Dec. 17, 1957 J. F. BAKER 2,816,675

LIFTING MECHANISM

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FIG. 1

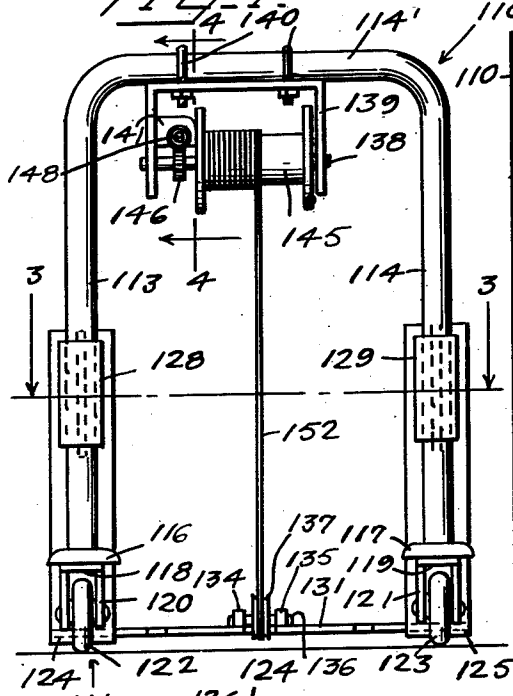
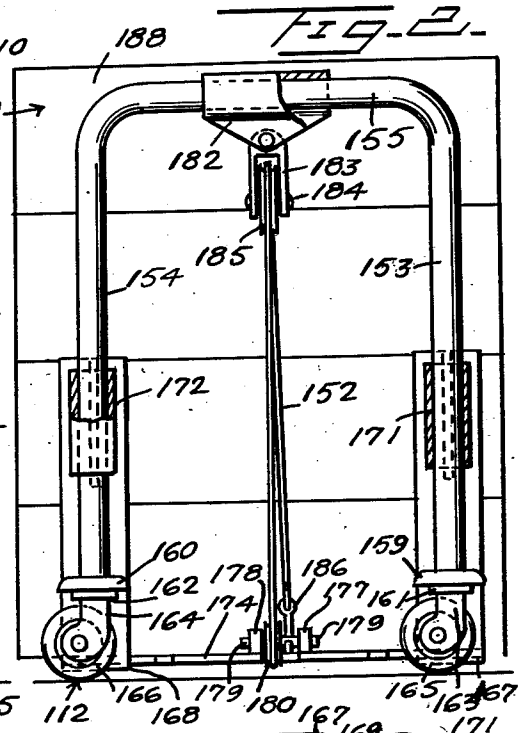


FIG. 2



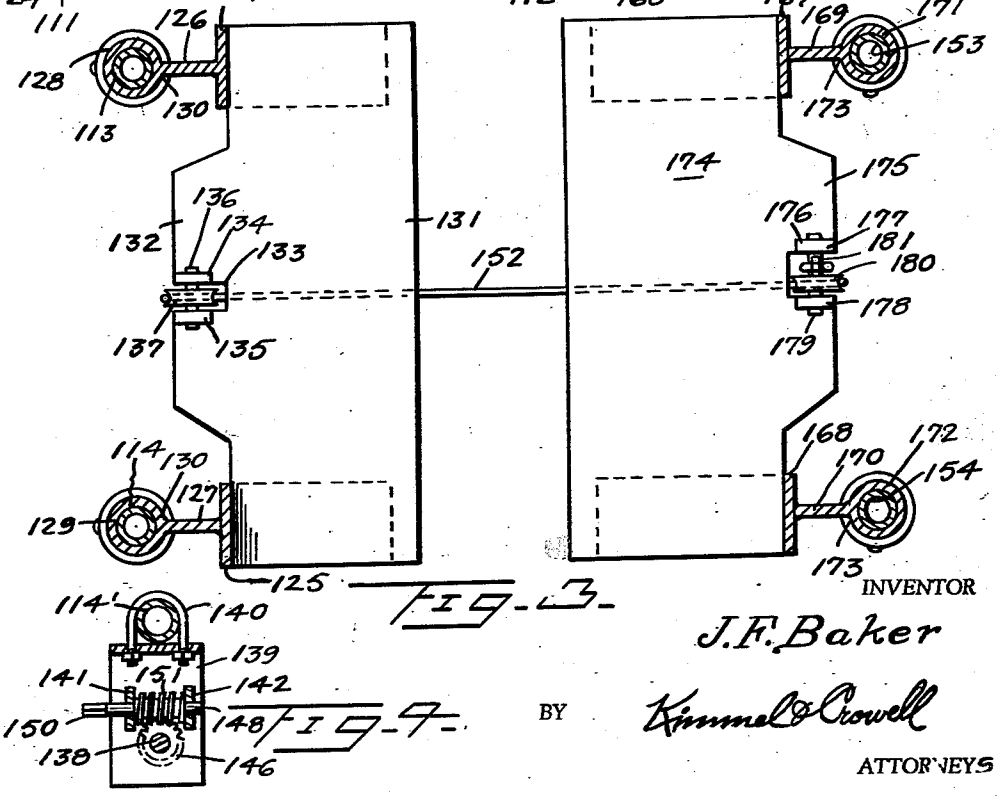


FIG. 3

FIG. 4

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Fig. 11.

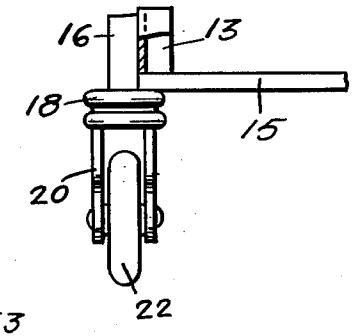
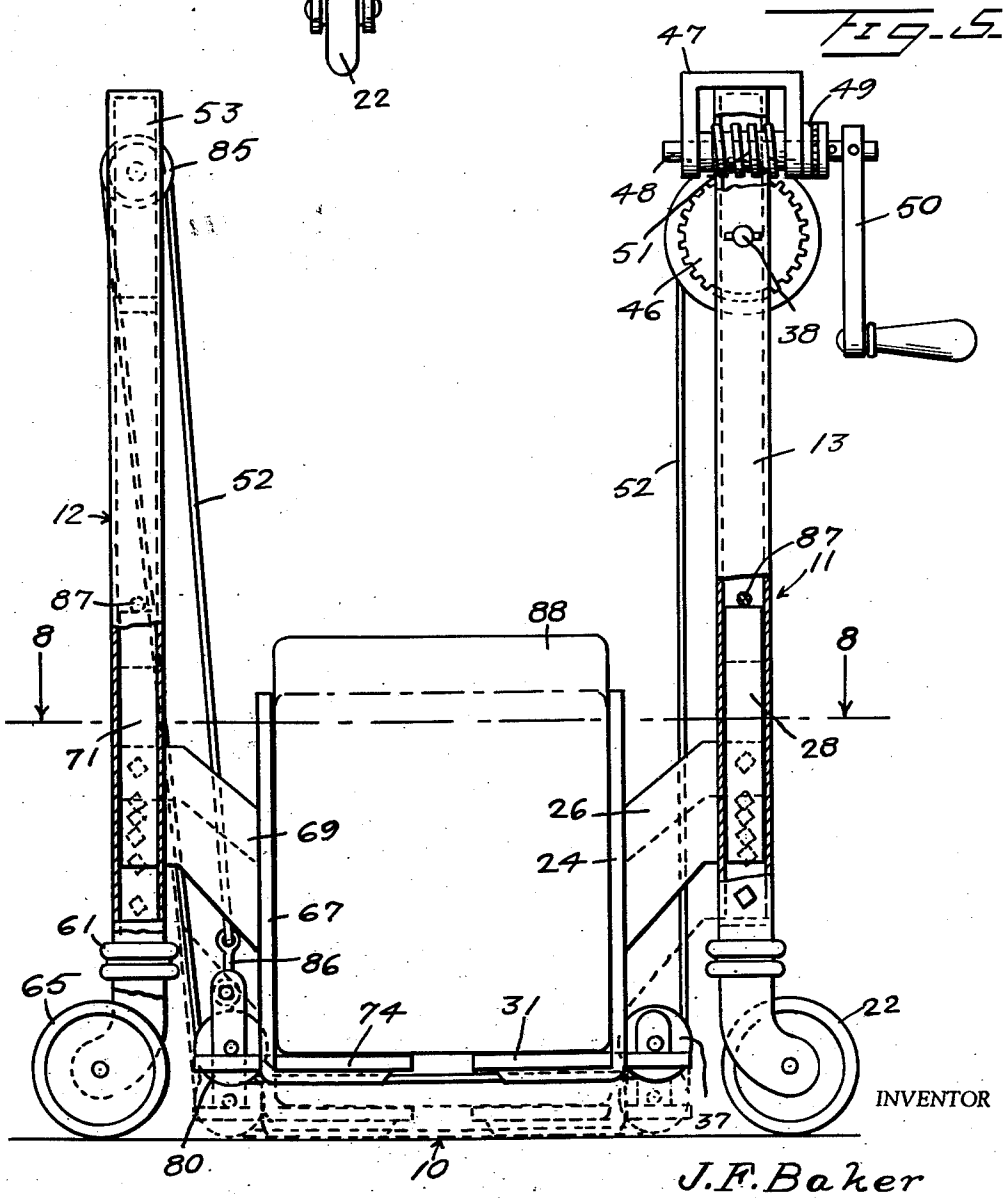


Fig. 5.



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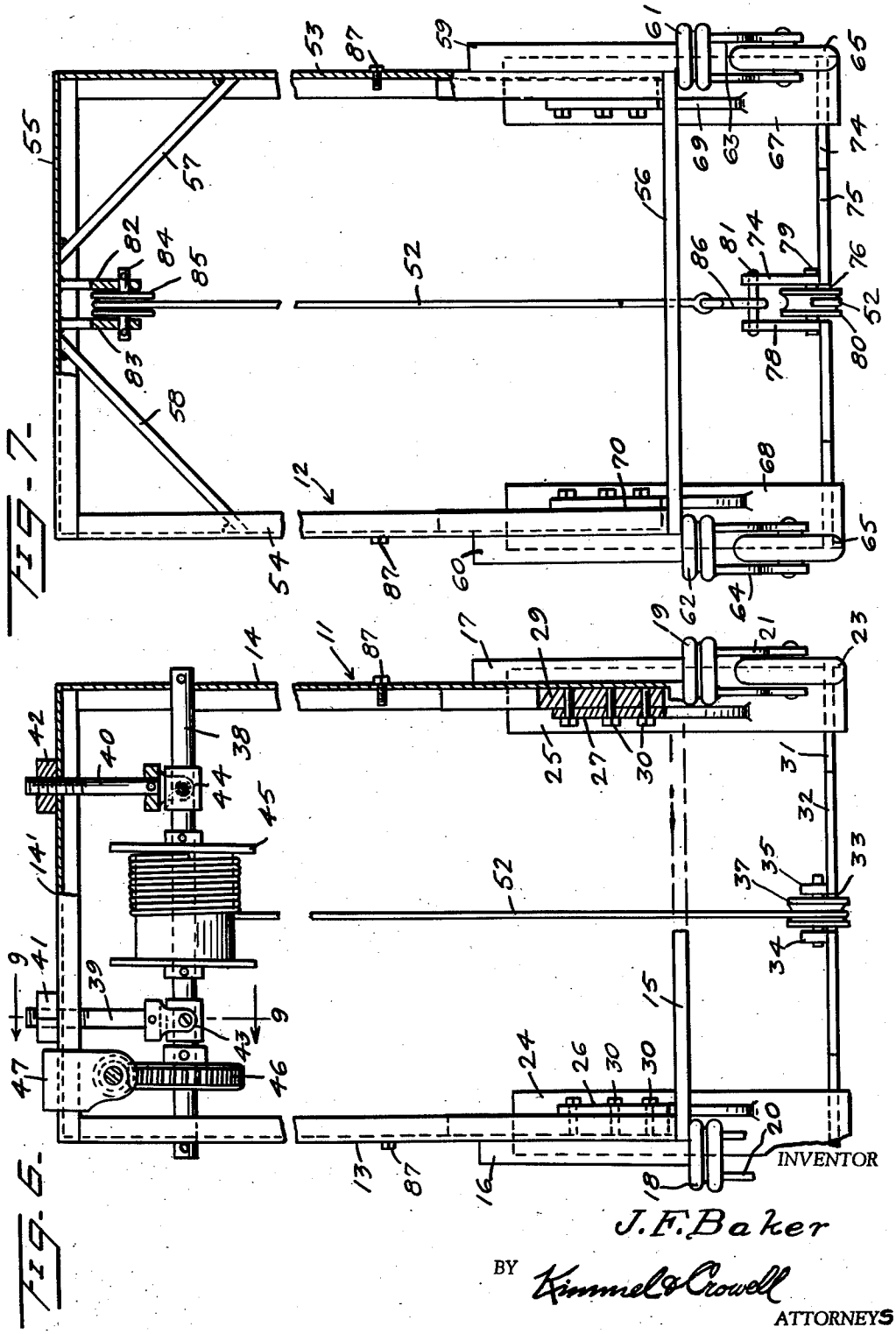


FIG. 7.

FIG. 6.

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Fig. 8.

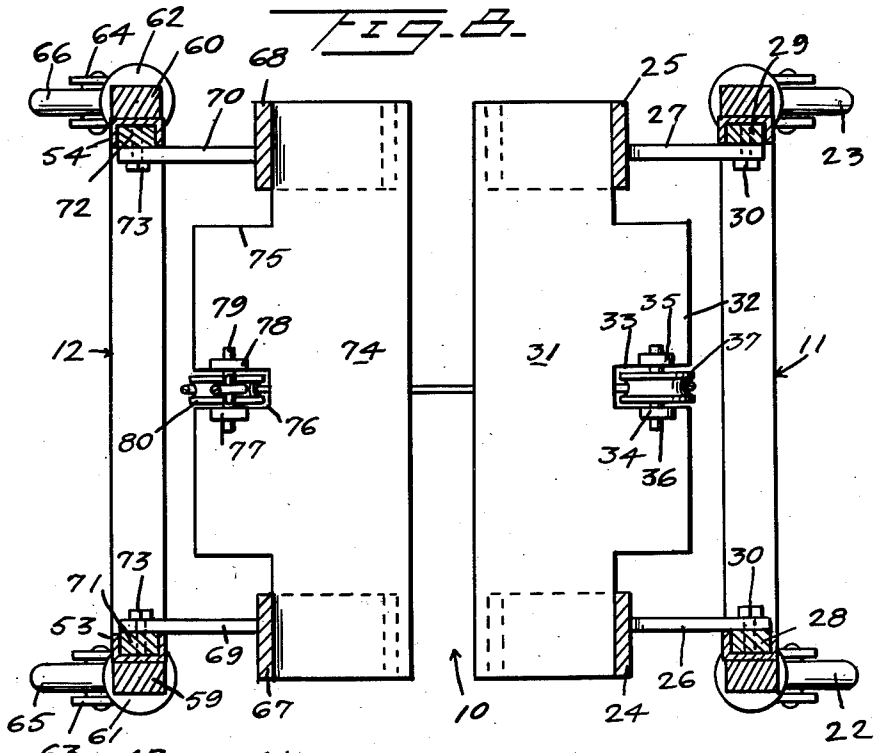


Fig. 9.

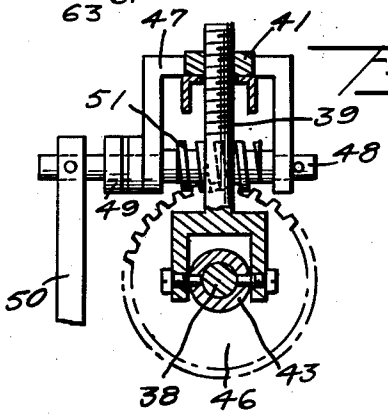
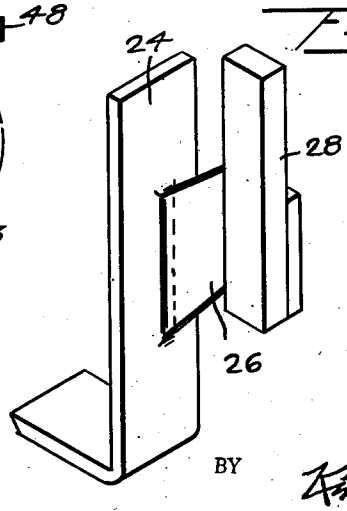


Fig. 10.



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United States Patent Office

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LIFTING MECHANISM

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Application June 8, 1956, Serial No. 590,260

3 Claims. (Cl. 214—390)

The present invention relates to lifting mechanisms, and more particularly, to such mechanisms which are adapted to lift an object and to serve as a carriage for the movement of the object from place to place.

The primary object of the invention is to provide a lifting mechanism for lifting and transporting relatively heavy objects which when not in use can be collapsed into a relatively small area for storage purposes.

Another object of the invention is to provide a lifting and transporting mechanism of the class described which consists of a pair of flexibly connected units having the facility of encompassing loads varying greatly in size.

A further object of the invention is to provide a lifting and transporting mechanism of the class described above which is inexpensive to manufacture, simple to attach and use, and positive in its action.

Other objects and advantages will become apparent in the following specification when considered in the light of the attached drawings, in which:

Figure 1 is a side elevation of the invention.

Figure 2 is a side elevation of the invention shown partly broken away, illustrating the side opposite to that shown in Figure 1.

Figure 3 is a horizontal cross-section taken along the line 3—3 of Figure 1, looking in the direction of the arrows.

Figure 4 is an enlarged fragmentary vertical cross-section taken along the line 4—4 of Figure 1, looking in the direction of the arrows.

Figure 5 is a front elevation of the invention shown partly broken away and in section for purposes of clarity and with the lowered position shown in dotted lines.

Figure 6 is a side elevation of the invention shown partly broken away and in section for purposes of clarity.

Figure 7 is a side elevation of the invention showing the side opposite to Figure 6, also partly broken away and partly in section for purposes of clarity.

Figure 8 is a horizontal cross-section taken along the line 8—8 of Figure 5, looking in the direction indicated.

Figure 9 is a vertical cross-section, on an enlarged scale, of a fragmentary portion of the invention taken along the line 9—9 of Figure 6, looking in the direction indicated.

Figure 10 is a perspective view of one of the lifting forks.

Figure 11 is a detailed fragmentary side elevation of one of the caster wheel mountings.

Referring now to the drawings in detail wherein like reference numerals indicate like parts throughout the several figures, the reference numeral **110** indicates generally a lifting mechanism constructed in accordance with the invention and includes a winch unit generally indicated at **111**, and a trailing unit generally indicated at **112**.

Referring particularly to Figures 1 and 3, it will be seen that the winch unit **111** comprises a pair of upright tubular members **113** and **114** which are integrally joined

by a horizontal tubular member **114'** extending between their top ends. The tubular uprights **113** and **114** extend parallel to each other in spaced apart relation and are provided at their lower ends, respectively, with a pair of caster brackets **116** and **117**. Caster bearings **118** and **119** are secured to the caster brackets **116** and **117**, respectively, and pivotally carry a pair of caster forks **120** and **121**, respectively, having caster wheels **122** and **123** journalled therein.

A pair of L-shaped forks **124** and **125** extend inwardly from the tubular members **113** and **114**, respectively, and are provided with upright mounting plates **126** and **127** which are welded thereto and extend in parallel relation to a position adjacent the upright tubular members **113** and **114**. A pair of tubular guide members **128** and **129** are secured to the mounting plates **126** and **127** along a side edge thereof opposite the forks **124** and **125** by means of welding or the like, as indicated at **130**, and are telescopically mounted on the tubular upright members **113** and **114** for reciprocation thereon. A plate **131** is secured to the horizontal portions of the forks **124** and **125** and extends therebetween. The plate **131** has a rearwardly offset portion **132** having a medial slot **133** formed therein.

A pair of upstanding ears **134** and **135** are positioned on opposite sides of the slot **133** supporting a shaft **136** therebetween. A pulley **137** is journalled on the shaft **136** between the ears **134** and **135** in a position so that the pulley **137** extends below the plate **131** and rearwardly of the offset portion **132**.

A shaft **138** has its opposite ends journalled in the opposite sides of a U-shaped mounting bracket **139** which is secured to the tubular frame member **114'** by means of U-bolts **140**. A pair of laterally extending ears **141** and **142** are positioned in parallel relation and project inwardly from one of the sides of the U-shaped bracket **139**. A winch drum **145** is secured to the shaft **138** for rotation therewith. A gear **146** is secured to the shaft **136** adjacent one end of the winch drum **145**. The gear **146** is keyed to the shaft **138** for rotation therewith.

A shaft **148** is journalled in the ears **141** and **142** and carries a worm gear **151** which is keyed thereto and positioned between the ears **141** and **142**. The shaft **148** is provided with a square shank **150** to receive a hand crank (not shown). The worm gear **151** is meshed with the gear **146** so that upon rotation of the shaft **148** the worm gear **151** will rotate the gear **146** turning the shaft **136** and rotating the winch drum **145**. A cable **152** is wound on the winch drum **145** and extends downwardly under the pulley **137**.

A trailer unit **112** is provided with an upright framework identical to the winch unit **111** and including a pair of upstanding spaced apart parallel tubular members **153** and **154** joined at their upper terminal ends by an integrally tubular member **155**.

Caster brackets **159** and **160** are secured to the lower terminal ends of the tubular members **153** and **154**, respectively, and carry at their lower ends caster bearings **161** and **162**, respectively.

Caster forks **163** and **164** are mounted for swivel action on the bearings **161** and **162** and are provided with caster wheels **165**, **166** which are journalled therein. A pair of lifting forks **167** and **168** having a generally L-shape are positioned inwardly of the upright tubular members **153** and **154** and have secured thereto in upwardly and outwardly extending position support bracket plates **169** and **170** which extend in parallel relation to a point adjacent the upright tubular members **153** and **154**, respectively.

Tubular guide members **171** and **172** are telescopically engaged over the upright tubular members **153** and **154**, respectively, and are secured to the outer ends of the

bracket plates 169 and 170 by means of welding as is indicated at 173, or the like. A support plate 174 is secured to the horizontal portions of the lift forks 167 and 168 and is provided with a rearwardly offset portion 175 carrying a medially positioned inwardly extending slot 176. A pair of upstanding ears 177, 178 are secured to the plate 174 along opposite side edges of the slot 176.

A shaft 179 is secured to and extends between the ears 177 and 178. A pulley 180 is journalled on the shaft 179 and extends below and outwardly of the plate 174. A pulley 180 is positioned adjacent the ear 178 in spaced apart relation to the ear 177 leaving a portion 181 of the shaft 179 exposed, for reasons to be assigned.

A U-shaped yoke 182 is engaged over the tubular frame member 155 and depends therefrom. A pulley fork 183 is pivotally mounted in the yoke 182 and carries a shaft 184 adjacent its lower end. A pulley 185 is journalled on the shaft 184 and is adapted to have a cable 152 trained thereover. The cable 152 extends from the pulley 137 under the pulley 180 and over the pulley 185 and is provided with a hook 186 at its terminal end which engages the portion 181 of the shaft 179, as illustrated in Figures 2 and 3.

In the use and operation of the preferred form of the invention, the cable 152 is disconnected from the trailer unit 112 and the winch unit 113 is positioned so that the plate 131 extends under an object 188 to be lifted and supported. The forks 124 and 125 are brought into engagement with one side of the object 188 with the cable 152 extended under the object 188. The trailer unit 112 is positioned with its support plate 174 under the opposite side of the object 188 and with its forks 167, 168 in engagement with the side of the object 188. The cable 152 is then trained under the pulley 180, around the pulley 185, and downwardly with the hook 186 engaged about the portion 181 of the shaft 179. The drum 145 is then rotated, winding the cable 152 thereon.

The initial movement of the cable 152 onto the drum 145 causes the forks 124, 125, 167 and 168 to grip the sides of the object 188 tightly. Further winding of the cable 152 on the drum 145 will cause the support plates 131 and 174 to move upwardly with the units 111 and 112 so that the object 188 is lifted clear of the supporting surface and is carried by the caster wheels 122, 123, 165 and 166 permitting the object 188 to be transported as desired.

To unload the object 188 from the lifting mechanism 110, the procedure noted above is reversed, thus disconnecting the units 111 and 112 from the object 188.

Referring now to the modification illustrated in Figures 5 through 11, the reference numeral 10 indicates generally a modified lifting mechanism constructed in accordance with the invention which consists of a winch unit, generally indicated at 11, and a trailing unit, generally indicated at 12.

Referring particularly now to Figures 5, 6, and 8, it will be seen that the winch unit 11 comprises a pair of upright channel members 13 and 14 which open inwardly and are connected at their tops by means of a channel frame member 14'. The channel uprights 13 and 14 extend parallel to each other in spaced apart relation and are connected at their bottom ends by means of a crossbar 15. A pair of caster brackets 16 and 17 are secured to the outer lower portions of the channels 13 and 14, respectively, and have secured to the bottom ends thereof caster bearings 18 and 19, respectively. Caster forks 20 and 21 are pivotally secured to the bearings 18 and 19, respectively, and have caster wheels 22 and 23 journalled therein.

A pair of L-shaped forks 24 and 25 extend inwardly from the channel members 13 and 14, respectively, and are provided with upright mounting plates 26 and 27 which are welded thereto and extend in parallel relation to a position lying between the channels 13 and 14. A pair of guide bars 28 and 29 are secured to the ends of

the mounting plates 26 and 27 opposite the forks 24 and 25 by means of bolts 30. A plate 31 is secured to the horizontal portions of the forks 24 and 25 and extends therebetween. The plate 31 has a rearwardly extending offset portion 32 having a medial slot 33 formed therein.

A pair of upstanding ears 34 and 35 are positioned on opposite sides of the slot 33 supporting a shaft 36 extending therebetween. A pulley 37 is journalled on the shaft 36 between the ears 34 and 35 in a position so that the pulley extends below the plate 31 and rearwardly of the offset portion 32. A shaft 38 extends between the channel members 13 and 14 adjacent the channel member 14'.

Hanger bolts 39 and 40 project upwardly through the channel 14' and are secured thereto by means of nuts 41 and 42, respectively. Swivel shaft bearings 43 and 44 are carried by the lower ends of the support bolts 39 and 40 with the shaft 38 being journalled for support therein. A winch drum 45 is secured to the central portion of the shaft 38 for rotation therewith. A gear 46 is secured to the shaft 38 adjacent one end thereof and is adapted to rotate with the shaft 38.

An inverted U-shaped bracket 47 is secured to the channel 14' and extends downwardly on opposite sides thereof to support a shaft 48 journalled therein. A thrust bearing 49 is carried by the shaft 48 and engages against the bracket 47. A hand crank 50 is secured to the shaft 48 by any suitable means, and a worm gear 51 is mounted on the shaft 48 between the opposite sides of the bracket 47 in engagement with the gear 46 on the shaft 38. Rotation of the shaft 48 by the handle 50 will cause the worm gear 51 to rotate which in turn will rotate the gear 46 and the shaft 38 rotating the winch drum 45.

A cable 52 is wound on the winch drum 45 and extends under the pulley 37.

The trailer unit 12 is provided with an upright framework identical to the winch unit 11 consisting of a pair of upstanding spaced parallel channel members 53 and 54 joined at their upper edges by a channel member 55 and at their lower edges by a connector bar 56. Braces 57 and 58 extend across the upper corners of the unit 12 and are welded at their opposite ends to the channels 53, 54 and 55, respectively.

Caster brackets 59 and 60 are secured to the outer faces of the lower portions of the channels 53 and 54, respectively, and carry at their lower ends bearings 61 and 62, respectively. Caster forks 63 and 64 are mounted for rotation on the bearings 61 and 62 and have caster wheels 65 and 66 journalled therein respectively. A pair of lifting forks 67 and 68 are positioned inwardly of the channels 53 and 54 and have secured thereto in upwardly and outwardly extending position support bracket plates 69 and 70. The plates 69 and 70 extend in parallel relation between the channels 53 and 54.

Guide blocks 71 and 72 are positioned for reciprocation within the channels 53 and 54, respectively, and are secured to the outer ends of the support brackets 69 and 70 by means of bolts 73. A support plate 74 is secured to the horizontal portions of the lift forks 67 and 68 and is provided with a rearwardly extending offset portion 75, as best illustrated in Figure 8. An inwardly extending slot 76 is formed in the central portion of the offset 75 and has a pair of upstanding ears 77 and 78 positioned adjacent opposite edges thereof.

A shaft 79 is secured in and extends between the ears 77 and 78. A pulley 80 is journalled on the shaft 79 and extends below and outwardly of the plate 74. A coupling pin 81 is secured to and extends between the ears 77 and 78 in vertically spaced parallel relation to the shaft 79, as best illustrated in Figure 7.

A pair of ears 82 and 83 are secured to the channel 55 and depend therefrom in spaced parallel relation carrying a shaft 84 in transversely extending position

therein. A pulley 85 is journalled on the shaft 84, as best illustrated in Figure 7. The cable 52 from the drum 45 extends under the pulley 80 upwardly between the channel members 53 and 54 and over the pulley 85.

The cable 52 then extends downwardly to a hook 86 secured to its terminal end and engaged over the coupling pin 81, as illustrated in Figure 7.

Each of the upright channel members 13, 14, 53 and 54 are provided with a stop pin 87 which are adapted to engage the upper ends of the guide bars 28, 29, 71 and 72, respectively, to act as a stop to limit the upward movement thereof in the channels 13, 14, 53 and 54.

In the use and operation of the invention, the cable 52 is disconnected from the trailer unit 12, and the winch unit 13 is positioned so that the plate 31 extends under an object 88 to be lifted and transported. The forks 24 and 25 are brought into engagement with one side of the object 88, as best illustrated in Figure 5. The cable 52 is extended under the load and the trailer unit 12 is positioned with its support plate 74 under the opposite side of the object 88 and with its forks 67 and 68 in engagement with the opposite side of the object 88. The cable 52 is then trained over the pulley 80 and around the pulley 85 with the hook 86 engaged about the coupling pin 81. The drum 45 is then rotating winding the cable 52 thereon.

The first movement of the cable 52 onto the drum 45 will cause the forks 24, 25, 67 and 68 to grasp the sides of the object 88 tightly. Further winding of the cable 52 on the drum 45 will cause the support plates 31 and 74 to move upwardly with relation to the units 11 and 12 so that the object 88 is lifted clear of the supporting surface and is supported by the caster wheels 22, 23, 65 and 66. The object 88 can then be transported as desired.

To unload the object 88 from the lifting mechanism 10, the procedure noted above is reversed, thus disconnecting the units 11 and 12 from the object 88.

Having thus described the preferred embodiments of the invention, it should be understood that numerous other structural modifications and adaptations may be resorted to without departing from the scope of the appended claims.

What is claimed is:

1. A load lifting and transporting mechanism comprising an upright frame, a pair of wheels supporting said frame, a support mounted for reciprocation on said frame and adapted to engage one side of a load, a second upright frame, a pair of wheels supporting said second frame, a support mounted for reciprocation on said second frame and adapted to engage the other side of a load, a pulley journalled on the lower end of each of said supports, a flexible cable trained under said pulleys and extending under said load, means securing one end of said cable to said first named frame, and a winch mounted on said second named frame with the other end of said cable wound thereon.

2. A device as claimed in claim 1 wherein said cable when wound on said winch biases said supports into clamping engagement with said load.

3. A device as claimed in claim 1 wherein said frames are horizontally adjustably connected by said cable.

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