abuts rear wall **49** and a flattened rear end **61** which engages raised section **46** and is provided with a hole for attachment by rear rivet **43**.

Each rivet **42** and **43**, as in FIGS. 11 and 13, is provided with a head **63** which is conveniently flash welded

to the underside of seat S, as by one electrode inserted in a hole **64** in the rivet, which is hollow, and a ring electrode placed around head **63**. By use of both a relatively high voltage and amperage, for a controlled, very short time, the head **63** of the rivet may be welded to the underside of seat S without unduly heating the opposite side, for a purpose described later. Due to the head **63** of each rivet **42** and **43**, the raised portion **46** of a peripheral flange **45** is necessary to enable the peripheral flange to be held tightly against the underside of seat S, while the bottom flat **52** of well **51** is also spaced from the underside of seat S to accommodate head **63** of rivet **42**. For assembly purposes, the rear end **61** of rod **44** is inserted through the hole in flat **55** of the bracket, until head **59** reaches the flat **55**. Then, rod **44** may be shifted to one side and bracket B placed against the underside of seat S, with rivets **42** and **43** extending through appropriate holes in flat **52** and portion **46**, respectively. Then, the hollow end of rivet **42** may be riveted over onto a washer **65** to hold the bracket in position. After both brackets B are similarly partly installed, leg frames F and R may be placed in position, then rod **44** of each bracket moved into position over cross bars **12** and **15** and the rear end of each rod **44** placed over the corresponding rear rivet **43** and the hollow end of the latter riveted over onto the flattened end **61**. As will be evident, such as assembly operation may be carried out quickly and expeditiously.

To provide an attractive appearance and also to provide greater comfort during use, the upper surface of seat S, which is conveniently stamped or pressed from metal, is provided with a covering **67** which is conveniently a suitable plastic, such as vinyl, and may be provided in a desired color or colors, as in a leather simulating or other pattern. The seat S is conveniently cut to shape and the covering **67** bonded thereto under pressure while flat, as by a resin adhesive, to provide better adherence. Then, the seat may be formed to shape, as in a suitable press, as to provide the contour shown in FIGS. 1–5, 8 and 10, including a downwardly curved front end **68** and an upwardly curved rear end **69**, together with upwardly curved sides **70**, which increase in height from front to rear. The generally rectangular, central portion of the seat, between the front and rear ends and the sides, is preferably slightly concave, both from front to rear and from side to side, so that the contour of the seat is thus such that the seat is comfortable to sit in. As will be evident from FIG. 2, the central portion of the seat will be level during use, although slightly concave, since rod **44** slants rearwardly downwardly in the unfolded position of the stool. Thus, the seat provides a level surface for standing. In addition, the peripheral edge **71** of the seat is curled around onto itself, as in FIGS. 10–13, not only to obviate sharp edges or corners, but also to place the peripheral edge of the covering **67** in a protected position and thereby prevent the possibility of accidental blows or impacts by a sharp instrument from separating the covering from the metal of the seat.

As noted above, the covering **67** is more conveniently applied while the metal strip, from which seat S is formed, is flat. Also, the seat is more conveniently formed to shape before rivets **42** and **43** are attached to the underside thereof. Although the metal of the seat is not adversely affected by the heat of welding rivets **42** and **43** thereto, the plastic covering **67** might be affected. Thus, the flash welding of the rivets **42** and **43**, as described above and which can be carried out so that the plastic covering **67** is not unduly heated, permits the covering to be bonded to the seat in a more convenient manner. As will be evident, if rivets **42** and **43** extended through the seat, the heads thereof would extend or wells in the seat would be necessary to countersink the heads. In either event, irregularities in the surface of the seat would be produced, which would tend to cause discomfort on the part of the user.

From the foregoing, it will be evident that the objects hereinbefore set forth have been fulfilled to a marked degree. The invention provides a foldable step stool, which will not tip over when one is standing on the step. This is true because the step is located inwardly of the ends of the front legs, so that any weight on the step is always supported between the front and rear legs. In addition, a stool has been provided which may be easily folded, by lifting upwardly on the step, and may be easily unfolded, by lifting upwardly on the seat. Thus, the step frame is pivoted between the front legs and a pair of links pivoted to the rear legs to cause the rear legs to pivot with respect to the front legs upon lifting the step, so that the stool may be easily and quickly folded. Also, the upper end of the front leg frame is slidable between the rods and brackets mounted on the underside of the seat, causing the front leg frame to pivot when the seat is lifted, so that the stool is easily and quickly unfolded. In storage position, the stool is compact, since the step and step frame fit within the front leg frame, which in turn fits within the rear leg frame, while the seat overlies portions of the leg frames and step. Furthermore, the stool is easy to use, is of relatively simple construction, has an attractive appearance, and is durable in construction.

Although the stool of this invention has been shown and described as having one step, it will be evident that a higher stool with additional steps may be provided, the upper steps being pivotally interconnected with the lower step and nesting within the front leg frame with the stool in storage position.

Although a preferred embodiment of this invention has been illustrated and described, it will be understood that various changes and variations may be made, without departing from the spirit and scope of this invention.

What is claimed is:

1. A step stool comprising a pair of front legs; a pair of rear legs pivoted to said front legs above the center of height thereof so that, with said legs in open position, the upper portion of said rear legs will be disposed above said front legs and the upper portion of said front legs will be disposed above said rear legs; a seat pivotally attached at its front to the upper portion of said rear legs and movably connected to the upper portion of said front legs; a step frame having a pair of spaced, rearwardly extending bars, said step frame being pivotally connected to said front legs below the pivotal connection of said front and rear legs; a step mounted on the front of said step frame; a cross rod extending between said rear legs intermediate the ends thereof; links pivotally connecting a bar of said step frame to said rear cross rod, said bars of said step frame being adapted to engage the underside of said rear cross rod to maintain said step in normal position; and an angle attached to the underside of said step and having an ear depending from each end thereof, each said ear being connected to a pivotal connection between a front leg and said step frame.

2. A step stool comprising a pair of front legs interconnected by a top cross bar; a pair of rear legs interconnected by a top cross bar and pivoted to said front legs above the center of height thereof so that, with said legs in open position, the upper portion of said rear legs will be disposed above said front legs and the upper portion of said front legs will be disposed above said rear legs; a seat connected to said front and rear legs; a step frame having a pair of spaced, rearwardly extending bars, said step frame being pivotally connected to said front legs below the pivotal connection of said front and rear legs; a step mounted on the front of said step frame; a cross rod extending between said rear legs intermediate the ends thereof; links pivotally connecting a bar of said step frame to said rear cross rod, said bars of said step frame being adapted to engage the underside of said rear cross rod to maintain said step in normal position; a pair of spaced brackets, each having a peripheral flange engaging the underside of said seat, side walls extending from said flange to a land which is disposed angularly to said seat, a knob at the front end of said land and a socket forwardly of said knob; and a pair of rods, each attached at its front end to a bracket forwardly of said socket and at its rear end to said bracket rearwardly of said land, each rod being disposed in parallel relation to said land of said bracket, said cross bar of said rear legs being held for pivotal movement in said sockets of said brackets by said rods and said cross bar of said front legs being restrained for sliding movement along said lands by said rods.

3. A step stool, as set forth in claim 2, wherein each said bracket is attached to the underside of said seat by a front rivet and a rear rivet, said land being divided adjacent said knob into a front land disposed on each side of a well for receiving said front rivet; and said rear rivet attaching both the rear end of said bracket and the rear end of said rod to the underside of said seat.

4. A step stool, as set forth in claim 3, wherein the upper surface of said seat is provided with a plastic covering; and each said rivet is a hollow rivet having an enlarged head flash welded to the underside of said seat.

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