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2,805,703

COMBINED CHAIR AND STEP LADDER

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2 Sheets-Sheet 1

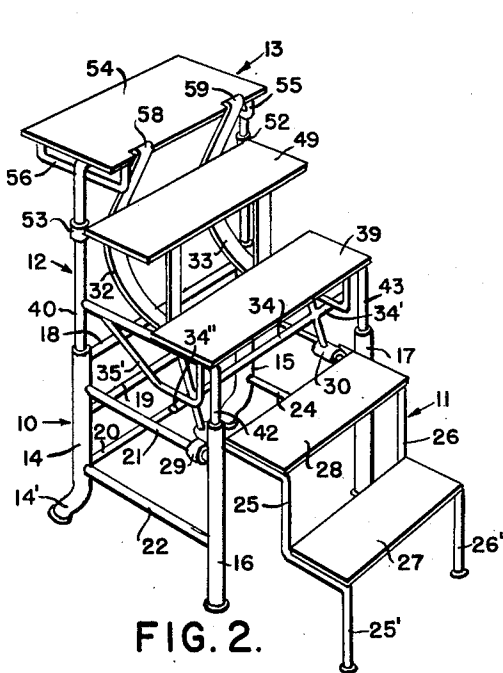


FIG. 2.

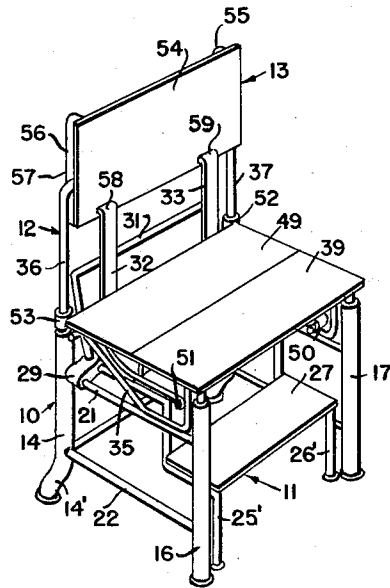


FIG. 1.

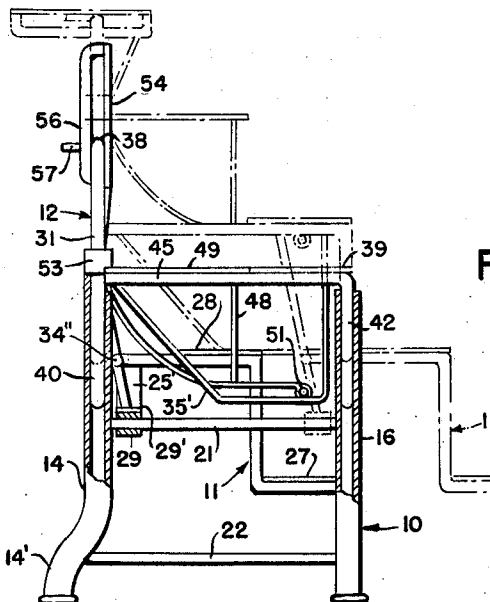


FIG. 3.

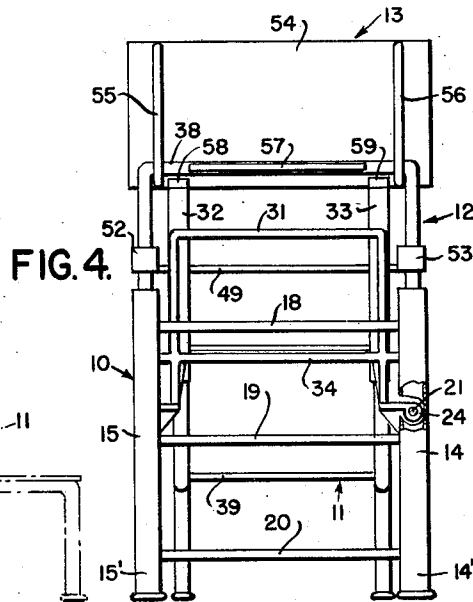


FIG. 4.

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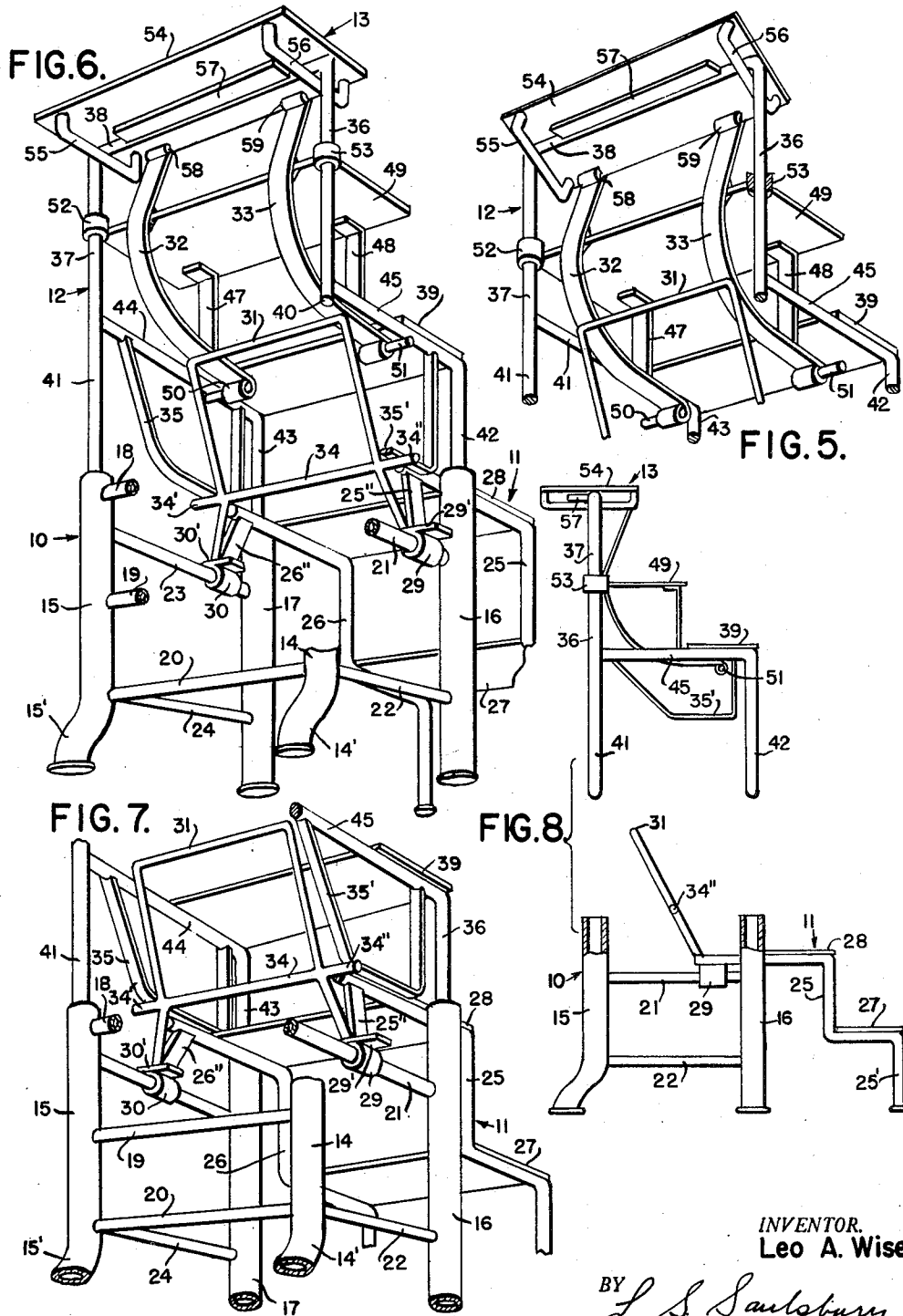
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COMBINED CHAIR AND STEP LADDER

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5 Claims. (Cl. 155—42)

This invention relates to a combined chair and step ladder.

It is an object of the present invention to provide a chair out of which a full size step ladder having five steps can be obtained.

It is another object of the present invention to provide a combined chair and step ladder having the full number of steps wherein the conversion of the chair into the step ladder can be effected with as little effort as possible and by a simple pulling operation of the lower steps with relation to the chair legs and to have the upper steps lying above the seat portion automatically elevated and positioned by the same operation.

It is still another object of the invention to provide a chair adapted to be converted into a full size step ladder having five steps wherein the intermediate steps of the ladder can be made up from partial seat portions of the chair and wherein the middle step is a partial seat portion vertically adjustable with the upwardly-extending and adjustable frame sub-unit but made rigidly therewith and without linkage being necessary for connection with the other adjustable steps.

It is still another object of the invention to provide a combined chair and step ladder, a chair having a back rest and out of which one of the steps of the ladder can be formed upon the chair being converted into a five-step step ladder.

Other objects of the invention are to provide a combined chair and step ladder having the above objects in mind which is of simple construction, strong, durable, compact, light in weight, pleasing in appearance, inexpensive to manufacture, having a minimum number of parts, efficient and effective in use.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a front and side perspective view of the combined chair and the step ladder with the parts retracted to provide the chair;

Fig. 2 is a front and side perspective view of the combined chair and step ladder with the steps extended to provide the five-step ladder;

Fig. 3 is a side elevational view of the combined chair and step ladder with portions of the legs broken away to show the slidable upper frame structure therein and with the parts extended and illustrated in phantom to show the manner in which the chair is converted into a step ladder;

Fig. 4 is a rear elevational view of the chair with the parts or steps not extended;

Fig. 5 is a fragmentary side and rear perspective view of the upper frame structure elevated out of the lower frame structure and showing the parts extended;

Fig. 6 is an enlarged side and rear perspective view of the chair and step ladder with the steps fully extended and with portions broken away to more clearly show certain of the operating parts that serve to support the steps upon the frame structures and the relation of the upper frame structure with respect to the lower frame structure;

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Fig. 7 is a rear and side perspective view of the lower frame structure and a part of the upper frame structure extended therefrom, said view being enlarged, and certain of the parts being cut away to more fully show the inner working parts of the chair with the ladder parts extended;

Fig. 8 is an exploded side elevational view of the upper and lower structures with the steps extended thereon but with the upper frame structure lifted out of the lower frame structure.

Referring now to the figures, this combined chair and step ladder comprises generally a lower frame structure 10 having a lower step assembly 11 horizontally adjustable therefrom, an upper frame structure 12 vertically adjustable in the lower frame structure and lifted vertically by the horizontal movement of the lower step assembly to its outwardly extended position and an articulable partial seat and back assembly 13 adjustable upon the upper frame structure and also by the lower step assembly 11 whereby to effect the full conversion of the chair into a five-step ladder upon which one may climb.

The lower frame structure 10 has vertically extending hollow rear legs 14 and 15 and front legs 16 and 17. The rear legs are bent rearwardly at their lower ends as indicated respectively at 14' and 15' to provide adequate support for the step ladder when the step assemblies have been extended for use as a step ladder and to prevent the step ladder from rearwardly upsetting. The rear legs 14 and 15 are held in spaced relation by three vertically spaced, parallel rounds 18, 19 and 20. The front legs 16 and 17 are respectively held in forwardly spaced relationship from the rear legs 14 and 15 by vertically-spaced parallel rounds 21 and 22, 23 and 24.

The lower step assembly 11 comprises laterally spaced stepped side frame members 25 and 26 having respectively forward feet 25' and 26' and first and second steps 27 and 28. On the rear ends of the side frame members 25 and 26 are respectively rigidly secured slide sleeves 29 and 30 surrounding the respective rounds 21 and 23 and slidable therealong. The lower step assembly 11 is slidable horizontally in and out of the lower frame structure 10.

Extending upwardly and rearwardly from the rear ends of the side frames 25 and 26 is a lifting member 31 adapted at its closed upper end to engage with laterally spaced, upwardly and rearwardly curved cam members 32 and 33 forming a part of the partial seat and back assembly 13 and by means of which the same is adjusted upon the upper frame structure 12 to form the two upper steps of the step ladder. This lifting member 31 has a transverse bar 34 extending beyond the sides of the member 31 to provide extensions 34' and 34'' which respectively engage with laterally spaced, rearwardly curved and upwardly extending cam members 35 and 35' rigidly secured to the upper frame structure 12 and by means of which the upper frame structure and the upper step assembly are elevated from the lower frame structure upon pulling outwardly the lower step assembly 11.

The upper frame structure 12 comprises two side frame members 36 and 37 held in laterally spaced relationship by a top transverse bar 38 and a partial fixed step 39 that forms the third step of the step ladder and spaced below and forward of the transverse brace bar 38. This upper frame structure 12 has depending legs 40, 41, 42 and 43 respectively slidable in the respective hollow legs 14, 15, 16 and 17 of the lower frame structure 10 and by which the vertical movement of the upper frame structure and the upper step assembly 13 are guided in their vertical movement. The side frame member 36 has a horizontal seat supporting bar 45 to the underside of which one end of the cam member 35' is attached adjacent the rear leg 40 and is further attached to the under-

side thereof adjacent to the front leg 42 so that the cam can slide downwardly past the upper ends of the legs 14 and 16 of the lower frame structure 10. The side frame member 37 has a horizontally extending seat bar 44 to the underside of which cam 35 is connected at one end adjacent the leg 41 and at the other end by its vertical portion adjacent to the leg 43 so as to also allow this cam member 35 to be lowered below the upper ends of the legs 15 and 17.

The upper step assembly cams 32, 33 serve as brackets when taken with upstanding braces 47 and 48 that are fixed to the upper side of the lower end of cams 32 and 33 and extend upwardly and inwardly to support the front edge of a vertically adjustable fourth step 49 that, when in its lowered position, provides the rear half of the seat for the stool, the fixed step 39 serving as the forward half of the seat, as can be seen in Figs. 1 and 3. The lifting arm 31 of the lower step assembly 11 engages the cam members 32 and 33 and accordingly as the lower step assembly is moved outwardly and forwardly, the step 49 is elevated until lateral extensions 50 and 51 on the respective lower ends of the cam members 32 and 33 engage, as shown in Fig. 6, the respective horizontal bars 44 and 45 of the lower frame structure 12.

The rear edge of the fourth step 49 is rigidly secured and braced to the cam members 32 and 33 to level the rear of the step 49 with the forward edge which is supported on the upright braces 47 and 48. The rear edge of the step 49 carries guide sleeves 52 and 53 that are slidable on the frames 37 and 36 so that the step 49 will be guided in its vertical adjustment when the upper step assembly 13 is lifted along with the upper frame structure 12.

A fifth, or top, step 54 is mounted for pivotal and sliding movement upon the top bar 38 of the frame structure 12. On the bottom face of the step 54 are parallel U-shaped guide members 55 and 56 which lie under the bar 38 and which have their legs rigidly fixed to the underside of the step 54. On the bar 38 and extending rearwardly therefrom is an extension 57 that supports the step 54 when it lies in its extended and horizontal position over the top bar 38 and when the stool has been converted into a step ladder. The cam members 32 and 33 have their upper ends pivotally connected within the front edge of the step 54 as indicated respectively at 58 and 59. These cam members accordingly, when elevated and lowered, will position the top step 54. With the upper step assembly retracted so that the step 49 serves as a seat portion, the cam members 32 and 33 will have been pivoted and pulled down the forward edge of the step 54 so that the step will extend vertically against the front of the frames 36 and 37 and serve as the back support for the stool. The vertically inclined lifting member 31 is connected at its lower end to plates 29' and 30' rigidly secured to the respective guide sleeves 29 and 30 and these plates 29' and 30' are in turn respectively connected by braces 25'' and 26'' to the respective side frames 25 and 26 of the horizontally movable lower step assembly 11. The bar 34 of the lifting member 31 has extensions 34' and 34'' that respectively engage with the underside of the respective brackets 35 and 35' to lift the upper frame assembly 12 as the lower step assembly 11 is drawn outwardly from the lower frame structure 10.

In operation, it will be seen that as the lower step assembly 11 is pulled outwardly from the lower frame structure 10 that the lifting member 31 and particularly the extensions 34' and 34'' of the transverse bar 34 thereof ride downwardly upon the cam bracket members 35' and 35'', so as to cause them and the upper frame structure 12 to be elevated out of the hollow legs of the lower frame structure 10 whereby the intermediate step 39 which is rigid with the upper frame structure 12 is elevated to a third step level. The lower steps 27 and 28 will extend outwardly and forwardly of the intermediate step 39 and the frames carrying these steps 27

and 28 will be supported by their sleeves 29 and 30 upon the rounds 21 and 23 of the lower frame structure.

At the same time, the upper end of the lifting member 31 of the lower step assembly reacts against the cam members 32 and 33 of the upper step assembly 12 so as to elevate the step 49 to the fourth step position and to lie rearwardly of the intermediate step 39. As these cam members 32 and 33 are rigidly connected to the step 49, their upper ends 58 and 59 will act upon the lower and forward edge of the back rest or support member 54 so as to pivot it upon the upper bar portion 38 of the upper frame 12 to assume the position, as shown in Figs. 2 and 6, and provide the fifth step to the step ladder. The rearwardly extending plate 57 will give support to the step 54 and the rearwardly bent foot portions 14' and 15' of the respective rear legs 14 and 15 of the lower frame structure will give adequate support to the step ladder so that one may stand upon the upper step 54 with safety.

To convert the step ladder into a chair, the lower step assembly 11 is thrust inwardly in the lower frame structure allowing the upper frame structure 12 to fall by gravity and its legs extended into the legs of the lower structure, and the extensions 34' and 34'' made free of the depending cam members 35 and 35'. The intermediate step 39 accordingly is lowered to the seat position.

The upper step assembly will also be lowered by gravity with the step 49 being returned to its seat position in the rear of the step or partial seat portion 39 and supported upon the laterally spaced horizontally extending bars 44 and 45 of the side members 36 and 37 of the upper frame structure 12. The cam members 32 and 33 will be pulled downwardly with the step 49, taking with them the step 54, so as to provide the back rest for the stool. The top step 54 will accordingly be extended vertically. This is permitted as the lifting member 31 rides rearwardly up the cam members 32 and 33 to be free thereof.

It should now be apparent that there has been provided a chair which can be converted into a full size five-step step ladder. It will also be seen that the parts that form the seat of the stool are separable to provide the third and fourth steps; and that the back rest of the stool serves to provide the top and fifth step.

It should be further apparent that this is readily effected, merely upon pulling outwardly the lower step assembly from the lower frame structure and automatically as the lower step assembly is retracted or returned to the lower frame structure, the upper frame structure and the upper step assembly will be automatically returned by gravity to their original positions to provide the seat and back rest of the chair. The movements are simple.

It will further be apparent that the lifting action effected upon the upper frame assembly and of the upper step assembly is done with positive camming action of the upwardly and rearwardly inclined lifting member acting upon depending downwardly and rearwardly curved cam members carried by the upper frame structure and by the upper step assembly.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A combined chair and step ladder comprising a lower frame structure, an upper frame structure vertically adjustable upon the lower frame structure, a lower step assembly slidably mounted thereon and laterally adjustable out of the lower frame structure, said lower frame structure having a lift member, said upper frame structure having depending cam members, said lift member engageable with said cam members to elevate said upper frame structure as the lower step assembly is pulled out of the lower frame structure, said upper frame structure having a seat member adapted to serve as a step as

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the upper frame structure is elevated by the lower step assembly.

2. A combined chair and step ladder as defined in claim 1, and said step upon the upper frame structure forming a part of the seat, said upper frame structure having vertically extending side frames, an upper step assembly having a step serving as a part of the seat when in the lowered position being adjustable upon the side frames of the upper frame structure, further depending cam members connected to the upper step and said lift member of the lower step assembly being engageable with the further depending cam members of the upper step.

3. A combined chair and step ladder as defined in claim 2, and said upper step assembly providing a fifth step adapted to serve as a back rest upon the upper step and the upper frame assembly being lowered to provide the chair, said upper frame structure having a transverse top bar, said fifth step being pivotally and slidably connected to the top frame bar, means for connecting the rear edge of the upper step and the lower edge of the back rest step to pivot the back rest step and position the same horizontally for use as a step as the structures and step assemblies are extended.

4. A combined chair and step ladder comprising a lower frame structure having vertically extending hollow legs and a lift member, small rounds extending along the back and sides of the structure, said lower frame structure being open in the front, a lower step assembly having side step frames, step members extending across the side frames, sleeve elements connected to the respective side frames and slidable along the side rounds, said lower step assembly being adjustable in and out of the open front of the lower frame structure, a rearwardly and upwardly inclined inverted U-shaped member secured across said side frames of the lower frame structure, and

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extending upwardly above the lower frame structure, said lift member having a transversely extending bar with lateral extensions thereon, an upper frame structure having depending legs adjustable and slidable in the respective hollow leg members of the lower frame structure, said upper frame structure having depending cam members on the opposite sides thereof engageable with the lateral bar extensions of the lift member, and a step member adapted to serve as a seat on the upper frame member when the upper frame structure is retracted and lowered.

5. A combined chair and step ladder as defined in claim 4, a further seat step member vertically adjustable upon the upper frame structure and adapted to lie, when adjacent said seat step on the upper frame structure when the upper frame structure is retracted, cam members respectively connected to the further step member and the upper end of said lift member of the lower step assembly being engageable with said cam members to lift said further seat step relative to the upper frame structure, a top step pivotally and slidable upon the upper end of the upper frame structure and means extending between the further step and the top step to effect the adjustment of the top step as the further seat step is lifted, said further step serving as a back for the chair when retracted upon the upper frame assembly and the upper frame assembly retracted in the lower frame assembly.

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