Nov. 5, 1968 LE GRAND H. LULL 3,409,157

HOLD DOWN APPARATUS FOR MATERIAL HANDLING CARRIAGES

Filed March 9, 1965 2 Sheets-Sheet 1

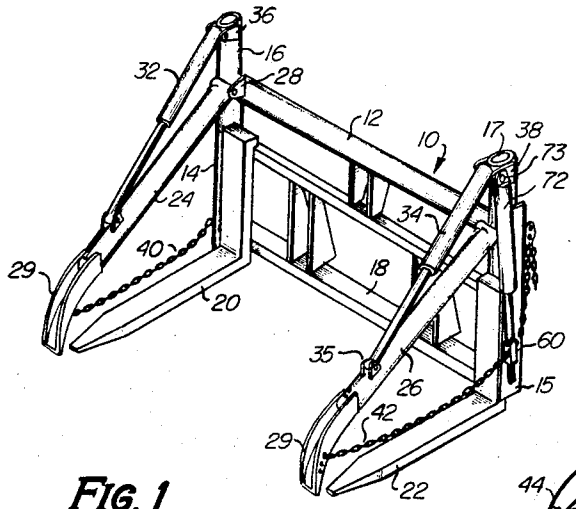


FIG. 1

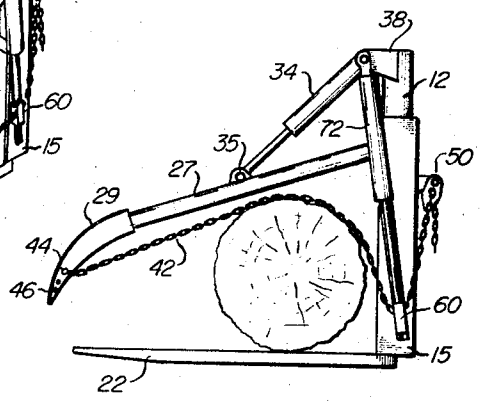


FIG. 2

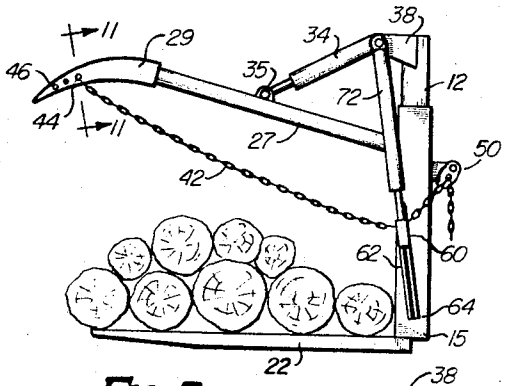


FIG. 3

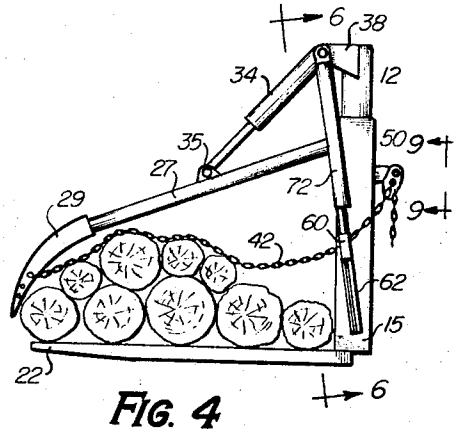


FIG. 4

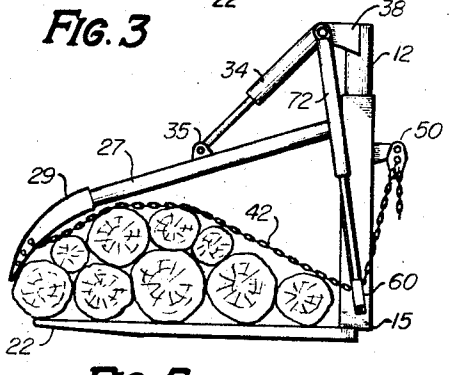


FIG. 5

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HOLD DOWN APPARATUS FOR MATERIAL HANDLING CARRIAGES

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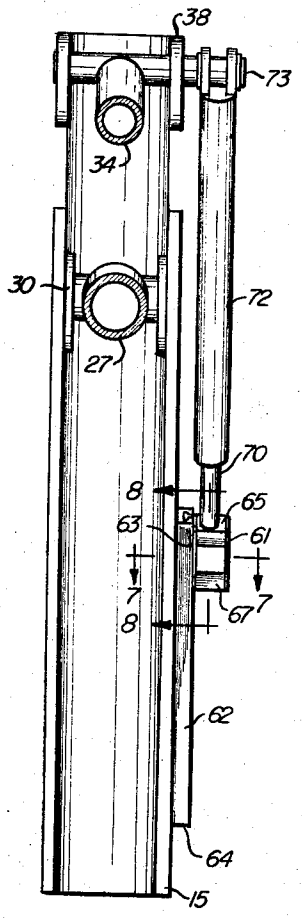


FIG. 6

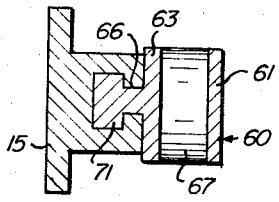


FIG. 7

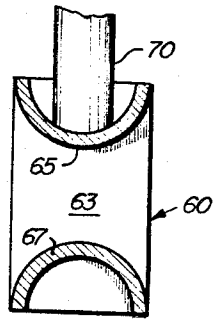


FIG. 8

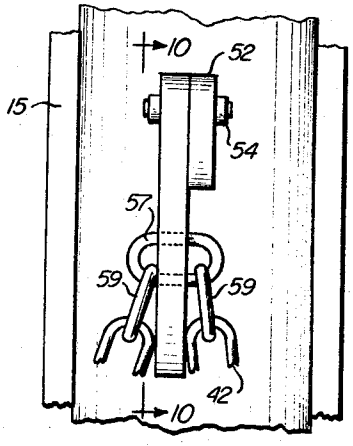


FIG. 9

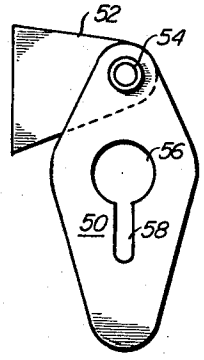


FIG. 10

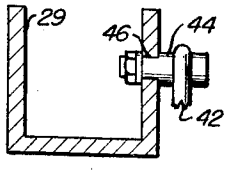


FIG. 11

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HOLD DOWN APPARATUS FOR MATERIAL HANDLING CARRIAGES

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Filed Mar. 9, 1965, Ser. No. 438,427
10 Claims. (Cl. 214—654)

ABSTRACT OF THE DISCLOSURE

A forklift load handling carriage provided with flexible cable or chain hold down means which can be tightened down over irregularly sized and shaped loads such as logs or poles or the like to hold them securely in place.

This invention relates to improved apparatus for material handling; in particular, it concerns improved apparatus of this type including flexible elongated tension member means for engaging and holding loads upon a carriage.

The general object of the invention is to improve material handling carriage of the type used for handling and sorting logs, pole and other articles. Other objects of the invention are: to provide an improved hold down apparatus for material handling carriages whereby to enhance the versatility of the carriage and permit it to handle loads efficiently without regard to their size or shape; to provide apparatus of this type including elongated flexible tension member and associated power means adapted to securely hold a load; to provide in apparatus of this type improved means for mounting said tension member means upon a load handling carriage for coaction with the lift arms and hold down clamps forming part of the carriage; to provide in apparatus of this type improved means for guiding and supporting said tension member for movement towards and away from the lift arms of the carriage whereby to hold or release a load; and in general to provide an improved hold down apparatus for material handling carriages which is highly versatile and dependable in operation, simple and inexpensive to construct, and rugged and long wearing in service.

The foregoing and other objects and advantages of the invention will become apparent from a consideration of the followng detailed description taken in conjunction with the accompanying drawings wherein an embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawings:

FIG. 1 is a perspective view of a material handling carriage incorporating the invention;

FIG. 2 is a side view of the invention;

FIG. 3 is a side view of the invention with the hold down clamps in a raised position;

FIG. 4 is a side view with the hold down clamps in a lowered position and the chain members in a relaxed position;

FIG. 5 is a side view showing the chain members tightened against a load;

FIG. 6 is an enlarged fragmentary view, partially in section, taken on the line 6—6 of FIG. 4;

FIG. 7 is an enlarged view, partially in section, taken on the line 7—7 of FIG. 6;

FIG. 8 is a fragmentary view, partially in section, taken on the line 8—8 of FIG. 6;

FIG. 9 is an enlarged fragmentary view taken on the line 9—9 of FIG. 4;

FIG. 10 is a view taken on the line 10—10 of FIG. 9; and

FIG. 11 is an enlarged fragmentary view, partially in section, taken on the line 11—11 of FIG. 3.

Briefly speaking, according to the principles of the invention, I provide a material handling carriage of the type adapted for handling and sorting logs, poles and the like. The carriage includes a frame having a pair of forwardly extending lift arms or forks and a pair of hold down clamps which are pivotally mounted on the frame over the forks. In order to improve the versatility of this carriage to permit handling of small and irregular shaped loads, I have equipped it with a pair of load engaging chain members each of which is suspended between the end of one of the hold down clamps and the frame. Each chain is adjustably mounted so that its suspended length can be varied to accommodate different loads. To effect tightening of the chains over a load placed on the lift arms I provide hydraulically actuated guide members which are mounted on the frame between the ends of each chain and in surrounding sliding engagement therewith. The guide members move in directions towards and away from the lift arms so that the chains are tightened over a load when the guide members move towards the lift arms and loosened when the guide members move away from the lift arms. The ends of the chains are pivotally supported.

Referring now to the drawings, the invention is shown in FIGURE 1 as part of a material handling carriage **10** of the type used for handling and sorting logs and poles. Carriage **10** includes a rear frame **12** adapted for attachment to the boom of a mobile loader. Frame **12** includes side plates **14, 15** welded to vertical tubular members **16, 17** which are connected by laterally extending structural members **18**. A pair of forwardly extending lift arms **20, 22** are mounted on frame **12** in laterally spaced relation to each other and adjacent side plates **14, 15**. The tubular members **16, 17** extend above structural members **18**. Pivotally secure to tubular members **16, 17** are hold down clamps **24, 26** which are connected at their rear to brackets **28, 30** attached to members **16, 17**. Hold down clamps **24, 26** each include a straight section **27** extending from brackets **28, 30**, and a downwardly and forwardly curved end section **29**. Hydraulic power cylinders **32, 34** pivotally connected at their rear ends to brackets **36, 38** on members **16, 17** above side plates **14, 15** and at their forward ends, as at **35**, to the straight sections **27** of hold down clamps **24, 26** actuate the clamps for movement about their pivot axes from a raised position to a lower load clamping position.

The foregoing describes a conventional carriage for loaders; my invention concerns means for holding a load on the lift arms which because of its size or shape could not be properly held by the clamps alone. To this end I provide a pair of load engaging chains **40, 42** which are secured at one end to the forward section **29** of clamps **24, 26** and at the other end to structure rearwardly of frame **12**. A pin **44** removably mounted in one of three holes **46** in section **29** of clamps **24, 26** pivotally anchors the forward ends of chains **40, 42**. The rear ends of chains **40, 42** are each held in a mounting plate **50** which is swingably mounted on a bracket member **52** extending rearwardly from members **16, 17** slightly below brackets **28, 30**. Each mounting plate **50** is connected to its bracket member **52** by a pin **54** which extends laterally through both parts **50, 52** to permit plate **50** to swing in an arc about the axis of pin **54**. Below pin **54** plate **50** is provided with a hole **56** of larger radial extent than the thickness of chains **40, 42**. Hole **56** communicates at its lower end with an elongated chain link notch **58**. This construction allows the length of chain that is suspended between pin **44** and plate **50** to be adjusted according to the load. To do this the chain is run through the hole **56** until a particular length is reached, then the link **57** corresponding to this length is placed in notch **58** and held against endwise movement by the adjacent links **59** which abut

on each side of plate **50** adjacent notch **58** when the chain is moved endwise. Chains **40**, **42** are thus pivotally supported at their ends in the manner shown in the drawings.

To tighten the chains **40**, **42** against a load held by lift arms **20**, **22** and clamps **24**, **26**, I provide a power actuated chain guide member **60** for each chain which slidably surroundingly engages each chain intermediate its length and is mounted on frame **12** for movements in directions towards and away from the lift arms **20**, **22**. The mounting means for each guide members **60** consists of an elongated bed **62** which extends generally upwardly on side plates **14**, **15** from a position substantially adjacent the heel of lift arms **20**, **22**, as at **64**. Each bed **62** includes a slotted way **66** which extends throughout its length. Guide members **60** each include a box-like body having sides **61**, **63** which are connected at their top and bottom by semicircular chain engaging members **65** and **67**. Side **63** is provided with an external rib **71** which slidably reciprocates in way **66** of bed **62**. Members **65** and **67** are mounted between sides **61**, **63** of each guide member **60** with their convex surfaces **68** facing each other to form bearing surfaces for the chains **40**, **42** which extend through the throat **69** in each guide member **60**. The upper chain engaging member **65** of each guide member **60** is connected to the end of a piston rod **70** of hydraulic power cylinders **72** which are pivotally connected at their upper ends to brackets **36**, **38** of frame **12**, as at **73**.

As illustrated in FIGS. 2–4 and 10, when a load of logs or poles are placed on the lift arms **20**, **22** and held by the clamps **24**, **26**, chains **40**, **42** can be moved by the guide members **60** from a loosely suspended position above the load into a tightening position firmly biased against the load. Because the slack removed from the chains is taken up adjacent the rear of the lift arms virtually the entire chain length can be brought to bear against the load. The flexible nature of the chains **40**, **42** permits them to conform to the shape of the load; considerable pressure may be exerted by the cylinders **72** to hold the logs or poles in place even though there may be space between the clamps and the load. Cylinders **72** are in a hydraulic circuit and under the control of any suitable operator controlled valve mechanism (not shown) which in known manner permits introduction of pressure fluid to one of the ends of each cylinder while exhausting from the other and which permits retention of fluid in both ends of the cylinders to hold their pistons **70** in any desired set position. Thus, through the action of cylinders **72**, the chains **40**, **42** may be moved in directions towards or away from the lift arms **20**, **22** whereby to either release a load or exert tightening pressure thereagainst.

It is evident that changes within the skill of those versed in the art may be made without departing from the spirit of the invention. In many instances features may be added; in other, features may be omitted. It is clear that modifications of the invention will become apparent to those skilled in the art and where the same or similar results may be achieved by the use of equivalents, substitution of the equivalent may be made without departing from the inventive concept.

It is intended that the patent shall cover, by summarization in the appended claims, all features of patentable novelty residing in the invention.

I claim:

1. In a material handling carriage including a frame, forwardly extending lift arm means carried by said frame, forwardly and downwardly extending hold down clamping means pivotally mounted on said frame above said lift arm means, the combination of:

flexible elongated tension member means one end of which is secured to the forward end of said hold down clamping means and the other end of which is secured to said frame,

guide means slidably surrounding said tension member means intermediate the ends thereof between its points of attachment to the hold down clamping means and frame and mounted on said frame for movements in directions towards and away from said lift arm means, and

power means mounted on said frame and operable for moving said guide means towards said lift arm means to tighten said tension member means over a load carried by said lift arm means and said hold down clamping means.

2. The combination described in claim **1** wherein means are provided for changing the length of said tension member means.

3. The combination described in claim **1** wherein said hold down clamping means is provided with means for adjusting the mounting position of said tension member suspended thereon.

4. The combination described in claim **1** wherein said tension member is pivotally supported at each end.

5. In a material handling carriage including a frame, a pair of forwardly extending lift arms carried by said frame, a pair of forwardly and downwardly extending hold down clamps pivotally mounted on said frame above said lift arms for load clamping coaction therewith, the combination of:

a chain member, one end of which is secured to the front end of each hold down clamp and the other end of which is secured to said frame in generally overlying relationship to said lift arms,

a hollow tubular guide member slidably surrounding each of said chain members intermediate its ends between its points of attachment to the hold down clamp and frame,

each said hollow guide members being mounted on said frame for movements in directions towards and away from said lift arms,

said guide and chain members coacting so as to effect the tightening of said chain members over a load held between said lift arms and said hold down clamps when said guide members are moved towards said lift arms, and

power means mounted on said frame and operable to move said guide members towards and away from said lift arms.

6. The combination described in claim **5** wherein means are provided for adjusting the length of said suspended chain members.

7. The combination described in claim **5** wherein said hold down clamps are provided with means for adjusting the mounting position of said chain members suspended thereon.

8. The combination described in claim **5** wherein said chain members are each pivotally supported at their ends.

9. In a material handling carriage including a frame, forwardly extending lift arm means carried by said frame, forwardly and downwardly extending hold down clamping means pivotally mounted on said frame above said lift arm means, the combination of:

flexible elongated tension member means suspended between the forward end of said hold down clamping means and said frame,

guide means slidably surrounding said tension member means intermediate the ends thereof and mounted on said frame for movements in directions towards and away from said lift arm means,

said guide means including bed means mounted on said frame and extending upwardly from said lift arm means, and hollow guide member means slidably mounted for reciprocal movement in said bed means,

said guide means when moved towards said lift arm means being adapted to tighten said tension member means over a load carried by said lift arm means and said hold down clamping means, and

power means operable to move said guide means in directions towards and away from said lift arm means.

10. The combination described in claim **9** wherein said

power means includes power cylinder means connected between said hollow guide member means and said frame.

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