FIG. 2
DEVICE FOR LIFTING AND TRANSPORTING BUNDLED MATERIAL

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The present invention relates to a device for lifting and transporting bundled material, and is more particularly concerned with a new and improved form of lifting and stabilizing mechanism especially adapted for employment in conjunction with a known type of commercial straddle carrier.

In the program of transporting material, such as tubes, rods, wire, cables and the like, it is frequently desirable in the interests of efficient handling to bundle together a relatively large number of pieces of said material, which bundle is then handled and moved by wire straps, chains and the like. However, it will be appreciated that such bundled material is necessarily very heavy and, in many instances, because of its length is extremely cumbersome. Consequently, the problem of lifting and transporting the bundled material becomes a most troublesome one.

Broadly, the present invention has for its principal object the provision of a new and improved form of hydraulically operated lifting and stabilizing mechanism especially adapted for attachment to a conventional type of straddle carrier, whereby the carrier may conveniently be employed to lift and transport the bundled material. Specifically, the present invention contemplates providing a conventional straddle carrier with a new and improved form of hydraulic lift and stabilizing mechanism of such a nature that when not in use the carrier may be employed to perform its usual functions without interference by the aforesaid mechanisms.

Another feature of the present invention resides in the provision of lift mechanism of such a character that the bundled material may be lifted in a normal horizontal position, without the tilting of the opposite ends of the bundle.

A further feature of the invention resides in the provision of lift mechanism in conjunction with guide linkage to stabilize the bundle of material as it is being lifted and transported.

Still other features and advantages of the invention will in part be obvious and in part will hereinafter appear and they consist generally in the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction to be described and of which the scope of application will be indicated in the appended claims.

In the accompanying drawings, in which is shown the preferred illustrative embodiment of the invention:

Figure 1 is a perspective view of a device embodying the principles of the present invention shown in conjunction with the phantom outline of a known commercial type of straddle carrier;

Figure 2 is a front elevational view of the straddle carrier with the lift mechanism in a lowered operative position;

Figure 3 is a vertical sectional view through the straddle carrier of Figures 1 and 2 showing the lift mechanism in its raised or inoperative position, and

Figure 4 is a view similar to Figure 3 but showing the lift mechanism in its lowered or operative position. Referring now in detail to the drawings, there is there shown a straddle carrier 1 of a known commercial type comprising the horizontal operator's platform 2 carried by the side frames 3, the latter being supported upon the drive wheels 4 and the rear steering wheels 5. The platform carries thereon the usual controls for operating the carrier and for operating the hydraulic hoist 6, which normally is used for picking up and transporting bolsters. These "bolsters" are similar to the "pallets" as used in the fork lift truck art.

The lift and stabilizing mechanism of the present invention comprises a longitudinally extending beam 7, substantially I-shaped in cross-section, normally positioned midway between the hoist 6 (Fig. 3) and extending from the front to the rear of the carrier. Adjacent its front and rear ends, beam 7 is provided with brackets 8—9, respectively projecting upwardly from the upper surface thereof.

Bracket 8 has the flattened ends 10—11 of a pair of rods 12—13, respectively, pivoted thereto on a common pin 14. Such rods extend rearwardly of the carrier and divergently away from each other rearwardly of bracket 8. At its opposite end, rod 12 is flattened at 15 and pivoted on one side of a bracket 16 carrying a pivot pin 17, while the opposite end of rod 13 is also flattened at 18 and pivoted at one side of a bracket 19 carrying a pivot pin 20. As shown, brackets 16 and 19 are spaced laterally of the carrier because of the divergence of rods 12—13 from bracket 7 and are suitably secured to the under surface of platform 2.

On the opposite side of bracket 16, pivot pin 17 has one end of a link 21 pivoted thereon, the opposite end of link 21 being pivotally connected to one end of a second link 22 by the pivot pin 23. Similarly, on the opposite side of bracket 19, pivot pin 20 has one end of a link 24 pivoted thereon, the opposite end of link 24 being pivotally connected to one end of a second link 25 by the pivot pin 26. The opposite or free ends of links 22—25 are pivoted on platform 9 by a common pivot pin 27.

The rods 12—13, links 21—22 and links 24—25 thus stabilize beam 7 not only in its raising and lowering movements with respect to platform 2, but also when it is at rest in its inoperative position and when it is supporting a load. In the raising and lowering movement of beam 7, the ends 10—11 of rods 12—13 simply move toward and away from platform 2 about their pivots 17 and 20. That is also true of links 21 and 24, which move toward and away from platform 2 about their pivots 17 and 20. It will be noted, however, that links 22—25 "jackknife" with respect to links 21—23, the pivots 23—26 moving upwardly and forwardly of the carrier, while the links 22—25 swing upwardly and rearwardly of the carrier.

The means for raising and lowering beam 7 comprises a hydraulic cylinder 28 carried by a pair of brackets 29 suitably secured to the under surface of platform 2. By special reference to Figures 3 and 4, it will be noted that the free end of piston rod 30 of cylinder 28 is connected at 31 between one end of a pair of vertically spaced brackets 32 extending through and fastened to one end of an elongated frame 33, which is only of sufficient width to receive or embrace the cylinder. The opposite end of brackets 32 are connected at 34 to one end of a sprocket chain 35. Such chain extends from brackets 32 around a sprocket wheel 36 rotatable on a stub shaft 37 depending from and suitably secured to the under surface of platform 2. From sprocket wheel 36, the chain extends forwardly parallel and immediately along side frame 33 to a position forwardly thereof where it passes around
a sprocket wheel 38 and is fixed at 39 between a pair of vertically spaced brackets 40 fixed to the end of frame 33. It is apparent from the foregoing that by reason of the chain 35 passing around sprockets 36 and 38 and being fixed to the forward and rear ends of frame 33, as well as to piston rod 30, that upon movement of chain 35 the frame 33 will be moved with the chain translationally, and is supported horizontally and rearwardly of the carrier. Such translational movement of frame 33 is guided and supported by longitudinally spaced apart U-shaped brackets 55, which loosely embrace the frame 33 and are secured to platform 2 as by the bolts 56.

Sprocket wheel 38 is fixed to and rotates with a drum 41 on a stub shaft 42 depending from and suitably secured to the under surface of platform 2. Such drum 41 has the central portion of a cable 43 wound therearound. One end of the cable extends from the drum horizontally forwardly of the carrier and passes vertically downwardly over a pulley 47 pivoted at 45 in a U-shaped bracket 46, fixed to and extending horizontally rearwardly from a depending flange 47 of the platform 2. The free end of this rearwardly extending portion of the cable 43 has a hook 48 secured thereto, which hook engages in an eye-bolt 49 fastened to beam 7 forwardly of brackets 40. The opposite end of cable 43 extends from the drum horizontally rearwardly of the carrier and passes vertically downwardly over a pulley 50 pivoted at 51 in a U-shaped bracket 52, suitably fixed to and depending from platform 2. The free end of this rearwardly extending portion of cable 43 also has a hook 53 secured thereto, which hook engages in an eye-bolt 54 fastened to beam 7 rearwardly of bracket 9. It will be noted that the forwardly and rearwardly extending portions of cable 43 enter upon the drum at diametrically opposite points thereon. When the drum is rotated in a clockwise direction, for example, the opposite ends of the cable are paid out from the drum, while when the drum is rotated in a counterclockwise direction the cable is retrieved by the drum.

The operation of the lifting mechanism is substantially as follows:

With the component parts of the mechanism in the relation shown in Figure 3, admission of fluid pressure to cylinder 28 will move piston rod 30 outwardly of the cylinder 28 (to the left as viewed in Fig. 3). As frame 33 is fixed at 31, and as chain 35 is fixed to frame 33 at 34 and 39, movement of piston 30 will take the frame 33 and chain 35 along with it. The movement of chain 35 will of course, rotate sprocket 38 which, being fixed to drum 41, will rotate the latter in a clockwise direction, thereby paying out cable 43 from the drum and thereby lowering beam 7. The carrier may be driven over a bundle of rods 57 secured by the chains 58, and the beam 7 may be continuously lowered by continued outward movement of piston rod 30 until front and rear hooks 59 and 60, respectively, secured to the lower surface of the beam 7 contact the rods. By forward movement of the carrier, the hooks may then be engaged beneath the chains 58 of the bundle. By inward movement of piston rod 38 into cylinder 28, frame 33 and chain 35 will rotate drum 41 in a counterclockwise position, the cable 43 being then retrieved by the drum and thereby raising the beam 7 and the bundle of rods 57. During the aforementioned movements of beam 7, the rods 12—13 and the linkage means 21—22 and 24—25 will guide the beam and maintain it in substantially stable equilibrium. The latter is also true when the rods are being transported by the carrier.

While a preferred embodiment of the invention has been illustrated and described herein by way of example, it is to be understood that changes may be made therein within the spirit and scope of the invention and, therefore, the invention is not to be limited to the precise form herein disclosed, except insofar as it may be so limited by the appended claims.

1. For use with a straddle carrier having side frames and an operator's platform, of lift means comprising in combination, an elongated beam positioned substantially midway between the side frames of said carrier and extending longitudinally thereof, a hydraulic cylinder mounted on said platform, a drum longitudinally spaced from one end of said cylinder and rotatably mounted on said platform, a sprocket wheel fixed to said drum for rotation therewith, a second sprocket wheel spaced longitudinally from the other end of said cylinder and rotatably mounted on said platform, a sprocket chain connecting said sprocket wheels, a translationally movable member externally of said cylinder connected between the opposite ends of said sprocket chain and to said cylinder whereby to rotate said drum upon actuation of said cylinder, and means connected between said drum and said beam to vertically raise and lower the latter upon rotation of said drum.

2. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned substantially midway between the side frames of said carrier and extending longitudinally thereof, means mounted on said platform and connected with said beam to vertically raise and lower the same, and means connected between said platform and said beam to impart stability to the latter in its operative position as well as in its raising and lowering movements, said latter means including means connected with the forward end of said beam and the rear end of said platform and means connected between the latter part of said platform and the rear end of said beam.

3. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned substantially midway between the side frames of said carrier and extending longitudinally thereof, means mounted on said platform and connected with said beam to vertically raise and lower the same, and means connected between said platform and said beam to impart stability to the latter in its operative position as well as in its raising and lowering movements, said means comprising a pair of rods pivotally connected between said platform and one end of said beam, and linkage means pivotally connected between said platform and the opposite end of said beam.

4. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned substantially midway between the side frames of said carrier and extending longitudinally thereof, means mounted on said platform and connected with said beam to vertically raise and lower the same, and means connected between said platform and said beam to impart stability to the latter in its operative position as well as in its raising and lowering movements, said means comprising a pair of rods pivotally connected between said platform and said beam, a common pivot connecting the opposite end of said rods to one end of said beam, and linkage means pivotally connected between said platform and the opposite end of said beam.

5. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned substantially midway between the side frames of said carrier and extending longitudinally thereof, means mounted on said platform and connected with said beam to vertically raise and lower the same, and means connected between said platform and said beam to impart stability to the latter in its operative position as well as in its raising and lowering movements, said means comprising a pair of laterally spaced brackets mounted on said platform, a rod pivoted at one end to each of said brackets, a common pivot connecting the other end of said rods to one
end of said beam, a first link pivotally mounted on each of said brackets, a second link pivotally connected to each of said first links, and a common pivot pivotally connecting said second links to the other end of said beam.

6. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned midway between the side frames of said carrier and extending longitudinally thereof, means mounted on said platform and connected with said beam to vertically raise and lower the same, and means connected between said platform and said beam to impart stability to the latter in its inoperative position as well as in its raising and lowering movements, said means comprising a pair of rods, a common pivot connecting one end of said rods to one end of said beam, a pair of laterally spaced brackets fixed to said platform, a pair of first links, a common pivot for connecting the other end of one of said rods and one end of one of said first links to one of said brackets, a second link pivotally connected at one end to the free end of each of said first links, and a common pivot connecting said second links to the other end of said beam.

7. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned midway between the side frames of said carrier and extending longitudinally thereof, a hydraulic cylinder mounted on said platform, a drum rotatably mounted on said platform, a sprocket wheel fixed to said drum for rotation therewith, a sprocket chain connected between said cylinder and said sprocket wheel for rotating the latter and said drum upon actuation of said cylinder, means connected between said drum and said beam to vertically raise and lower the beam upon rotation of said drum, and means connected between said platform and said beam to impart stability to the latter in its inoperative position as well as in its raising and lowering movements, said means comprising a pair of latterly spaced brackets fixed to said platform, a rod pivoted at one end to each of said brackets, a common pivot connecting the other end of said rods to one end of said beam, a first link pivotally mounted on each of said brackets, a second link pivotally connected to each of said first links, and a common pivot pivotally connecting said second links to the other end of said beam.

8. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned midway between the side frames of said carrier and extending longitudinally thereof, a hydraulic cylinder mounted on said platform, a drum rotatably mounted on said platform, means connecting said drum with said beam to vertically raise and lower the latter upon rotation of said drum, means connected between said cylinder and said drum for rotating the latter upon actuation of said cylinder, and means connected between said platform and said beam to impart stability to said beam in its inoperative position as well as in its raising and lowering movements, said means comprising a pair of rods pivotally connected between said platform and one end of said beam, and linkage means pivotally connected between said platform and the opposite end of said beam.

9. For use with a straddle carrier having side frames and an operator's platform, of lift and stabilizing means comprising in combination, an elongated beam positioned midway between the side frames of said carrier and extending longitudinally thereof, a hydraulic cylinder mounted on said platform, a drum rotatably mounted on said platform, a sprocket wheel fixed to said drum for rotation therewith, a sprocket chain connected between said cylinder and said sprocket wheel for rotating the latter and said drum upon actuation of said cylinder, means connected between said drum and said beam to vertically raise and lower the beam upon rotation of said drum, and means connected between said platform and said beam to impart stability to the latter in its inoperative position as well as in its raising and lowering movements, said means comprising a pair of latterly spaced brackets fixed to said platform, a rod pivoted at one end to each of said brackets, a common pivot connecting the other end of said rods to one end of said beam, a first link pivotally mounted on each of said brackets, a second link pivotally connected to each of said first links, and a common pivot pivotally connecting said second links to the other end of said beam.

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