Nov. 15, 1960 J. BUFOGLE 2,960,181

STEPLADDERS

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FIG. 1

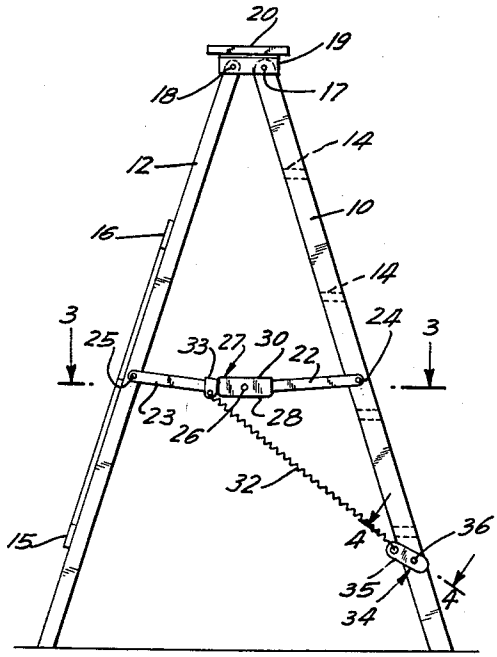


FIG. 2

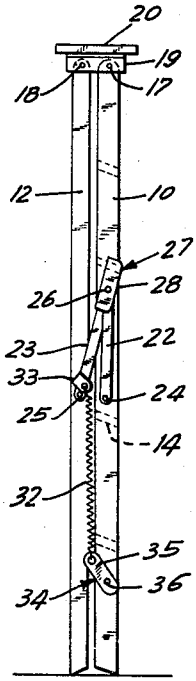


FIG. 3

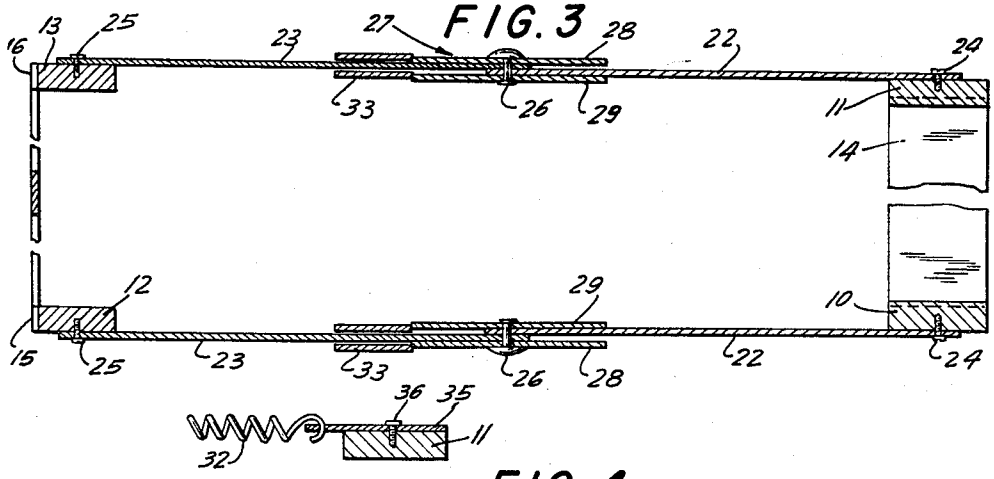
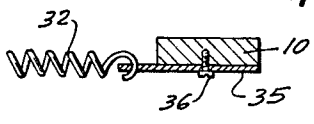


FIG. 4



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FIG. 5

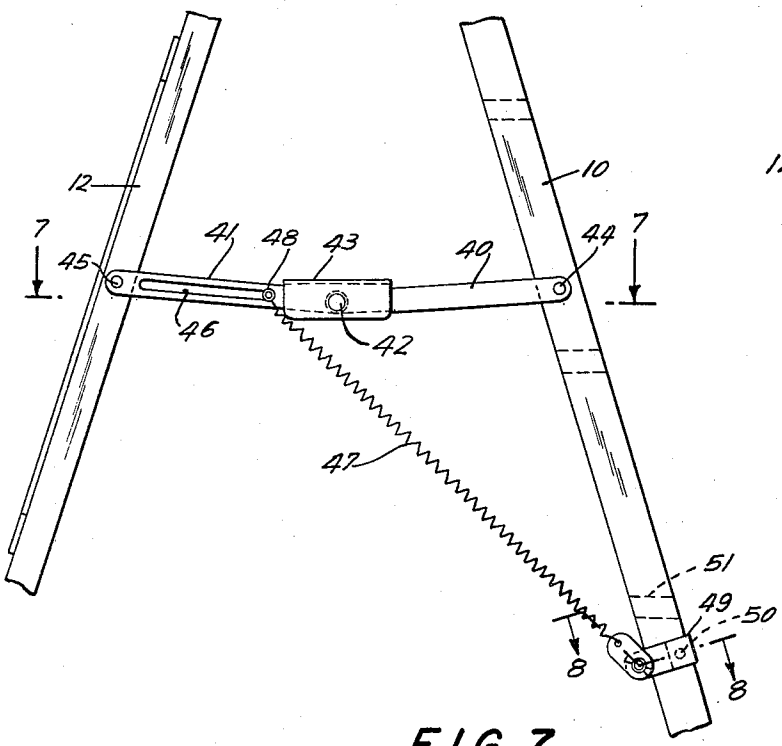


FIG. 6

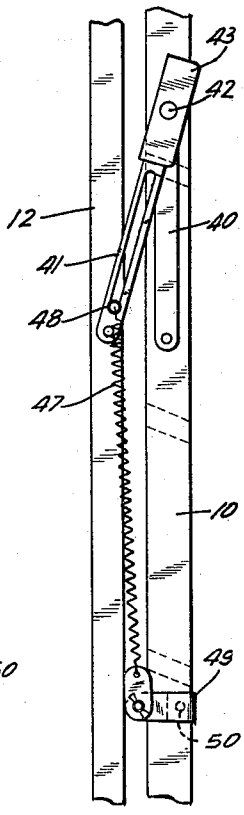


FIG. 7

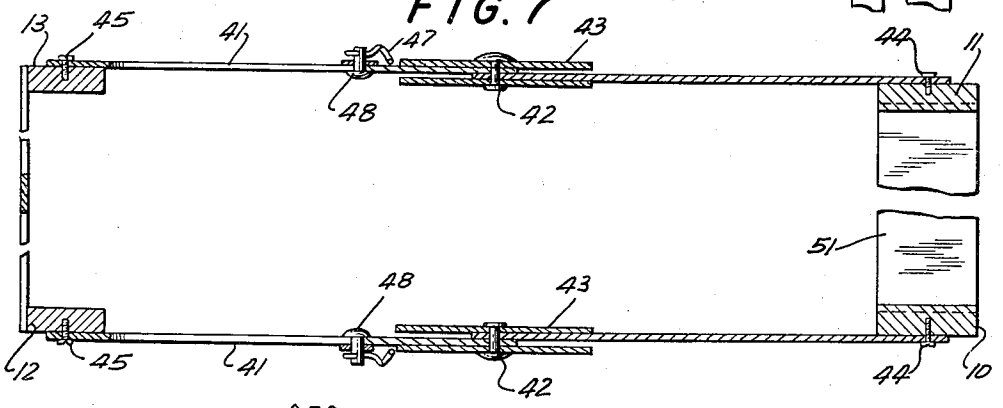
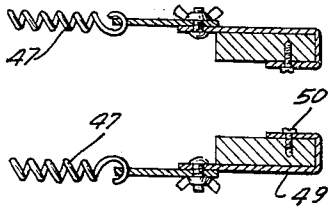


FIG. 8



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STEPLADDERS

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5 Claims. (Cl. 182—176)

This invention relates to stepladders.

Stepladders of conventional construction have pivotally connected arms which are pivoted to the front and rear legs of the ladder for spreading and maintaining the legs in open relation. Unless the pivotally connected arms are swung downwardly to their full extent when the ladder is set up, there is the possibility of the legs swinging to closed relation so as to present a hazard for the user of the stepladder. The present invention overcomes this objection by providing means for biasing the pivotally connected arms downwardly with the spreading of the legs and for maintaining the arms in downward relation to thereby maintain the legs in open or spread apart relation and eliminate all possibility of the legs collapsing or moving to closed relation when weight is imposed on the ladder.

Still another object of the invention is to provide biasing means which is at its maximum when the pivotally connected arms are in downward relation and the legs in spaced apart condition and which lessens as the legs approach closed or collapsed relation.

Still another object of the invention is to provide biasing means having sliding connection with one of the pivotally connected arms of the stepladder for urging the arms downwardly and the legs to open or spread apart relation whereby the tension of the biasing means against said arms increases as the legs are spread apart.

Still another object of the invention is to provide a stepladder with biasing means of said character which can be readily applied to both new or old ladders.

With the foregoing and other objects in view, reference is now made to the following specification and accompanying drawings in which the preferred embodiments of the invention are illustrated.

In the drawings:

Fig. 1 is a side view of a stepladder constructed in accordance with the invention showing the ladder in open relation.

Fig. 2 is a view in elevation thereof showing the ladder in closed relation.

Fig. 3 is an enlarged fragmentary sectional view taken approximately on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary sectional view taken approximately on line 4—4 of Fig. 1.

Fig. 5 is a side view of a ladder embodying a modified form of the invention and showing the ladder in open relation and with parts broken away.

Fig. 6 is a side view of the ladder shown in closed relation and with upper and lower parts thereof broken away.

Fig. 7 is a fragmentary sectional view taken approximately on line 7—7 of Fig. 5.

Fig. 8 is a fragmentary sectional view taken approximately on line 8—8 of Fig. 5.

Referring to the drawings, the invention may be used in connection with a conventional stepladder of the type which includes spaced front legs 10 and 11 and spaced rear legs 12 and 13 which are swingable from a closed substantially parallel relation to an open or spread apart upwardly converging relation. The front legs 10 and 11 are provided with a plurality of spaced treads 14 secured therebetween and the rear legs 12 and 13 are provided with diagonally extending bracing members 15 and 16 secured thereto. The front legs 10 and 11 and the rear legs 12 and 13 converge inwardly toward their upper ends and are pivotally connected on pivot pins 17 and 18 to brackets 19 affixed to the under side of a platform 20. The front and rear legs swing on the pivot pins 17 and 18 to and from collapsed and spread apart relations.

This type of ladder is provided with a pair of pivotally connected metallic arms 22 and 23 arranged on each side thereof with the arms 22 to the front legs 10 and 11 respectively on pivot pins 24 and the arms 23 pivoted to the rear legs 12 and 13 respectively on pivot pins 25. The arms 22 and 23 of each pair overlap at their inner ends and are pivotally connected by a pivot 26. A bridge member 27 including opposite side walls 28 and 29 and a connecting top wall 30 extends over the overlapping ends of the pivotally connected arms with the pivot 26 extending through the side walls 28 and 29 and pivotally connecting the bridge member thereto. The pivot 26 extends through the arms 22 and 23 of each pair substantially centrally of the width thereof and through the side walls 28 and 29 of the bridge member 27 slightly below the center thereof in order that the pivotal connection between the arms 22 and 23 at each side of the ladder is below the pivotal connections 24 and 25 of the arms with the front and rear legs when the legs are in fully opened or spread apart relation.

The invention provides biasing means which functions to maintain the pivotally connected arms 22 and 23 at each side of the ladder in downward position when the legs are in open or spread apart relation to thereby eliminate the possibility of the legs collapsing or moving to closed relation. As illustrated in Figs. 1 to 4 inclusive of the drawings, the biasing means includes a coil spring 32 at each side of the ladder which are connected with the arms 23 by slides 33 and at their lower ends the springs 32 are affixed to the front legs 10 and 11 respectively by securing means 34. The springs 32 are under tension when the ladder is in collapsed and open relation and with the movement of the front and rear legs to spread apart relation, the slides 33 move along the arms 23 into abutting engagement with the bridge member 27 and with the movement of the legs to collapse the ladder, the slides move on the arms 23 outwardly into adjacent relation with the legs 12 and 13 respectively. Each of the slides 33 consists of a metal clip of inverted U shaped formation in vertical section which engages over and slides on the upper edge of the arms 23. The securing means 34 at each side may consist of a flat metal plate 35 to which the lower end of the spring 32 hookedly engages and with the plate pivoted to a front leg by means of a pivot pin 36.

The springs 32 function to bias the front and rear leg members into closed parallel relation as shown in Fig. 2 of the drawings. When the legs are manually spread apart, the springs 32 are stretched to increase the tension thereof whereupon the slides 33 move inwardly on the arms 23 and assist in spreading the front and rear legs by pulling the pivotally connected arms 22 and 23 downwardly into the position shown in Fig. 1 of the drawings.

Instead of the slide 33, the tensioning means may have a pin and slot connection with one of the pivotally connected arms at each side of the ladder. In this form illustrated in Figs. 5 to 8 inclusive of the drawings, the ladder is of the same construction and the front legs 10 and 11 and the rear legs 12 and 13 are provided with a pair of pivotally connected metallic arms 40 and 41 at each side which are disposed in overlapping rela-

tion at their inner ends and are pivotally connected together on a pivot pin 42 which also extends through the opposite side walls of a bridge member 43 similar to the bridge member 27 in the previous form of the invention. The arms 40 are pivotally connected to the front legs 10 and 11 respectively on pivot pins 44 and the arms 41 are pivotally connected to the rear legs 12 and 13 respectively on pivot pins 45. The arms 41 are longitudinally slotted as at 46 and the biasing means at each side includes coil springs 47 which are connected with an arm 41 by a pin 48 slidable in the slot 46. The lower ends of the springs 47 are pivotally connected with looped members 49 secured to the front legs by screws 50 below the lowermost tread 51 secured between the front legs 10 and 11. The looped members 49 may be adjustably affixed to the legs 10 and 11 at varying distances below the lowermost tread 51 so as to vary or increase the tension of the springs on the pivotally connected arms. As illustrated in Figs. 1 to 4 inclusive of the drawings, the slides 33 are slidable on the arms 23 and the securing means 34 are affixed to the front legs 10 and 11. However, the slides 33 may be slidably arranged on the arms 22 and the securing means 34 may be affixed to the rear legs 12 and 13. Similarly in the form illustrated in Figs. 5 to 8 inclusive of the drawings, the arms may be slotted for receiving the pins 48 and the looped members 49 may be adjustably secured on the rear legs 12 and 13 respectively.

While the preferred form of the invention has been shown and described herein, it is to be understood that the same is not so limited but shall cover and include any and all modifications thereof which fall within the purview of the invention.

What is claimed is:

1. In a stepladder, a pair of front legs having treads connected therebetween, a pair of rear legs having means connected therebetween for movement of said rear legs in unison, means swingably connecting said pairs of legs at their upper ends for movement from substantially parallel closed relation to downwardly diverging spread apart relation, a pair of pivotally connected arms pivoted at their ends to a front leg and a rear leg respectively at each side of the stepladder, means carried by said pairs of arms for limiting the movement thereof from a folded upwardly extending relation when the stepladder is closed to a laterally extending relation when the stepladder is open, and biasing means including a coil spring affixed at its upper end to a slide slidably carried by one of the arms of one of said pairs of pivotally connected arms and extending downwardly in angular relation therefrom and connected at its lower end to one of said legs for biasing said pair of pivotally connected arms downwardly with the spreading of the pairs of legs.

2. In a stepladder, a pair of front legs having treads connected therebetween, a pair of rear legs having means connected therebetween for movement of said rear legs in unison, means swingably connecting said pairs of legs at their upper ends for movement from substantially parallel closed relation to downwardly diverging spread apart relation, a pair of pivotally connected arms pivoted at their ends to a front leg and a rear leg respectively at each side of the stepladder, means carried by said pairs of arms for limiting the movement thereof from a folded upwardly extending relation when the stepladder is closed to a laterally extending relation when the stepladder is open, and biasing means including a coil spring, a member attached to said spring at its upper end and slidable on one of the arms of one of said pair of pivotally connected arms for sliding movement longitudinally thereof from adjacent the leg to which said one arm is pivotally connected to adjacent the pivotal connection of said pair of arms, and means connecting the lower end of said spring to the leg to which the other arm of said pair of arms is pivotally connected for biasing said pair of arms downwardly with the spreading of the pairs of legs and for biasing the pairs of legs toward each other when in closed relation.

3. In a stepladder, a pair of front legs having treads connected therebetween, a pair of rear legs having means connected therebetween for movement of said rear legs in unison, means swingably connecting said pairs of legs at their upper ends for movement from substantially parallel closed relation to downwardly diverging spread apart relation, a pair of pivotally connected arms pivoted at their ends to a front leg and a rear leg respectively at each side of the stepladder, means carried by said pairs of arms for limiting the movement thereof from a folded upwardly extending relation when the stepladder is closed to a laterally extending relation when the stepladder is open, and biasing means including a coil spring, a member attached to said spring at its upper end and slidable in a longitudinally extending slot in one of the arms of one of said pair of pivotally connected arms for sliding movement longitudinally thereof from adjacent the leg to which said one arm is pivotally connected to adjacent the pivotal connection of said pair of arms, and means connecting the lower end of said spring to the leg to which the other arm of said pair of arms is pivotally connected for biasing said pair of arms downwardly with the spreading of the pairs of legs and for biasing the pairs of legs toward each other when in closed relation.

4. In a stepladder, a front supporting section having treads, a rear supporting section, means swingably connecting said front and rear sections at their upper ends for movement from adjacent closed relation to downwardly diverging spread apart relation, a pair of pivotally connected arms, one of said arms being pivoted at its outer end to the front section intermediate the ends thereof and the other of said arms being pivotally connected to said rear section substantially in alignment with the pivotal connection of said arm with the front section, means carried by said pair of arms for limiting the movement thereof from a folded upwardly extending relation when the stepladder is closed to a laterally extending relation when the stepladder is open, a member slidably mounted on one of said arms, a member affixed to the section remote from the arm on which said first member is slidable, and spring means connected at its ends to said members respectively and biasing said arms downwardly with the spreading of the sections and for maintaining a downward bias on said arms when the stepladder is open.

5. In a stepladder, a front supporting section having treads, a rear supporting section, means swingably connecting said front and rear sections at their upper ends for movement from adjacent closed relation to downwardly diverging spread apart relation, a pair of pivotally connected arms, one of said arms being pivoted at its outer end to the front section intermediate the ends thereof and the other of said arms being pivotally connected to said rear section substantially in alignment with the pivotal connection of said arm with the front section, means carried by said pair of arms for limiting the movement thereof from a folded upwardly extending relation when the stepladder is closed to a laterally extending relation when the stepladder is open, and biasing means including a slide slidably carried by one of said arms for sliding movement longitudinally thereof, a coil spring affixed to said slide, means connecting the lower end of said spring to the section to which the other arm is pivotally connected for biasing said pair of arms downwardly with the spreading of the pair of legs.

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