United States Patent

[11] **3,545,629**

[72] Inventors **Reuben A. Kaplan;**
Jan H. Boers, Owatonna, Minnesota

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[73] Assignee **Owatonna Tool Company**
a corporation of Minnesota

[54] **LOAD HANDLING DEVICE**
3 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **214/1**
[51] **Int. Cl.** **B65g 69/00**
[50] **Field of Search** ..... 214/1, 1(R), 1(R2), 1(R3); 294/86(LS), 78(A); 269/46, 77

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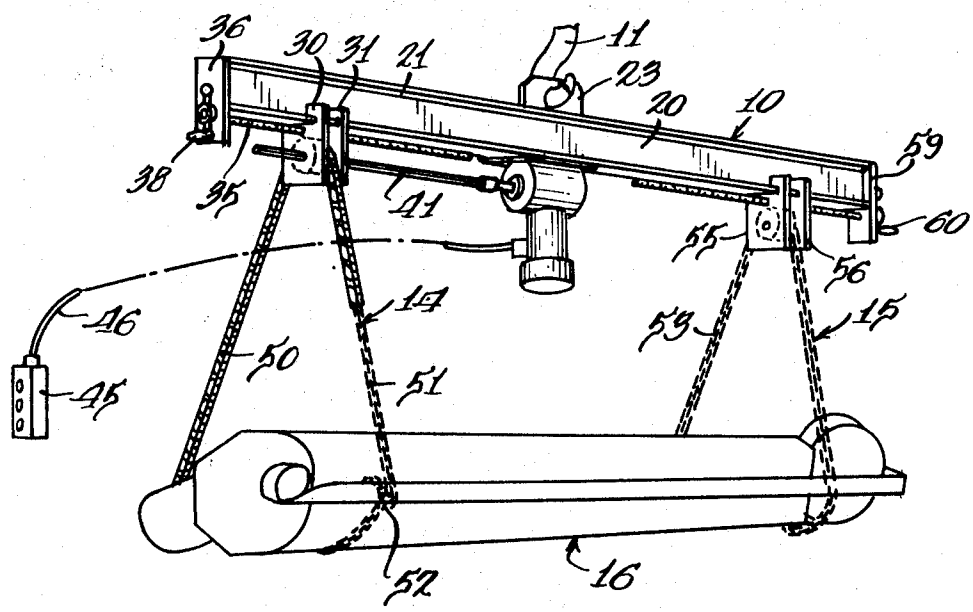
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Primary Examiner—Robert G. Sheridan
Assistant Examiner—Frank E. Werner
Attorney—Hofgren, Wegner, Allen, Stellman & McCord

ABSTRACT: A load handling device for relatively heavy parts which may have irregular shapes wherein the part is suspended above the ground by a pair of chain slings which wrap about the part and with one of the slings being power indexed for rotation of the sling by lengthwise movement of the chain. The powered sling is effectively attached to the part whereby the part can be rotated to a desired position while suspended from the ground and the other chain sling supports the part and is free for rotational movement to accommodate the powered rotative positioning of the part.



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SHEET 1 OF 2

Fig. 1.

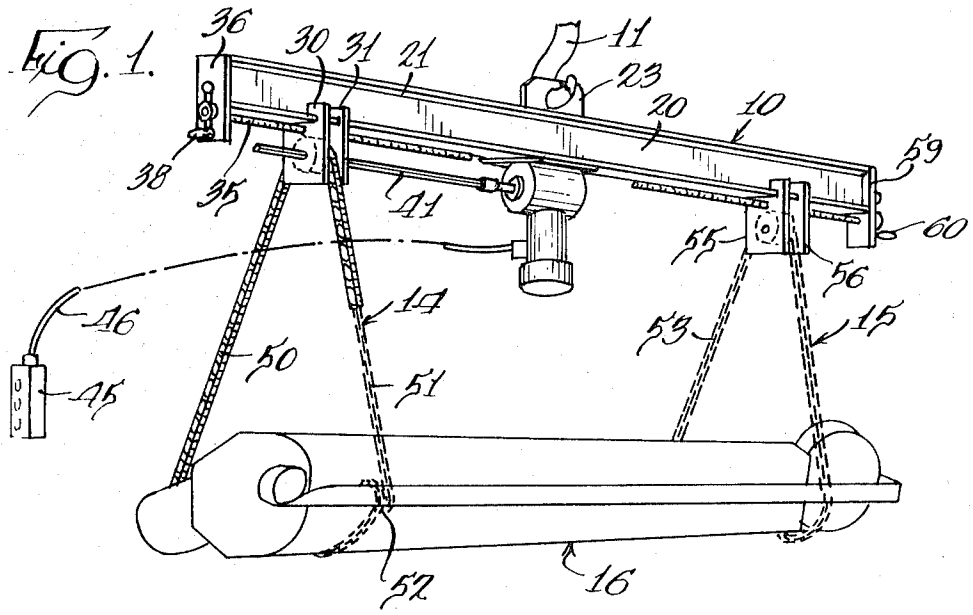
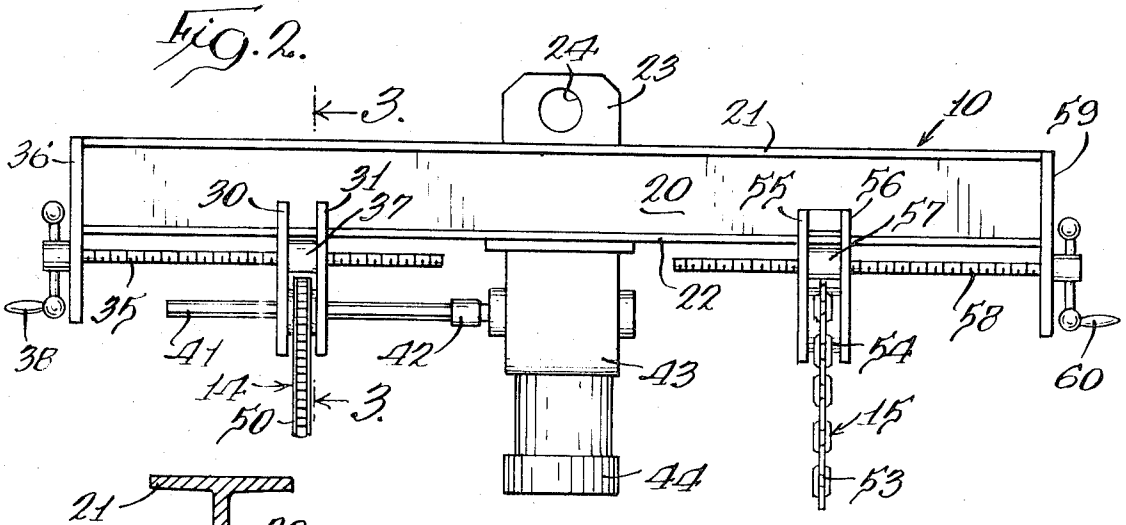


Fig. 2.



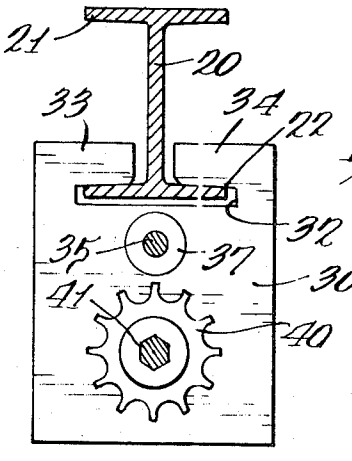


Fig. 3.

Inventors
Reuben A. Kaplan
Jan H. Boers
By Hofgren, Wegner,
Allen, Stellman & McCord
Attys

Fig. 4.

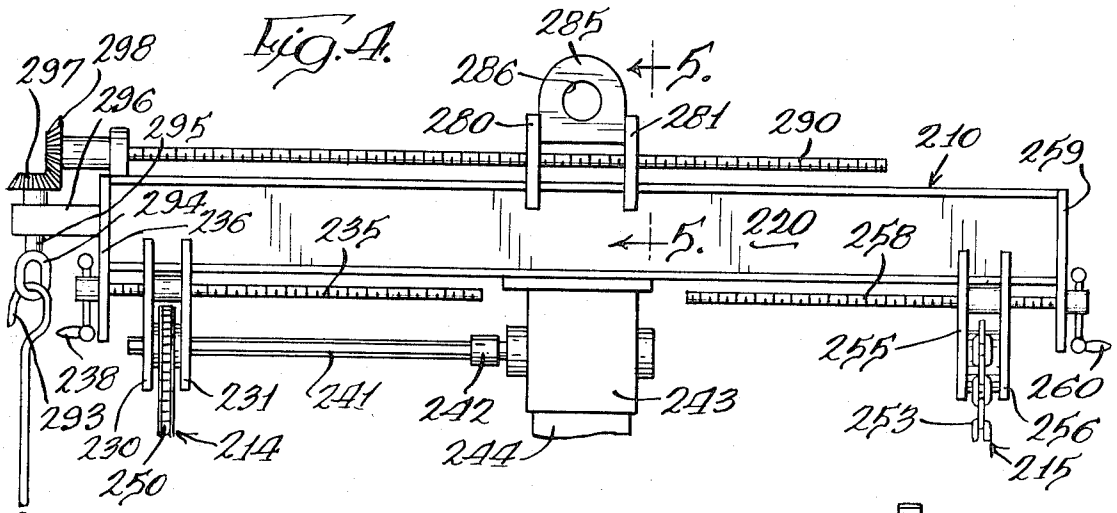
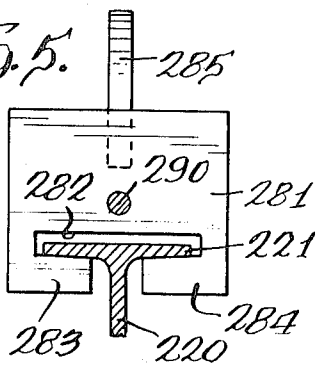


Fig. 5.



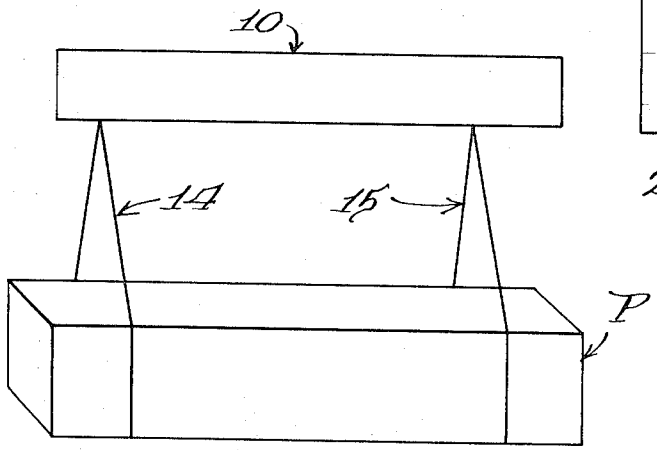


Fig. 6.

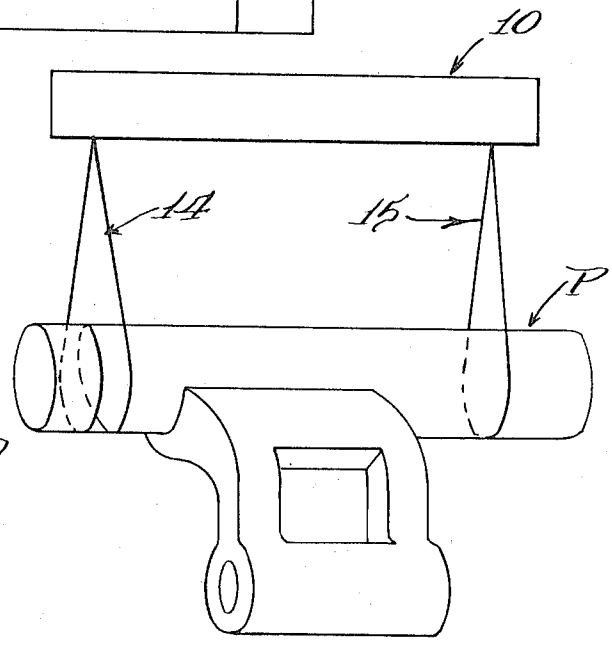


Fig. 7.

LOAD HANDLING DEVICE

BACKGROUND OF THE INVENTION

The invention pertains to a load handling device for suspending relatively heavy, bulky parts and obtaining desired rotative positioning thereof.

Load handling devices are known wherein a part is suspended above the ground, but do not have provision for suspending relatively heavy, bulky parts with irregular contours. Also known are load handling devices requiring specific fixtures for engaging the part, however, in the construction of applications' invention the utilization of separate fixtures is not required, inasmuch as the supporting chain slings can directly extend under the part and be effectively attached thereto to avoid the need for attaching fixtures.

SUMMARY

An object of this invention is to provide a new and improved load handling device for suspending heavy parts and obtaining desired rotative positioning thereof.

Still another object of the invention is to provide a load handling device for turning relatively heavy and bulky parts to a desired position while suspended above the ground comprising, a frame from which a pair of chain slings depend at spaced points along the length of the frame and with the slings extending around the underside of the part or entirely around the part, and means for rotating said one sling by lengthwise movement of the chain thereof to obtain rotation of the part and with the other sling supporting the part and moving therewith as the part is rotated.

A further object of the invention is to provide a load handling device as defined in the preceding paragraph and with means for adjusting the chain slings lengthwise along the length of the frame to accommodate parts of different length and to provide for balancing of the part weight relative to a hoist connection on the frame.

An additional object of the invention is to provide a load handling device as defined in the preceding paragraphs wherein the frame has a bracket for connection to a hoist and with means movably mounting the bracket lengthwise of the frame to balance the part weight relative to the hoist to maintain the load in a relatively level condition.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawing.

DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of an embodiment of the load handling device, with a part shown suspended therefrom;

FIG. 2 is a fragmentary front elevational view of the structure shown in FIG. 1;

FIG. 3 is a vertical section on an enlarged scale taken generally along the line 3–3 in FIG. 2;

FIG. 4 is a fragmentary front elevation, similar to FIG. 2 of a preferred embodiment of the invention;

FIG. 5 is a vertical section, on an enlarged scale, taken generally along the line 5–5 in FIG. 4 and with parts broken away;

FIG. 6 is a diagrammatic view of a preferred mode of supporting a balanced load of an appropriate shape by the load handling device; and

FIG. 7 is a diagrammatic view of still another mode of supporting a part.

DESCRIPTION OF THE EMBODIMENTS

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail an embodiment of the invention together with modifications thereof with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiments illustrated. The scope of the invention will be pointed out in the appended claims.

A first embodiment is shown in FIGS. 1 to 3 and comprises an elongate frame 10 which can be supported at a distance above the ground by means, such as a hoist (not shown) having a hook 11. A driven sling 14 and an idler sling 15 extend downwardly from the frame and around an irregularly-shaped part to be suspended and rotatably positioned above the ground. For illustrative purposes, the part is shown in FIG. 1 as a component 16 of a crawler-type tractor which is heavy and bulky and has an irregular contour. The load handling device can also be used to support heavy motors, dozer blades and buckets as well as other types of heavy machinery where it is desired in the course of repair, assembly, disassembly, welding and other maintenance work to turn the part without damage to the part or danger to the workmen.

A preferred procedure for supporting a balanced load is shown diagrammatically in FIG. 6 wherein the chain slings 14 and 15 merely extend around the underside of the part P. When the part has an irregular shape or is very substantially out of balance, the driven sling 14 can be effectively attached to the part by having a portion thereof wrapped entirely around a section of the part, as shown in FIG. 1, or, as shown diagrammatically in FIG. 7, the driven sling 14 can completely wrap around the part.

The frame 10 comprises an I-beam having a web 20 with an upper flange 21 and a lower flange 22. A bracket 23 is secured, as by welding, to the upper flange 21 midway between the ends of the frame and has an opening 24 therein to receive the hoist hook 11.

The chain slings 14 and 15 are each part of a load-engaging unit with the unit for the chain sling 14 embodying a pair of plates 30 and 31 connected together for simultaneous movement and each having a recess 32, as shown for the plate 30 in FIG. 3, which receives the lower flange 22 of the frame beam and has a pair of inturned legs 33 and 34 which rest upon the upper side of the beam flange 22 to support the weight of the unit from the frame. There is sliding engagement between the legs and the beam flange whereby the brackets can move longitudinally of the frame for purposes more fully set forth hereinafter. This adjusting movement is effected by a screw shaft 35 rotatably mounted in a bearing on panel 36 fixed to and depending downwardly from an end of the frame beam and which threads into a sleeve 37 affixed between the bracket plates 30 and 31 whereby rotation of the screw shaft 35 results in movement of the mounting bracket. The outer end of the screw shaft 35 has a manually operable crank 38 for imparting rotation to the screw shaft.

A drive sprocket 40 for the chain sling 14 is journalled in the mounting bracket plates 30 and 31 and a multisided drive shaft 41 extends therethrough in interfitting locked relation. The drive shaft is of a length, as seen in FIGS. 1 and 2, to permit substantial adjustment of the mounting bracket, along the frame, while still maintaining the connection to the drive sprocket. The drive shaft 41 is connected by a flexible coupling 42 to a power unit secured to the frame beam 20 embodying an electric motor 43 with gear reduction and an electric brake 44 which are under the control of a remote control box 45 connected thereto by a line 46. This control also has a connection to a source of electric power.

The chain sling 14 is preferably formed of two different types of chain with a length of roller chain 50 passing over and in driving engagement with the sprocket 40 and connected to a length of log chain 51. The roller chain provides for a good driving connection to the sprocket, while the log chain made up of interconnected similar links provides flexibility to either extend around and follow the contour of the part 16, as shown in FIG. 6; wrap around a portion of the part to fasten the two together, as shown at 52 in FIG. 1; or wrap completely around the part, as shown in FIG. 7. Also, the log chain permits the use of a half hitch to prevent slipping. The total length of the chain sling 14 can be adjusted by utilization of grab hooks associated with the log chain 51. Additionally, the log chain can be fastened to the part by bolting.

The second chain sling 15 is made up preferably of a length of log chain 53 which passes over an idler roller 54 rotatably

positioned between a pair of plates **55** and **56** defining a mounting bracket and which are of the same general construction as the plates **30** and **31** of the mounting bracket for the chain sling **14**. The plates **55** and **56** are secured together with a threaded sleeve **57** therebetween which receives a screw shaft **58** rotatably mounted in a bearing on an end plate **59** secured to an end of the frame **10**. The screw shaft **58** can be rotated by a manually-operable crank **60** connected thereto. Rotation of the crank **60** results in movement of the mounting bracket along the flange **22** of the frame beam to vary the location of the chain sling **15** along the length of the frame. The chain sling **15** is not driven, but extends under and conforms generally to the shape of the part and is rotated as a result of rotation of the part by the driven chain sling **14**, with resultant longitudinal movement of the chain **53**.

In operation of the load handling device shown in FIGS. **1** to **3**, the unit is placed over the part to be picked up and the proper spacing of the chain slings **14** and **15** is preliminarily determined according to the shape and size of the part by rotation of the cranks **38** and **60**. The chains are then put under the part and connected to form the slings. The slings are then tightened by elevation of the unit through raising of the hoist. The beam **20** of the frame **10** should be parallel to the load, with the chain slings **14** and **15** properly adjusted. Upon slight lifting of the load if the frame is not level, the load should be lowered and the mounting brackets for the slings **14** and **15** both moved an equal amount toward the high end of the frame beam. This operation should be repeated until the load and beam **20** are level when raised by the hoist.

When the level condition is obtained, the hoist can be lifted to raise the part and handling device to a desired height and the part can then be rotated to expose any one of the surfaces of the part to a working position by operation of the motor **43** to drive the chain sling **14**. The motor **43** is reversible, and the roller chain **50** is of sufficient length whereby substantially 360° positioning of the part can be obtained. The chain sling **15** may be of a different total length than the chain sling **14** and, therefore, follows the rotation of the part, rather than being power driven.

In the preferred embodiment of FIGS. **4** and **5**, provision is made for adjusting the connection point of the hoist to the load handling device while a part is suspended a distance above floor level to avoid making one or more adjustments of the chain sling locations relative to the frame as required in the embodiment of FIGS. **1** to **3**. The parts of the embodiment shown in FIGS. **4** and **5**, which are of the same construction as shown in the embodiment of FIGS. **1** to **3** have been given the same reference numeral with "200" added thereto.

In this embodiment, a bracket for connection to the hoist hook has a pair of transverse plates **280** and **281**, each constructed as shown for plate **281** in FIG. **5** having a recess **282** to receive the upper flange **221** of the frame beam **220** and with a pair of inturned legs **283** and **284** which extend under the flange **221** and which support the weight of the load handling device. A plate **285** is secured between the plates **280** and **281** and has an opening **286** to receive the hook of the hoist. The association of the bracket **280** and **281** with the frame beam permits longitudinal movement of the bracket relative to the frame beam. This movement is effected by a threaded shaft **290** which engages in threaded openings in the plates **280** and **281** and which is journaled in a journal block **291** at one end of the frame for rotation relative thereto. The shaft **290** is rotated by a removable manual operator **292** having a hook **293** engageable in an eye **294** at the lower end of a shaft **295** journaled in a journal block **296** attached to the frame panel **236**. Rotation of shaft **295** is transmitted to threaded shaft **290** through bevel gears **297** and **298** on the respective shafts. The spacing between chain slings **214** and **215** can be adjusted for the length of the part to be rotatably suspended and after lifting of the device if the load is not balanced the manual operator **292** can be rotated from the floor to adjust the point of hoist support of the load handling device until the load is balanced.

With all of the foregoing modifications of the invention, heavy, bulky parts, having irregular shapes, can be suspended and rotatably positioned by operation of the power drive for the drive sling by driving through the motor **43** and the gear reduction unit associated therewith to orient the suspended part in a desired rotative position dependent upon the requirements of the work being done.

We claim:

1. A load handling device for suspending a part at a distance from the ground and for rotatably positioning the part while suspended comprising: an elongate frame; first and second load engaging units associated with said frame; said first unit having a bracket mounted on said frame for movement lengthwise thereof, a drive sprocket mounted on said bracket, and a driven chain in engagement with said sprocket and extending around the load to have lengthwise movement of the chain cause rotation of the load; said second unit having a bracket mounted on said frame for movement lengthwise thereof whereby movement of the brackets of said units centers the load relative to the frame, and a flexible chain passing over a roller mounted in the second unit bracket with said last-mentioned chain extending around the load to secure the two together for simultaneous movement; and selectively operable reversible power means connected to said drive sprocket to rotate the sprocket and index the drive chain to obtain the desired rotative positioning of the load with the flexible chain freely moving over its mounting roller to follow the powered rotation of the load.

2. A load handling device as defined in claim **1** wherein said drive chain includes a length of roller chain to engage the drive sprocket for positive transmission of power to the chain and a length of log chain to facilitate attachment to the load, and said flexible chain is log chain to facilitate conforming to the shape of the load.

3. A load handling device as defined in claim **1**, wherein said frame is formed of a beam having a flange and each of said mounting unit brackets engage the top of said flange for support, means for moving said brackets along said flange including a pair of manually rotatable threaded shafts extending inwardly from opposite ends of the frame and a pair of nuts fitted one in each bracket and each receiving one of said threaded shafts, and said reversible power means includes an electric motor and brake unit on the frame with an output shaft keyed to and slidably received in the drive sprocket.