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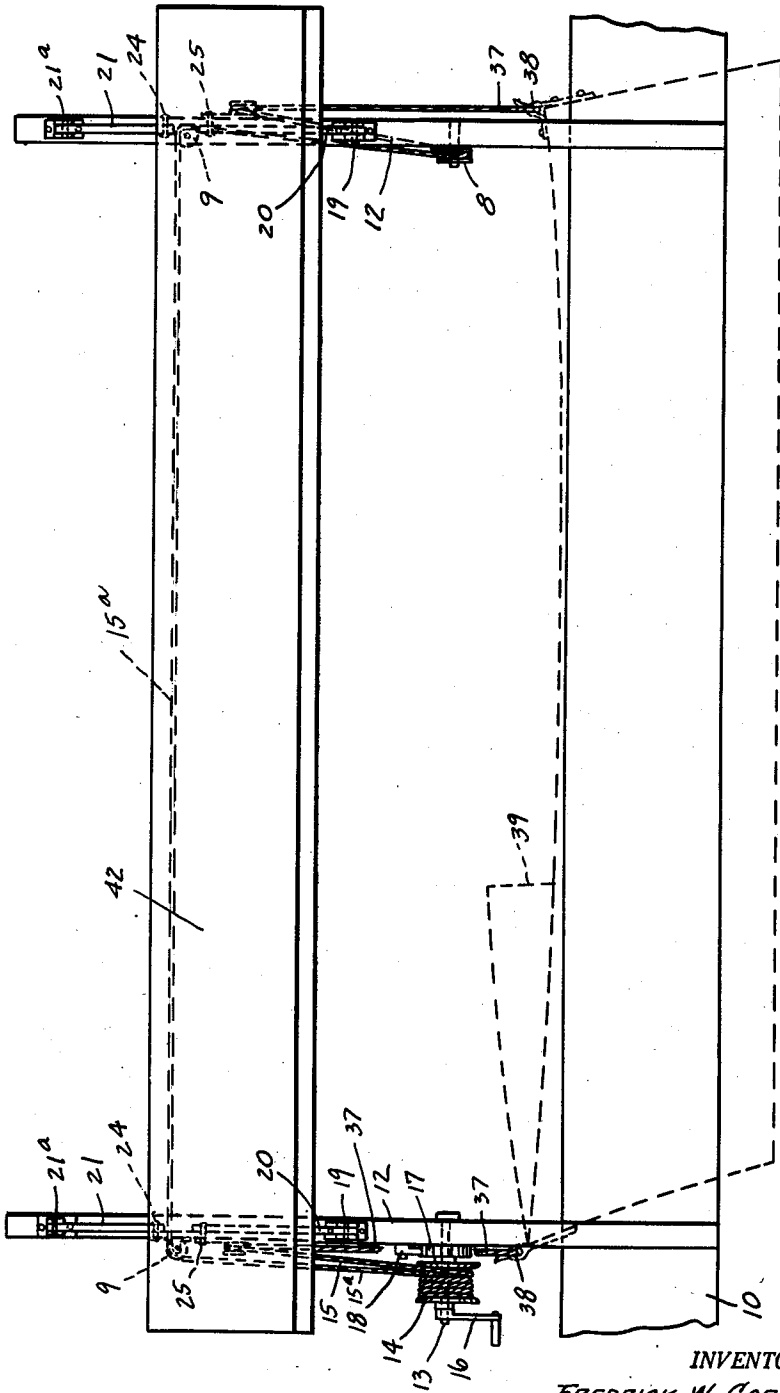
2,640,534

COLLAPSIBLE SUPPORTING FRAME

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4 Sheets-Sheet 2

FIG. 2



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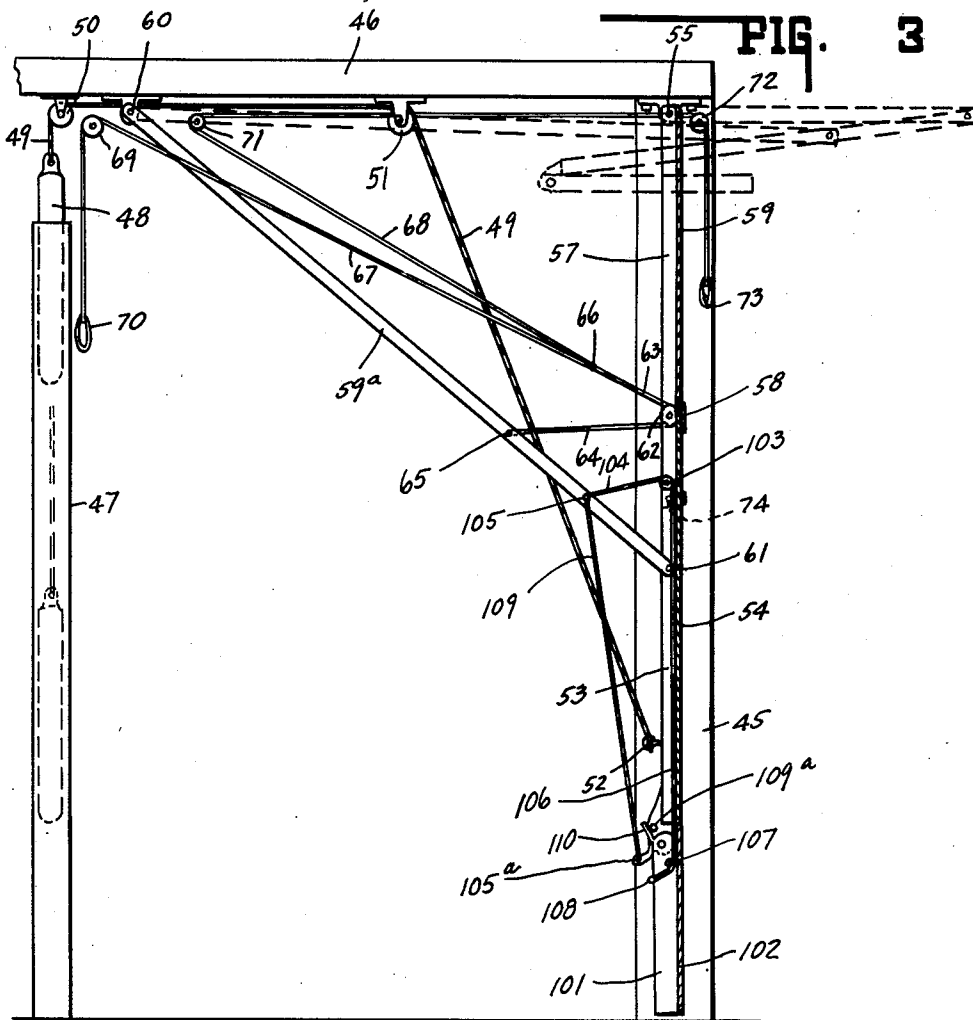
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FIG. 4

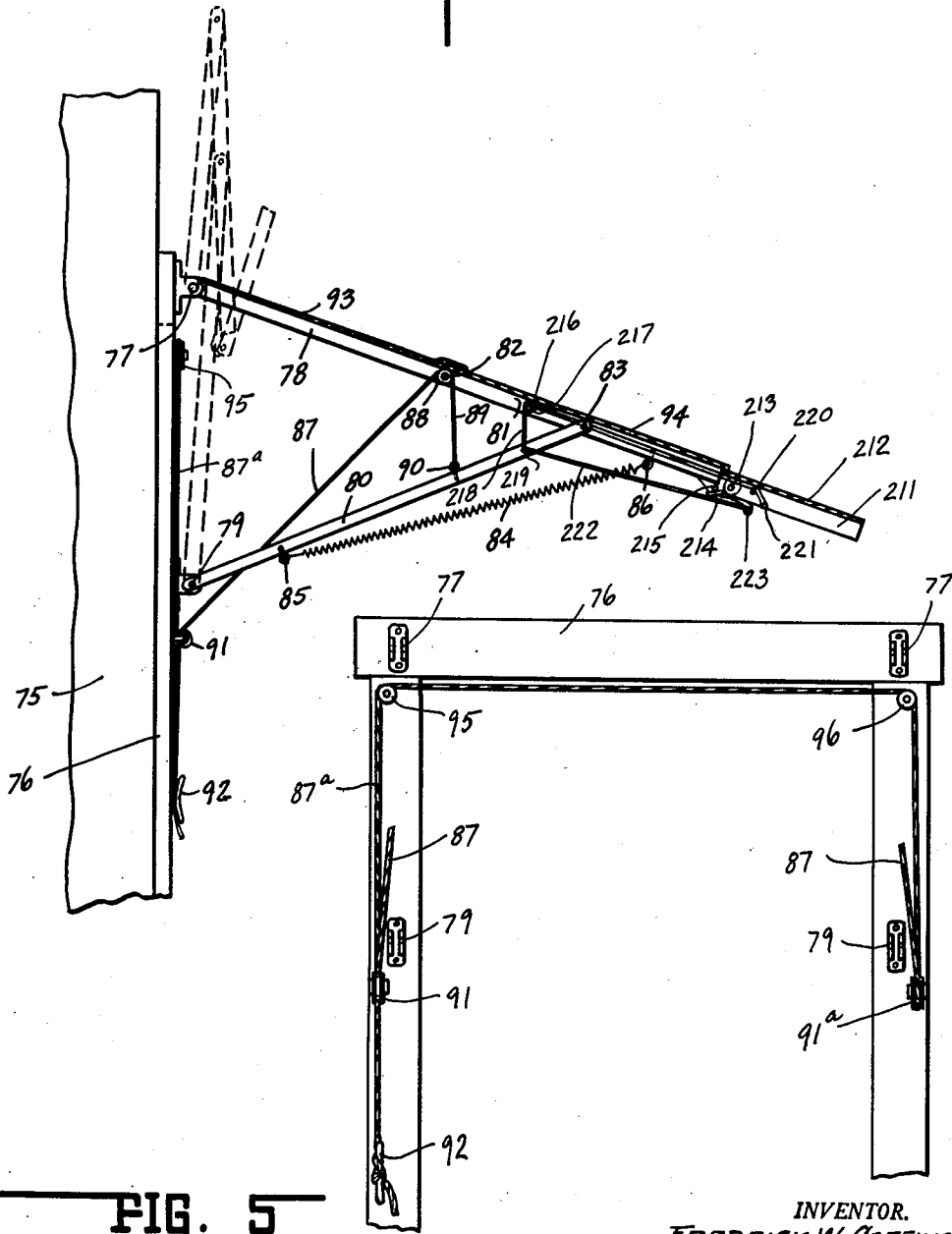


FIG. 5

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COLLAPSIBLE SUPPORTING FRAME

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3 Claims. (Cl. 160-62)

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This invention relates to a collapsible frame support applicable to various uses as in a collapsible shed and mooring device for boats, a collapsible awning for windows and doors, collapsible garage doors and like structures wherein it is desired to cause the frame of the structure to jack-knife on itself from an extended position to an upright collapsed position.

It is the object of the invention to provide such a frame support and structure which may be readily moved between its collapsed and extended positions through pull of an actuating cable and assisted by biasing means such as tension springs or gravity weights.

The above is accomplished, and a feature of the invention resides in a series of articulated frame members and associated braces pivotally mounted on a suitable support and provided with interengaging pulley mounted cables and biasing means, all as hereinafter more fully set forth and described.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings: Fig. 1 is an end elevational view of a portion of a wharf or pier to which the base portion of the mooring device is secured and upon which the moving structure is supported, the latter being of the covered type and having a tide accommodating arrangement associated with a boat, the latter also being shown in elevation.

Fig. 2 is a side elevational view of the same.

Fig. 3 is a view similar to Fig. 1 showing a garage door embodiment of the invention and the door portions proper being shown in section.

Fig. 4 is a view similar to Figs. 1 and 3 and of a canopy or awning embodiment of the invention, the cover portion of the awning being shown in section.

In Figs. 1, 3 and 4, dotted lines indicate the jack-knifed or collapsed positions of the frame support embodying the invention.

Fig. 5 is a front elevational view of the framed opening shown in Fig. 4 with the cable system applied thereto and the other awning parts omitted.

In Figs. 1 and 2 of the drawings, 10 indicates generally a portion of a dock or pier to which is suitably secured as at 11 a pair of parallel uprights or standards 12. Rotatably supported by one of them is the shaft 13 which mounts a drum 14 to which one end of dual cable 15 is secured.

The handle 16 is arranged for shaft and drum rotation. A ratchet 17 is fastened to the handle

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16. A pawl 18, pivoted upon that standard 12 adjacent the ratchet, is arranged to prevent retrograde ratchet movement, in other words, cable pay out.

The other cable 15^a passes upwardly over pulley 9, see Figs. 1 and 2, and thence across to corresponding pulley 9 on the other standard 12 and thence downwardly to a pulley 8, see Fig. 2, that is at the elevation of drum 14.

Above the drum and below the top of the standard there is pivotally supported at 19 upon each standard a rigid brace member 20. Near the top of each standard and upon it there is pivotally supported at 21^a an arm or frame member 21. A second arm or frame member 22 has one end relatively free and the other end is pivoted at 24 to the adjacent end of the arm 21. The other end of the brace member 20 is pivoted at 25 to the arm 22.

Herein a spring 26 has one end secured at 27 to brace member 20 adjacent its pivotal support 19. The other end of the spring 26 is secured at 28 beyond pivots 24 and 25 upon the arm 22. A pulley 29 is mounted coincident with the hinge 24, and the cable 15, or 15^a as the case may be, passes over this pulley and thence downwardly as at 30 and has operative connection at 31 to the brace member 20.

Since this embodiment of the invention includes a tide accommodating feature, the operative connection 31 is shown as a pulley and the cable 30 is extended as at 32 and passes around pulley 33 mounted adjacent the pivotal connection between arm 22 and brace 20.

The cable then has a portion 34 extended generally in the direction of the brace member 20 to pass over pulley 35 and thence back to pulley 36 immediately contiguous to pulley 33 and thence downwardly as at 37 for connection at 38 to the boat 39.

Pulley 35 is in effect a floating pulley because one end of a spring 40, to accommodate the rise and fall of tide where a mooring device is used, is connected to said pulley 35 at one end and its other end is connected to the brace 20 at 41.

With the structure in its extended position as illustrated in Fig. 1, the boat 39 may be anchored to the cable 37 as at 38 placing sufficient tension on the cable to react against the bias of the spring 27 to maintain the parts in their extended position. Due to the fact that the pulley 35 is connected to the spring 40 which in turn is connected to the brace member 20 as the boat 39 rises and falls with the tide the spring will accommodate this movement, extending as the

boat 39 lowers with the tide and contracting as the boat rises with the tide. In all instances, however, the tension of the cable 15 passing over the pulley 24 will maintain the parts in their extended position against the bias of the spring 26.

Fig. 2 shows the two standards 12 and the duplicate structures previously described. It will be apparent that when it is desired to protect the boat from the sun or from the rain, light metal or canvas 42 and 43 may be applied to a portion of the arms 22 and the two braces 20, the covering 43, see Fig. 1, on the brace members, however, being slotted as at 44 to permit the run 30 of the cable to pass to and from the pulley 31.

When the apparatus is not in use as a boat anchorage or mooring, the end of the line 37 may be secured to the brace member 20 in any suitable manner, just so the securing is fixed, and under these circumstances by unwinding the cable 15 from drum 40 to relieve the cable tension at the pivotal connection at 24, the spring 26 will draw the frame member 22 downwardly and inwardly causing it to collapse and force the pivotal connection upwardly to the position shown in dotted lines, swinging the frame member 21 upwardly with it.

Reference will now be had to Fig. 3 wherein the invention is illustrated as embodied in a so-called overhead door for garages and the like, the dotted lines, as stated, indicating the jack-knifed, collapsed overhead position of the parts.

In Fig. 3, 45 indicates the side of a door opening of a garage, etc., 46 indicates an overhead support member, 47 indicates a tube that may be provided if desired to receive and house a weight 48 connected to one end of a cable 49. This cable passes over pulleys 50 and 51, each of which is supported by the overhead member 46. The other end of the cable 49 is connected as at 52 to a frame of the lower door section member 53 near the bottom thereof as shown. This frame member and one at the other side of the opening supports a lower panel portion 54 of the door.

Pivotally supported at 55 on the overhead member 46 is another frame member 57 of the upper door section and the longitudinally alignable members 53 and 57 are hingedly connected together as at 58 and are adapted to break outwardly so that these portions of the door can be collapsed or jack-knifed into an overhead position. The upper panel portion 59 of the door is carried at opposite ends by the two frame members 57. A rigid brace member 59^a is pivotally supported at 60 upon the overhead support 46 and at its other end is pivotally connected at 61 to the frame member 53.

Associated with the hinge 58 is a pulley 62 and a cable 63 passes over the same and the run 64 thereof is secured to the brace member 59^a as at 65. This cable branches at 66 into lines 67 and 68. The branch 67 passes upwardly and over a depending pulley 69 and terminates in a hand grip 70. The branch 68 passes upwardly and about pulley 71 to the pulley 72 and thence downwardly and terminates in the hand grip 73 outside the opening to be closed.

If desired or required, the frame member 53 may have mounted thereon a door lock 74 of any suitable description that is suitably associated with a catch portion provided in or upon the door opening defining frame member 45 for the purpose of latching the door shut.

Herein, as before, there is illustrated a brace and a frame member, 59^a and 57, each pivotally

supported in spaced relation to each other at their remote ends. Associated therewith is the frame member 53 that has pivotal connection with the other end of the brace member 59^a and pivotal connection at one end with the adjacent end of the frame member 57.

The biasing means 48—49, herein primarily a weight, is connected to the frame member 53 remote from both pivotal connections 58 and 61. The manually operable cable 67—68—63 is associated with a pulley 62 substantially coincident with the hinge connection 58 and is in this instance fixedly terminated at 65 upon the brace member 59^a as shown. When the handle 70 is pulled down by one inside of the garage or the handle 73 is pulled down by a person outside of the garage the door is closed. Normally the door will remain closed after having been pulled closed by the operation of the handle or hand loops 70 or 73 due to the fact that the pivot point 58 is slightly past dead center. If now a slight push is given to the right, looking at Fig. 3, to move this pivot point past dead center the bias of the weight 48 acting through the cable 49 on the lower panel of the door will rock the lower panel of the door on the pivot point 61 outwardly causing the parts to jackknife or double upon themselves and eventually assume the position illustrated by dotted lines in Fig. 3.

The basic structural elements of this embodiment of the invention so far described are substantially the same as those previously described for the davit embodiment of the invention. Herein, however, as the lower panel 54 of the door moves up, since it swings inwardly in a clockwise direction, the free end of the door bottom would tend to strike the automobile bumper, etc., and in door lowering would tend to strike the trunk, etc. Therefore, the lower end of the door is articulated. As the door breaks to open, the lowest end folds outwardly and reversely, and in final lowering this door extension straightens out.

To each frame member 53, at its free end, is pivoted a bar 101 and these bars are connected to and support a bottom door section 102. Between pivots 58 and 61 is a pulley 103 carried by frame member 53. A cable 104 has one end anchored at 105 to brace member 59^a and passes over pulley 103 and then extends as at 106 to the bar 101. Here it engages offset 107 and then is anchored to said bar 101 at 108. Another cable 109 is connected at opposite ends to brace member 59^a at 105 and bar 101 at 105^a. A stop 109^a carried by the free end of frame member 53 is adapted to be engaged by stop 110 carried by the adjacent end of the bar 101.

Now as the two upper door sections break outwardly at the pivot 58, the brace 59^a moves upwardly and pulley 103 moves away from anchor 105 causing bar 101 to move outwardly and swing counter-clockwise until it lies adjacent frame members 53—54 when in overhead position. The cable 104, 106 passing over pulley 103 jackknives the bar 101 to the position shown in dotted lines of Fig. 3 when the frame members are collapsed upwardly to the position shown by said dotted lines. When the door is unfolded to its closing position as shown in full lines, the cable 109 swings the bar 101 into its downwardly aligned position through its fixed connection at 105^a, and until the stop 110 engages stop 109^a. This action results from a downward swinging movement of the brace member 59^a from its upward collapsed dotted position to its downward full line

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position. The result is more car-door clearance which is required by reason of this reverse hinging. The action described facilitates the initial breaking action in door opening and final alignment of door sections in door closing.

Reference will now be had to Figs. 4 and 5 wherein one of the simplest forms of the invention is illustrated and herein the utilitarian embodiment is of the canopy or awning type. In this form the extension feature is again utilized for the awning may be over a trailer door and thus clearance is effected relative to trailer door opening, etc., when the awning is up.

In Figs. 4 and 5, 75 indicates a building structure having a window or door frame 76. Pivotally supported at each side by the upper portion of said frame at 77 are the arms or frame members 78. Also pivotally supported therebeneath, at 79, is one end of the brace members 80. These two pairs of pivotal supports are spaced apart, see Figs. 4 and 5.

Each arm or frame members 81 is pivotally connected at one end as at 82 to the adjacent end of the arm 78. The other end of the cooperating brace member 80 is pivotally connected at 83 to the arm 81. An elongated spring 84 is connected at 85 to the brace member adjacent the pivot 79. The other end of said spring is connected at 86 to the arm 81 remote from the pivotal connections 82 and 83 aforesaid. A cable 87 passes over a pulley 88 substantially coincident with the pivotal axis 82 and the downwardly directed run 89 thereof is connected at 90 to the brace member 80 remote from the ends of said member and at such a distance from the pivotal axis 83 that the run 89 is approximately vertical. The cable 87 passes over a pulley 91 carried by the frame 76 and may be anchored as at 92.

It will be recalled in Figs. 1 and 2 a common cable system is utilized. In Fig. 5 cable 87 includes a branch 87^a that passes upwardly to pulley 95, then over the same to pulley 96 and downwardly to pulley 91^a disposed oppositely relative to pulley 91. This cable then is extended upwardly, etc., all as previously described for cable 87 except it is at the opposite side of the framed opening.

Preferably when the awning serves as a door shade the pulleys 95 and 96 are disposed at an elevation to permit door clearance if the door opens outwardly. Also to insure clearance for such door opening the free end of the awning may be arranged to fold back in substantially the same manner and by the same means as the bar 101 of the bottom section of the door, see Fig. 3, is folded when disposed in elevated position.

The action of the structure illustrated in Fig. 4 is substantially the same as the action of the parts illustrated in Fig. 1 when the mooring line 37 is disconnected from the boat and fixedly attached to the arm 20.

In other words so long as the cable 87 is secured as at 92, the cable will hold the arms 93 and 94 against buckling under the bias of the spring 84. As soon, however, as the cable 87 is released this anchorage will be released and with the spring exerting a pulling effect on the end of the arm 94 this arm will be caused to rock at the pivot point 83, breaking at the pivot point 82 and the parts will jackknife into the position illustrated in the dotted lines.

Also as shown in Fig. 4 the awning is provided with an extension comprised of a pair of bars or

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frame members 211 with bridging cover 212. This extension is pivoted at 213 upon the outer ends of bars 81.

Since this structure is duplicated at each side reference will only be had herein to one side. Bar 211 adjacent the pivot includes lug 214 adapted to engage stop 215 carried by bar 81 near its end. This limits clockwise movement of bar 211.

Bar 81 at 216 mounts pulley 217. A cable 218 is anchored at 219 to brace member 80, passes over pulley 217 and thence over offset portion 220 and is anchored at 221 on bar 211. Another cable 222 is anchored at opposite ends to frame member 80 and bar 211 at 219 and 223 respectively.

Operation of this extension is identical to that shown in Fig. 3 and is provided for clearance as suggested hereinbefore.

While the invention has been illustrated and described in great detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In combination, a pair of collapsible frame members hingedly connected together at adjacent ends for substantial longitudinal alignment or jackknifing collapsed disposition, a support for said members, one of said members having its other end pivoted to said support in a fixed position, the other said member having a free end, a rigid brace having one end pivoted on said support at a second fixed position in spaced relation to the first mentioned fixed position and its other end pivoted to the said other member between the ends thereof, a control cable having one end connected to said brace and movably supported at the pivot between adjacent ends of said frame members, said cable being directed therefrom toward the second mentioned fixed position, and biasing means connecting the said other frame member between its ends with said brace and tending to urge the outer end portion of said other frame member toward said brace and said second fixed position.

2. A pair of collapsible frame members hingedly connected together at adjacent ends for substantial longitudinal alignment or jackknifing into collapsed disposition, a support for said members, one of said members having its other end pivoted to said support in a fixed position, the other said member having its opposite end pivotally connected to an extension bar, a rigid brace having one end pivoted on said support at a second fixed position in spaced relation to the first fixed position and its other end pivoted to the said other member between the ends thereof, a cable mounting pulley secured to the hinged connection between said frame members, a second pulley mounted on said support adjacent said second fixed position of said brace, a control cable passing over said pulleys having one end connected to said brace adjacent its pivotal connection with the said other member and its other end positioned for manual operation, and biasing means connecting the said other frame member between its ends with said brace and tending to urge it toward collapsed position about its pivoted connection therewith.

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3. A pair of collapsible frame members hingedly connected together at adjacent ends for substantial longitudinal alignment or jackknifing into collapsed disposition, a support for said members, one of said members having its other end pivoted to said support in a fixed position, the other said member having its opposite end pivotally connected to an extension bar, a rigid brace having one end pivoted on said support at a second fixed position in spaced relation to the first fixed position and its other end pivoted to the said other member between the ends thereof, a cable mounting pulley secured to the hinged connection between said frame members, a second pulley mounted on said support adjacent said second fixed position of said brace, a control cable passing over said pulleys having one end connected to said brace adjacent its pivotal connection with the said other member and its other end positioned for manual operation, biasing means connecting the said other frame member between its ends with said brace and tending to urge the

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outer end portion of said other frame member toward said brace and said second fixed position, a third pulley on said other frame member, a cable connected to said brace adjacent said other frame member extending over said third pulley and having its other end connected to said extension bar, and a third cable similarly connected to said brace and having direct connection with said extension bar.

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