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REEL LOADER

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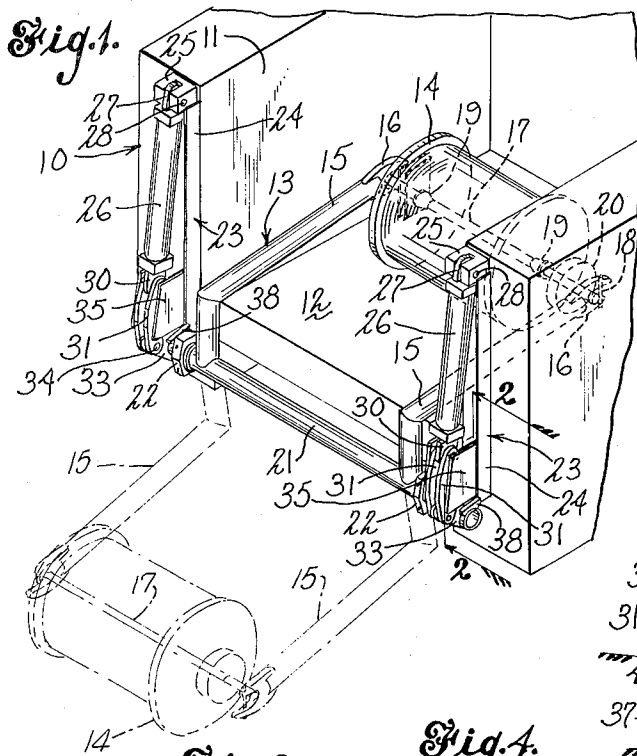


Fig. 2.

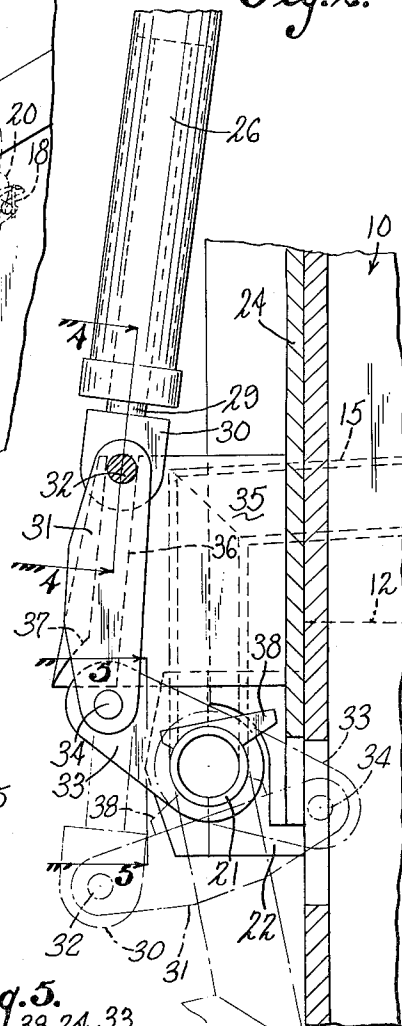


Fig. 3.

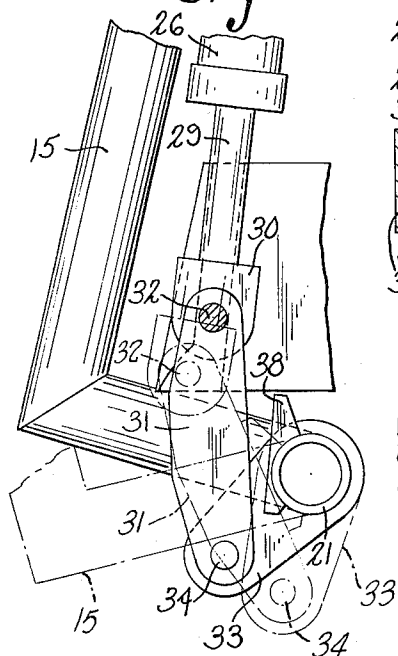


Fig. 4.

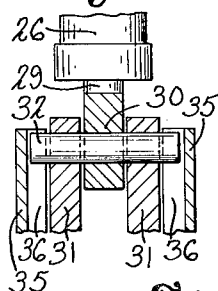
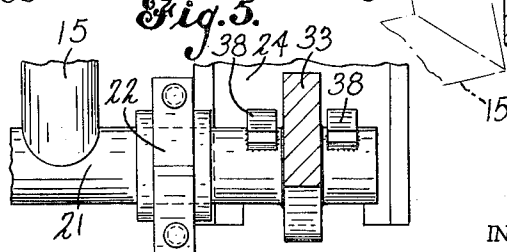


Fig. 5.



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REEL LOADER

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8 Claims. (Cl. 242—86.5)

This invention relates to reel loaders, and relates more particularly to apparatus for loading and unloading reels of wire and cable from the backs of utility-type trucks, which are often large, heavy, and difficult to handle manually. The apparatus is also of the type which may support a reel of wire or cable in a somewhat elevated position either with respect to the ground or the truck platform or deck, so that the wire or cable may be unreeling. The apparatus is often employed by utility companies for successively lifting a plurality of reels of wire from the ground onto the deck of the truck where they are disconnected from the apparatus and stored on the truck for transportation to a job site.

Heretofore most, if not all, reel loaders of the type characterized above have been of large and awkward proportions, have been difficult to mount on most truck bodies of the type now being employed by utility companies, and have occupied too much space on the truck, cutting down the available work or cargo space on the truck.

One object of the invention is to provide a compact reel loader which occupies little working space on a truck.

Another object is to provide a reel loader which, while not limited thereto, is particularly adaptable to being mounted on the rear end of a bobtailed body of the utility type; that is, a body having only a short overhang rearwardly over the rear wheels.

Still another object is to provide a reel loader capable of swinging a reel through or supporting a reel on any point of an arc of 180° or more.

A further object is to provide in a reel loader, such as characterized above, an improved reel-lifting and -holding linkage.

Further objects of the invention will be apparent from the following detailed description of a preferred form of the reel loader shown in the accompanying drawing by way of example.

In the drawing:

FIG. 1 is a perspective view illustrating a reel loader embodying the invention and showing the same in association with the rear end of a truck body of the utility type;

FIG. 2 is an enlarged sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a view generally similar to FIG. 2, but showing parts of the apparatus in different positions;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 2; and

FIG. 5 is a sectional view taken on line 5—5 of FIG. 2.

In the drawing, the rear end of the body of a utility-type truck is indicated generally at 10, the body having cabinet style side walls which at their rear extremities define therebetween an opening 11 through which the truck may be loaded and unloaded from the rear end. The truck body is provided with the usual deck or floor 12 extending between the last mentioned side walls. The reel loader is indicated generally at 13, and is shown in the drawing in association with a reel 14.

The reel loader comprises a pair of elbowed arms 15, laterally spaced apart and, as will appear more fully hereinafter, foldable into the truck body to extend parallel to and adjacent to portions of the corresponding side walls of the truck body. In the folded position of the

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reel loader shown in FIG. 1, each arm has a fixed joint in the region where the arm folds over the rear extremity of the truck floor 12. As shown in the last mentioned view, the arms extend to a plane below the plane of the upper surface of the floor 12. The distal end of each reel lifting arm 15 is bifurcated as at 16, and a reel supporting spindle 17 is revolvably received between the arms, the spindle 17 extending between the corresponding bifurcations of the arms and being held captive therein by a pair of pins 18 which are removable to permit the reel to be disconnected from the loader. As indicated in FIG. 1, each pin 18 extends through the bifurcations of one arm 15. The spindle 17 is provided with axially spaced and fixed cones 19 to center the reel, and the spindle is provided with the usual braking device 20 to frictionally brake the reel when wire, for example, is payed off the reel and a braking action on the reel is desired.

At their other ends the arms 15 are interconnected by a rock shaft 21 fixed thereto, as by welding, and extending laterally beyond the arms 15 in the manner shown in FIG. 1. As shown in the last mentioned view, the shaft 21 is journaled in a pair of pillow blocks 22 located laterally outwardly of the respective arms 15 and secured, as by being welded and bolted, to respective support assemblies, indicated generally at 23, located at either side of the opening 11 in the truck body; that is, the opening in the tail of the truck body. Each support assembly 23 comprises a channel element 24 opening rearwardly and having the bottom thereof secured to the rear face of the truck body as by welding. Each support assembly 23 includes a slotted steel blocklike member 25 extending into the upper end of the corresponding channel element 24 and suitably fixed thereto.

Two pairs of hydraulic cylinders 26 are provided, each having one end supported by the corresponding block 25 in pivotal relation thereto. As shown in FIG. 1, the last mentioned end of each cylinder is provided with a flange 27 received in the slot in the corresponding block 25 and pivoted therein by a pin 28 for swinging movement of the cylinder in a vertical plane. In the illustrated form, the piston rods of the respective cylinders 26 are extensible from the other ends of the cylinders 26, one of the piston rods being indicated at 29 in FIG. 2, and the other being identical. The distal end of each piston rod 29 is provided with a head or flange 30 of plate-like form extending between a pair of plate-like links 31, each having one end thereof pivoted to the head 30 on a common axis provided by a pivot pin 32, the links being arranged in a parallelism with one another, as shown in FIG. 4. The other ends of the links 31 receive therebetween one end of a link 33 which is pivoted to the last mentioned ends of the links 31. The other end of the link 33 receives the shaft 21 in angularly rigid relation thereto, the link 33 being secured to the shaft, as by welding. As indicated in the drawing, the links 31 and 33 are relatively short, the links 33 being somewhat shorter than the links 31.

Each support assembly 23 also comprises a pair of spaced and parallel cheek plates 35 fixed to the respective sides of the channel element 24, as by welding, and extending outwardly therefrom as shown in FIG. 1. As shown in the drawing, the opposing inner faces of the cheek plates 35 are grooved, as at 36, to receive the respective ends of the pivot pin 32, the grooves providing vertically arranged tracks for the pin 32. The grooves 36 may extend through the upper extremities of the cheek plates and, as indicated in FIGS. 1 and 2, each groove 36 extends through the lower extremities of the corresponding cheek plate. The outer or rearward wall of each groove 36, near the bottom of the corresponding cheek plate, flares outwardly, as at 37 (see FIG. 2) for a

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reason which will appear hereinafter. As indicated in FIG. 2, the bottom of each channel element may be cut away to provide clearance for the links 31 and 33 and, if necessary, the corresponding rear wall portion of the truck body may also be cut away to provide clearance for the links.

In the illustrated form the reel-lifting arms 15 and the interconnecting rock shaft 21, all of which are preferably formed of steel, may be of hollow, tubular construction to reduce the weight of the reel loader. During the unfolding of the reel loader from the full line position of FIG. 1 to the broken line position of this view, the links 31 abut the shaft 21 and rock bodily therewith, and for the purpose of providing broad bearing surfaces between the links 31 and the shaft 21 during this movement, two pairs of lugs 38 are provided, one pair being provided for each pair of links 31, the lugs 38 being of the form best shown in FIGS. 2 and 5. The lugs 38 may be formed of plate steel and may be secured to the shaft 21 by being welded thereto. As indicated in broken lines in FIG. 3, each lug 38 engages a substantial edge portion of the corresponding link 31, this edge portion being located substantially centrally between the ends of the last mentioned link. The hydraulic cylinders 26 work in unison to operate the reel-lifting arms 15 through the above-described linkage, and these cylinders may be supplied with hydraulic fluid from a conventional pressure system, not shown, to drive each cylinder piston rod in both axial directions.

The operation of the reel loader is as follows: When the reel lifting arms 15 are fully folded in the back of the truck the reel-supporting spindle may be supported from the arms a distance of approximately six inches above the floor 12 of the cargo space. However, the distance of the reel-supporting spindle 17 from floor 12 is usually dictated by the diameter of the reel which it supports. It has been found in use that the reel loader may support reels varying in diameter from approximately 5" to 6" and more. To lift a reel of wire or cable which has previously been disconnected from the reel loader and stored on the truck, or a reel which has not yet been loaded on the truck or connected to the reel loader, it is first necessary to slide the spindle 17 through the axial bore of the reel and place the ends of the spindle in the respective bifurcated ends of the reel-lifting arms 15 where they are revolvably supported, after first removing the pins 18. The pins 18 are then replaced to hold the spindle captive in the arms.

When the reel-lifting arms 15 are folded into the truck body in a manner similar to that shown in full lines in FIG. 1, the piston rods of the respective cylinders are retracted to positions similar to the full line position of the piston rod 29 shown in FIG. 2. In this position of the last-named piston rod the pivot 32, interconnecting the links 31 with the head 30 of the piston rod, occupies the upper parts of the opposing grooves 36 formed in the cheek plates 35 of the corresponding support assembly 23. When the piston rod is in this position the links 31 are substantially in alignment with the axis of the piston rod, as shown in FIG. 2, and are held in these positions through the pivot pin 32, which in turn is held captive in the grooves 36 of the cheek plates 35. It will be noted that, as shown in the last-mentioned view, the pivot pin 34 which interconnects the links 31 with the link 33 is disposed below the cheek plates 35 when the piston rod 29 is in the retracted position shown in full lines. It will also be noted from this view that when the links and the piston rod are in their full line positions shown in FIG. 2, the links 31 assume with the link 33 an angle of approximately 120°. Therefore, when the piston rod 29 is extended from the full-line position of FIG. 2, the piston rod exerts great leverage on the shaft 21 through the links 31 and the link 33. This movement of the piston rod effects movement of the reel-supporting arms 15 from their positions within the truck body toward

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the broken line positions of the arms shown in FIG. 1, in which the arms are without the truck body and extend rearwardly therefrom. As the piston rod 29 is extended from the hydraulic cylinder from the full line position of FIG. 2 to the full line position of FIG. 3 the piston rod has a movement which is substantially linear only, owing to the pivot pin 32 held captive in the grooved cheek plates 35, and during this movement of the piston rod to the full-line position of FIG. 3 the links 31 are maintained substantially in alignment with the piston rod 29, as indicated in FIG. 3.

When and as the last-named rod is extended from the full-line position shown in the last-mentioned view, the links 31 continue to swing relatively to the link 33 and the shaft 21 on the axis of the pivot 34 until further swinging movement of the links 31 is prevented by engagement of the last-mentioned links with the shaft 21, and more specifically engagement with the corresponding lugs 38 on the shaft. When the links 31 become engaged with the last-named lugs further relative movement of the links 31 and the shaft 21 is rendered impossible, and upon further outward extension of the piston rod 29 the links 31, the link 33, and the shaft 21 rotate bodily about the axis of the last-named shaft. The outwardly or rearwardly flaring wall portions 37 of the corresponding grooves 36 permit, at this point in the travel of the links, the passage of the pivot 32 in a direction out of the groove 36, as indicated in broken lines in FIG. 3.

It may be noted here that when the links 31 become engaged and, in effect, locked with link 33 and the shaft 21, the links 31 form with the link 33 an angle of approximately 30° while the pivot rod 29 forms with the links 31 an angle of approximately 150°. Thus, it will be seen that at this point the piston rod 29 has lost a considerable amount of its leverage advantage on the shaft 21. However, also at this point, the piston rod 29 requires little advantage, as the reel-lifting arms 15 have been raised from positions approaching the horizontal to positions approaching and passing the vertical.

As extension of the piston rod 29 is continued from the broken line position of FIG. 3, the piston rod, no longer traveling in a linear direction only, swings outwardly on the axis of the pivot 28 as the pivot 32 between the links 31 and the piston rod 29 passes out of the grooves in the cheek plates 35 and passes below the cheek plates. Upon continued extension of the piston rod 29, the links 31, the link 33, and the shaft 21 are rotated to the broken line position of FIG. 2 with an ever increasing leverage advantage on the shaft 21 until the links 31 pass a 90° position with respect to the axis of the piston rod, the head of the piston rod during this movement swinging outwardly and then inwardly to some extent toward the rear end of the truck body.

In FIG. 2 one of the reel-lifting arms 15 is shown in broken lines in fully unfolded position, the other, of course, being parallel with it. The relatively short movement of the piston rods from their retracted positions to their extended positions, like the broken-line position of the piston 29 in FIG. 2, effects swinging movement of the reel-lifting arms 15 through an arc of approximately 190°. In practice it has been found that if the diameter of the reel supported by the arms permits, the spindle may swing to a point about 5" from ground level so that the reel may be detached from the loader. If it is desired to unload the reel supported by the arms 15, the arms, of course, are unfolded only to the point where the reel rests on the ground, and it will be manifest from the foregoing that the reel may be lifted by the loader to any point between the two extreme positions shown in FIG. 1, one being shown in full lines and the other in broken lines, to permit wire, for example, to be unreeled, or payed out from the reel.

The operation of the loader to lift a reel onto the truck from the ground will be manifest from the foregoing description. When the spindle is only 5" from ground level

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the piston rods of the hydraulic cylinders have a substantial leverage advantage on the shaft 21 due to the angle formed between the piston rods and the corresponding links 31. This angle may be approximately 78°, and it will be appreciated that when the spindle is in the last-named position, that is, approximately 5" from the ground, the reel loader may conveniently pick up a reel of wire or cable approximately 10" or slightly more in diameter; and it will be also appreciated that if the diameter of the reel is greater the reel-carrying arms and the spindle must be raised a distance from the ground to pick up the larger reel, thereby increasing the leverage advantage of the piston rods on the respective links 31 and the shaft 21.

To pick up a reel the piston rods are retracted, swinging the links 31, the links 33, and the shaft 21 bodily in clockwise direction as viewed in FIG. 2, until the pivot pins 32 reenter the corresponding grooves 36 in the cheek plates and the links 31 subsequently disengage the shaft 21 for swinging movement relatively to both the shaft 21 and the links 33. Upon continued reaction of the piston rods, the corresponding links 31 become substantially aligned with these rods and are maintained in these positions by the respective cheek plates 35, so that the leverage advantage of the piston rods on this shaft 21 is increased up to the point where the corresponding links 31 form an angle with the corresponding links 33 of approximately 90°. Thereafter the leverage advantage decreases to some small extent as the links move to the full-line positions shown in FIG. 2.

From the foregoing disclosure it will be manifest that there is provided a reel loader which occupies little working space on a truck and which is particularly advantageous for use on the rear end of a bobtailed body of a truck of the utility type. A further advantage of the reel loader is that it is capable of swinging a reel through or supporting a reel on any point of an arc of 180° or more. Still another advantage resides in the improved linkage which, while being of simple construction, provides a great leverage advantage on the arms of the reel loader through the shaft which interconnects them. It will be apparent that the reel loader is of relatively simple construction and may be made at low cost. It is relatively light in weight, will not easily get out of order, and is very efficient in operation.

While only one form of the reel loader has been shown in the accompanying drawing and described above, it will be apparent to those versed in the art that the reel loader may take other forms and is susceptible of various changes in details without departing from the principles of the invention and the scope of the appended claims.

What I claim is:

1. In apparatus employed for loading and unloading a reel of wire or cable from the floor of a truck body and also for supporting the reel in an elevated position, a pair of laterally spaced reel-lifting arms for swinging movement in unison into the open rear end of the truck body in parallel vertical planes and adjacent the respective side walls of the truck body, the distal ends of the arms being provided with releasable means to support the reel therebetween, means in fixed relation to the truck pivotally mounting the other ends of the arms, fluid cylinder means on the truck for effecting swinging movement of the arms, means between the cylinder means and the arms and including a linkage to actuate the arms, said linkage including a first link pivotally connected to the cylinder means and a second link pivoted to the first link and also rigid with the arms to swing on the pivotal axes of the latter, and an abutment in fixed relation to the second link, the first link being held substantially in axial alignment with the cylinder means during a portion of the swinging movement of the arms to exert a leverage advantage on the second link, and, upon losing this leverage advantage during the swinging movement of the arms from one extreme position to the other, being engageable with the member on the shaft to swing bodily with the second link and the shaft and again exert a leverage advantage on the arms during movement of the latter toward said other extreme position.

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other, being engageable with said abutment to swing bodily with the latter and again exert a leverage advantage on the arms during movement of the latter toward said other extreme position.

2. In apparatus employed for loading and unloading a reel of wire or cable from the floor of a truck body and also for supporting the reel in an elevated position, a pair of laterally spaced reel-lifting arms for swinging movement in unison into the open rear end of the truck body in parallel vertical planes and adjacent the respective side walls of the truck body, the distal ends of the arms being provided with releasable means to support the reel therebetween, a shaft transversely disposed and mounted on the truck to pivotally mount the other ends of the arms in fixed relation thereto, fluid cylinder means on the truck for effecting swinging movement of the arms, and means between the cylinder means and said shaft and including a linkage to actuate the arms, said linkage including a first link pivotally connected to the cylinder means and a second link pivoted to the first link and also rigid with the shaft to swing on the axis of the latter, the first link being held substantially in axial alignment with the cylinder means during a portion of the swinging movement of the arms to exert a leverage advantage on the second link, and, upon losing this leverage advantage during the swinging movement of the arms from one extreme position to the other, being engageable with a member on the shaft to swing bodily with the second link and the shaft and again exert a leverage advantage on the arms during movement of the latter toward said other extreme position.

3. In apparatus employed for loading and unloading a reel of wire or cable from the floor of a truck body and also for supporting the reel in an elevated position, a pair of laterally spaced reel-lifting arms for swinging movement in unison into the open rear end of the truck body in parallel vertical planes and adjacent the respective side walls of the truck body, the distal ends of the arms being provided with releasable means to support the reel therebetween, a shaft transversely disposed and mounted on the truck to pivotally mount the other ends of the arms in fixed relation thereto, a pair of fluid cylinders spaced axially of the shaft and pivotally mounted on the truck for effecting swinging movement of the arms, and means between each fluid cylinder and the shaft and including a linkage to actuate the arms, each linkage including a first link pivotally connected to the corresponding fluid cylinder and a second link pivoted to the first link and also rigid with the shaft to swing on the pivotal axis of the latter, the first link being held substantially in axial alignment with the fluid cylinder during a portion of the swinging movement of the arms to exert a leverage advantage on the second link, and, upon losing this leverage advantage during the swinging movement of the arms from one extreme position to the other, being engageable with a member on the shaft to swing bodily with the second link and the shaft and again exert a leverage advantage on the arms during movement of the latter toward said other extreme position.

4. In apparatus employed for loading and unloading a reel of wire or cable from the floor of a truck body and also for supporting the reel in an elevated position, a pair of laterally spaced reel-lifting arms for swinging movement in unison into the open rear end of the truck body in parallel vertical planes and adjacent the respective side walls of the truck body, the distal ends of the arms being provided with releasable means to support the reel therebetween, a shaft transversely disposed and mounted on the truck to pivotally mount the other ends of the arms in fixed relation thereto, the arms being swingable through an arc of approximately 180°, a pair of fluid cylinders spaced axially of the shaft and pivotally mounted on the truck for effecting swinging movement of the arms, linkage means between each fluid cylinder and the shaft to actuate the arms, each linkage including a first link pivot-

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ally connected to the corresponding fluid cylinder and a second link pivoted to the first link and also rigid with the shaft to swing on the pivotal axis of the latter, and means for holding each first link substantially in axial alignment with the corresponding fluid cylinder during a portion of the swinging movement of the arms to exert a leverage advantage on the corresponding second link, each first link, upon losing this leverage advantage during the swinging movement of the arms from one extreme position to the other, being engageable with a member on the shaft to swing bodily with the corresponding second link and the shaft and again exert a leverage advantage on the arms during movement of the latter toward said other extreme position.

5. A reel loader, as characterized in claim 4, wherein the arms are of rigid and elbowed construction to swing over the rear extremity of the truck floor, each arm having a portion thereof extending below the level of the truck floor, the shaft being disposed below the level of the truck floor and rearwardly thereof and being joined in this region to the arms.

6. A reel loader as defined in claim 5, wherein the fluid cylinders are vertically arranged and disposed without the truck body on the rear thereof.

7. A reel loader, as defined in claim 6, wherein the means which holds each first link substantially in axial alignment with the corresponding fluid cylinder during a portion of the swinging movement of the arms comprises a pair of cheek plates in fixed relation to the truck body having tracks thereon co-acting with the respective ends of the pivot interconnecting the fluid cylinder with the first link.

8. In apparatus employed for loading and unloading a reel of wire or cable from the floor of a truck body and also for supporting the reel in an elevated position, a pair of laterally spaced reel-lifting arms for swinging movement in unison into the open rear end of the truck body in parallel vertical planes and adjacent the respective side walls of the truck body, the arms being of rigid and elbowed construction to swing over the rear extremity of the truck floor, the distal ends of the arms being provided with releasable means to support the reel therebetween, and the other ends of the arms extending below the level of the truck floor and being disposed rearwardly thereof,

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a transverse shaft disposed below the level of the truck floor and rearwardly thereof and being rigidly joined in this region to the arms, the shaft being journaled on the truck and the arms being swingable on the shaft through an arc of approximately 180°, a pair of fluid cylinders vertically arranged and disposed without the truck body on the rear thereof, the fluid cylinders being spaced axially of the shaft and being pivotally mounted on the truck for effecting swinging movement of the arms, a pair of linkages, each linkage being disposed between one fluid cylinder and the shaft to actuate the arms and including a pair of first links arranged in parallel and laterally spaced-apart relation to each other and having ends pivotally connected to the fluid cylinder, each linkage also including a second link having one end thereof pivoted between the other ends of the first links and having the other end thereof fixed to the shaft for swinging movement on the axis of the latter, and two pairs of cheek plates, each pair of cheek plates being in fixed relation to the truck and embracing one of the linkages, each pair of cheek plates having opposing tracks therein co-acting with and guiding the respective ends of the pivot pin interconnecting the first links with the fluid cylinder for holding the first links substantially in axial alignment with the fluid cylinder during a portion of the swinging movement of the arms, to exert a leverage advantage on the corresponding second link, the shaft being provided with two pairs of abutments thereon for engagement with the respective first links, and the first links of the linkages, upon losing their leverage advantage during the swinging movement of the arms from one extreme position to the other, being engageable with the respective abutments to swing bodily with the corresponding second links and the shaft and again exert a leverage advantage on the arms during the movement of the latter toward said other extreme position.

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