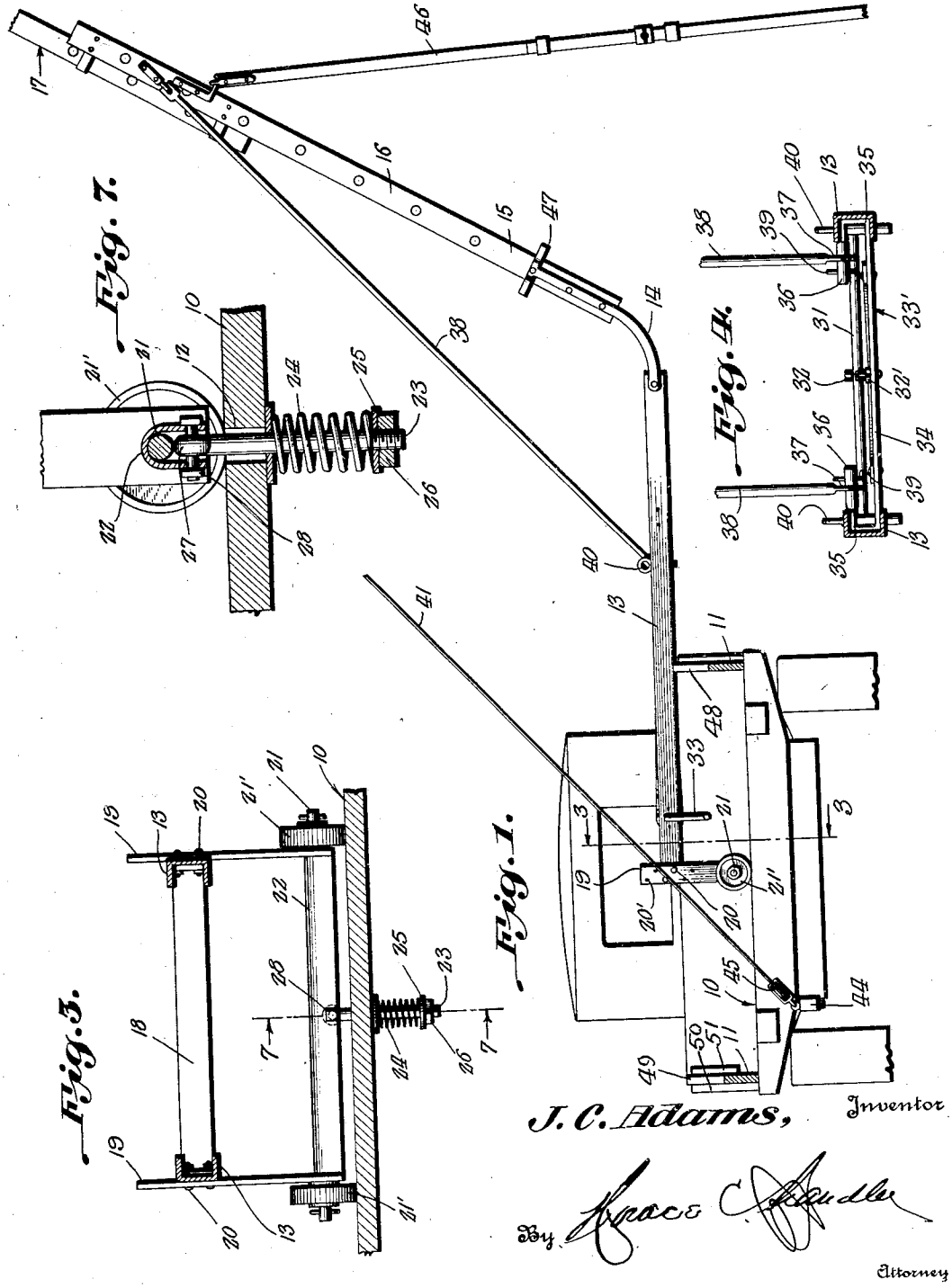
May 24, 1932. J. C. ADAMS 1,860,005

EXTENSION LADDER SUPPORT

Filed March 7, 1930 2 Sheets-Sheet 1



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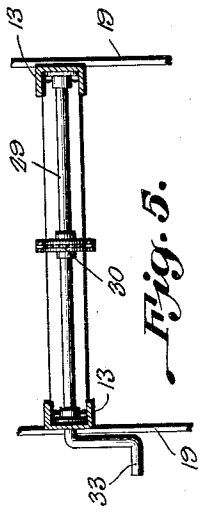

Fig. 5.

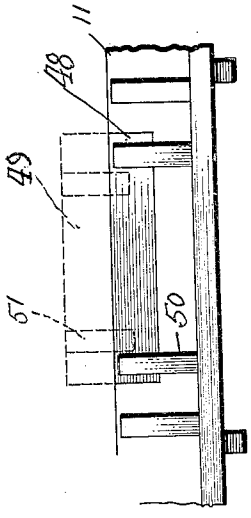

Fig. 6.

Fig. 2.

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1,860,005

UNITED STATES PATENT OFFICE

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EXTENSION LADDER SUPPORT

Application filed March 7, 1930. Serial No. 434,126.

This invention relates to new and useful improvements in ladders, and particularly to extension ladders.

The principal object of the invention is to provide an extension ladder which is adapted to be supported on a vehicle, whereby to permit use of the ladder at places where there are no objects against which to rest the upper end of the ladder, such as telephone or telegraph wires, between the poles.

Another object is to provide a device of this character which is adapted to be used on either side of the vehicle, or at the rear thereof.

Another object is to provide novel and improved means for changing the angle of inclination of the ladder, when the same is in extended position.

Another object is to provide novel and improved means for bracing the extended ladder.

Other objects and advantages will be apparent from the following description when taken in connection with the accompanying drawings.

In the drawings:

Figure 1 is a side elevation of the device in extended position, the end-gate of the vehicle being removed to show the carriage or support of the ladder.

Figure 2 is a top plan view of the same.

Figure 3 is an enlarged vertical transverse sectional view on the line 3—3 of Figure 2.

Figure 4 is a vertical sectional detail view on the line 4—4 of Figure 2.

Figure 5 is an enlarged vertical sectional view on the line 5—5 of Figure 2.

Referring particularly to the accompanying drawings, 10 represents the bottom, and 11 the sides of the box of an automobile truck, in connection with which the present invention is adapted for use. Formed in the bottom 10, transversely alined with respect to the vehicle, are the openings 12, to which reference will be made later herein.

Disposed in parallel relation are two channel members 13, the channels of which are directed inwardly toward each other, and pivoted on the outer end of each of said members is an upwardly curved strip 14, such strip being secured to the lower end of one of the side rails 15, of the lowermost section 16, of the extension ladder 17. Extending between the inner ends of the channel members, and having its ends bent at right angles, and disposed in the said channels, is a bar 18, and on the outer face of each of said members 13, is the upper end of a leg 19, bolts or rivets 20 being disposed through the said parts, whereby to form a rigid frame end. The lower ends of the legs 19 receive the ends of a transverse axle 21, and disposed over the axle is an inverted U-shaped plate 22. Disposed through the intermediate opening 12, of the bottom of the vehicle box, is a large bolt 23, the lower end of which has a coil spring 24, bearing against the lower face of said bottom, and having the washer 25, and nut 26 thereon. The upper end of this bolt is provided with an eye 27, which is disposed between the intermediate portions of the sides of the plate 22, which alines with transverse openings in said plate to receive a securing bolt 28 therethrough, whereby said frame end is properly held in place. On each end of the axle 21 is a wheel 21′, which is adapted to run on the bottom 10, so that the support may be rotated to project from either side, or from the rear of the box of the vehicle.

Disposed transversely of the support, and having its ends journaled in the members 13, is a shaft 29, on which is secured the sprocket wheel 30, and supported in said members 13, at a suitable distance outwardly of the shaft 29, is a second shaft 31. Trained around the said sprocket wheel, and the second shaft 31, is a sprocket chain 32. On one end of the shaft 31 is a crank handle 33, by means of which the shafts may be rotated. Slidable in the channels of the members 13 is a frame 33′, which includes a transverse bar 34, the ends of which are bent into angular U-shape, as at 35, for slidable movement in the channels of the members 13. Disposed through the frame, and a link of the chain 32, is bolt 32′ whereby to couple the frame to the chain, and permit movement of the frame, longitudinally of the members 13, upon rotation of the crank handle, for a purpose to be set

forth later herein. The ends 35 are formed with the studs 36, which are received in the eyes 37, on the lower ends of the brace rods 38, said studs having openings to receive the cotter pins 39, for holding the said eyes thereon. The other ends of the brace rods 38 are loosely connected with the upper ends of the side rails of the lowermost of the ladder sections, so that a rigid triangular construction is formed between the braces 38, the members 13, and the said ladder section. In the upper webs, only, of the channel members 13, adjacent the inner ends thereof, are alining openings 39, which are adapted to receive the pins 40, for holding the frame 33′ against sliding in the channels, while the device is in operation. Suitable guy ropes 41 are connected to the upper portion of an upper ladder section, and are wound on a drum 42, carried by the opposite side of the automobile, a pulley 43 being carried by the forward end of one side of the automobile, and a rearwardly extending, removable arm 44, carried by the rear of the automobile, and carrying a pulley 45, serving to guide the windable ends of the guy ropes, so that they may be drawn taut, to maintain the extended ladder against side play.

It will be noted that the upper ends of the legs 19 are provided with extra sets of openings 20′, so that the support may be adjusted as to its height. Connected to the upper end portions of the side rails 15, of the lower ladder section 16, are the extensible legs or props 46, said legs or props being adapted to be swung inwardly and engaged with the adjacent ends of the double keepers 47, carried by said side rails.

From the foregoing it will be seen that the outer ends of the members 13 support the bottom of the entire ladder structure; that the brace rods 38 hold the structure against outward movement; that the props 46, cooperate with said brace rods, to hold the ladder up under the weight of the workman; while the guy ropes maintain the structure against lateral swaying movement. Thus the structure is held in a rigid condition, except for the fact that a certain amount of resiliency is permitted through the action of the coil spring 24, on the bolt 23.

Upon rotating the crank handle 33, the chain 32, acting through the medium of the bolt 32′, slides the frame 33′ longitudinally of the channel members 13, whereby to move the lower ends of the brace rods 38 inwardly or outwardly, so as to vary the inclination of the extension ladder structure.

To fold the device for transportation, the ladder structure is first collapsed, the lower ends of the brace rods 38 detached from the studs 36, and swung into engagement with the other of the keepers 47, carried by the lower ladder section after which the folded or collapsed ladder structure is folded down on the members 13. The legs or props 46 are collapsed and secured in the keepers 47, on the lower ladder section. The guy ropes are detached from the ladder and wound on the drum, after which the operator swings the ladder and its support around so that it extends over the end-gate of the automobile. The vehicle can then proceed to the next point of use, where the ladder can be erected, as before, in a very short time.

It will also be noted that the king bolt 23 may be disposed in any one of the openings 12, whereby to position the ladder support in different positions of the vehicle, with respect to the transverse dimension of the body, so that the ladder structure may be erected in proper position to the work.

It is sometimes found necessary to increase the height of the ladder structure, even after the same has been extended to its full height, or to drop the ladder to a lower level. To provide for these contingencies, I have the removable sections 48 and 49, in the respective sides 11, of the vehicle box. Ordinarily the carriage rests on the upper edge of the side 11, but when it is desired to lower the carriage, I remove the section 48, thereby permitting the carriage to rest on the upper edge of the bottom wall of the opening formed by the removal of such section. In the event that the carriage is to be raised above the level of the side 11, I remove the section 49, and place the same on the upper edge of the section 48, so that the lower ends of the strips 50 and 51, carried by this section 49, straddle the said edge of the section 48. The members 13 are then permitted to rest on the upper edge of the section 49, whereby the carriage will extend outwardly from a greater elevation than before.

When it becomes necessary to move the ladder to a point farther along the road, for operation upon another portion of the telephone, or like wires, the operator folds the props 46, and engages them with the keepers 47, and rotates the crank handle 33, so as to draw the ladder to a more nearly vertical position, after which the vehicle may be propelled along the road. When the point is reached, the operator simply swings out the props 46, and swings the ladder to the proper inclination so that said ladder rests against the props, which latter are engaged in the ground.

What is claimed is:

1. The combination with a vehicle having a bottom and a side, of a support, means for resiliently and rotatably attaching said support to the said bottom and arranged to be swung over and rest on said side, an extension ladder structure pivotally carried by the outer end of said support, said support having wheels bearing on said bottom whereby to permit the support to be rotated to extend to the other side or rear of the vehicle, and

bracing and guying means between the ladder structure and said support.

2. The combination with a vehicle box and a ladder structure, said vehicle box including sides and a bottom having an opening, of a wheeled carriage on said bottom arranged to extend over a side and support said ladder structure, a bolt disposed through said opening and having one end engaged with the carriage above said bottom, and a spring on the bolt between said bottom and the lower end of said bolt for maintaining the wheels of said carriage engaged with said bottom and said carriage engaged with said side.

3. The combination with a vehicle box and a ladder structure, said vehicle box including sides and a bottom, of a spring held wheeled carriage on said bottom arranged to extend across a side of the box and support said ladder structure on its outer end, a frame slidable in said carriage, braces between the frame and ladder structure, transverse shafts in the carriage, means for rotating one of the shafts, and means trained around said shafts and having connection with said frame for moving the latter, upon rotation of said shaft, whereby to vary the inclination of the ladder structure.

4. The combination with a support, of a carriage mounted on the support and carrying a ladder structure, yieldable means between the carriage and support, said carriage including channeled side members, a frame slidable within the channeled members, brace members connected to the frame and ladder structure, transverse shafts in the carriage each having a sprocket wheel, a chain engaged around said sprocket wheels, connections between the chain and said frame, and means for rotating one of said shafts, whereby to move the frame and braces to change the inclination of the ladder structure.

5. The combination with a vehicle box and a ladder structure, of a carriage, means for rotatably supporting said carriage in the box, and pivotally supporting the ladder structure on its outer end, the ladder structure being adapted to be swung upon the carriage from a horizontal position to an approximately vertical position, the carriage being rotatable for projection from either side or rear of the vehicle box, and yieldable means between the carriage and the box for maintaining the former in contact with the latter.

6. The combination with a vehicle box and a collapsible ladder structure, of a carriage, means for rotatably mounting said carriage in the box, said carriage being adapted to project over a side of said box, yieldable means between the carriage and box, said carriage having the ladder structure pivotally supported on its outer end for swinging movement from a horizontal position to an approximately vertical position, a member longitudinally slidable on said carriage, brace means between the said member and said ladder structure, and means for moving the said member whereby to shift the brace means and thereby vary the inclination of the ladder structure when extended.

7. An extension ladder support comprising a carriage, means for rotatably mounting said carriage on a vehicle, yieldable means between the carriage and the vehicle, a ladder pivotally mounted on the carriage for movement into and out of a horizontal position and an approximately vertical position with respect thereto, a frame slidably mounted on the carriage, braces between the ladder and the frame, and means for moving the frame whereby to vary the inclination of the ladder.

In testimony whereof, I affix my signature.

JAMES C. ADAMS.