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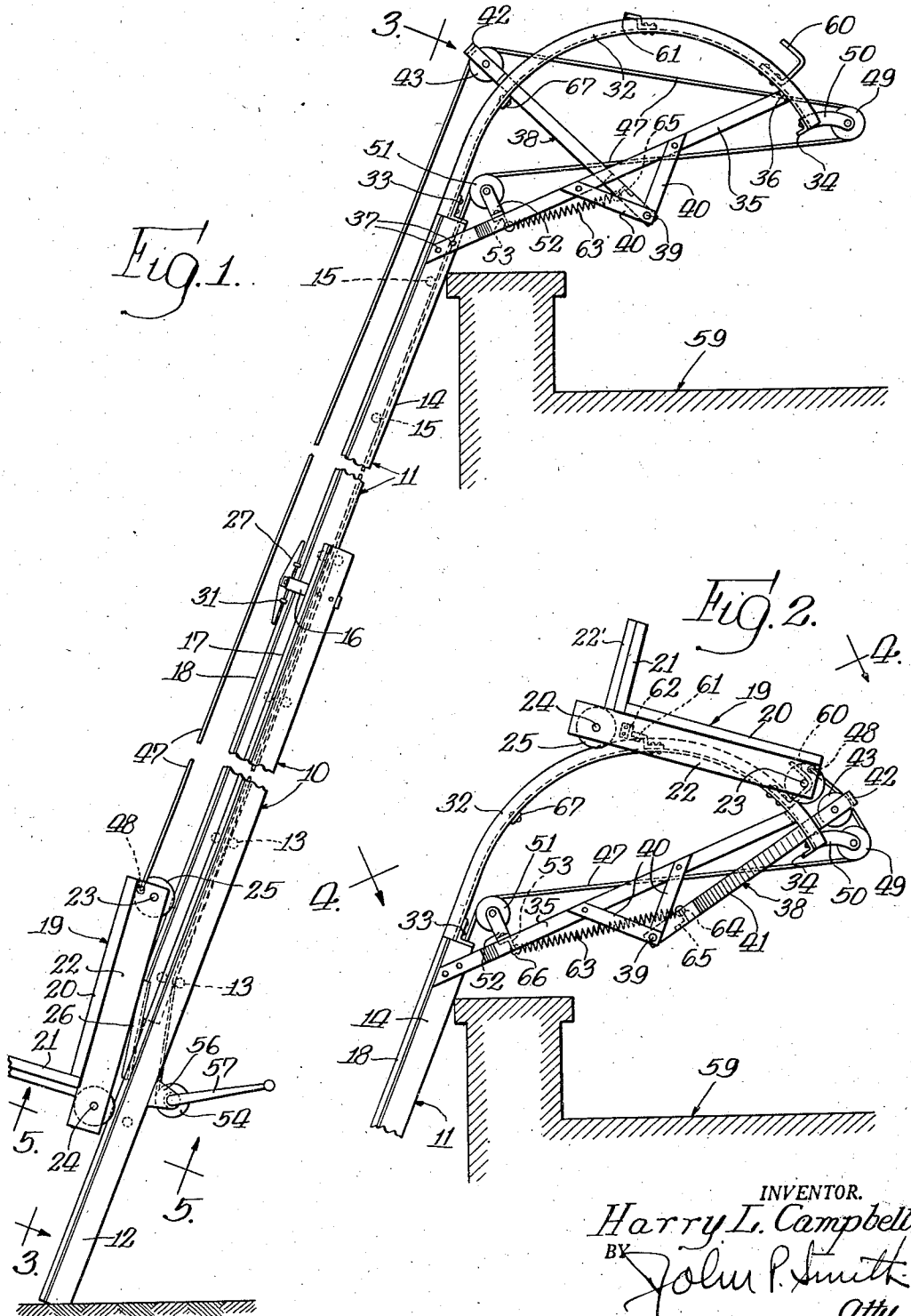
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2,394,148

HOIST ATTACHMENT FOR LADDERS

Filed Aug. 7, 1944

3 Sheets-Sheet 1



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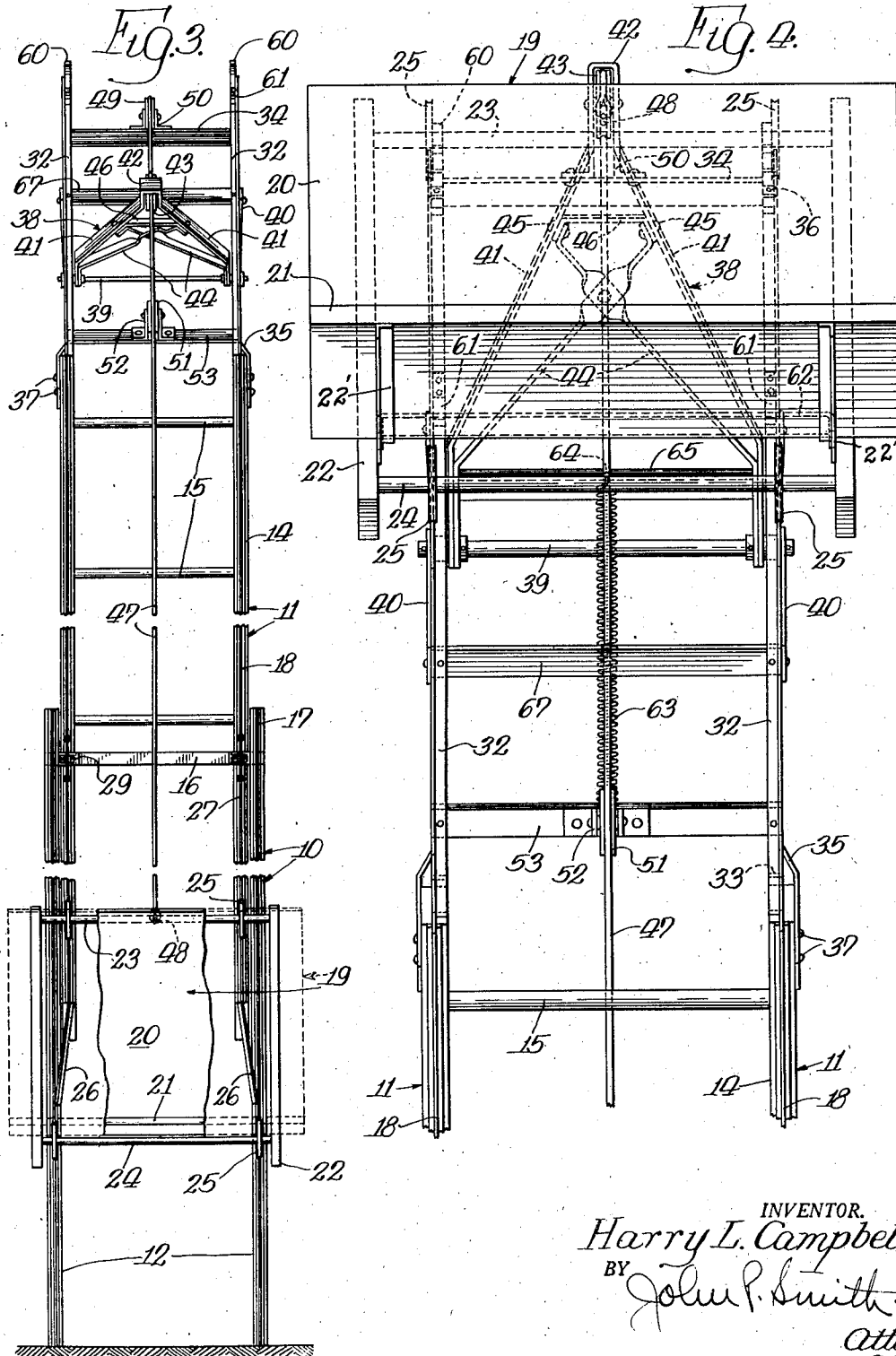
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3 Sheets-Sheet 2



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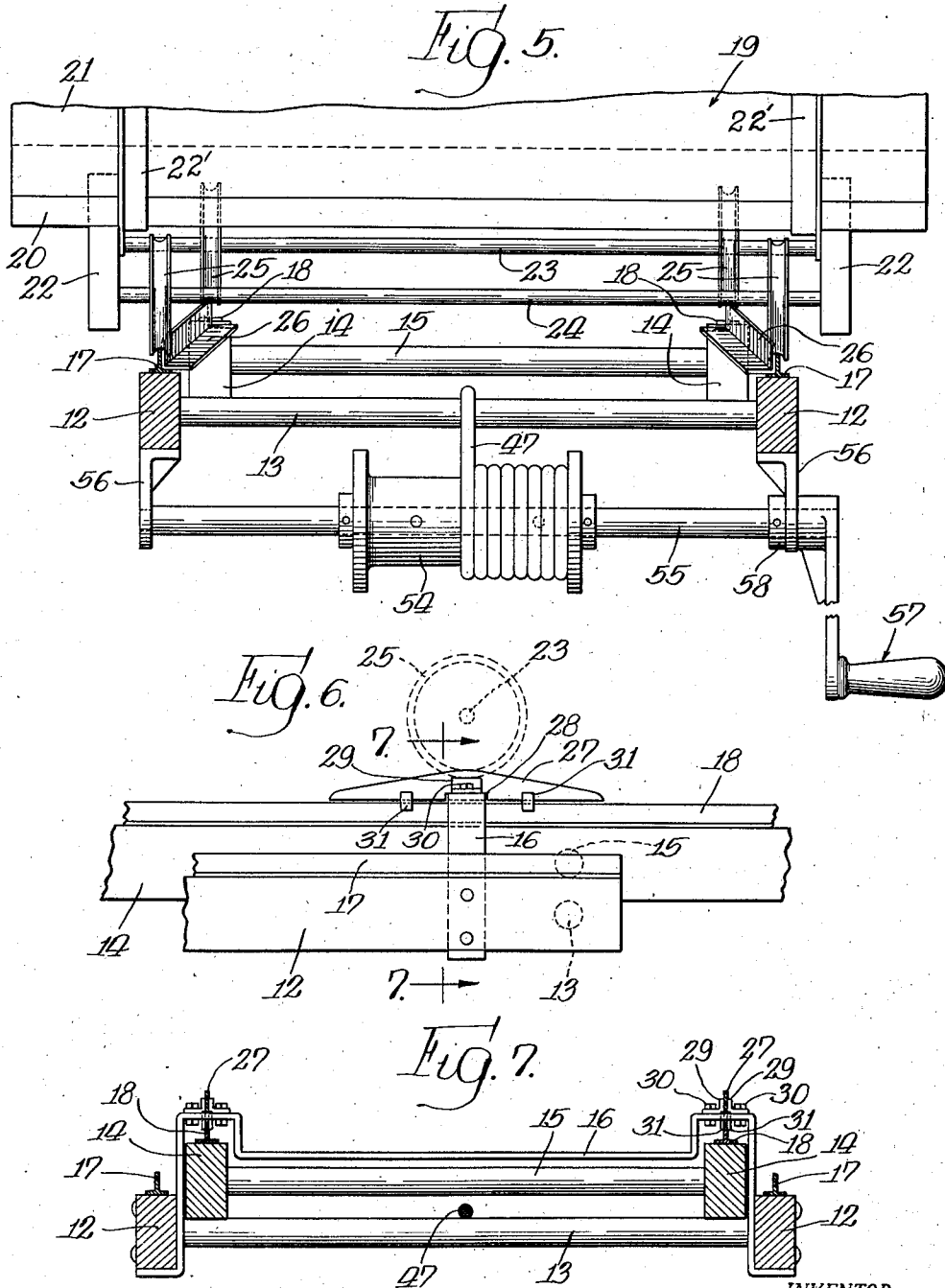
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HOIST ATTACHMENT FOR LADDERS

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3 Sheets-Sheet 3



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HOIST ATTACHMENT FOR LADDERS

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10 Claims. (Cl. 214-103)

The present invention relates generally to ladders, but more particularly to a hoist or a material conveying and elevating attachment for extension ladders.

One of the primary objects of the present invention is to provide a novel, improved and simplified construction of a hoist or material conveying and elevating mechanism in the form of an attachment for an extension type ladder whereby the material, such for example as roofing material or building material, may be elevated from the ground and conveyed over the ladder sections to an elevated position such as a roof of a building, and discharged from the carrier at the upper end of the ladder section by the operator on the ground.

A further object of the invention is to provide a novel and improved construction of a conveying and elevating attachment for an extension ladder whereby the material conveyed and elevated thereby may be effectively elevated and discharged to the upper end thereof by an operator on the ground.

A still further object of the invention is to provide a novel and improved material elevating and conveying mechanism in the form of an attachment for an extension ladder which includes a novel form of carriage or container adapted to be elevated into a position so that when it reaches the upper end of the ladder extension, the material conveyed thereon may be removed or discharged, after which the carrier may be returned to its lower or ground position by a single operator on the ground.

Another object of the invention is to provide a novel and improved form of material elevating and conveying attachment for extension ladders which includes a form of a switch and a bridge for guiding the wheels of the carriage between and over the ladder sections.

These and other objects are accomplished by providing a construction and an arrangement of the various parts in the manner hereinafter described and particularly pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a side elevational view of the conventional form of a two section extension ladder having my improved material elevating and conveying mechanism mounted thereon;

Fig. 2 is an enlarged fragmentary view showing the upper part of my improved attachment and illustrating the manner in which the carriage comes to a stop upon reaching the upper end of its travel;

Fig. 3 is a substantially planned view taken on the line 3-3 in Fig. 1;

Fig. 4 is an enlarged top plan view, taken on the line 4-4 in Fig. 2;

Fig. 5 is an enlarged cross sectional view taken on the line 5-5 in Fig. 1;

Fig. 6 is an enlarged fragmentary and side elevational view showing the form of bridge which permits the carriage to pass over the bracket between the two ladder sections; and

Fig. 7 is a cross sectional view taken on the line 7-7 in Fig. 6.

In illustrating one form of my invention, I have shown the same in connection with a conventional form of extension ladder which comprises a main or lower section 10 and an upper section or extension 11. The lower section 10 of the ladder comprises two oppositely disposed and spaced apart parallel side rails or beams 12 which support uniformly spaced apart steps or rungs 13. The upper or extension section 11 similarly comprises oppositely disposed parallel arranged guide rails or beams 14 which in turn support the uniformly spaced apart rungs 15. The upper section or extension 11 is of a narrower width than the lower or main section 10 so that the side rails 14 thereof are normally located inwardly of the side rails 12 of the main section 10 so that the upper section may slide or be adjusted with respect to the lower section. The extension 11 is guided with respect to the lower section by means of the usual guide bracket 16 which has its opposite ends secured to the opposite rails 12 of the main section 10 adjacent the upper ends thereof. The lower ends of the side rails or beams 14 of the extension 11 are provided with the usual locking hooks (not shown) for supporting the upper section in various positions of adjustment with respect to the lower section. The construction thus far described is the conventional form of an extension ladder.

My improved attachment for elevating, conveying and discharging material which is adapted to be attached to a conventional form of extension ladder includes inverted T-like wheel tracks 17 secured to the front surfaces of the side rails 12 of the lower section and extend throughout the length of each of these side rails 12. Secured to the front surfaces of the side rails 14 of the upper section 11 are similarly inverted T-like wheel tracks 18. Mounted on the tracks is a material elevating and conveying carrier or carriage, generally indicated by the reference character 19. The carriage, of course, may assume a variety of forms, but preferably includes

a platform 20 having an angularly extending rear wall 21. The platform 20 and wall 21 are mounted on two longitudinally extending main frame members 22 which are reinforced by angle members 22'. Secured to the rear ends of the main frame members 22 are front and rear shafts or axles 23 and 24 respectively. Journaled on the shafts 23 and 24 are peripherally grooved carrying wheels or pulleys 25. These wheels 25 are adapted to engage the tracks 17 and 18 of the respective ladder sections. The wheels 25 are freely slidable upon the shafts, so as to move inwardly or outwardly to accommodate themselves to the varying width of the tracks on the respective ladder sections. In order to permit the carriage 19 and the respective carrying wheels 25 to transfer the wider track section to the narrower track section or vice versa, switches are interposed between the upper and lower ladder sections to accomplish this function. These switches include angle members 26 which are attached to the lower ends of the tracks 18 of the upper ladder section 11. The vertical portions of the angle members 26 adjacent the upper ends thereof lay contiguous to and in alignment with the vertical portions of the T-shaped tracks and the lower portion of the angle members 26 are disposed angularly so that their lower ends lay contiguous to and in alignment with the respective lower tracks 17 on the lower ladder section 10. The switches obviously permit the grooved wheels 25 to transfer from the wider rail 17 to the narrower rail 18 or vice versa. In this connection it will be noted that when the carriage is traveling over these switches, the wheels move inwardly or outwardly with respect to their respective shafts so as to accommodate the wheels to the varying spacing of the different track sections.

In order to permit the carriage to cross the bracket 16 between the ladder sections, I have provided a novel type of bridge in the form of an arch member indicated by the reference character 27. The bridges 27 have cut-outs or recesses as shown at 28 which are complementary to the front portions of the bracket 16. The bridges 27 are held in position by oppositely disposed angle members 29 which are welded to the opposite sides of the bridge members 27 and are, in turn, bolted by means of bolts 30 to the bracket member 16. These bridges are further held from displacement with respect to the tracks 18 by side clips 31 which are secured to the bridge members and frictionally attached to the rails 18 as clearly shown in Fig. 6 of the drawings.

In order to discharge the material from the carriage when the carriage reaches the upper end of the ladder extension, I have provided a track extension frame in the form of arcuate or curved track extensions 32 which are in the form of angle members and form continuations of the tracks 18. These arcuate track extensions 32 are secured to the upper end of the side rails 14 of the extension 11 by a transverse angle member 33. The outer or free ends of the tracks are held in spaced relation with respect to each other by a transverse brace or angle member 34. The arcuate track sections are further reinforced and supported by angularly extending bars 35 which have their upper ends connected to the arcuate tracks as shown at 36 and their lower ends as shown at 37 to the upper ends of the opposite side rails 14 of the ladder extension 11.

In order to guide a hoisting cable as the carriage conveyed around the arcuate tracks at the top

of the ladder extension and to aid in returning the carriage from its uppermost position after the load has been discharged, I have provided a novel form of swinging or pivoted arm generally indicated by the reference character 38. This swinging arm is pivoted as shown at 39 to oppositely disposed pivots formed by two pairs of downwardly converging bars 40 which have their upper ends secured to the opposite brace members 35. This swinging arm comprises two outside bars 41 which converge inwardly towards a plane occupying the longitudinal center between the ladder sections. The inner ends of these bars extend parallel and form a pulley bracket as shown at 42 and having journaled therein a pulley 43. The converging bars 41 of the arm 38 are reinforced and braced by diagonally crossing bars 44 which have their inner ends journaled on the pivot 39 common with the pivot of the bars 41 and their upper ends rigidly secured as shown at 45 to the converging bars 41. These bars 41 are further reinforced by transverse bar 46. The carriage is elevated through the medium of a cable and winch mechanism. The cable indicated at 47, which has one end connected to the forward end of the carriage 19 is shown at 48. The cable 47 extends from the carriage and is trained about the pulley 43 carried by the arm 38. From this point the cable is trained about a second pulley 49 journaled in the bracket 50 secured to the transverse angle member 34. From this point the cable is trained about a third pulley 51. The pulley 51 is journaled in a bracket 52 secured to a transverse angle member 53. The transverse angle member 53 has its opposite ends secured to the opposite braces or bars 35. The cable 47 extends from the pulley 51 below the rungs 15 of the upper ladder section and above the rungs 13 of the lower ladder section to a winding drum 54. The drum 54 is secured to a shaft 55. The shaft 55 is journaled in opposite bearing brackets 56 secured to the rear side of the lower side rails 12, as clearly shown in Fig. 5 of the drawings. Secured to one end of the shaft 55 is a hand operating crank indicated by the reference character 57. The shaft is prevented from displacement with respect to its bearing brackets 56 by a collar 58 secured to the shaft.

In Figs. 1 and 2 of the drawings, my invention is disclosed as being employed in connection with an extension ladder leaning at a suitable angle against a building so that the arcuate extension frame extends above the roof of the building which is diagrammatically shown in these figures and generally indicated by the reference character 59. In order to stop the carriage and discharge the material at the upper end thereof and to prevent the carriage from being displaced from the tracks at this point, I have provided oppositely disposed, substantially U-shaped stops as shown at 60 which are secured to the lower flanges of the respective arcuate tracks 32 so that the upper arms of the stops 60 engage the front axle or shaft 23 of the carriage. In order to prevent the rear end of the carriage from displacement with respect to the tracks, I have provided two additional stops as shown at 61 which are adapted to engage transverse angle bracket 62. The angle bracket 62 is secured to the opposite main frame members 22 of the carriage 19. The opposite ends of the stop angle 62 are secured to the lower flanges of the arcuate tracks 32 as clearly shown in Fig. 2 of the drawings. It will be obviously seen that as the carriage, together with the material carried thereon, reaches the

upper end of its travel on the arcuate tracks, the shaft 23 of the carriage engages the stops 60 and simultaneously the transverse angle member 62 engages the opposite stops 61 to prevent further movement forward of the carriage with respect to the tracks and prevents the displacement of the carriage from the tracks so that the material thereon may be discharged therefrom before the carriage is returned to its lowermost position.

In order to facilitate the return of the carriage from the position shown in Fig. 2 of the drawings, to the inclined tracks on the upper ladder section, I have provided an extension spring generally indicated by the reference character 63 which has one end thereof connected as shown at 64 to a transverse angle 65. The opposite ends of the transverse angle 65 are secured to the inner ends of the opposite cross bars 44. The other end of the spring 63 is connected as shown at 66 to the transverse angle member 53.

From the above description it will be obvious that as the cable 47 is unwound from the winding drum 54 by the manipulation of the crank 57, the tension on the spring 63 will actuate the arm 38 to force the carriage 19 rearwardly about the arcuate tracks 32 until it returns to the inclined portion of the upper track section, from there it will be lowered by gravity to the position shown in Fig. 1 of the drawings. In this connection it will also be noted that the swinging arm 38 will stop at the position shown in Fig. 1 of the drawings by reason of the arm 38 striking a stop or transverse bar 67 secured adjacent the lower end of the arcuate track sections 32.

Summarizing the functions and advantages of my improved hoisting or material elevating and conveying attachment for an extension ladder, it will be readily seen that by providing tracks for the side rails for an extension ladder and providing switches between these different width tracks on the respective ladder sections and bridges to convey the carriage across the inner connecting ladder bracket and permitting the wheels of the carriage to slide axially of their respective shafts, I have afforded a very simple elevating and conveying mechanism which can be easily and readily attached to extension ladders. In this connection it will also be noted that by providing an arcuate track extension to the upper ladder section together with the pivoted arm for guiding the cable and carriage about the arcuate tracks and the return of the carriage after the load has been discharged so that all these functions may be performed by a single operator on the ground, the labor and time heretofore required to perform these functions has been reduced to a minimum.

While in the above specification I have described one embodiment which my invention may assume in practice, it will, of course, be understood that the same is capable of modification and that modification may be made without departing from the spirit and scope of the invention as expressed in the following claims.

What I claim as my invention and desire to secure by Letters Patent is:

1. The combination with an extension ladder having a main section and an adjustable extension section, of tracks carried by said sections, a movable carriage mounted on said tracks, arcuate tracks secured to the upper end of said extension section, a pulley mounted adjacent the upper end of said extension, a cable having one end connected to said carriage and trained about said pulley, a winch mounted on said main sec-

tion and connected to the other end of said cable, and located in the path of and engageable with said carriage means for guiding a portion of said cable during the movement of said carriage over said arcuate tracks.

2. The combination with an extension ladder having a main section and an adjustable extension section, of tracks carried by said sections, a movable carriage mounted on said tracks, arcuate tracks secured to the upper end of said extension section, a pulley mounted adjacent the upper end of said extension, a cable having one end connected to said carriage and trained about said pulley, a winch mounted on said main section and connected to the other end of said cable, means adapted to be engaged by said carriage for guiding a portion of said cable during the movement of said carriage over said arcuate tracks, and means carried by said arcuate tracks and engageable with said carriage for stopping said carriage adjacent the end of said arcuate tracks.

3. The combination with an extension ladder having a main section and an adjustable extension section, of tracks carried by said sections, a movable carriage mounted on said tracks, arcuate tracks secured to the upper end of said extension section, a pulley mounted adjacent the upper end of said extension, a cable having one end connected to said carriage and trained about said pulley, an arm pivotally related to said arcuate tracks, a pulley journaled on the free end of said arm over which a portion of said cable is trained, and a winch mounted on said main section and operatively connected to the other end of said cable.

4. The combination with an extension ladder having a main section and an extension section adjustably mounted on said main section, of tracks extending longitudinally of each of said sections, switches located between the tracks of the respective sections, a traveling carriage mounted on said tracks, a supplemental track frame mounted on the upper end of said extension section, arcuate tracks carried by said frame and forming a continuation of the tracks on said extension section, a swinging arm pivoted to said frame, a pulley journaled on the free end of said arm, a second pulley journaled adjacent the outer end of said frame, a third pulley journaled adjacent the upper end of said ladder extension, a cable having one end secured to said carriage and trained about all of said pulleys, and a winch carried by said main section and operatively connected to the other end of said cable.

5. The combination with an extension ladder having a main section and an extension section adjustably mounted on said main section, of tracks extending longitudinally of each of said sections, switches located between the tracks of the respective sections, a traveling carriage mounted on said tracks, a supplemental track frame mounted on the upper end of said extension section, arcuate tracks carried by said frame and forming a continuation of the tracks on said extension section, a swinging arm pivoted to said frame, means for limiting the pivotal movement of said arm with respect to said frame, a pulley journaled on the free end of said arm, a second pulley journaled adjacent the outer end of said frame, a third pulley journaled adjacent the upper end of said ladder extension, a cable having one end secured to said carriage and trained

about all of said pulleys, and a winch carried by said main section and operatively connected to the other end of said cable.

6. The combination with an extension ladder having a main section and an extension section adjustably mounted on said main section, of tracks extending longitudinally of each of said sections, switches located between the tracks of the respective sections, a traveling carriage mounted on said tracks, a supplemental track frame mounted on the upper end of said extension section, arcuate tracks carried by said frame and forming a continuation of the tracks on said extension section, a swinging arm pivoted to said frame, means for limiting the pivotal movement of said arm with respect to said frame, a spring having one end connected to said arm and the other end connected to said frame for actuating said carriage on the return travel over said arcuate tracks, a pulley journaled on the free end of said arm, a second pulley journaled adjacent the outer end of said frame, a third pulley journaled adjacent the upper end of said ladder extension, a cable having one end secured to said carriage and trained about all of said pulleys, and a winch carried by said main section and operatively connected to the other end of said cable.

7. The combination with an extension ladder having a main ladder section and a relatively narrower ladder extension section slidably connected therewith, a bracket secured to the upper end of said main section and embracing said extension section, tracks mounted on the respective ladder sections, track members secured to and bridging said bracket, switch track members connecting the respective tracks of said ladder sections, a traveling carriage mounted on said tracks, a pulley journaled adjacent the upper end of said extension section, a cable trained about said pulley and having one end connected to said carriage, and a winch mounted on said main section and operatively connected to the other end of said cable.

8. The combination with an extension ladder having a main ladder section and a relatively narrower ladder extension section slidably connected therewith, a bracket secured to the upper end of said main section and embracing said extension section, tracks mounted on the respective ladder sections, track members secured to and bridging said bracket, switch track members connecting the respective tracks of said ladder sections, a traveling carriage mounted on said tracks, arcuate tracks in the form of a frame con-

nected to the upper extension section, a swinging arm pivoted to said frame, a pulley journaled on the free end of said arm, a second pulley journaled on said frame, a cable trained about said pulleys having one end connected to said carriage, and a winch mounted on said main section and operatively connected to the other end of said cable.

9. The combination with an extension ladder having a main ladder section and a relatively narrower ladder extension slidably connected therewith, a bracket secured to the upper end of said main section and embracing said extension section, tracks mounted on the respective ladder sections, track members secured to and bridging said bracket, switch track members connecting the respective tracks of said ladder sections, a travelling carriage mounted on said tracks, arcuate tracks in the form of a frame secured to said extension section, a swinging arm pivoted to said frame, a pulley journaled on the free end of said arm, means for limiting the pivotal movement of said arm, means for stopping the movement of said carriage at the end of said frame, a spring for normally returning said arm and carriage over said arcuate track, a cable trained about said pulleys and having one end connected to said carriage, and a winch mounted on said main section and operatively connected to the other end of said cable.

10. The combination with an extension ladder having a main ladder section and a relatively narrower ladder extension section slidably connected therewith, a bracket secured to the upper end of said main section and embracing said extension section, tracks mounted on the respective ladder sections, track members secured to and bridging said bracket, switch track members connecting the respective tracks of said ladder sections, a traveling carriage mounted on said tracks, arcuate tracks in the form of a frame secured to said extension section, a swinging arm pivoted to said frame, a pulley journaled on the free end of said arm, means for limiting the pivotal movement of said arm, means for stopping the movement of said carriage at the end of said frame, a spring for normally returning said arm and carriage over said arcuate track, a cable trained about said pulleys and having one end connected to said carriage, a winch mounted on said main section and operatively connected to the other end of said cable, and means for preventing the displacement of said carriage from the arcuate tracks at its uppermost position.

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