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ADJUSTABLE STEPLADDER

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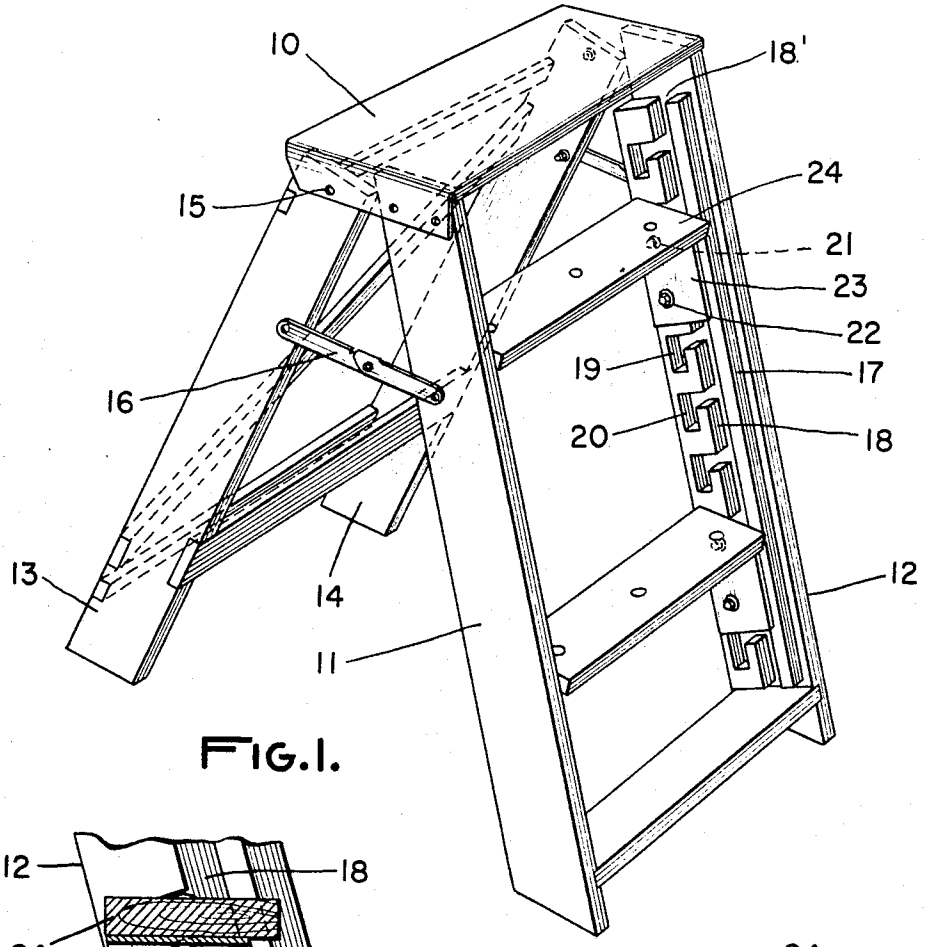


FIG. 1.

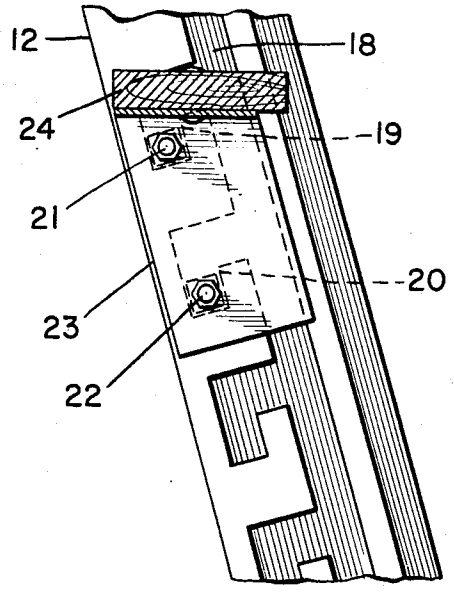


FIG. 2.

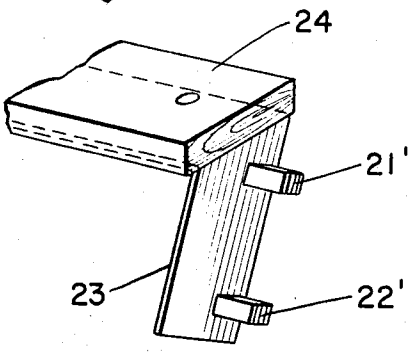


FIG. 3.

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ADJUSTABLE STEPLADDER

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This invention relates generally to stepladders and more particualrly to an improved stepladder in which one or more individual steps thereon may be adjusted in position to vary the level of the step from the floor.

Most stepladders have a six to eight inch distance between adjacent steps with the consequence that a painter or electrician may be positioned too high to work comfortably or not high enough. This problem has been recognized for some time and heretofore several solutions have been proposed in the form of stepladders having adjustable steps.

Such ladders as have been designed, however, usually require special tools or complicated manual manipulations in order to remove a step and reposition it at a desired level. In addition, the steps in such ladders are completely separable therefrom and consequently may become lost or misplaced. Also, many such ladders usually are formed by means of adapter brackets to fit the inside front legs to permit small incremental movements of a single step. Thus, while a minute variation in the height of a step may be made, this variation can only be effected with the one step between certain lower and upper limits determined by the remaining fixed steps. If additional adapters are provided, the additional step or steps positioned at a desired level may be so close to one of the permanent steps as to result in interference.

With the above in mind, it is accordingly a primary object of this invention to provide a greatly improved stepladder overcoming the foregoing problems.

More particularly, it is an object to provide a stepladder in which at least one of the steps may be adjustable to a desired level without the necessity of complicated tools or the necessity of removing bolts or nuts and the like to the end that the step may be manually moved by a housewife or other person with a minimum of difficulty.

Another important object is to provide an improved stepladder in which the steps are coupled to the ladder in such a manner that they may be adjusted to a desired level without having to completely separate the step from the ladder so that the steps will not inadvertently become separated or lost from the ladder proper.

Still another object is to provide an improved stepladder meeting the foregoing objects in which there are no permanent steps but in which each step is adjustable so that a desired level throughout the entire height of the ladder may be selected, and the other steps spaced at a convenient distance from the selected level to avoid any interference.

Briefly, these and many other objects and advantages of this invention are attained by forming on the interior opposed surfaces of the front legs of the ladder, a plurality of bayonet type slots which extend at equally spaced intervals along substantially the entire length of the legs. One or more of the steps of the ladder in turn are provided with lateral projections at opposite ends adapted to be received within the bayonet slots. By this arrangement, the projections may be inserted in a selected set of bayonet type slots to position the step at a desired level.

In the preferred embodiment of the invention, the projections are formed as pairs extending from opposite sides of the step in vertical spaced relationship so that upper and lower projections on each side of the step will be received within vertically adjacent bayonet slots to provide stability and maintain the plane of the steps substantially horizontal. The bayonet slots themselves communicate

with a single elongated groove for receiving the projections when the step is shifted from one level to another. By this arrangement, the step or steps are still coupled to the ladder as they are moved therealong.

A better understanding of the invention will be had by now referring to one embodiment thereof as illustrated in the accompanying drawings, in which:

FIGURE 1 is a perspective view of the adjustable stepladder of this invention;

FIGURE 2 is a fragmentary cross-section of a portion of the ladder of FIGURE 1 after one of the steps has been repositioned to a different level; and,

FIGURE 3 is a fragmentary perspective view of one end portion of one of the steps illustrated in FIGURE 1.

Referring first to FIGURE 1, there is shown a stepladder **10** including a pair of front legs **11** and **12**, and rear legs **13** and **14**. Suitable means such as a pivot rod **15** serve to couple the upper ends of the front and rear legs to the top of the ladder **10** as shown. Conventional spreaders such as indicated at **16** are provided to lock the legs in their spread apart position when the ladder is being used.

The ladder described thus far is entirely conventional. In accordance with the present invention, the inside opposing surfaces of the front legs **11** and **12** have directly formed therein or on an auxiliary stripping such as indicated at **17**, elongated vertical grooves such as indicated at **18** for the leg **12**. This groove opens out of the top portion of the leg **12** as indicated at **18'**. A plurality of bayonet type slots such as indicated at **19** and **20** run along the entire length of the strip **17** at equally spaced intervals. Entrance portions to these slots communicate with the longitudinal groove **18** as shown. The other leg **11** includes a similar structure.

Arranged to cooperate with the bayonet type slots are one or more steps, one such step being indicated at **24**. Since all of the steps that are movable in the present invention are identical, detailed description of one will suffice for all. Thus, with respect to the step **24**, there are provided projections from opposite ends, two of which extend from bolts **21** and **22** passing through a downwardly bent underplate **23**. These projections are respectively receivable in successive first and second bayonet type slots, the projections themselves being vertically spaced to correspond to the vertical spacing between the respective slots. By providing a vertical spacing between the projections from the bolts **21** and **22**, the step **24**, when positioned between the legs with the projections received in corresponding slots, will be stabilized to remain in a horizontal position.

The foregoing will be better understood by referring to the enlarged fragmentary view of FIGURE 2 which illustrates the step **24** after removing the same from its position illustrated in FIGURE 1 and lowering it to be secured within the bayonet slots **19** and **20**. As shown, the projections are indicated by dotted lines at **21'** and **22'** on the other side of the plate. After the step **24** has been retracted so that the projections can move along the groove **18**, they may be positioned to be received in the bayonet type slots **19** and **20**. As indicated by the dotted lines in FIGURE 2, the projections themselves are preferably of square cross-section insofar as the portions that extend from opposite ends of the step are concerned. The portions are more clearly illustrated in FIGURE 3. The underplate **23** may extend under the entire strip and depend downwardly on the opposite side of the step and this opposite downwardly extending side (not shown) includes laterally extending projections for reception in the corresponding bayonet slots of the leg **11** of FIGURE 1.

In operation, the height of a step may be adjusted in increments determined by the successive spacing between

the bayonet slots such as the slots **19** and **20**. Thus, it is a simple matter for a person using the ladder to simply lift up on one of the steps such as the step **24** to lift the projections **21'** and **22'** from the bayonet type slots and then pull rearwardly on the step until the projections **21'** and **22'** are received in the groove **18**. The step may then be lowered or raised along the groove, the ladder serving as a guide for movement of the step and facilitating this action. When a step is brought to the desired level, the projections are then passed into the entrance portions of the successive slots at such level and received in the lower cavity portions of the bayonet type slots. The locking action of the bayonet type slots is facilitated by making the entrance walls of the slots parallel and providing square type cavities to correspond to the square cross-sections of the projections. By this arrangement, "play" is minimized so that the step **24** will be fairly rigid when locked in the bayonet slots.

To remove one or more of the steps completely from the ladder, the step may be shifted out of the bayonet slots and slid upwardly with the projections in the groove **18** until the top open portion **18'** of the respective grooves is reached. At this point, the upper projections **21'** may be removed and then the lower projections slid up to the upper opening **18'** and removed. In this respect, the groove **18** itself may be made slightly wider than the side of the square cross-section of the projections to facilitate the removal thereof.

From the foregoing description, it will be evident that the present invention has provided a greatly improved adjustable type stepladder. Not only may the height of a step be selected over the entire length of the operating height of the ladder but in addition, the step or steps themselves are at all times coupled to the ladder so that they cannot become inadvertently separated and lost. Moreover, it will be clear from the description that it is not necessary to remove any fastening bolts or nuts in order to shift the position of a step. The only action needed is a simple one-handed manual operation to change the step level. Thus, no auxiliary tools or complicated maneuvers are necessary.

It will be understood, of course, that the bayonet sype slots may be formed in the legs at any desired intervals such as two inches or three inches, or even lesser or greater intervals depending upon the degree of level adjustment desired for the ladder.

In the preferred form of the invention, the front legs **11** and **12** are parallel to each other and the bayonet type slots simply formed therein. Alternatively, it would be possible to diverge the front legs **11** and **12** in a more conventional manner and make the strip **17** wedge shaped so that the inside opposing surfaces of the strips **17** in which the bayonet type slots and grooves are formed are essentially parallel to each other.

It is also possible to provide the rear legs with bayonet type slots along their inner opposed surfaces, these slots preferably being of a different interval in vertical spacing so that a more versatile adjustment of the stepladder is provided.

While only one particular embodiment of the invention has been described, it is to be understood accordingly

that the concept of this adjustable ladder is not to be thought of as limited to the one example set forth.

What is claimed is:

1. In a stepladder including a pair of front legs, means on the interior opposed surfaces of said legs defining a plurality of bayonet type slots running at equally spaced intervals along substantially the entire length of said legs; and at least one step having pairs of vertically spaced projections extending from opposite ends adapted to be received in selected pairs of said bayonet type slots in each opposed surface of said legs, respectively, to support said step between said front legs at a desired level and stabilize said step so as to maintain it substantially horizontal.

2. The subject matter of claim **1**, including means for retaining said step coupled to said ladder when shifting said step between various pairs of said slots to vary its level.

3. An adjustable stepladder comprising, in combination: a pair of front legs running parallel to each other; a pair of rear legs; means coupling the upper ends of said rear legs to the upper ends of said front legs; at least one step including first and second vertically spaced projections extending from opposite ends of said step; and a plurality of bayonet type slot structures formed on the inner opposed surfaces of said front legs respectively at equally spaced intervals along substantially the entire length of said legs, any successive two of said slots on each leg at equal levels being adapted to receive said projections to lock said step between said front legs whereby said step is adjustable in height in accordance with the level of the selected adjacent two of said slots on each leg.

4. An adjustable stepladder according to claim **3**, in which the inside portion of each of said front legs includes an elongated groove running along substantially the entire length of the leg, each groove opening out at the top portion of its respective leg, said bayonet slots having entrance portions communicating laterally with said grooves so that said projections can ride in said grooves during up and down adjusting movement of said step and then be received in selected entrance portions to lock into said bayonet slots whereby said step can only be separated from said legs by moving it to the upper end portions thereof to pass said projections of the upper end of each groove.

5. An adjustable stepladder according to claim **4**, in which each of said bayonet slots are defined by straight parallel entrance walls forming a right angle downward turn to terminate in a substantially square shaped receiving cavity, each of said projections being square shaped in cross-section to fit in said cavity.

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