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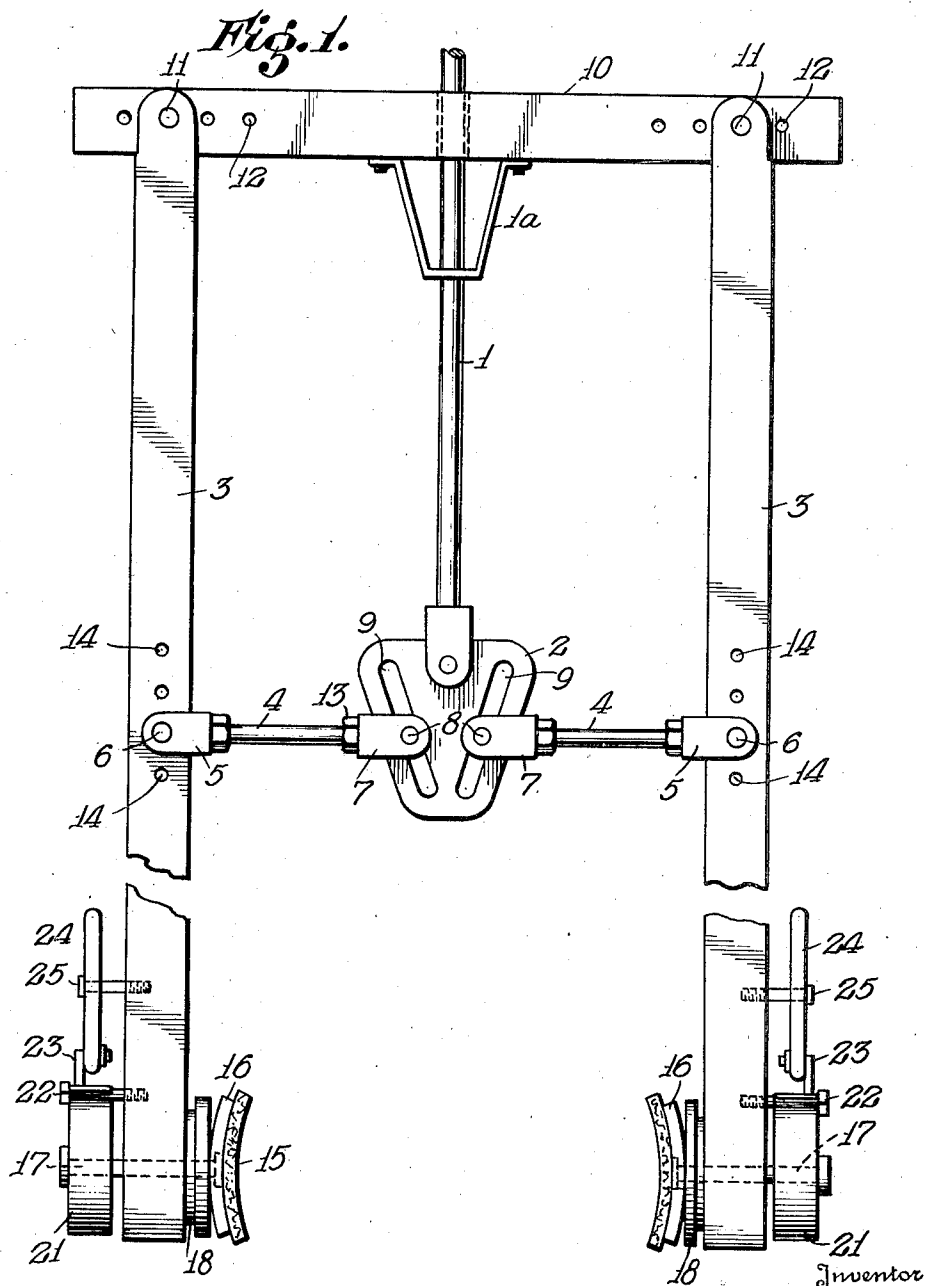
W. M. GRIGSBY

2,364,897

HOIST GRAPPLE

Filed July 17, 1944

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

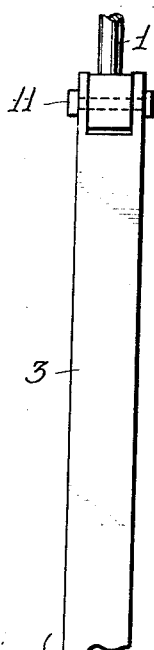


Fig. 2.

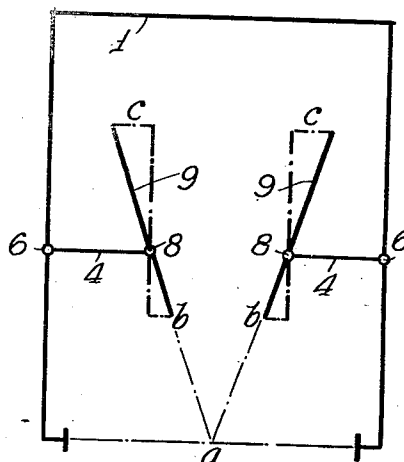


Fig. 6.

Fig. 5.

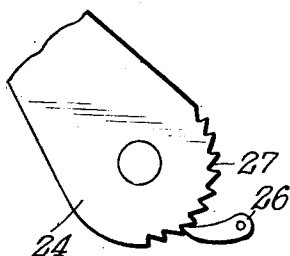
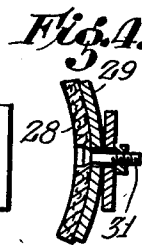
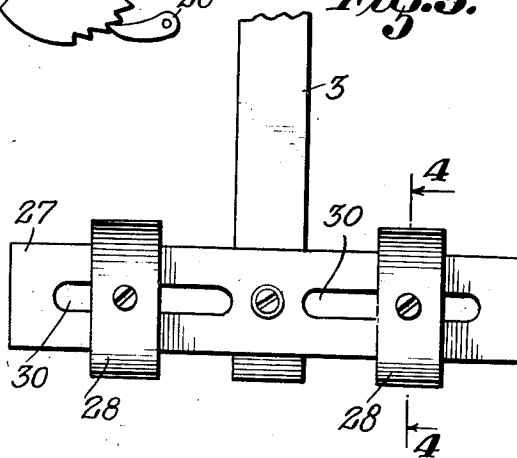
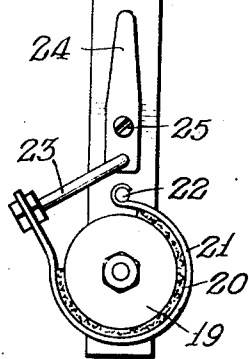


Fig. 3.



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HOIST GRAPPLE

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8 Claims. (Cl. 294—115)

The invention relates to a hoist grapple.

The hoist grapple to which the invention applies in particular has utility in the handling of cylindrical loads such as oil drums, paper rolls and the like, in terminals, warehouses and similar industrial institutions but is not limited, within the purview of the invention, to a load of any specific conformation.

Prior grapples of the type to which the invention has application employ a pair of downwardly depending jaws which are pivoted at their upper extremities to a beam adjacent the ends thereof, and the jaws have linkage connection with a centrally disposed hoist line whereby to contract the jaws upon application of tension to the hoist line.

The invention has for an object to provide a grapple wherein the gripping effort of the jaws may be assisted by a linkage coupling therebetween to more positively grip the load to which the grapple is applied.

Another object is to provide a grapple which may be readily adjusted to loads of varying conformation.

Another object is to provide a grapple having gripping shoes which may be readily adapted to maintain the load in fixed position relative to the grapple.

Another object is to provide a grapple which may be readily and economically manufactured.

According to the invention, the hoist line by which the grapple is suspended is terminated in a coupling having a pair of upwardly diverging guides which are associated with the jaws of the grapple whereby to pivot the jaws upon vertical movement of the coupling relative to the jaws.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

The invention is exemplified in a hoist grapple shown in the accompanying drawings, in which the views are as follows:

Fig. 1 is a front elevation of the grapple;

Fig. 2, a side elevation thereof;

Fig. 3, an elevation of a form of divided shoe assembly employed with the grapple;

Fig. 4, a section on the line 4—4 through Fig. 3;

Fig. 5, an enlarged view, in part, of means to fix the shoe locking means against loosening thereof;

Fig. 6, a schematic diagram, not to scale, of

some of the force components related to the invention.

The grapple has a hoist line or rod 1, by which it is suspended from an overhead crane or like lifting appliance, not shown.

The rod 1 terminates at its lower end in a coupling plate 2, which is connected to a pair of jaws 3, by a pair of laterally disposed links 4, extending outwardly from the coupling.

The links 4 have their outer ends pivoted to the jaws by clevises 5, pintled as by bolts 6 passed through the jaws.

The links terminate at their inner ends in clevises 7, pintled as by bolts 8 in a pair of upwardly diverging guides 9, slotted in the coupling plate 2.

The beam 10 may be slotted or perforated at intervals, horizontally, as at 12 to permit lateral adjustment of the jaws longitudinally of the beam by transferring the bolts 11 to the desired perforation.

The links 4 may be threaded at each of the ends thereof for assembly with their respective clevises whereby to permit the links to be advanced into or retracted out of the clevises to permit the links to be shortened or lengthened in their accommodation to the horizontal adjustment obtaining between the upper extremities of the jaws 3. The links are secured against accidental displacement from the clevises by nuts 13.

The jaws 3 are likewise provided with a plurality of perforations 14 to permit the vertical adjustment of the clevises 5 relative to the jaws to thereby accommodate the linkage to loads of varying height.

The jaws are each provided with a rotatable gripping shoe assembly comprising an arcuate face 15 of suitable friction material, such as rubber or the like, which is fitted to a swivel plate 16 carried on a rotatable shaft 17 journaled in the jaws adjacent the bottom ends thereof. The swivel plate 16 is spaced from the jaw adjacent thereto by washers 18.

Adjacent its outer end the shaft 17 carries a locking mechanism comprising a drum 19 having arranged therearound a braking strip 20. The drum 19 has passed therearound and outside the braking strip 20, a band 21 of resilient metal or like substance.

The jaws 3 are pivoted at their extremities to a beam 10, by bolts 11, and the beam is adapted to receive the rod 1 substantially centrally of the beam and slideable therethrough in a brace 1a.

The band 21 has one end thereof secured, as by coiling, to a stationary pin 22 secured in the

jaw 3, and the other end of the band is fastened to a crank member 23 by which it is connected to a brake handle 24 pivoted as at 25 to the jaw 3.

The handle 24 may be kept in locking position by any suitable means such as a pawl 26 arranged to engage the serration 27 notched in the bottom portion of the handle.

A modified form of gripping shoe which may be employed with the invention is shown in Figs. 3 and 4, and comprises a swivel plate 27, rotatably carried on the previously described shaft 17, on the inner side of the jaw 3. The shoe has a pair of spaced apart concave contact faces 28 of suitable friction material, which are fitted to a corresponding pair of re-inforcing plates 29 having slidable movement relative to each other in slots 30 formed in the swivel plate, and held therein by fastenings 31 which may be headed to assist in maintaining the contact faces 28 in the shoe assembly. The shaft may be arranged in a suitable anti-friction bearing (not shown). Thus, when handling loads such as oil drums, which customarily have a flange or like peripheral hoop to reinforce the mid portion of the drum, the modified form of shoe may be employed to straddle the peripheral protuberance to permit engagement of the spaced apart contact faces against the load substantially in the mid portion thereof to maintain the load in balance.

The gripping shoes may be interchangeable in any convenient manner, with shoes having a flat gripping surface in place of the concave contact faces shown to adapt the grapple to loads having flat sides.

In practice, the grapple is positioned over the load to be handled with the gripping shoes in engagement with the sides thereof.

Upon application of tension to the hoist rod 1, and the consequent elevation of the coupling plate 2, the jaws 3 will be drawn inwardly through the shortening of dimension *a* (see Fig. 6) resulting from the angular displacement of the links as their pivots 6 remain fixed while their pivots 8 tend to rise with the elevation of the coupling plate 2.

With the coupling positioned in relation to the grapple assembly as diagrammatically shown in Fig. 6, and the jaws adjusted to a load therebetween prior to application of full tension to the rod 1, that is to say, when the slack has been taken up in the hoist line, the gripping shoes will initially be brought into frictional engagement with the sides of the load.

The resiliency of a load, as for example, the tendency of the sides of an oil drum to deflect inwardly under pressure exerted by the jaws will cause a reduction in the width, dimension *a* of the load, resulting in a further elevation of the coupling plate 2 in the grapple assembly. The length of the guides 9 and their angle of divergence from each other will be understood to be relative characteristics which may be pre-determined in the carrying out of the invention, such that when the coupling plate 2 has upward movement relative to the links 4, the clevises 7 have downward movement and are thus inwardly urged along a component *b*, to assist in the contraction of the jaws 3 and the more positive gripping of the shoes upon the load positioned therebetween.

To adapt the grapple to loads of relatively greater width, the jaws may be spread by manipulating the coupling and links so as to bring the clevises 7 and the upper ends of the guides

9 in closer proximity thereby urging the clevises outwardly along a component C.

It will be understood that the coupling plate 2 may be of heavy construction in the grapple assembly such that when the grapple is brought over a load with any portion of the frame thereof resting upon the load, during manipulation of the grapple, the coupling may drop of its own weight and assist in spreading the jaws for adjustment and engagement with the sides of the load.

From the foregoing description, it will be seen that I have provided a device which is capable of gripping and hoisting objects of various shapes. For example, my grapple hoist can be used in connection with the movement of barrels, rolls of paper, or other relatively heavy cylindrical objects. It can also be used with objects having flat surfaces, such as boxes or the like, and the particular material of the object being lifted is of no moment since in actual practice, this device has been used in connection with both metallic and wooden objects. Heretofore, barrels have occasioned considerable difficulty during their transportation because, as far as I am aware, the only device on the market for lifting barrels comprises a more or less simple grapple. This grapple must lift the barrels from a position where they are seated on a side cylindrical surface and then must deposit the barrels on a side surface which obviously does not prevent the barrels from rolling. My device can be employed to grip the barrels in any position in which they may be positioned and then in setting down the barrels, they may again be placed in any position. For instance, a barrel may be lifted from a dock, even though deposited on the dock on its side cylindrical surface, and then may be placed in the hold of a vessel on its end. This is a much better means of storage, particularly in vessels and trucks, because the barrels are not likely to move.

The device is also adaptable to the handling of large rolls of paper which have heretofore been manipulated by means of a long bar. This, of course, involves considerable labor and in tipping the rolls from a horizontal position to a vertical position, a large amount of paper is damaged because of the extreme weight of the roll. This damage is completely obviated with the use of my device since a paper roll can be engaged whether in its horizontal or vertical position and moved and placed in either a horizontal or vertical position.

The device of my invention has further utility in that it is capable of association with conventional equipment; for example, a portable crane or a power truck. This makes its employment possible in loading trucks, ships, freight cars and airplanes.

The locking feature, in connection with the gripper is of considerable importance where it is not desirable to rotate or move the object being lifted with respect to its vertical axis. By way of illustration, it may be mentioned that a crate of potted plants or bottle goods, or even a box filled with open liquid containers, could be moved from one point to another without damage or loss of the contents of the pots or bottles, etc.

In the claims, I have referred to the rod 1 as a hoist line and it will be understood that this element of the device may take the form of a chain, cable, rope, pipe or solid rod.

Of course, the invention is susceptible of vari-

ous modifications without departing from the scope thereof as hereinafter claimed:

I claim:

1. A hoist grapple comprising a pair of pivotable jaws, a hoist line, a coupling having a pair of upwardly diverging guides formed thereon suspended from said hoist line, a pair of links pivoted at their outer ends to said jaws and at their inner ends to said guides whereby to pivot said jaws upon vertical movement of said coupling.

2. A hoist grapple comprising a frame having a beam and a downwardly depending pair of jaws each pivoted thereto adjacent the ends thereof, a hoist line passing through said beam substantially centrally thereof, a coupling suspended from said hoist line, a pair of upwardly diverging guides formed on said coupling, a pair of links associated with said jaws and said guides whereby to converge said jaws in gripping relation to a load therebetween upon application of tension to said hoist line.

3. In a hoist grapple, a beam, a pair of jaws pivotally suspended from said beam, a hoist line extending through said beam and between said jaws, a coupling plate attached to the lower end of said hoist line and links extending between said plate and said jaws, divergent slots in said coupling plate and means to cause the ends of said links to follow said slots as the hoist line moves, the lower ends of said jaws being provided with rotatable gripping shoes, there being means present to lock said shoes in a desired position on the axis of rotation of said shoes.

4. In a hoist grapple, a beam, a pair of jaws pivotally suspended from said beam, a hoist line extending through said beam and between said jaws, a coupling plate attached to the lower end of said hoist line and links extending between said plate and said jaws, divergent slots in said coupling plate and means to cause the ends of said links to follow said slots as the hoist line moves, said links being removably attached to said jaws, and means present to mount said links upon said jaws in various positions.

5. A hoist grapple comprising a pair of pivotable jaws, a hoist line, a coupling having a pair of upwardly diverging guides formed thereon suspended from said hoist line, a pair of links pivoted at their outer ends to said jaws and at their inner ends to said guides whereby to pivot said jaws upon vertical movement of said coupling, a pair of rotatable gripping shoes pivoted to said jaws on the inner faces thereof, and means to lock said shoes to maintain a load therebetween in any desired position on the horizontal axis thereof.

6. A hoist grapple comprising a pair of pivotable jaws, a hoist line, a coupling having a pair of upwardly diverging guides formed thereon suspended from said hoist line, a pair of links pivoted at their outer ends to said jaws and at their inner ends to said guides whereby to pivot said jaws upon vertical movement of said coupling, a pair of gripping shoes swiveled to said jaws on the inner faces thereof and comprising, respectively, a rotatable shaft journaled in each of said jaws adjacent the bottom thereof, a contact plate fixed on said shaft, a drum rotatably carried by said shaft and having a brake band arranged therearound, a handle pivoted to each of said jaws and operatively associated with said band to lock said drum and maintain said contact plate in any desired position on the axis of said shaft.

7. A hoist grapple comprising a frame having a beam and a downwardly depending pair of jaws each pivoted thereto adjacent the ends thereof, a hoist line passing through said beam substantially centrally thereof, a coupling suspended from said hoist line, a pair of upwardly diverging guides formed on said coupling, a pair of links associated with said jaws and said guides whereby to converge said jaws in gripping relation to a load therebetween upon application of tension to said hoist line, a pair of rotatable gripping shoes pivoted to said jaws on the inner faces thereof, and means to lock said shoes to maintain a load therebetween in any desired position on the horizontal axis thereof.

8. A hoist grapple comprising a frame having a beam and a downwardly depending pair of jaws each pivoted thereto adjacent the ends thereof, a hoist line passing through said beam substantially centrally thereof, a coupling suspended from said hoist line, a pair of upwardly diverging guides formed on said coupling, a pair of links associated with said jaws and said guides whereby to converge said jaws in gripping relation to a load therebetween upon application of tension to said hoist line, a pair of gripping shoes swiveled to said jaws on the inner faces thereof and comprising, respectively, a rotatable shaft journaled in each of said jaws adjacent the bottom thereof, a contact plate fixed on said shaft, a drum rotatably carried by said shaft and having a brake band arranged therearound, a handle pivoted to each of said jaws and operatively associated with said band to lock said drum and maintain said contact plate in any desired position on the axis of said shaft.

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