March 5, 1946. F. M. SPAYD 2,396,028

STEPLADDER

Filed April 17, 1942 2 Sheets-Sheet 1

FIG. 1

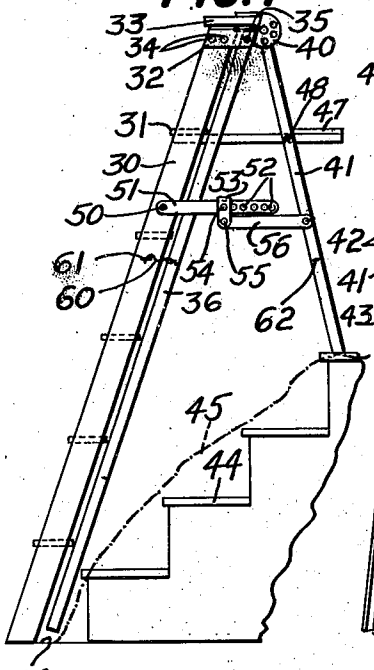


FIG. 2

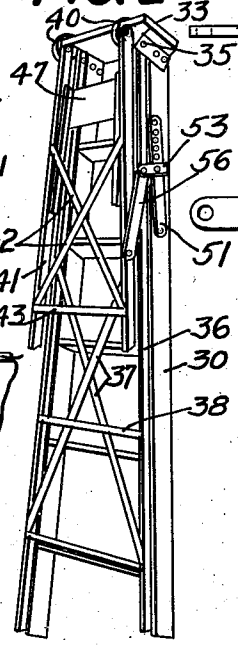


FIG. 3



FIG. 4

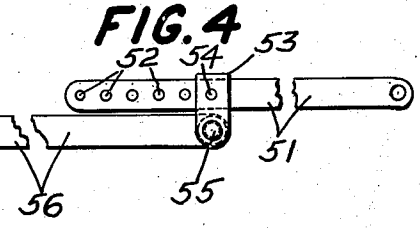


FIG. 5

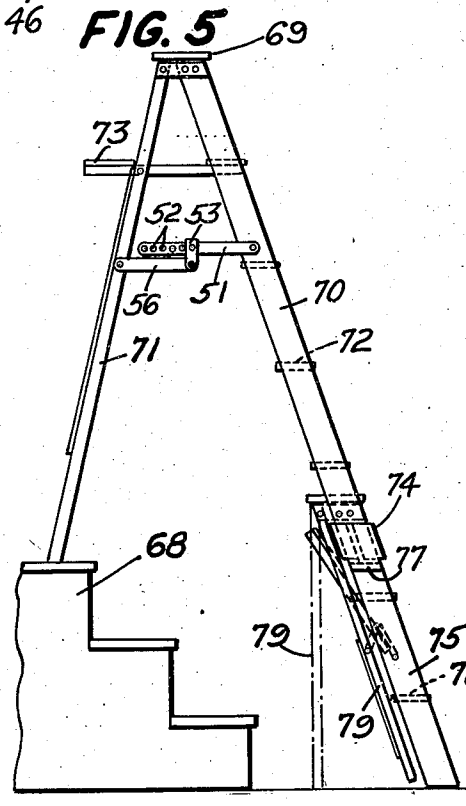


FIG. 6

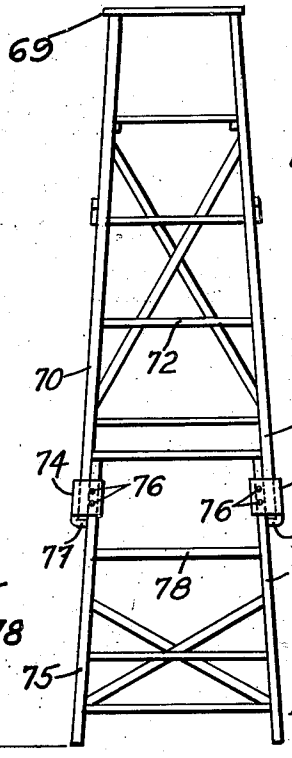


FIG. 7

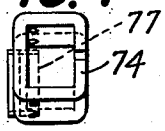
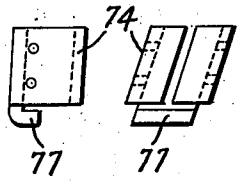


FIG. 8 FIG. 9



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March 5, 1946. F. M. SPAYD 2,396,028

STEPLADDER

Filed April 17, 1942 2 Sheets-Sheet 2

FIG. 10

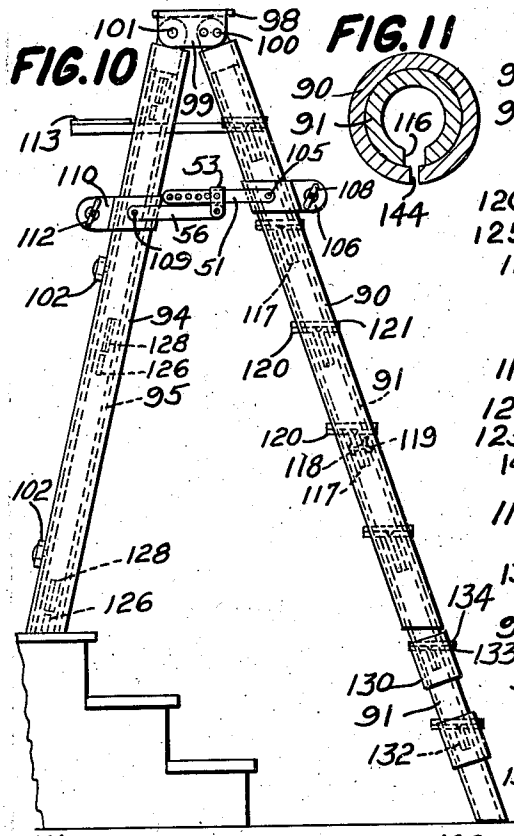


FIG. 11

FIG. 12

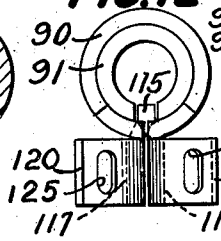


FIG. 13



FIG. 14

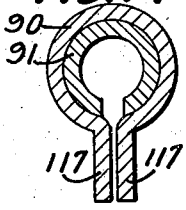


FIG. 15

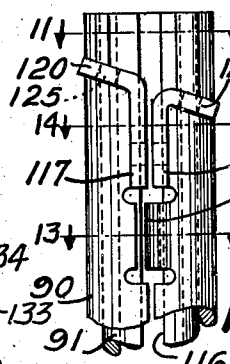


FIG. 16

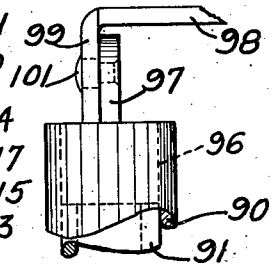


FIG. 17

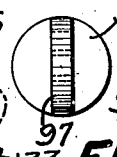


FIG. 18

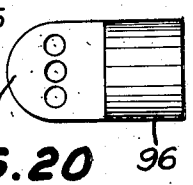


FIG. 19

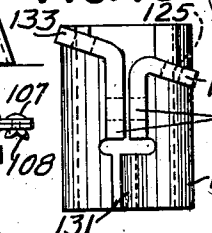


FIG. 20

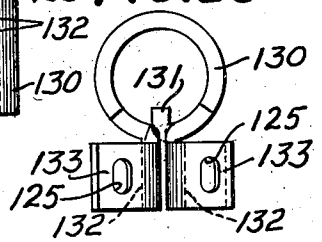


FIG. 21

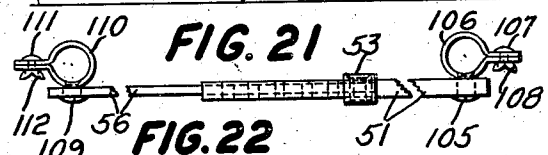


FIG. 22

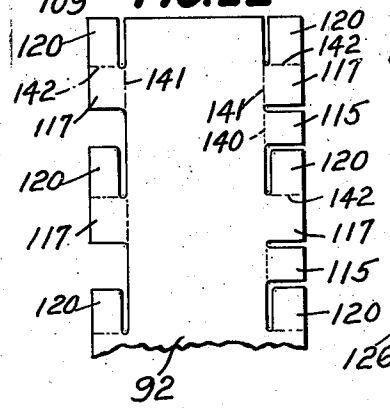


FIG. 23

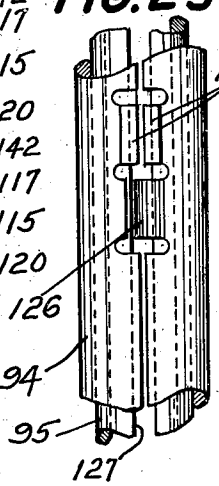
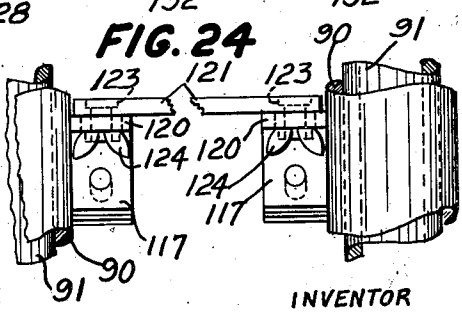


FIG. 24



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Patented Mar. 5, 1946 2,396,028

UNITED STATES PATENT OFFICE

2,396,028

STEPLADDER

Fred M. Spayd, Van Wert, Ohio, assignor to F. M. Spayd Engineering Corporation, Dayton, Ohio, a corporation of Ohio

Application April 17, 1942, Serial No. 439,349

5 Claims. (Cl. 228—27)

This invention relates to step ladders and more particularly to one which can be conveniently used on stair steps and other uneven places where the usual step ladder cannot be used.

The step ladders now on the market cannot be used on stair steps or on any base, foundation or ground where one part of the same is substantially higher than the other part. For example, at the edge of a terrace which is, say, anywhere from one foot to two feet in height. This is due to the fact that the step ladders now being marketed are made to set on level, or substantially level places. Therefore, a step ladder could not be used to reach places above stair steps and above the edges of terraces.

However with the use of my invention, in the form of a novel step ladder, a person can reach many places which were impossible to reach by the step ladders now on the market.

It is, therefore, an object of my invention to provide a novel step ladder which can be used on stair steps and other places of uneven contour.

Another object is to provide a novel step ladder having more than two pairs of legs.

Another object is to provide an auxiliary pair of legs whereby the ladder can be used on stair steps.

Another object is to provide an auxiliary pair of legs in the form of a short household-ladder with coupling means thereon, so that an ordinary ladder may be coupled thereto to form a novel ladder which can be used on stair steps and other uneven places.

A further object is to provide a step ladder with two pairs of rear legs, one pair being shorter than the other pair, and so arranged that either pair can be used depending upon the place where usage is desirable.

A still further object is to provide a step ladder with two pairs of rear legs, either of which can be moved into effective or ineffective positions and retained in such positions.

A further object is to provide novel spreading means for my step ladder to compensate for the different pitches of various stair steps.

Another object is to provide a step ladder with an auxiliary pair of adjustable front legs.

Another object is to provide adjustable step brackets arranged to compensate for the gradually increasing distance between the auxiliary front legs as they are extended to make the front legs of the ladder longer than the rear legs, whereby the ladder can be used on stair steps and other uneven places.

A further object is to produce ladder legs, tubular in shape, from flat material, and having flanges formed thereon for clamping purposes, and also having wing portions bent from said flanges, to support ladder steps.

A further object is to provide a step ladder with tubular telescoping legs formed from flat material and arranged with appurtenances to clamp the telescoping legs in any adjusted position, to guide the two legs relative to each other while being adjusted, and to form supports for the ladder steps.

A still further object is to provide a step ladder with adjustable telescopic legs.

With these and other incidental objects in view, my invention includes certain other novel features and combinations of elements, the essential elements of which are set forth in appended claims, and a preferred and modified forms on embodiments, of which are hereinafter illustrated and described with reference to the drawings which accompany and form part of this specification.

Of said drawings:

Fig. 1 shows one form of my novel step ladder in use on stair steps.

Fig. 2 shows the same ladder folded up.

Fig. 3 is an enlarged top edge view of my novel ladder spreading means in its open or effective position.

Fig. 4 is a side elevation of the same spreading means.

Fig. 5 is a modified form of my invention showing auxiliary front legs consisting of a short household-ladder coupled to the regular front legs of an ordinary ladder.

Fig. 6 is a front view of the ladder of Fig. 5.

Fig. 7 is an enlarged top view of the left side coupling bracket for the ladder of Figs. 5 and 6.

Fig. 8 is a front view of said coupling bracket.

Fig. 9 is a side elevation of said coupling bracket.

Fig. 10 is another modified form of my invention showing a step ladder with auxiliary front and back legs.

Fig. 11 is a section on line 11—11 of Fig. 15.

Fig. 12 is an enlarged top view of the right front leg and its auxiliary leg.

Fig. 13 is a section on line 13—13 of Fig. 15.

Fig. 14 is a section on line 14—14 of Fig. 15.

Fig. 15 is an enlarged portion of the right front leg and its auxiliary leg, in side elevation.

Fig. 16 shows how the ladder legs are attached to the top step of the ladder.

Fig. 17 is a plan view of the attachment plug

for securing the top step of the ladder to the ladder legs.

Fig. 18 is a side elevation of the same.

Fig. 19 is an enlarged view of the step supporting clamp for the extra steps for the auxiliary legs when in use.

Fig. 20 is an enlarged top view of the same.

Fig. 21 is an enlarged edge view showing how my novel spreading means is attached to the tubular legs of the ladder shown in Fig. 10.

Fig. 22 shows in reduced scale, the shape of the blanked out material for forming the outer tubular front legs of the ladder shown in Fig. 10.

Fig. 23 shows a portion, in enlarged scale, of one of the rear legs and its auxiliary legs of the ladder of Fig. 10.

Fig. 24 shows how the steps are supported on their winged flange supports.

Detailed description

Referring to Figs. 1 and 2 my novel step ladder includes a pair of front legs **30** with the usual steps **31**. These legs **30** are secured to brackets **32**, attached to the top step **33** of the ladder by the usual rivets or bolts **34**. Pivoted at **35** to the brackets **32** is a pair of rear legs **36** of the usual length. These legs **36** are braced by the usual cross bars **37** and a bar **38**.

Attached by hinged brackets **40** to the top step **33** is a pair of auxiliary legs **41** braced by cross bars **42** and a bar **43**. The auxiliary legs **41** are shorter than the rear legs **36** so that the step ladder can be used on stair steps **44** or on other uneven places such as a terrace **45** (shown in dot-and-dash lines in Fig. 1), rising from the normal ground level **46**.

A utility shelf **47** is carried by the auxiliary legs **41** and said shelf is pivoted at **48** to the legs **41**. Arms **49** of the shelf **47** contact the under side of the next to the top step **31** when the ladder is open and the shelf is down in effective position.

Since all stair steps do not have the same width of treads, which accounts for stairs having different pitches, I have provided novel spreading means for my ladder to compensate for said varying pitches of different stair steps. This is in addition to the adjustment afforded by the hinged brackets **40**.

There are two spreading means, both identical. One connects the right side front leg **30** with the right side auxiliary leg **41** Fig. 1, and the other spreading means connects the left side front leg **30** with the left side auxiliary leg **41** (Fig. 2). A description of one of these spreading means will suffice for both.

This spreading means is shown in enlarged scale in Figs. 3 and 4. Pivoted at **50** to the front leg **30** is a bar **51** having a series of holes **52**. A U-bar **53** or yoke embraces the bar **51** and is held in position by a removable pin **54**. This yoke **53** extends below the bar **51** and its ends are connected by a shouldered stud or rivet **55** upon which is pivoted a bar **56** which in turn is pivoted to the auxiliary leg **41** which is in the same plane of the leg **30** to which the bar **51** is pivoted. This spreading means, consisting of the bars **51** and **56** and the yoke **53** may be lengthened by pulling the pin **54** and adjusting the yoke **53** into alingnment with any of the series of holes **52**. Therefore, the "spread" of the ladder legs may be adjusted to suit the conditions under which the ladder is being used, especially to take care of the different pitches of various stair steps.

Each of the rear legs **36** carries a latch in the form of a hook **60** adapted to cooperate with a keeper **61** on the front legs **30** and keepers **62** on the auxiliary legs **41**.

When the ladder is used as shown in Fig. 1, the hooks **60** are latched in the keepers **61** thus maintaining the rear legs **36** adjacent the front legs **30**.

When the ladder is used as here shown, the spreading means consisting of the bars **51** and **56** prevent the ladder from folding up.

When the ladder is used in the regular way, then the hooks **60** are latched in the keepers **62** whereby the auxiliary legs **41** are maintained adjacent the rear legs **36** and the spreading bars **51** and **56** function to hold the ladder legs the proper distance apart and prevent the ladder from closing or folding up.

When the ladder is folded up or closed, then the spreading bars **51** and **56** assume the position shown in Fig. 2.

Modification

The modified form of my invention shown in Figs. 5 to 9 inclusive is constructed so that it can be used in the regular manner and also so that it can be used on stair steps and other uneven places in the same manner as the ladder shown in Figs. 1 and 2, when it is coupled to a short household-ladder to form one of the modifications of my invention.

This form of my invention includes a regular step ladder **69** having the usual front legs **70**, steps **72** and rear legs **71**. It also has a shelf **73**. The front legs **70** and the rear legs **71** are the same length.

To make this ladder of Figs. 5 and 6 usable on stair steps **68** such as shown in Fig. 5, the front legs **70** are simply slipped into a pair of coupling brackets **74** (Fig. 6, one right hand and one left hand), secured to front legs **75** of a short household-ladder, by means of bolts or pin **76**. The coupling brackets **74** have stop flanges **77** for the bottoms of the legs **70** to rest upon.

The legs **75** of the short ladder have the usual steps **78** which provide the auxiliary steps whereby a person may climb to the bottom step **72** of the ladder legs **70**. Rear legs **79** are provided for the short ladder and may be folded in as shown in Fig. 5 or said legs **79** may be left in open position (shown in dot-and-dash lines) if desirable. Or if the legs **79** are of the kind that do not fold up then they will be in the dot-and-dash line position.

Thus by providing a short household-ladder with simple coupling brackets **74** the ladder **69** may be easily attached thereto to provide a novel step ladder which can be used on stair steps **68** or such novel ladder may be used in other places where the base, foundation or ground is very uneven, or especially where a terrace is involved.

Modification

In Figs. 10 to 24 there is shown another modification of my invention. This modification is a step ladder which also may be used on stair steps and other uneven places like the ladder shown in Figs. 1 and 2.

This ladder has tubular legs made to slide one within the other so that they may be adjusted for use as above described.

The ladder of this modification includes a pair of front legs comprised of an outer tube leg **90** and an inner tube auxiliary leg **91**. The outer tubes are made right and left, but both are made from a common blank **92** (Fig. 22). The rear

pair of legs comprise an outer tube leg 94 and an inner tube leg 95, the latter being the auxiliary leg.

The legs 90 and 94 each have secured in the top thereof a plug 96 having an ear 97. A top step 98 has bent over ends 99 and the front legs 90 are secured thereto by two bolts or rivets 100. The rear legs 94 are each secured to one of the ends 99 by a bolt or stud 101 so that the rear legs can pivot in order to fold up the ladder when desirable. The rear legs 94 may be braced by two bars 102 (Fig. 10) connecting them across the back.

The spreading means for this ladder is identical with that used with the ladders of Figs. 1 and 5 and consists of the bars 51 and 56, yoke 53 and pivot pin 55. The bar 51 is pivoted on a stud 105 (Fig. 21) carried by a clamp 105 clamped around the leg 90 (Fig. 10) by means of a bolt 107 and nut 108. The bar 56 is pivoted on a stud 109 carried by a clamp 110 clamped around the leg 94 by means of a bolt 111 and nut 112. There is a spreading means on each side of this ladder which connects each front leg 90 with its associated rear leg 94. This ladder is provided with the usual shelf 113 pivoted to the rear legs 94.

Each leg 90 has several bent over ears 115 (Figs. 12, 13 and 15) which slide in a slot 116 running the entire length of the auxiliary leg 91 to act as a guide and clamping devices to retain the auxiliary leg 91 in any position into which it has been adjusted to lengthen the front legs of the ladder.

Adjacent the ears 115 are pairs of clamping flanges 117 with bolts 118 and nuts 119 to draw the legs 90 tightly around the auxiliary legs 91 whereby the ears 115 are caused to also "bite" in the slot 116 to prevent any possible slipping upwardly of the auxiliary leg 91 when the same has been extended below the leg 90 to lengthen the front legs of the ladder.

There are as many pairs of clamping flanges 117 as there are to be steps in the ladder, and therefore these flanges 117 have bent over wings 120 to carry steps 121 which may be secured to said wings by bolts 123 and nuts 124. These wings 120 have slots 125 to provide for slight endwise adjustment of the steps 121 when assembling.

The rear legs 94 have ears 126 (Fig. 23) arranged at the proper intervals to cooperate with a slot 127 in the auxiliary leg 95 so that it too may be extended below the leg 94 if desirable.

The legs 94 have clamping flanges 128 like the flanges 117 and they are for the same purpose of carrying bolts and nuts to clamp the legs 94 and 95 securely together in any position in which they may be adjusted relatively to each other.

Should the auxiliary legs 91 be extended to such a distance that the bottom step 121 on the legs 90 is too far from the ground, then an additional step or steps may be necessary. In this event I have provided an auxiliary support for such steps, which support is in the form of a collar 130 (Figs. 10, 19 and 20) having a clamping and guiding ear 131 to ride in the slot 116. This ear 131 is like the ears 115 and is for the same purpose as explained.

The collar 130 also has a pair of clamping flanges 132 with wings 133 to carry an auxiliary step 134 (Fig. 10) in the same manner as the step 121 is carried by the wings 117.

In making the tubular legs 90, the blank 92 is first made as shown in Fig. 22. The reference numbers applied thereto are the same as the corresponding bent parts on the finished and formed leg 90. The ears 115 are bent in, on the lines 140, the flanges 117 are bent on the lines 141 and the wings 120 are bent on the lines 142. The blank 92 is formed into a cylindrical or tubular leg 90 which leaves a narrow slit 144 as shown in Figs. 11 and 15.

From the above illustrations and descriptions it can be clearly seen that all three of my forms of ladders are very useful for the same purpose, that is the particular use in connection with stair steps and other uneven surfaces where the usual and ordinary ladders cannot possibly be used, and for this reason my invention supplies a much needed article.

While the forms of devices herein described and illustrated are admirably adapted to fulfil the objects primarily stated, it is to be understood that I do not wish to limit my invention to the particular and specific forms shown in the embodiments illustrated, for it is susceptible of embodiment in various forms, all coming within the scope of the claims which follow.

What I claim is:

1. In a step ladder, the combination of two pairs of legs, one pair being pivotally mounted for movement relatively to the other pair; a third pair of legs pivotally mounted adjacent the pivot of said one pair, said third pair of legs adapted to be moved relatively to said other pair of legs by said one pair of legs when the latter is moved relatively to said other pair of legs, said third pair of legs being also movable relatively to said two pairs of legs; a latch device carried by said one pair of legs and adapted to connect said two pairs of legs together and also adapted to connect said one pair of legs to said third pair of legs; and ladder spreading means operable by said third pair of legs to spread the third pair of legs from said other pair of legs when the third pair of legs is moved relatively to said two pairs of legs when said latch connects said two pairs of legs together.

2. In a step ladder having a pair of front legs, a pair of middle legs pivotally mounted for movement relatively to said front legs, and a third pair of legs pivotally mounted adjacent the pivotal mounting of the middle legs for movement relatively to the front legs and relatively to the middle legs, said third pair of legs also movable with the middle legs; latching means adapted to latch the front and middle pairs of legs together and also adapted to latch the middle and third pairs of legs together; and ladder spreading means in a non-spreading position when the ladder is closed and adapted to be moved into effective spreading position by the third pair of legs when said third pair is moved relatively to the middle legs and relatively to the front legs, when said front and middle pairs of legs are latched together said spreading means also adapted to be moved into effective spreading position by the middle legs when the latter are moved relatively to the front legs when said middle and third pairs of legs are latched together.

3. In a step ladder adapted for normal use and for use on stair steps of varying pitches, said ladder including a pair of front legs, a pair of rear legs pivotally mounted for movement relatively to said front legs, and a pair of auxiliary legs pivotally mounted for movement relatively to said front legs and relatively to said rear legs and also for movement with said rear legs; ladder spreading means connected to the pair of front legs and to the pair of auxiliary legs; and a latch device to connect the pair of rear legs to the pair of

front legs to prevent relative movement between said rear legs and said front legs when the auxiliary legs are moved relatively to both the front legs and the rear legs to render the ladder usable on stair steps and to connect said pair of rear legs to the pair of auxiliary legs to render the spreading effective to properly spread the rear legs from the front legs when the ladder is used in the normal manner.

4. A step ladder having two regular pairs of legs for normal use, one of said pairs of legs being pivotally mounted for movement relatively to the other pair of legs, and including an additional pair of legs pivoted adjacent the regular pair of legs and movable relatively to said one pair of legs to render the ladder usable on stair steps and other uneven places, and movable with said one pair of legs when the latter is moved to render the ladder normally usable; adjustable spreading means pivotally connected to said other pair of the regular legs and to the additional pair of legs and adapted to be effective with either of said usages of the ladder; and means to connect the two regular pairs of legs together to render said one pair of legs ineffective when the ladder is used on stair steps, and also adapted to connect the last mentioned one pair of legs to the additional pair of legs when the ladder is in normal use to render the adjustable spreading means effective for normal use of the ladder.

5. In a step ladder having a pair of front legs, a pair of middle legs pivotally mounted for movement relatively to said front legs, and a third pair of legs pivotally mounted adjacent the pivotal mounting of the middle legs for movement relatively to the front legs and relatively to the middle legs, said third pair of legs also movable with the middle legs; ladder spreading means connecting the pair of front legs and the third pair of legs and being in a non-spreading position when the ladder is closed and adapted to be moved into effective spreading position by the middle legs when the latter are moved relatively to the front legs and a connecting device to connect the front and middle pairs of legs to cause the spreading means to be moved into effective position by the third pair of legs when the latter are moved relatively to the front pair to spread only the front and third pair of legs.

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