

[54] **LOADING AND UNLOADING MEANS FOR
CABLE REELS AND OTHER STRUCTURES**

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[51] Int. Cl. **B60p 1/48**

[58] Field of Search **214/77 R, 78, 80, 130 R, 214/130 A, 130 C, 147 R, 518, 1 BD, DIG. 1, DIG. 3, DIG. 4; 294/82 R**

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Attorney, Agent, or Firm—McDougall, Hersh & Scott

[57] **ABSTRACT**

A mechanism for loading structures such as cable reels onto a supporting bed and for unloading the structures from the bed. The mechanism employs pivotally mounted arms having engaging means at their ends adapted to engage rods associated with the structures to be lifted onto or off of the bed. The arms are mounted on a shaft with the mounting means permitting adjustment of the arms along the shaft whereby the spacing between the arms can be varied to accommodate structures of different sizes. The arms are preferably supported on a frame which can be removably mounted on the bed. Transfer arms associated with the bed are preferably employed whereby structures moved onto the bed can be moved by the transfer arms to a separate location on the bed thereby permitting loading of additional structures on the bed. The transfer arms are also preferably associated with frame structures which are removably supported by the bed. Latch means which facilitate engaging, locking and releasing of the structures are associated with the arms, including the transfer arms. These latch means may be manually and automatically operable.

20 Claims, 23 Drawing Figures

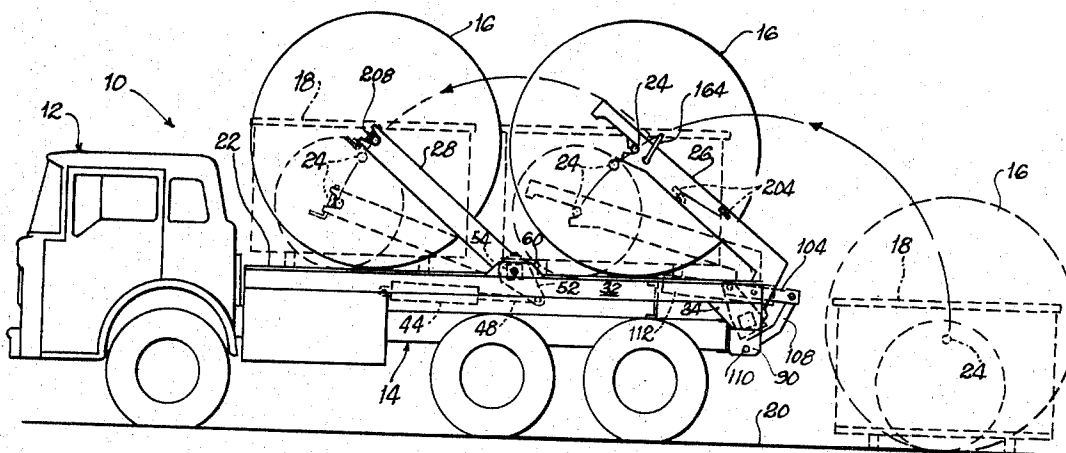


FIG. 1

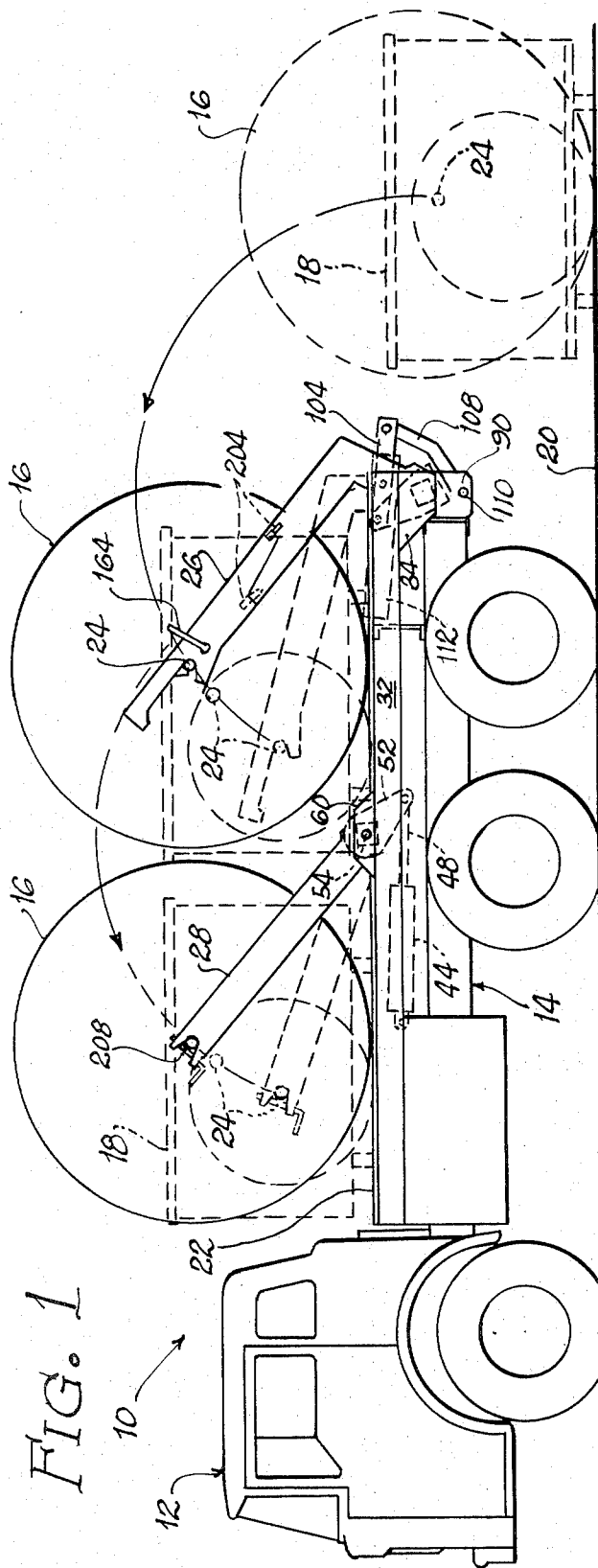
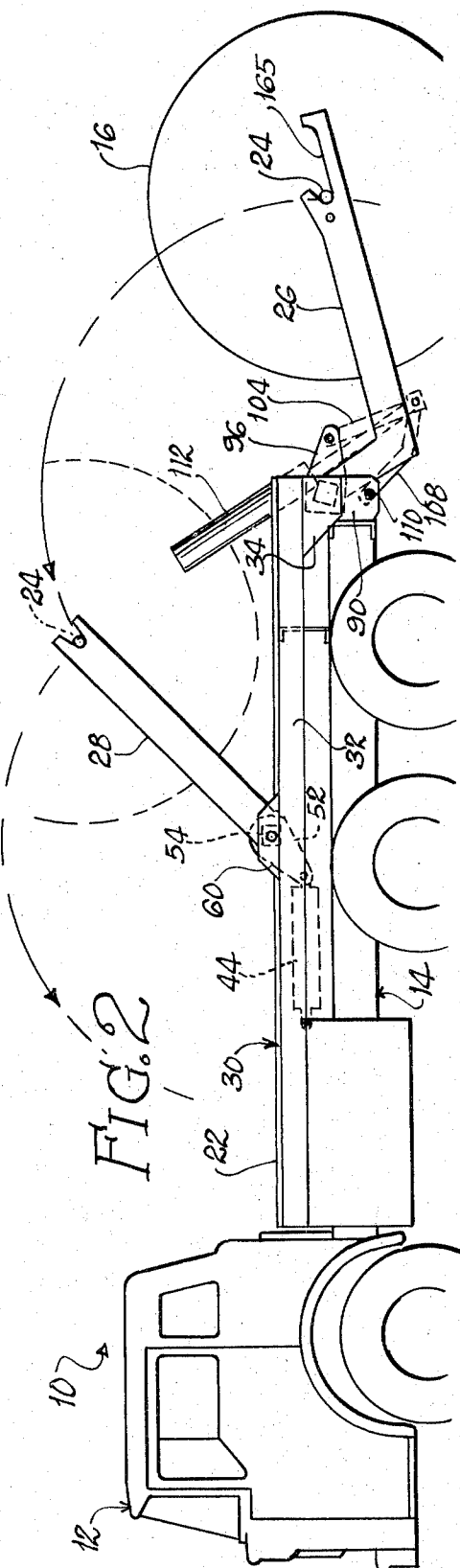


FIG. 2



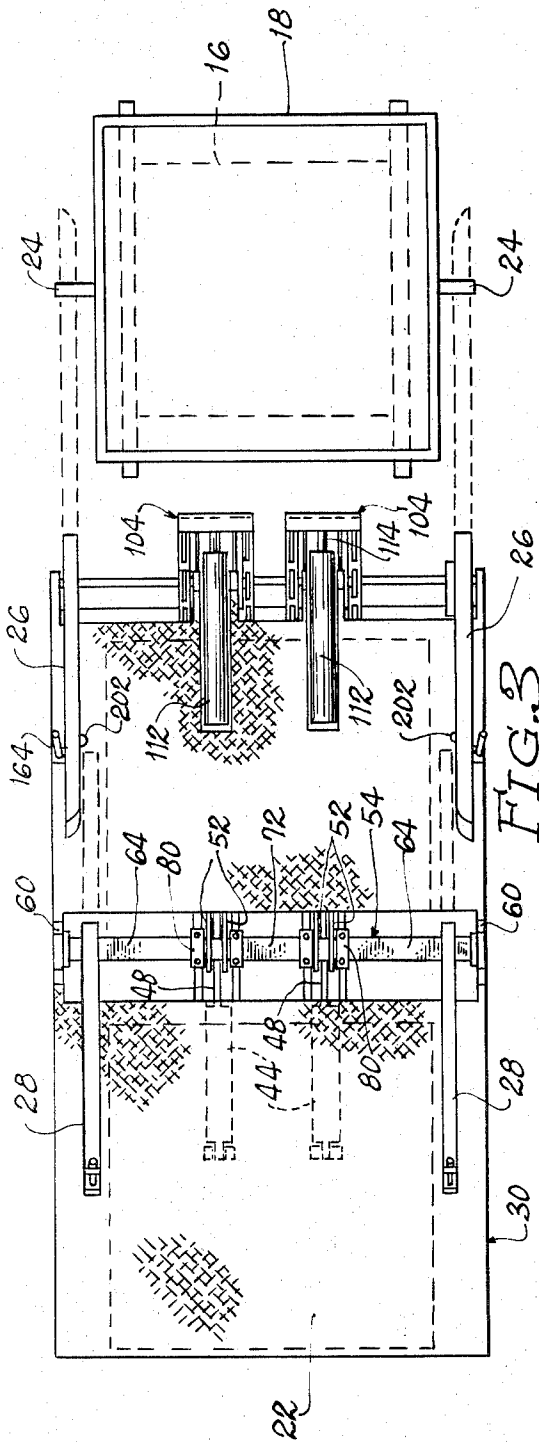


FIG. 3

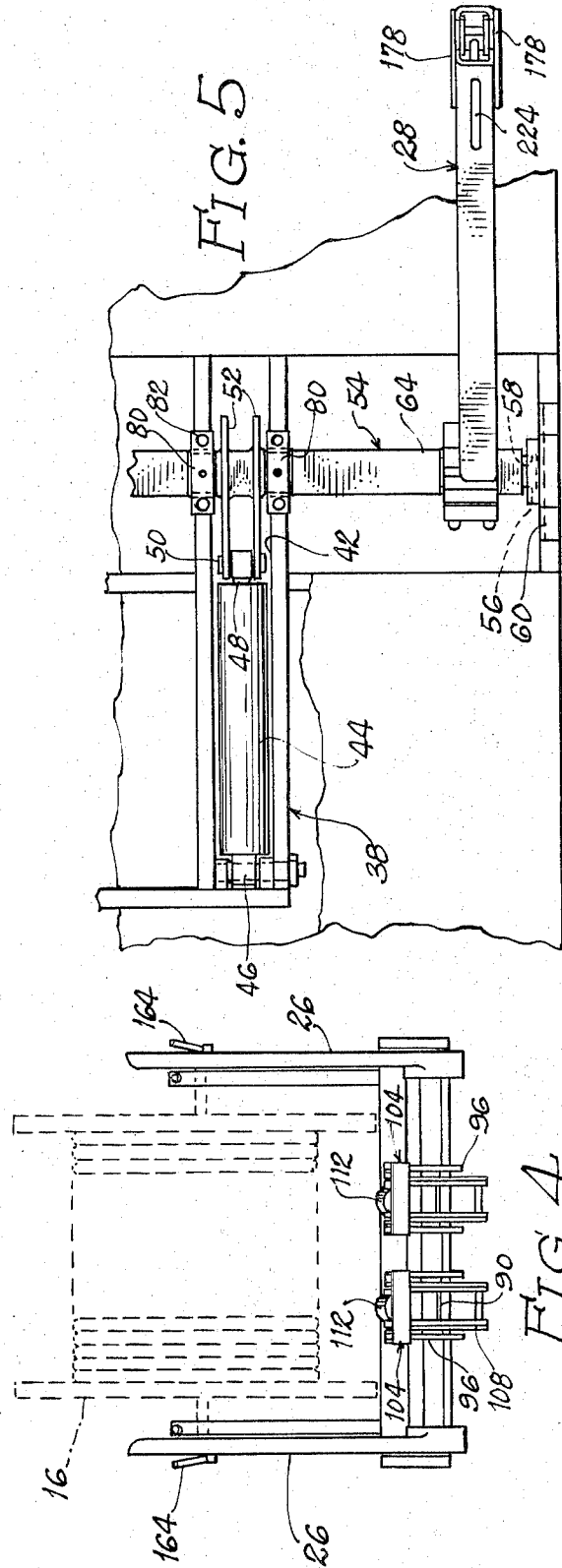


FIG. 4

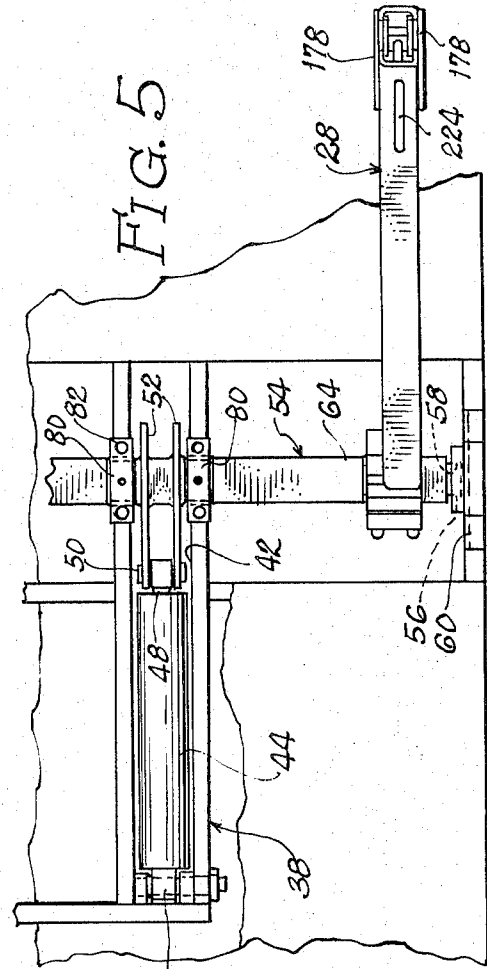


FIG. 5

FIG. 6

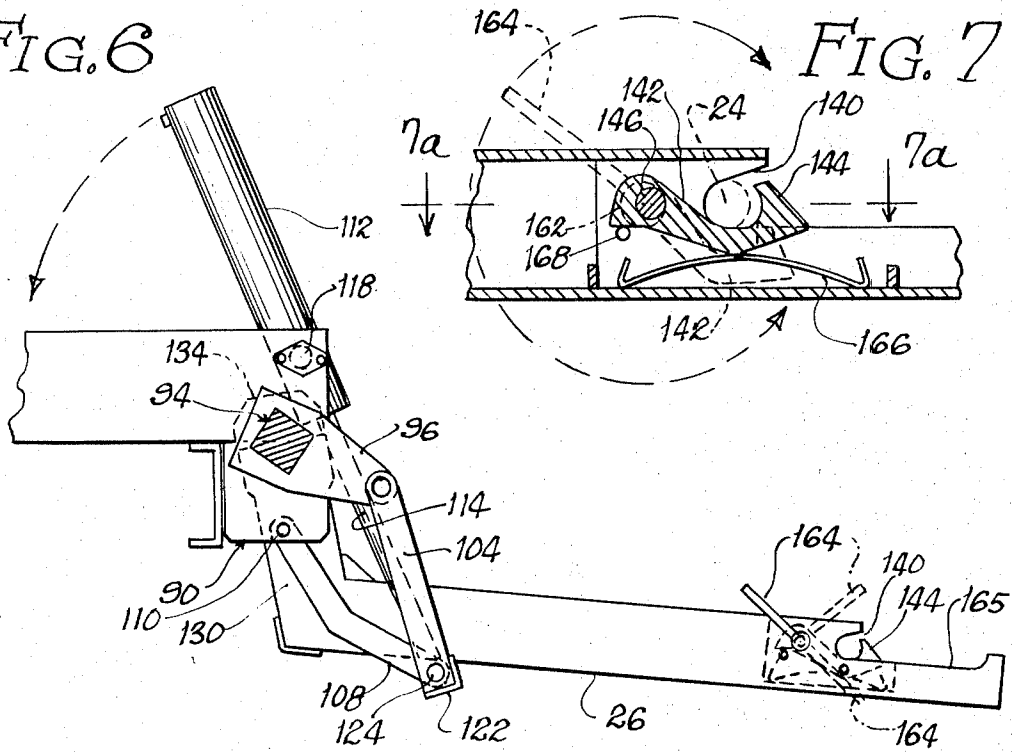


FIG. 7

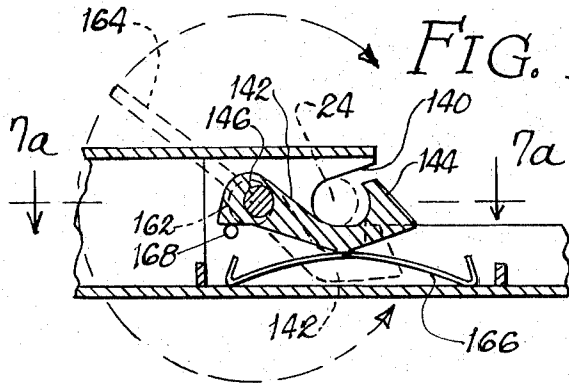


FIG. 7a

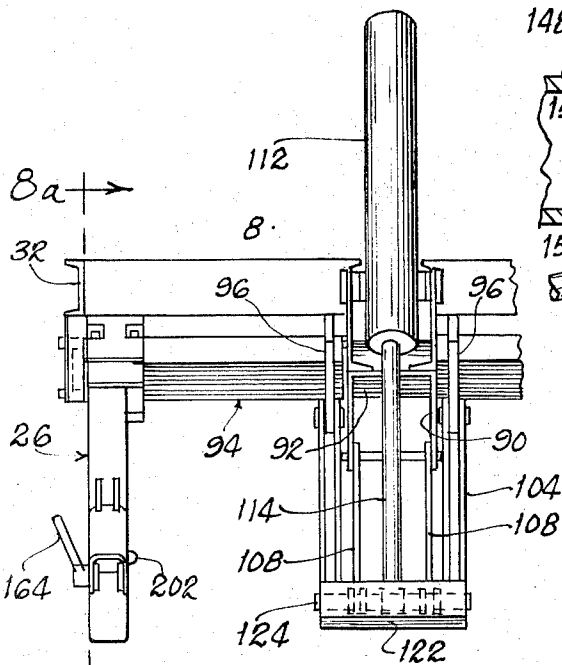
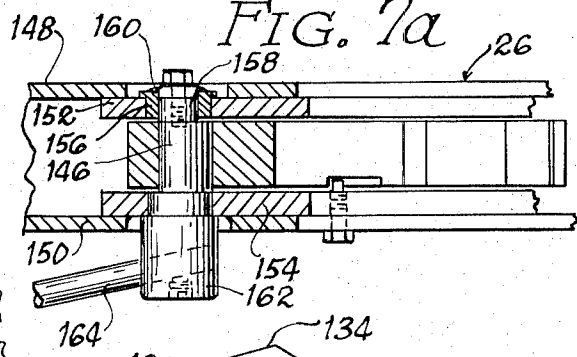


FIG. 8

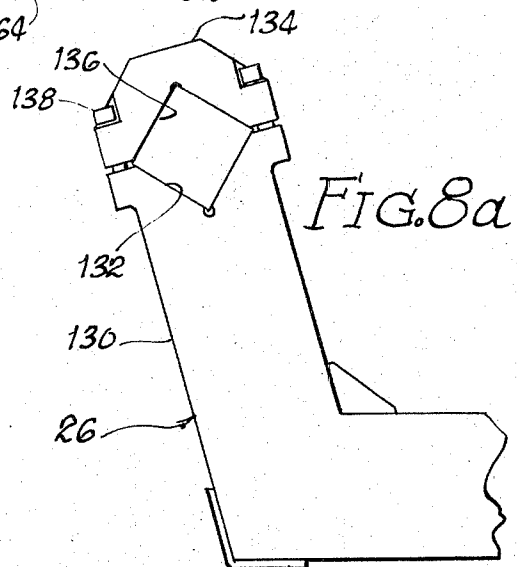


FIG. 9

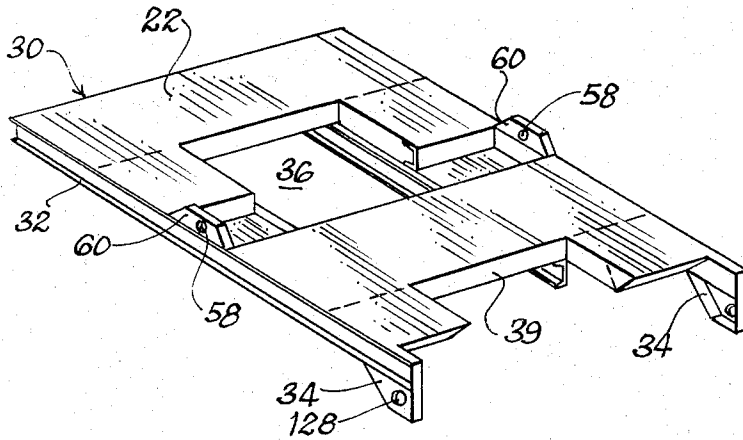


FIG. 10

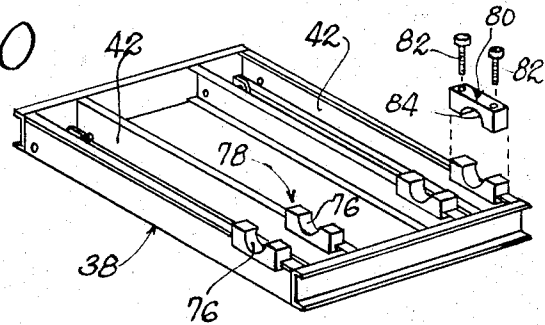


FIG. 11

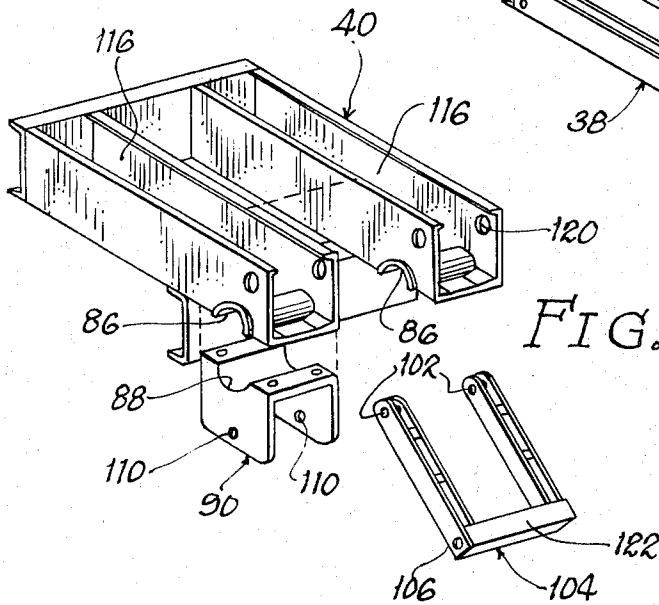


FIG. 12

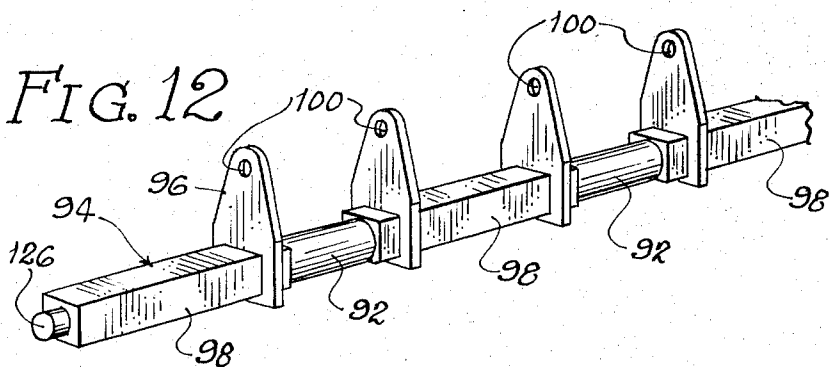


FIG. 12a

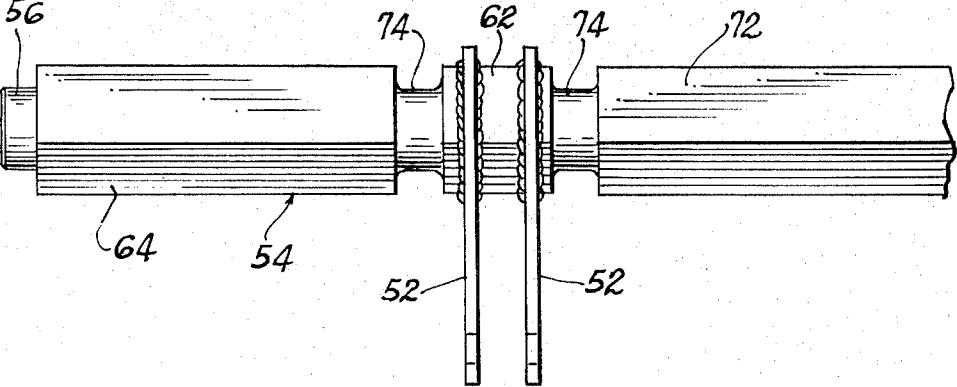


FIG. 20

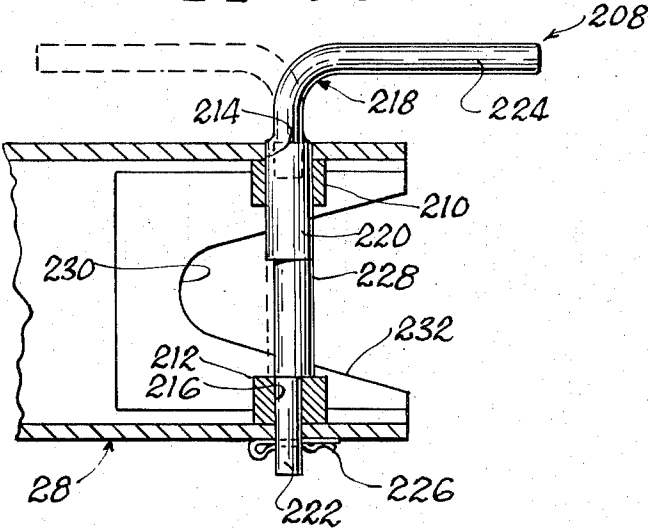


FIG. 13

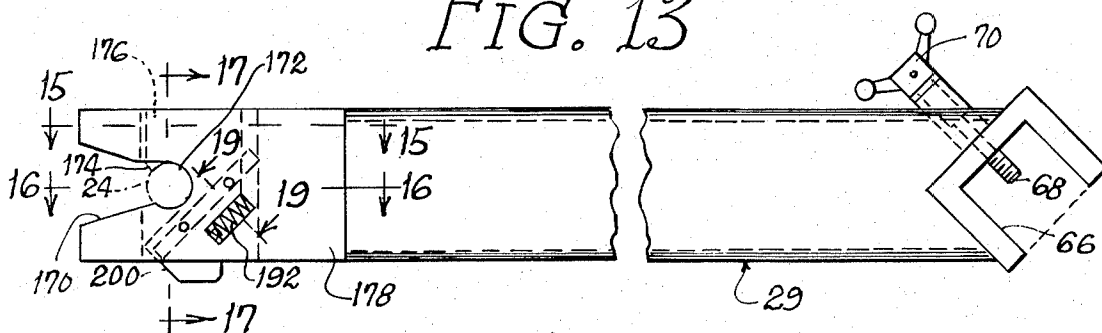


FIG. 14

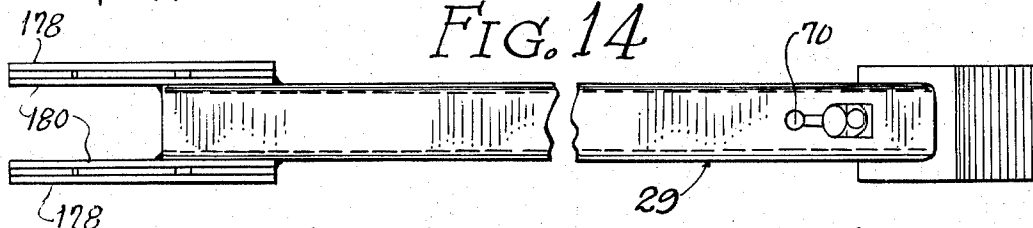


FIG. 15

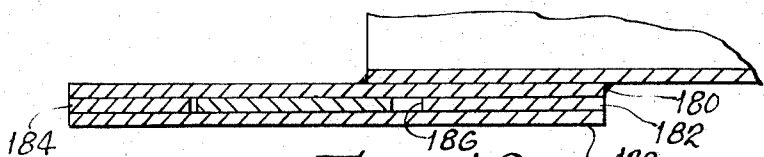


FIG. 16

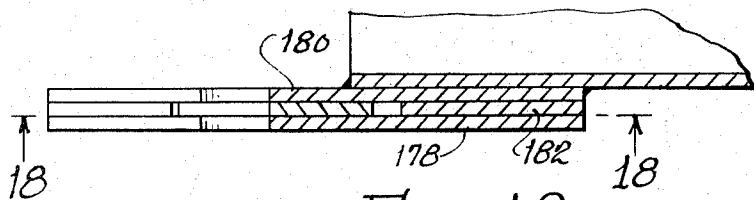


FIG. 17

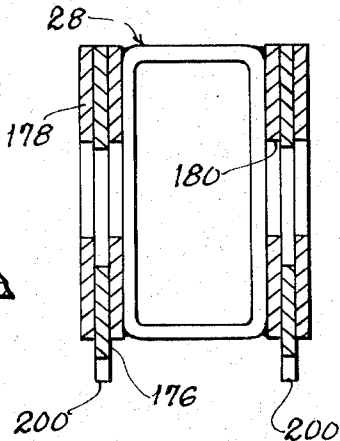


FIG. 18

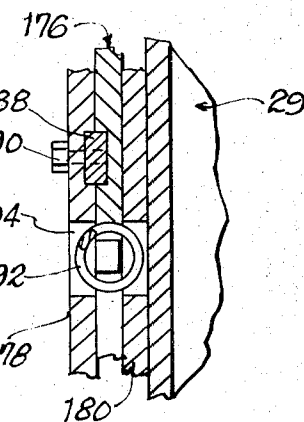
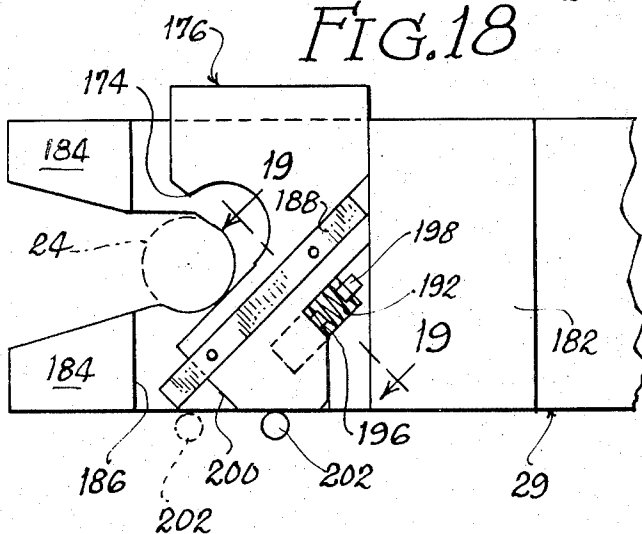


FIG. 19

LOADING AND UNLOADING MEANS FOR CABLE REELS AND OTHER STRUCTURES

This invention relates to mechanisms employed for loading and unloading structures with respect to a supporting bed. The mechanisms are particularly designed for handling relatively large structures which cannot be efficiently handled by individuals. In addition, the mechanisms are of the type carried with the supporting bed whereby the mechanisms are available for loading and unloading operations irrespective of the location of the bed.

The mechanisms of this invention are generally of the type employing lift arms pivotally mounted on a supporting bed. Examples of structures of this type are found in Hall U.S. Pat. Nos. 3,184,082 and 3,325,118, Fleischer et al. U.S. Pat. No. 3,063,584 and Rheinberger U.S. Pat. No. 3,036,790. These patents describe lift arms which are associated with truck beds whereby reels employed for telephone cable and the like can be loaded and unloaded.

This invention will be directed to improvements in loading and unloading mechanisms and specific reference will be made to the association of the mechanisms with truck beds designed for supporting cable reels and other structures. It will be understood, however, that the mechanisms have utility in other applications involving handling of relatively large structures.

It is a general object of this invention to provide an improved mechanism for loading and unloading structures of relatively large size, for example, cable reels.

It is a more specific object of this invention to provide a mechanism of the type described which is especially suited for the handling of structures of various sizes.

It is a more specific object of this invention to provide a mechanism of the type described which is adapted for adjustability whereby cable reels and other structures can be most efficiently loaded on truck beds and the like with maximum efficiency.

It is a further object of this invention to provide a mechanism of the type described which is characterized by removable supporting frames whereby the mechanism can be associated with truck beds or other structures without permanent association with the structures whereby the structures do not require any significant modification to accommodate the mechanisms of the invention.

It is a still further object of this invention to provide mechanisms of the type described which include latch elements whereby the structures handled by the mechanisms can be efficiently secured to and retained in place relative to lifting arms for accomplishing the loading and unloading operations.

It is a still further object of this invention to provide a mechanism of the type described which includes lifting arms adapted to transfer articles from and to a supporting bed as well as transfer arms adapted to move the structures from one section of the truck bed to another.

It is an additional object of this invention to provide mechanisms having the lift arms and transfer arms as described and also including latch means uniquely suitable for the respective sets of arms whereby attachment of structures to the arms and transfer from the lift arms to the transfer arms can be readily accomplished.

These and other objects of this invention will appear hereinafter and for purposes of illustration, but not of limitation, specific embodiments of the invention are shown in the accompanying drawings in which:

FIG. 1 is a side elevation of a truck including the loading and unloading mechanisms of the invention;

FIG. 2 is a side elevation of a truck illustrating the mechanisms in their lifting and transfer positions;

FIG. 3 is a plan view of a supporting bed incorporating mechanisms of the invention;

FIG. 4 is a rear elevational view of the mechanisms shown in FIG. 3;

FIG. 5 is an enlarged fragmentary view illustrating details of the transfer arm structure incorporated in the mechanisms of the invention;

FIG. 6 is a side elevational view of the lift arm structure also illustrating a type of latch means suitable for use with the mechanisms of the invention;

FIG. 7 is an enlarged fragmentary cross-sectional view illustrating the latch means;

FIG. 7a is a horizontal sectional view taken about the line 7a—7a of FIG. 7;

FIG. 8 is a rear elevational view of the lift arm structure shown in FIG. 6;

FIG. 8a is a cross-sectional view illustrating the means for mounting the lift arm to its supporting shaft taken about the line 8a—8a of FIG. 8;

FIG. 9 is a perspective view of a deck structure employed for supporting mounting frames utilized for the lift and transfer mechanisms of the invention;

FIG. 10 is a perspective view of a mounting frame for transfer arms utilized in the construction of the invention;

FIG. 11 is a perspective view of a mounting frame for lift arms utilized in the construction of the invention;

FIG. 12 is a fragmentary view of a supporting shaft for the lift arms;

FIG. 12a is a fragmentary perspective view of a supporting shaft for the transfer arms;

FIG. 13 is a fragmentary side elevational view of an auxiliary transfer arm structure;

FIG. 14 is a fragmentary plan view of the auxiliary transfer arm shown in FIG. 13;

FIG. 15 is an enlarged fragmentary cross-sectional view illustrating details of a latch element associated with the auxiliary transfer arm taken about the line 15—15 of FIG. 13;

FIG. 16 is a fragmentary sectional view illustrating details of the latch element taken about the line 16—16 of FIG. 13;

FIG. 17 is a vertical sectional view illustrating the latch element taken about the line 17—17 of FIG. 13;

FIG. 18 is a sectional view taken about the line 18—18 of FIG. 16;

FIG. 19 is an enlarged fragmentary cross-sectional view taken about the line 19—19 of FIG. 18; and,

FIG. 20 is a fragmentary view illustrating a latch mechanism adapted to be associated with transfer arms of the construction.

The subject matter of this invention generally involves a mechanism for loading structures such as cable reels onto a supporting bed such as a truck bed. The invention utilizes pivotally mounted arms having engaging means for engaging the structures whereby pivoting movement of the arms will lift the structures onto or off of the supporting bed.

The lifting arms are preferably mounted so that they can be adjusted relative to a supporting shaft. Specifically, the spacing between the arms can be varied to accommodate structures of different sizes. This feature is particularly valuable since cable reels are used in different sizes and, in addition, the mechanisms of the invention can then be utilized for handling structures other than cable reels.

The invention also preferably involves the use of a frame for supporting the mounting shaft for the lift arms. This frame may include means for removably mounting the frame on a supporting bed. The invention may also include transfer arms associated with the supporting bed whereby structures lifted onto the bed by the lift arms can be moved by the transfer arms to a different bed location. The use of the combination of lift arms and transfer arms increases the loading capabilities of the mechanism.

Where transfer arms are employed, these arms are also preferably mounted in a supporting frame which is removably located on the supporting bed. The supporting frames employed for the arms may be designed for temporary attachment directly to a truck bed or the like. On the other hand, the invention contemplates the use of a deck structure which serves as a means for mounting the supporting frames, the deck structure thus being removably connected to the truck bed. The deck structure is preferably designed so that it will accommodate cylinder and piston assemblies, supporting shafts for the arms, and other mechanisms utilized in the operation of the arms.

With the use of the deck structure and supporting frames, the mechanisms of the invention can be associated with a truck bed or the like without any significant modification of the bed. This represents a distinct advantage when compared with prior lift arrangements which require extensive modification of the truck body to the extent that the lift mechanisms are virtually permanently associated with a particular supporting structure.

The invention also contemplates the use of latch elements which insure relatively simple attachment of lift arms and transfer arms with respect to supporting structures. These latch elements preferably comprise an arrangement wherein supporting rods for cable reels or other rod structures can be quickly engaged by and released by the lift and transfer arms.

In a preferred arrangement, the lift arms include manually operable means which permit quick engagement and release of supporting rods when a structure is located at ground level. The latch elements on the transfer arms are automatically operable when the lift arms move structures into position for transfer. By providing the automatic features, the manual labor required for operating the mechanisms of the invention is reduced to a minimum while providing completely secure latching characteristics.

FIGS. 1 and 2 of the accompanying drawings illustrate a truck 10 including a cab section 12 and a truck bed section 14. The invention will be described with reference to the loading of structures on a truck bed; however, it will be appreciated that the invention may be used for many applications which involve transfer of structures from one position to another.

In FIGS. 1 and 2, the structures identified by the numeral 16 are intended to represent cable reels. The structures identified by the numerals 18 are intended to

represent containers, for example of the type used for holding refuse. As indicated, the mechanisms of the invention are suitable for loading and unloading structures of these types from the ground level 20 to the bed 22 of the truck. It will be apparent that other structures could also be readily handled by the mechanisms of this invention.

The structures 16 and 18 include laterally extending rods 24. The laterally extending rods 24 are adapted to be engaged by the arms 26 which are pivotally connected to the truck. In addition, transfer arms 28 are pivotally connected to the truck. These transfer arms are also adapted to engage the rods 24. As indicated, the lift arms 26 serve to move the structures 16 or 18 to a rearward position on the truck bed 22. The transfer arms 28 serve to move the structures to a forward position whereby structures can be loaded and unloaded from both positions. Obviously, if the truck bed or other supporting surface were of sufficient size, one or more additional sets of transfer arms could be employed for locating structures at one or more additional positions.

In the preferred form of the invention, the supporting bed or surface 22 of the truck is provided by means of a deck structure 30 illustrated in FIG. 9. This deck structure includes longitudinally extending side rails 32 having downwardly extending portions 34. A central opening 36 is provided for receiving a transfer arm frame structure 38 (FIG. 10). A recessed portion 40 of the deck structure is dimensioned to receive a lift arm supporting frame 40.

The transfer arm supporting frame 38 includes laterally spaced, recessed areas 42 dimensioned to receive cylinder and piston assemblies 44 (FIG. 5). The cylinders are pivotally connected at 46, and the pistons 48 of the cylinders are pivotally connected at 50 to plate members 52 which are tied to the transfer arm supporting shaft 54 (FIG. 12a). The shaft 54 includes trunnions 56 at each end which are rotatably received in openings 58 defined by the upwardly extending portions 60 carried by the deck 30.

The members 52 are welded or otherwise tied to the shaft portion 62, and this shaft portion may be of non-circular cross section to insure accurate alignment of the members 52. Additional non-circular shaft portions 64 are provided for attaching the transfer arms 28 to the shaft 54. The transfer arms 28 are provided with a connecting arrangement substantially corresponding with that provided for lift arms 26 (to be described with reference to FIG. 8a), whereby the arms can be tied to the shaft 54 in a manner which will prevent relative rotation. With an identical arrangement provided for each transfer arm 28, the spacing between the transfer arms can be readily adjusted for purposes of accommodating structures of different sizes.

The shaft 54 includes an intermediate section 72 which serves to support a third transfer arm 29 (FIG. 13). In the embodiment illustrated in FIG. 3, the structures 16 and 18 are of a size such that only one structure can be located in a given position on the truck bed. Where these structures are substantially narrower, two such structures can be located side-by-side in a given truck bed position, and in that case, intermediate arm 29 and a corresponding intermediate lift arm are employed. The securing arrangement for these arms permits selective removal and attachment of the arms. This securing arrangement comprises a rectangular re-

cess 66 defined at the end of the arm 29 adapted to fit around the shaft section 72. A wing bolt 70 defining threaded end 68 is receivable within a tapped opening of the shaft section to thereby releasably secure the arm to the shaft section.

The shaft 54 includes circular cross-sectional portions 74 which are received within the semi-cylindrical recesses 76 which are defined by blocks 78 mounted on the supporting frame 38. Removable blocks 80 are attached by means of bolts 82, and these blocks define complementary recesses 84 to provide bearings for the rotation of shaft 54. The shaft rotates, as illustrated in FIGS. 1 and 2, during extension and retraction of the piston 48, this action swinging the arms 28 back and forth between a forward and rearward position relative to the truck bed.

The supporting frame 40 defines semi-cylindrical bearing surfaces 86 which are complemented by bearing surfaces 88 defined by the U-shaped members 90 illustrated in FIGS. 1, 2 and 11. The cylindrical passages defined by the surfaces 86 and 88 receive the portions 92 of the lift arm supporting shaft 94. These portions 92 defined a circular cross section whereby the shaft 94 is adapted to rotate relative to the supporting frame 40.

The shaft 94 also carries perpendicularly extending members 96 which are tied to the shaft. These members preferably define a non-circular central opening which corresponds with the cross-section of the shaft portions 98 to insure accurate alignment of the members 96 on the shaft.

Each of the members 96 includes a circular opening 100 designed for the pivotal connection of the upper ends 102 of yoke members 104. The lower ends 106 of the yoke members are pivotally connected to links 108 which are in turn pivotally connected to the U-shaped supports 90 at the openings 110 thereto.

Assemblies including cylinders 112 and pistons 114 are received within recessed areas 116 defined by the supporting frame 40. The forward end of the cylinders 112 is pivotally connected at 118 by means of openings 120 defined by the supporting frame 40. Each piston 114 is pivotally connected to the base member 122 of the yoke 104. A rod 124 is associated with the base member to serve as a connecting means for the end of piston 114 and also for the connection of links 108 (FIG. 8).

The shaft 94 includes trunnions 126 at each end which are received in openings 128 defined by the members 34 carried by the deck 30. The rectangular portions 98 of the shaft serve to support lift arms 26. As best shown in FIG. 8a, these lift arms define a forward end portion 130 having a right angle recess 132 formed therein. Securing cap means 134 define corresponding recesses 136 whereby the lift arm assembly can be secured to the shaft portions 98 by means of bolts 138. It will be apparent that loosening of these bolts permits lateral adjustment of the lift arms along the shaft portions 98. The rectangular cross section of the shaft and the corresponding recessed portions 132 and 136 insures accurate alignment of the lift arms relative to the shaft. When this combination is employed along with the accurate mounting arrangement provided for the members 96, assembly problems are greatly minimized while achieving complete accuracy from the standpoint of consistent relationship of these parts.

The arms 26 and 28 each include means for engaging structures such as the structures 16 and 18 whereby the structures will be secured to the arms to enable the lifting and transfer functions. Engaging means particularly suited for the respective arms will be described; however, it will be understood that the different arrangements could be interchanged without undue modification of components or functions, and that the other features of the invention could be used in conjunction with engaging means of different types.

In the case of cable reels, the rods 24 are usually elongated bars which are merely inserted through the center of reels when a lifting operation is contemplated. The bars, in the case of the instant invention, need only be long enough so that sufficient portions thereof will extend on opposite sides of the reels to permit engagement by the lift arms and transfer arms. Because of the lateral adjustability of the arms employed in the described mechanisms, engagement of the reels can be effected immediately adjacent the sides of the reels. In prior art constructions where such adjustability is not possible, it is often necessary to use relatively long bars for small reels since the spacing between arms must be maintained to accommodate the largest reels to be handled. When attempts are made to lift reels with the lift arms substantially displaced from the sides of the reels, there is a great tendency toward bending of the rods since the weight is concentrated at a point at the center of the rods, and this can lead to dropping of the reels either due to fracture of the rods or to disengagement of the rods and arms resulting from the sagging.

Whether the rods 24 are provided by means of removable bars or are permanently associated with a structure as in the case of containers 18, the lift arms 26 are designed to engage and secure the rods to insure safe and effective lifting action. As best shown in FIGS. 6 through 8, the arms 26 define recessed openings 140 which are tapered outwardly so that the entrances thereof are significantly larger than the diameter of the rods 24. A latch element 142 includes an engaging end 144 normally blocking entrance to the opening 140. The latch element is secured on an eccentric shaft portion 146 which forms the central part of a shaft rotatably mounted at the end of each arm 26.

As best shown in FIGS. 7 and 7a, the arm 26 defines opposed side walls 148 and 150. A latch supporting frame including opposed walls 152 and 154 is secured between the walls 148 and 150, and a bushing 156 is mounted in the wall 152. A trunnion portion 158 of the eccentric shaft is rotatably received within this bushing, and the combination of the bushing and trunnion portion determines the axis of rotation of the eccentric shaft. A Belleville spring washer arrangement 160 is preferably associated with the trunnion portion and bushing to normally hold the shaft against rotation by itself while permitting rotation through the application of manual force. The opposite end of the eccentric shaft defines an enlarged end 162 which receives a handle or lever 164.

The latch element 142 is normally retained in the position shown in FIG. 7 by means of a spring 166. In operation, the arms 26 are moved relative to rods 24 whereby the rods will press against the end 144 of the latch element to drive the latch element downwardly. The spring 166 will restore the latch element to its normally blocking position when a rod 24 has moved suffi-

ciently within the opening 140. The described action takes place when the handle 164 is located in the neutral position shown in FIGS. 6 and 7.

When a rod 24 is positioned as shown in FIG. 7, the handle 164 is rotated counterclockwise to the extreme lower position shown in FIG. 6 for purposes of locking or clamping the rod relative to the arm 26. This rotation, by means of the eccentric 146, shifts the latch element 142 to the left in FIGS. 7 and 7a whereby the end portion of the latch element moves against the rod 24. The action of spring 166 operates to hold or lock the latch element in this clamped position.

In order to release a rod, the handle 164 is moved clockwise to the extreme upper dotted line position shown in FIG. 6. This action operates to move the eccentric approximately 90° from the position illustrated in solid lines in FIG. 7 whereby the latch 142 is pivoted downwardly to the dotted line position. A pin 168 engages the end of the latch element adjacent the eccentric 146 whereby the latch element will pivot as opposed to the entire latch element being merely moved downwardly in response to this movement of the handle 164. As illustrated, the pivoting action clears the opening 140 for removal of the rod 24.

FIGS. 13-19 illustrate transfer arm 29 and a latch structure preferably associated with this transfer arm and also transfer arms 28. As best shown in FIGS. 13 and 18, the end of the latch structure defines an opening 170 which tapers inwardly whereby this end of the arm will readily receive a rod 24. The opening terminates in an end portion 172 dimensioned to be slightly larger than the diameter of a rod 24. This end portion is normally blocked by the engaging portion 174 of a latch element 176.

As best shown in FIG. 14, the transfer arm carries two assemblies each made up of outer plates 178 and inner plates 180, the latter being welded to the sides of the transfer arm. Intermediate plates 182 and 184 are held between the inner and outer plates, and an open area 186 is defined between these intermediate plates. The latch element 176 comprises a plate or block slideably received within this opening.

A keyway is defined by the latch element 176, and a key 188 is attached to the inner wall of plate 178 by means of bolts 190. A spring 192 is maintained within a cavity 194 defined by the respective plates with a first pin 196 holding the spring relative to the latch element 176 and a second pin 198 holding the spring in position relative to the intermediate plate 182. It will be appreciated that with this arrangement, the latch element is normally retained in the position shown in FIG. 13 whereby the blocking portion 174 of the element enters into the end portion 172 of the opening 170.

Entry of a rod into the opening 170 results in engagement of the rod with the blocking portion 174 whereby the latch element 176 will slide out of position in opposition to the spring 192. When the rod is seated as shown in FIG. 13, the spring 192 will restore the latch element. Because of the structural arrangement described, the restoring action has the effect of locking the rod relative to the transfer arm. Thus, any force tending to move the rod to the left relative to FIG. 13 tends to move the latch element downwardly to the left which, of course, urges the latch element to a blocking position. The rod is, therefore, automatically locked to the transfer arm.

In order to release the rod with respect to a transfer arm, the exposed surface 200 of the latch element 176 is engaged to drive the latch element to the position shown in FIG. 18. This engagement of the cam surface can be effectively accomplished by forming a cam element 202 on each of the lift arms 26. (See also FIG. 3). With this arrangement, the movement of the lift arms will result in automatic release of rods carried by the transfer arms whereby the rods and the associated structures can be efficiently transferred to the lift arms.

FIG. 20 illustrates a transfer arm 28 incorporating a manual latch arrangement 208 which is useful alone or in conjunction with the automatic latch structure described. The transfer arm carries tubular members 210 and 212 defining respective openings 214 and 216. An L-shaped latch arm 218 defines an intermediate section 220 received within the opening 214 and an end section 222 received within opening 216. A handle 224 operates to rotate the latch arm and a removable cotter pin 226 holds the latch arm in place.

The section 228 of the arm is an eccentric whereby rotation of the arm alternately increases and decreases the space defined between the eccentric and the base 230 of the opening 232 defined by the transfer arm. If the automatic latch is used, the arm carrying the latch assemblies must be extended to provide for mounting of the latch 208.

In a typical operation of the mechanisms of this invention, a cable reel 16, container 18, or other structure will be located on the ground as shown in FIG. 1. In order to move the structure onto the truck bed, the lift arms 26 are moved into position through the action of the pistons 114 and associated components. The engagement of the lift arms with the rods 24 is preferably accomplished by swinging the arms into position, and then backing the truck or moving the structures to that the rods 24 will enter the latch openings 140 of the lift arms. The handles 164 are then operated to clamp the latch elements.

The arms 26 are designed to accommodate misalignment of the structures, for example, if they are positioned on uneven terrain, or if the rod portion protruding from one side of a structure is closer to the truck than the rod portion on the other side. The elongated end section 165 of the lift arm can be initially positioned beneath a rod in various attitudes and still achieve the connecting function.

The pistons 114 are then retracted whereby the structure is lifted onto the rearward position of the truck bed. Assuming that the forward position of the truck bed is empty, the transfer arms 28 will be located in the position shown in FIG. 2 at this time. The ends of the lift and transfer arms may be aligned and designed so that free portions of the rods 24 will automatically enter into openings 170 of the transfer arms whereby automatic latching of the rods is achieved. The handles 164 are then moved to the release position whereby the pistons 48 can be operated to pivot the transfer arms rearwardly for movement of the structures to the forward position on the truck bed. The lift arms are, of course, available for locating a second structure or second set of structures in the rearward bed position.

Removal of structures from the truck bed is accomplished in essentially the same fashion. In this instance, the lift arms will be utilized for moving structures at the

rear of the truck bed onto the ground. The lift arms are then repositioned as shown in FIG. 1 whereby the transfer arms will move the forward structures into position. Assuming that the latch means shown in FIGS. 13-19 are in use, the latch elements will be automatically operated to release the rods 24 for movement of the associated structures to the ground by means of the lift arms. If the latch arrangements 208 are utilized, the arms are removed prior to entry of the rods and then replaced and rotated to latching position.

The mechanisms described provide many distinct advantages when compared with prior art arrangements. A highly efficient arrangement is provided for enabling movement of structures from and to two or more truck bed positions. Efficiencies in this respect are particularly accomplished because or lift and transfer arms which are movable to a common transfer point and because of the preferred latching structures described.

The mechanisms are characterized by extreme versatility, particularly due to the use of mounting arrangements whereby the spacing between arms can be readily adjusted to accommodate structures of different sizes. The means for attaching the arms to supporting shafts simplifies the adjustability, insures accurate alignment of the arms because of the non-circular cross sections of the connecting arrangements, and permits the attachment of additional arms whereby lifting of structures to be mounted side-by-side can be readily accomplished. Where additional arms are contemplated, the arms may be made in two or more sections to simplify storage when not in use. A sectional arm 26, held together by pins 204, is shown in FIG. 1. The adjustment capabilities are particularly valuable in the case of cable reels since these reels can be handled by arms which are closely spaced relative to the sides of the reels thereby eliminating problems such as undue deflection of rods used for lifting the reels. The arrangements of the invention eliminate the need for collars or other arrangements which are often attached to the spindle rods in order to prevent sliding of reels along the rods.

The cylinder and piston arrangement for operating the lift arms 26 also provides distinct advantages. By employing a swing structure as characterized by the pivotal mounting of the cylinder 112, and the use of yoke 104 and stabilizing link 108, the arc through which a transfer arm 26 can be moved is substantially increased. The arrangement described permits rotation of the arms through approximately 180° as shown in FIG. 1, an arc which is not possible with a standard linkage of a cylinder and piston to a shaft. The stabilizer link in this arrangement serves to hold the piston 114 in the proper attitude during pivoting action, and the connections achieved by means of the pin 124 also contribute to the efficiency of this arrangement.

A further distinct advantage is provided by the preferred arrangement for mounting the mechanisms of the invention. Thus, the use of specially designed decks and frames as shown in FIGS. 9, 10 and 11 permits the association of the mechanisms with a wide variety of supporting structures. By employing these modules, it is not necessary to reconstruct a truck body to achieve the operations described. Thus, these deck and frame modules can be mounted on a truck body with a minimum of modification whereby the modules can be removed for use in other locations while the truck remains useful for its originally intended purposes.

It will be understood that various changes and modifications may be made in the above described structures which provide the characteristics of this invention without departing from the spirit thereof.

That which is claimed is:

1. In a mechanism for loading structures onto a supporting bed and for unloading the structures, the mechanism including pivotally mounted arms having engaging means at one end, a horizontally extending shaft for supporting said arms, and means carried by the structures for engagement with said ends of the arms whereby pivoting movement of the arms operates to lift the structures onto or off of said bed, the improvement wherein the opposite ends of said arms define openings for receiving the shaft, and means for adjusting the positions of said opposite ends of said arms relative to the horizontal axis of the shaft whereby the spacing between said arms can be varied to accommodate structures of different sizes, the portions of said shaft supporting said arms defining a non-circular configuration, the openings defined by said arms defining a substantially corresponding configuration whereby said arms are adapted to slide along the shaft without relative rotation between the openings and the shaft, and including a second set of arms pivotally mounted on said bed, one end of each arm in said second set defining engaging means for said structures, said second set being pivotable into overlapping position with said first mentioned arms to the extent that the engaging means of the arms are located at a substantially common point whereby transfer of structures from one set of arms to another can be accomplished, said second set of arms being mounted on a second shaft positioned at an intermediate point on said bed, the portions of said second shaft supporting said second set of arms defining a non-circular configuration, said second set of arms defining openings for receiving said shaft portions, said opening defining a substantially corresponding configuration whereby said second set of arms can be moved along said second shaft without relative rotation between the openings in the second set of arms and the shaft.

2. A construction in accordance with claim 1 wherein said portions of said shaft define a rectangular cross section.

3. In a mechanism for loading structures onto a supporting bed and for unloading the structures, the mechanism including pivotally mounted arms having engaging means at one end, a horizontally extending shaft for supporting said arms, and means carried by the structures for engagement with said ends of the arms whereby pivoting movement of the arms operates to lift the structures onto or off of said bed, the improvement wherein the opposite ends of said arms define openings for receiving the shaft, and means for adjusting the positions of said opposite ends of said arms relative to the horizontal axis of the shaft whereby the spacing between said arms can be varied to accommodate structures of different sizes, and including at least one cylinder and piston assembly for imparting movement to said arms, a first link, at least one member tied to and extending perpendicularly from said shaft, said member being pivotally connected to one end of said link, the outer end of said piston being connected to the opposite end of said link whereby movement of the piston is transmitted through the link and member to said shaft to thereby pivot said arms upon rotation of the shaft, and wherein said cylinder comprises a forward

end through which said piston extends, and means pivotally connecting said forward end to said bed at a point adjacent the axis of said shaft whereby said cylinder pivots during extension and retraction of the piston.

4. A construction in accordance with claim 3 wherein said cylinder is located in a substantially horizontal position relative to said bed when the piston is retracted, said arms then being located over said bed for engagement with a structure on the bed, extension of the piston operating to pivot the cylinder upwardly relative to the bed and to simultaneously rotate said shaft whereby said arms pivot away from the bed for engagement with structures located beyond the bed.

5. A construction in accordance with claim 4 including a second link having one end pivotally connected to said bed and the other end pivotally connected at the point of connection of said piston with said first link, said second link maintaining said point of connection in a definite path of movement relative to said bed.

6. A construction in accordance with claim 5 wherein said first link comprises a yoke, and a pair of said members extending from said shaft for connection with the arms of said yoke.

7. A construction in accordance with claim 6 wherein a pair of cylinders and piston assemblies are provided for pivoting the shaft, a separate pair of said extending shaft members straddling each assembly, the outer end of each piston being connected to the base of the yoke associated with the particular cylinder and piston assembly.

8. A construction in accordance with claim 7 wherein each cylinder is pivotally connected adjacent its forward end to said bed at a point located above the pivot axis of said shaft, and wherein said second link is pivotally connected to said bed at a point below the pivot axis of said shaft.

9. A mechanism for loading structures onto a supporting bed and for unloading the structures, the mechanism including a first set of pivotally mounted arms each having engaging means at one end, a horizontally extending shaft for supporting said arms, a second shaft located in an intermediate position relative to said bed, a second set of arms mounted on said second shaft whereby rotation of said second shaft results in pivotal movement of said second set of arms, means carried by the structures for engagement with said ends of the first set of arms whereby pivoting movement of the first set of arms operates to lift the structures onto or off of said bed, one end of each arm in said second set defining engaging means for said structures, said second set being pivotable into overlapping position with said first mentioned arms to the extent that the engaging means of the respective arms are located at substantially common points whereby transfer of structures from one set of arms to another can be accomplished, a frame supporting said first shaft, and means for removably mounting said frame on said bed, a second frame supporting said second shaft, and means for removably mounting said second frame on said bed, and including a deck removably positioned on said bed, and recessed areas defined by said deck for receiving said frames whereby said frames and deck can be located on different beds.

10. A construction in accordance with claim 9 wherein said deck defines a supporting surface for said structures.

11. A construction in accordance with claim 9 including means for removably positioning said deck on a truck bed.

12. In a mechanism for loading structures onto a supporting bed and for unloading the structures, the mechanism including pivotally mounted arms having engaging means at one end, a horizontally extending shaft for supporting said arms, and means carried by the structures for engagement with said ends of the arms whereby pivoting movement of the arms operates to lift the structures onto or off of said bed, the improvement comprising a frame supporting said shaft, and means for removably mounting said frame on said bed, a second shaft located in an intermediate position relative to said bed, a second set of arms mounted on said second shaft whereby rotation of said second shaft results in pivotal movement of said second set of arms, one end of each arm in said second set defining engaging means for said structures, said second set being pivotable into overlapping position with said first mentioned arms to the extent that the engaging means of the respective arms are located at substantially common points whereby transfer of structures from one set of arms to another can be accomplished, a second frame supporting said second shaft, means for removably mounting said second frame on said bed, and including cylinder and piston assemblies for rotating said shafts, said frames defining recessed areas for receiving said assemblies whereby the assemblies can be located beneath the structure supporting surface.

13. A construction in accordance with claim 12 wherein the assembly associated with said first mentioned frame is pivotally connected to the frame, and wherein said assembly pivots out of said recess in the course of a loading and unloading operation.

14. In a mechanism for loading structures onto a supporting bed and for unloading the structures, the mechanism including pivotally mounted arms having engaging means at one end and means carried by the structures for engagement with said ends of the arms whereby pivoting movement of the arms operates to lift the structures onto or off of said bed, said means carried by said structures comprising rods extending outwardly from opposite sides of said structures, the improvement in said engaging means comprising recesses defined at said one end of said arms, said recesses being dimensioned for receiving said rods, latch elements normally blocking said recesses, spring means urging said latch elements into blocking position whereby said rods are free to enter said recesses by moving said latch elements out of blocking position in opposition to said spring means, means for locking said latch elements in blocking position when said rods are positioned in said recesses, and means for unlocking said latch element for releasing said rods, and including a shaft for pivotally supporting each latch element, eccentric means associated with the shaft, and means for rotating the shaft, said eccentric means operating to set the latch element in a first position wherein the latch element is out of blocking position to permit release of rods from said recesses, a second position wherein the latch element is in position to be moved by said rods in opposition to said spring means, and a third position wherein the latch element is located in blocking position for holding the rods within said recesses.

15. A construction in accordance with claim 14 including means for rotating said shaft comprising a man-

ually operable handle which moves the shaft and the associated eccentric means.

16. In a mechanism for loading structures onto a supporting bed and for unloading the structures, the mechanism including pivotally mounted arms having engaging means at one end and means carried by the structures for engagement with said ends of the arms whereby pivoting movement of the arms operates to lift the structures onto or off of said bed, said means carried by said structures comprising rods extending outwardly from opposite sides of said structures, the improvement in said engaging means comprising recesses defined at said one end of said arms, said recesses being dimensioned for receiving said rods, latch elements normally blocking said recesses, spring means urging said latch elements into blocking position whereby said rods are free to enter said recesses by moving said latch elements out of blocking position in opposition to said spring means, means for locking said latch elements in blocking position when said rods are positioned in said recesses, and means for unlocking said latch element for releasing said rods, and wherein each latch element is slideably mounted in the end of an arm, a cam surface defined by said latch element and engageable by a rod to move the latch element out of blocking position in opposition to said spring means, said latch element being attached to a block slideably mounted in the end of said arm, the angle of sliding movement of said block being such that the pressure on a latch element of a rod held within a recess operates to lock the latch in blocking position to prevent release of a rod from the recess.

17. A construction in accordance with claim 16 including a second set of arms pivotally mounted on said bed, one end of each arm in said second set defining engaging means for said structures, said second set being pivotable into overlapping position with said first mentioned arms to the extent that the engaging means of the arms are located at a substantially common point whereby transfer of structures from one set of arms to

another can be accomplished, and wherein said latch elements are associated with the ends of said second set of arms, and including an extension defined by said block, means defined by said first mentioned set of arms for engaging said extension when said sets of arms move to said common point, the engagement of said extension operating to drive said block and associated latch element to said first position to thereby release said rods for transfer of the rods from one set of arms to another.

18. In a mechanism for moving structures relative to a supporting bed, the mechanism including pivotally mounted arms having engaging means at one end and means carried by the structures for engagement with said ends of the arms whereby pivoting movement of the arms operates to lift the structures, said means carried by said structures comprising rods extending outwardly from opposite sides of said structures, the improvement in said engaging means comprising recesses defined at said one end of said arms, said recesses being dimensioned for receiving said rods, latch elements removably associated with said arms, said elements being adapted to maintain said rods in position within said recesses, said elements comprising rotatable members having camming portions, bores defined by said arms for insertion of said latch elements adjacent the rod engaging portion of said recesses, rotation of said elements operating to drive the camming portions thereof against rods located within the recesses for thereby locking said rods in said recesses.

19. A construction in accordance with claim 18 wherein said rotatable members comprise shafts receivable within said bores, and means for releasably retaining said shafts within said bores.

20. A construction in accordance with claim 19 including a handle connected to said shafts, said handle providing manual means for rotating said shafts within said bores.

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