Nov. 24, 1942. F. B. HULL 2,303,079

STEPLADDER

Filed July 11, 1940

FIG. 1

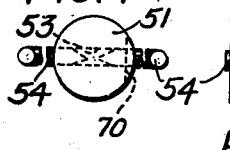


FIG. 3

FIG. 6

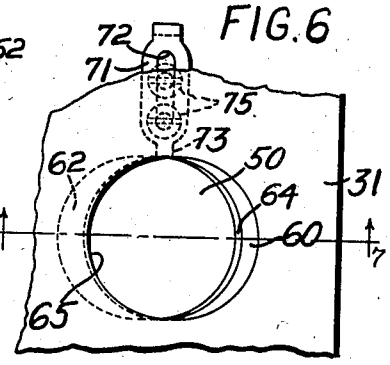


FIG. 2

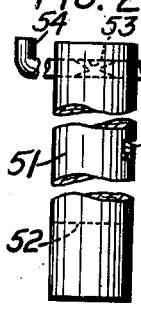


FIG. 4

FIG. 5

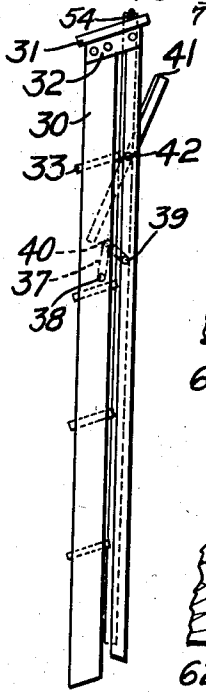


FIG. 7

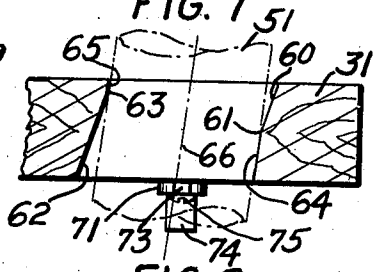


FIG. 8

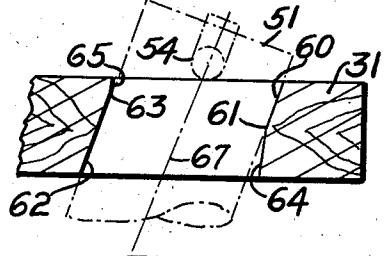


FIG. 9

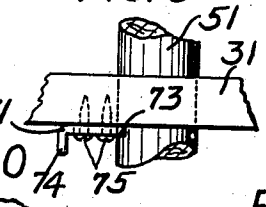


FIG. 10

FIG. 11

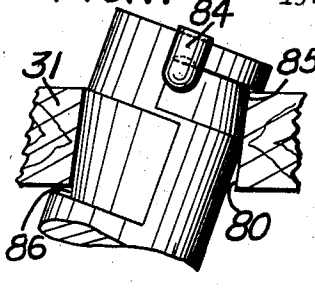


FIG. 12

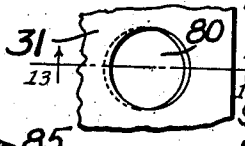


FIG. 13

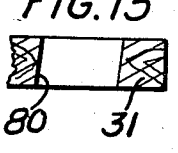


FIG. 14

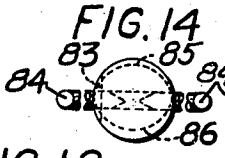


FIG. 15

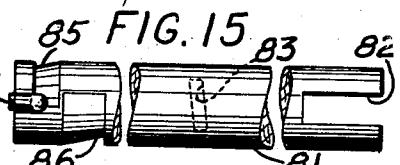


FIG. 17

FIG. 16

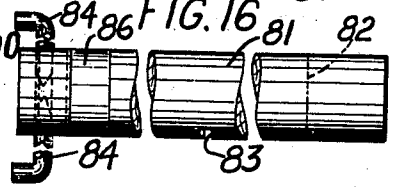
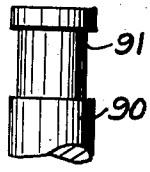


FIG. 18



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Patented Nov. 24, 1942 2,303,079

UNITED STATES PATENT OFFICE

2,303,079

STEPLADDER

Frederick B. Hull, Dayton, Ohio

Application July 11, 1940, Serial No. 346,455

8 Claims. (Cl. 228—67)

My invention relates to improvements in step ladders and particularly to the folding type of step ladder, and is more specifically an improvement over my invention illustrated and described in my co-pending application for Letters Patent of the United States, Serial No. 277,860, filed June 7, 1939.

I do not wish to limit my invention to the folding step ladder as it is susceptible of embodiment in connection with non-folding step ladders. Nor do I wish to limit my invention to any particular height of ladder, notwithstanding the drawings illustrating my invention show a five foot step ladder.

When climbing the ordinary step ladder, as one nears the top of the ladder, it is necessary to bend over and hold on to the top step to maintain one's balance before continuing on to the extreme top step or even to the next to the top step of the ladder.

Even after having steadied oneself by such bending over and holding to the top step, one often gets dizzy as he or she straightens up to an erect position to perform whatever task is before them.

Very often persons have fallen from step ladders due to their unsteadiness when nearing or reaching the top of the ladder.

Then too, some persons become scared when they near or reach the top of the ladder perhaps due to the fact that the ladder might wabble because of looseness in the joints of the ladder legs.

Many persons have been injured from falling off the ordinary step ladder due to the above reasons, and also due to the fact that they do not have a feeling of confidence in themselves nor do they have a feeling of safety when nearing or reaching the top step of the ladder, as there is nothing above the top step to provide any means of safety, or by which they might steady themselves.

To eliminate the above mentioned hazards and disadvantages appertaining to the use of the ordinary step ladder when climbing to the top step or near the top step, I have invented an improved step ladder having a novel and very useful safety means, simple, and compact in its construction, yet very effective in its function.

Such an improved safety step ladder is illustrated and described in my hereinbefore mentioned application for Letters Patent of the United States, Serial No. 277,860, filed June 7, 1939.

Therefore it is an object of my present invention to produce an improved step ladder with a safety device, whereby one climbing the ladder may steady oneself, thus eliminating the danger factors of fear, lack of confidence in high places, dizziness, etc.

It is another object of my present invention to produce a safety ladder simpler in construction, and easier to manufacture.

Another object of my invention is to produce an improved step ladder provided with safety means adjustable from an ineffective position into an effective position, and having the top step of the ladder constructed to positively align the safety means while the latter is in its effective position, to prevent any shaking motion of the safety means where it passes through the top step of the ladder.

Another object of my invention is the production of a safety ladder wherein the safety means is also positively aligned with the ladder legs when the safety means is in its ineffective position, thus preventing said means from wabbling around when the ladder is packed for storage or shipment.

A further object of my invention is the production of an improved safety ladder which eliminates the locating pins of my former safety ladder, shown in my above mentioned application for Letters Patent of the United States.

A more specific object of my invention is to provide the top step of my safety ladder with a peculiarly shaped opening to guide and hold the safety means, when the latter is in its effective position, and also when said safety means is in its ineffective position.

A further specific object of my invention is to provide my safety ladder top step with a peculiarly shaped opening to cooperate with a novelly constructed safety bar or rod, to maintain the same rigid in both of its adjustable positions.

Another object of my invention is to provide the top step of my safety ladder with an opening having a plurality of angled sides to cooperate with a plain safety bar or rod to retain the same in the proper position relative to the bottom support for the bar or rod when the same is in one of its adjustable positions, and to retain said rod in the proper position when said rod is in another of its adjustable positions.

Another object of my invention is to provide the top step of my safety ladder with an opening of such a shape as to cooperate with a safety rod having a plurality of novel sections thereof to retain the safety rod in its several positions of adjustment.

With these and incidental objects in view my

novel invention includes certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims, and a preferred form or embodiment of which is hereinafter described with reference to the drawing which accompanies and forms part of this specification.

Of said drawing:

Fig. 1 is a top view of the safety means disassembled from the ladder.

Fig. 2 is a rear view of the same.

Fig. 3 is a side view of said safety means.

Fig. 4 shows a side view of my improved step ladder in its open position, the safety means being in its effective position.

Fig. 5 shows a side view of the latter closed for storage, with the safety means confined therein in its ineffective position.

Fig. 6 is an enlarged plan view of a portion of the top step of the ladder showing the construction of the novel opening for guiding the safety means.

Fig. 7 is a section on line 7—7 of Fig. 6, and also shows the safety means, in dot-and-dash lines, in its effective position.

Fig. 8 is also a section on line 7—7 of Fig. 6 and shows the safety means guided in the special opening when the safety means is in its ineffective position.

Fig. 9 shows a front view of a portion of the top step of the ladder with the safety means in effective position and also shows the locking slide in locking position.

Fig. 10 shows a portion of one of the other steps of the ladder and illustrates how the same are cut out to accommodate and guide the safety means when the latter is confined between the ladder legs for storage.

Fig. 11 is an enlarged view of a modified form of my safety means shown in the position it occupies when the ladder is closed, the top step of the ladder being shown in section to illustrate the modified form of the special opening which cooperates with the safety means.

Fig. 12 is a top view of a portion of the top step of the ladder showing the modified form of the special opening therein.

Fig. 13 is a section on line 13—13 of Fig. 12.

Fig. 14 is a top view of my modified form of safety means disassembled from the ladder.

Fig. 15 is a left side view of the same.

Fig. 16 is a rear view of the same.

Fig. 17 is top view of a second modification of a safety means for my improved ladder.

Fig. 18 is a side view of the same.

Detailed description

Figs. 4 and 5 show a step ladder, the front legs **30** of which have secured to the top step **31**, by means of angle plates **32**, only one leg **30** and plate **32** being shown. The front legs **30** support the usual steps **33**. Rear legs **34** (only one shown) are pivoted to the plates **32** at **35** and are braced by the usual cross bars **36**, shown in dotted lines only in Fig. 4.

The usual spreading bars **37**, only one shown, are pivoted to the front legs **30** at **38** and to the rear legs **34** at **39** in the usual manner, and have a handle **40**, or in some types of ladders are shaped to form a handle at the central part thereof where they are pivoted, for manipulation when opening and closing the ladder. The usual shelf **41** is pivoted at **42** to the rear legs **34**.

As stated above my invention includes a step ladder with a safety means for persons climbing the ladder and is an improvement over my invention disclosed in my co-pending application for Letters Patent of the United States, Serial No. 277,860, filed June 7, 1939.

My present invention is simpler in construction, whereby the safety means is more easily adjusted from its ineffective position to its effective position, and vice-versa. My novel construction also positively aligns and retains the safety means in its proper angular position relative to the spreading means support when said safety means is in its effective position. My novel construction also aligns and retains the safety means in its proper position relative to the ladder legs when said safety means is in its ineffective position. My improved safety ladder also eliminates the use of the locating and locking pins of my above mentioned co-pending application, thus making for a cheaper construction and more effective in the maintenance of the safety means in its positions of adjustment, and what is very important, maintaining the same factors of safety even with the cheaper construction.

In my present invention the top step **31** of the ladder has an aperture **50** Figs. 6, 7 and 8 adapted to receive a safety rod **51**, Figs. 1 to 5, 7 and 8. This rod is preferably made of a good strong hard wood which is tough but not brittle. However I do not wish to limit myself to a wooden rod as rods of other materials may be used with the same effectiveness, so long as they are not too heavy as to become cumbersome for handling. Lightness in materials, with a sufficient factor of safety is all important for ease of handling especially when the ladder is used for household purposes where women use them a great deal for cleaning purposes about the house.

The rod **51** has a slot **52** in its lower end to facilitate engagement of this end of the rod with the handle **40** of the spreading bars **37**. In case the spreading bars **37** are of a different type at the center junction, that is where they are joined by the handle **40**, or if the handle **40** is shaped differently, then the slot **52** is to be cut to fit whatever type of spreading bars and handle are used in the ladder.

Near the top, the rod has a hole **53** into which are driven from opposite sides a pair of heavy pins, bent up at their outer ends to function as hooks upon which may be hung cleaning cloths or other implements being used by the person on the ladder.

These pins **54** rest on the top step **31** and act as supporting or suspending means for the rod **51** when the latter is in its ineffective position, confined between the legs **30** and **34** as shown in Fig. 5, and also in Fig. 8.

The relation between the top step **31** and the front legs **30** never changes and the aperture **50** (Figs. 6 to 8), is especially constructed to retain the rod **51** in its proper positions of adjustment at all times and comprises bores made on two separate and distinct angles. These intersecting bores are of a size to provide a nice sliding fit for the rod **51** in either of its positions and also while it is being moved from one position to another.

One bore **60—62** is substantially parallel to the legs **30**, and, as shown in Fig. 7, that portion of the wall **60** of the bore **60—62**, at line **7—7** where the section is taken extends from the top of the step **31** to a point **61** substantially midway through the step **31**. That portion of the wall

62 of said bore 60—62 extends from the bottom of the step 31 to a point 63 substantially ⅛ of an inch from the top of the step 31.

The other bore 64—65 is on such an angle relative to the legs 30, as to maintain the rod 51 in the position shown in Fig. 4, with the center of the rod on a line passing therefrom through the center of the handle 40 or center pivot of the spreading bars 37. This bore 64—65 is the same diameter as the first mentioned bore 60—62 and the portion designated 64 thereof extends from point 61 to the bottom of the step 31, and the portion designated 65 extends from the top of the step 31 to the point 63.

In Fig. 7 the safety rod 51 is shown in its effective position whereby it is in contact with the bores 64—65 a center line 66 of which passes through the center of the handle 40 (Figs. 4 and 7). The rod 51 in this position (Fig. 7) is guided and retained by this angled bore 64—65 so that there is no motion of the rod at the point where it passes through the top step 31. This is the effective position of the rod 51 and the slot 52 thereof is engaged by the handle 40 at this time. Therefore the rod is perfectly safe and a person can climb to the top of the ladder by grasping the rod and feel safe at all times as he or she nears or reaches the top of the ladder.

When the ladder is closed then the rod is in the position shown in Figs. 5 and 8 wherein the rod contacts the other bore 60—62 of the aperture 50. A center line 67 of this bore is substantially parallel to the front legs 30 so that the rod will hang correctly between the front and rear legs of the ladder when the same is closed or folded up for storage or shipment.

To adjust the rod from its effective position of Figs. 4 and 7 to its ineffective position of Figs. 5 and 8 it is lifted until it is disengaged from the handle 40 and then slid down until the pins 54 rest on the top step 31. The handle 40 is then grasped and the ladder is folded up into the position shown in Fig. 5. As the ladder is folded the rod 51, due to the bore 60—62 freely swings forwardly at the bottom, pivoting on the pins 54, until the rod contacts clearance and guiding notches 68 (Fig. 10) cut in the rear of the steps 33. The rod as it is lowered may follow the bore 60—62 or the bore 64—65 depending upon the angular position of the ladder while it is being closed. If left standing until the rod is way down, which is the preferable way to do, then the rod will follow the bore 64—65 until the ladder has started to fold, at which time the rod will begin to swing and will continue to swing until the ladder is completely folded.

The rod 51 has a notch 70 cut in its side on an angle which is at right angles to the bore 64—65 whereby when the rod is in its effective position the notch 70 is parallel to the top step 31. This notch 70 is so located relative to the top of the rod as to be opposite a slide or detent 71 (Figs. 6, 7 and 9) when the rod is in its upper position. The detent 71 has a slot 72 by means of which it is slidably mounted on the under side of the top step 31 and has a nose 73 adapted to be moved into the notch 70 by manual operation through an ear 74 bent downwardly therefrom. Screws 75 may be used to retain the detent 71 in position.

Modified form

Figs. 11 to 16 illustrate a modified form of my invention wherein the top step 31 has only one bore 80 on an angle the same as the bore 64—65 described in my preferred form.

A safety rod 81 having a slot 82 at the lower end thereof and a notch 83 like the previously described notch 70 and also having a pair of pins 84 like the pins 54 is used in this form.

This safety rod 81 has an arcuate notch 85 the radius of which is one half the diameter of the rod 81. This notch 85 is also tapered as shown in Figs. 11 and 15 so that it fits the bore 80 when the rod 81 is in its lower or ineffective position. The rod 81 has another arcuate notch 86 the radius of which is one-half the diameter of the rod 81. This notch 86 is also tapered as shown in Figs. 11 and 15 so that it fits the bore 80 when the rod 81 is in its lower or ineffective position and the pins 84 are resting on the top step 31.

In this modified form the notches 85 and 86 of the rod 81 function to permit the rod to swing forwardly at the bottom when the ladder is folded in the same manner as the bores 60—62 and 64—65 cause the rod 51 to swing as the ladder is folded. The rod 81 now contacts the clearance or guide cuts 68 (Fig. 10) which slots are cut on an angle parallel to the legs 30, and thus retain the rod 81 in its ineffective position.

The detent 71 cooperates with the slot 83 in the same manner as it cooperates with the slot 70. The slot 83 is also cut on the same angle as the slot 70 so as to be parallel with the top step 31 when the ladder is open for use.

Second modification

Figs. 17 and 18 show a second modification of the safety rod, which rod is numbered 90. This rod 90 has a slot in the bottom like the slot 52 and a notch like the notch 70, neither of which are shown. This rod 90 also has a pair of pins like the pins 54, which are not shown.

This rod 90 has an annular groove 91 near the top, which may be used with a ladder having a top step 31 with a single bore, for example like the bore 80 to permit the rod 90 to swing freely forward at the bottom as the ladder is folded.

While the forms of devices herein shown and described are admirably adapted to fulfill the objects primarily stated, it is to be understood that my invention is not limited to the forms shown, as other forms may be used, all coming within the scope of the claims which follow.

What I claim is:

1. In a device of the class described, the combination of a step ladder; means extending above the top of the ladder and adapted to be moved downward into a position between the front and rear legs of the ladder; and means including differently sloped walls of intersecting bores in the top step of the ladder, the sloped wall of one of the intersecting bores acting to retain said first mentioned means in a certain angular position when above the top of the ladder and the sloped wall of the other of said intersecting bores permitting said first mentioned means to assume another angular position when down between the ladder legs when said legs are closed.

2. In a device of the class described, the combination of a folding step ladder; a safety device extending above the top step of the ladder and adapted to be moved down between the ladder legs; means including the wall of a bore through the top step of the ladder to retain said device in a certain angular position when above the ladder; and means including the wall of a second bore through the top step of the ladder and made

at a different angle than said first mentioned bore and intersecting the first mentioned bore to permit said device to swing from said certain angular position into another angular position when said device is down between the ladder legs.

3. In a device of the class described, the combination of a step ladder, the top step of which has an aperture constructed by a plurality of intersecting bores made at different angles; and a safety member supported by the ladder and controlled as to position by the walls of said intersecting bores.

4. In a device of the class described, the combination of a step ladder; a spreading means pivoted to the front and rear legs and also pivoted near the center of said means; the top step of the ladder having an aperture with a plurality of differently sloped portions formed by two intersecting bores made at different angles off the vertical; and a safety device associated with the ladder and having an effective and an ineffective positions and cooperating with those portions of the aperture formed by one of said two intersecting bores to retain said device in a definite position relative to the center pivot of the spreading means when the latter is open and when said device is in its effective position, and cooperating with those portions of said aperture formed by the other of said two intersecting bores to retain said device in another position relative to the ladder legs when the device is in its ineffective position when the spreading means is closed.

5. In a device of the class described, the combination of a step ladder, the top step of which has a bore made by cutting on two different angles, the bore being slightly shorter in distance from front to rear edges at the top side of the step than at the bottom side of the step, each of said distances being greater than the width of said bore at its sides, one of the front surfaces of the bore extending from the bottom of the step to a point substantially ⅞ of the distance through the thickness of the step at one angle, the other front surface of said bore extending from said point to the top of the step at a lesser angle from the vertical, one of the rear surfaces of the bore extending from the top of the step to a point substantially midway through the step at said one angle, and the other rear surface extending from the last mentioned point to the bottom of the step at said lesser angle; and a safety member having a plurality of positions of adjustment and cooperating with said surfaces of the bore to be controlled as to angular position thereby.

6. In a device of the class described, the combination of a step ladder; spreading means therefor; a safety member having an effective position and an ineffective position; the top step of the ladder having an aperture the wall of which has certain portions inclined at different angles, the lower rear half of said wall extending upwardly at one angle from the bottom edge of the top step to a point half way through said top step, and the upper front half of said wall extending downwardly at the same angle from the top edge of the top step to a point one-eighth of the thickness of said top step, said lower rear half and said upper front half being a guide for said member when it is in its effective position to retain the member in a definite position relative to the spreading means, the remaining portion of said aperture wall including the upper rear half of said wall extending downwardly at a different angle from the top edge of the top step to a point half way through said top step and the lower front half of said wall extending upwardly at said different angle from the bottom edge of the top step upwardly to a point seven eighths of the thickness of said top step, said upper rear half and said lower front half of said wall being a guide for said member when it is in its ineffective position to retain said member in a definite position relative to the ladder legs.

7. In a device of the class described, the combination of a step ladder; spreading means therefor; a safety member having an effective position and an ineffective position; the top step of the ladder having an aperture the wall of which has certain portions inclined at different angles, the lower rear half of said wall extending upwardly at one angle from the bottom edge of the top step to a point half way through said step, and the upper front half of said wall extending downwardly at the same angle from the top edge of the top step to a point one eighth of the thickness of said top step, said lower rear half and said upper front half of said wall being a guide for said member when it is in its effective position to retain the member in a definite position relative to the spreading means, the remaining portion of said aperture wall including the upper rear half of said wall extending downwardly at a different angle from the top edge of the top step to a point half way through said step and the lower front half of said wall extending upwardly at said different angle from the bottom edge of the top step to a point seven eighths of the thickness of said top step, said upper rear half and said lower front half of said wall being a guide for the member when it is in its ineffective position, all other steps of the ladder below the top step being formed to cooperate with said member when it is in its ineffective position.

8. In a device of the class described, the combination of a step ladder, the top step of which has an aperture the wall of which is provided with a plurality of differently angled portions, one portion includes the lower rear half of the aperture and extends upwardly at a certain angle off the vertical half way through the top step, a second portion includes the front upper half of the aperture and extends downwardly parallel to said one portion one eighth of the distance through said top step, a third portion includes the rear upper half of the aperture and extends downwardly at a greater angle off the vertical half way through the top step, a fourth portion includes the front lower half of the aperture and extends upwardly parallel to said third portion seven eighths of the distance through said top step; an adjustable safety means supported by the ladder and cooperating with said one portion and said second portion of the aperture when in one position of adjustment and with said third portion and said fourth portion of said aperture when in another position of adjustment; and a manually operable detent cooperating with shoulders in said safety means, said shoulders being arranged at right angles to said one position.

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