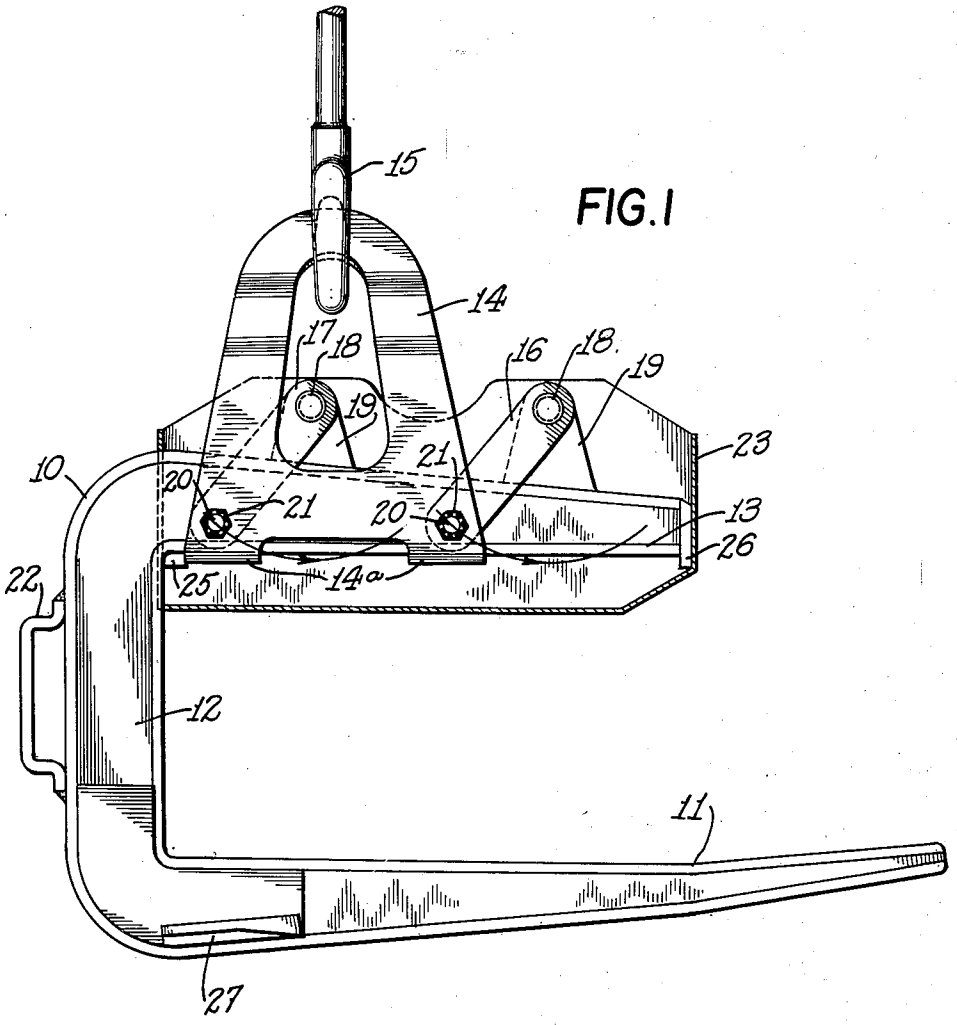
July 4, 1950 W. E. BOYD 2,514,307

CRANE HOOK

Filed Feb. 5, 1948 3 Sheets-Sheet 1

FIG. 1



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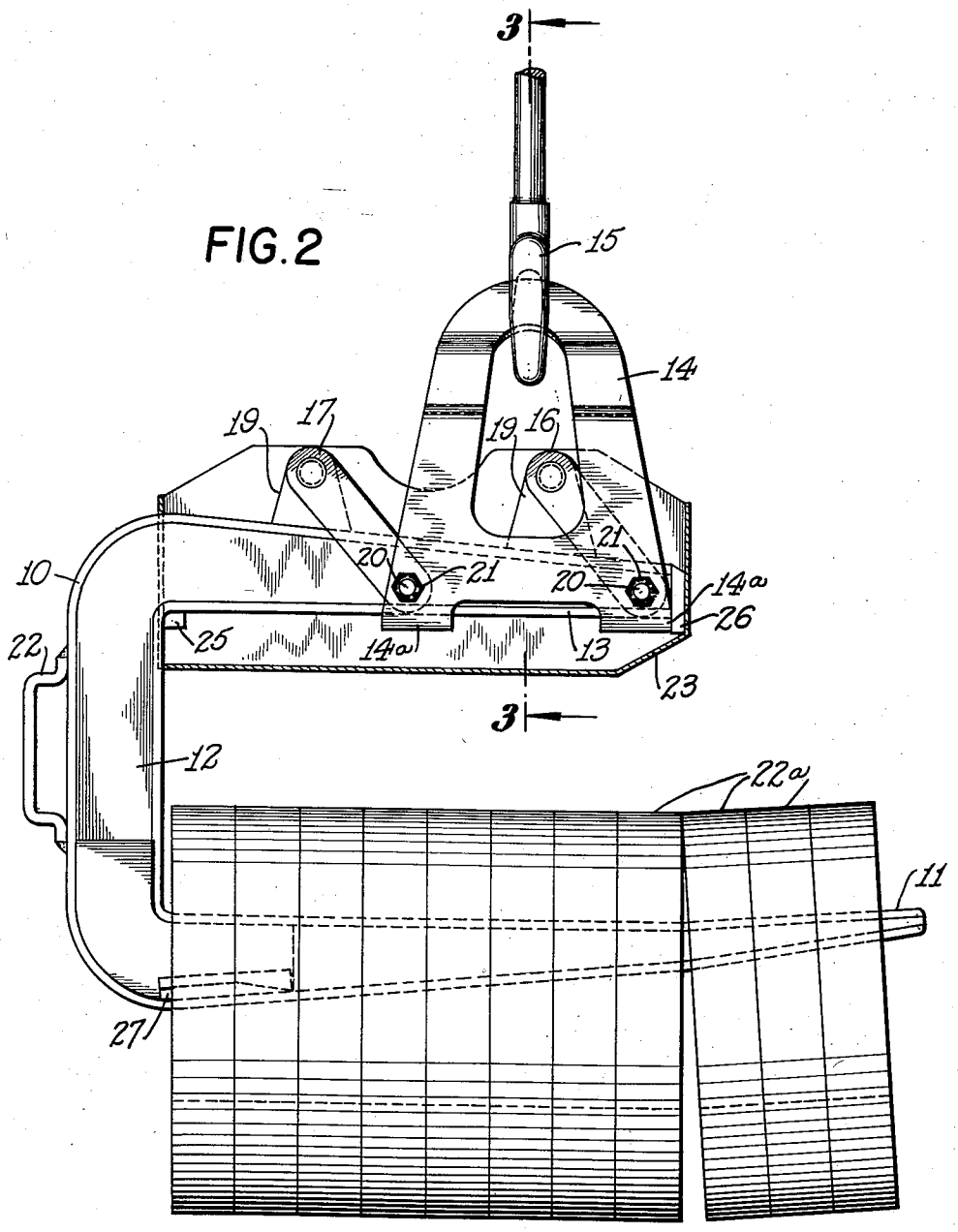
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FIG. 2



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FIG. 3

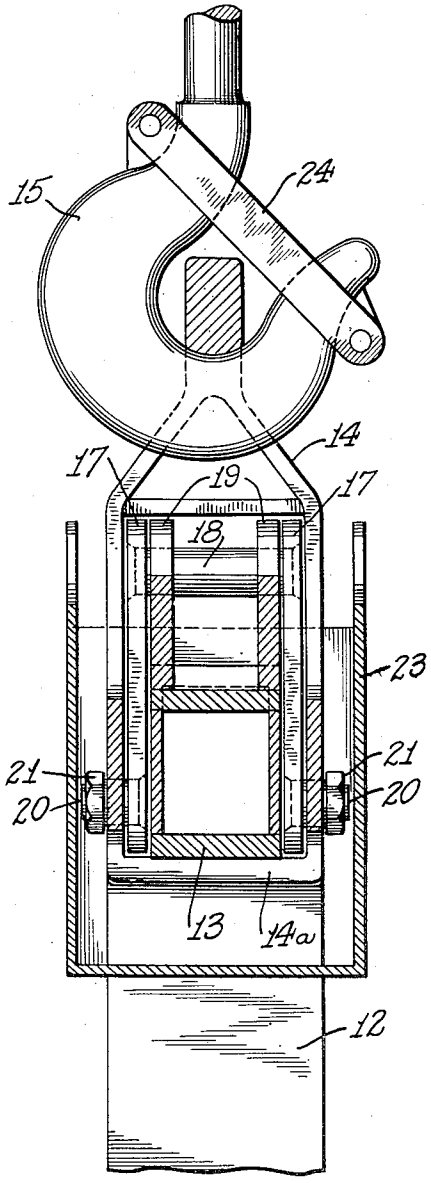


FIG. 4

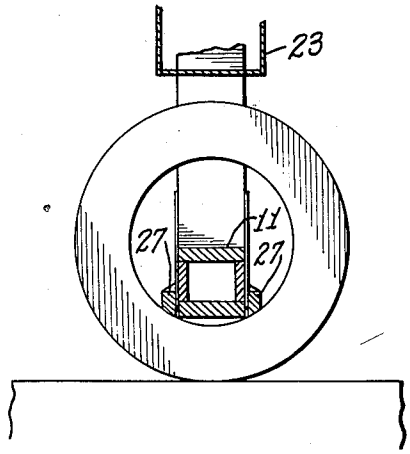
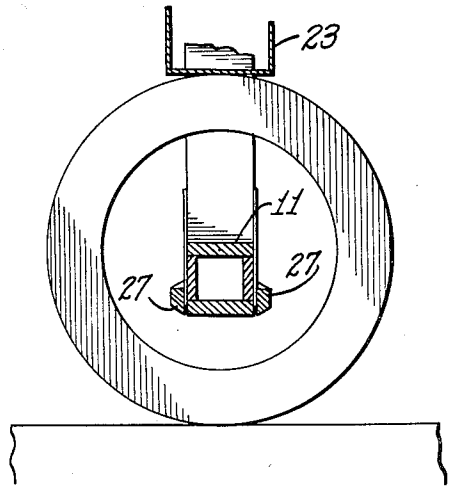


FIG. 5



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UNITED STATES PATENT OFFICE

2,514,307

CRANE HOOK

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Application February 5, 1948, Serial No. 6,415

9 Claims. (Cl. 294—82)

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This invention relates to load-handling apparatus, especially apparatus for engaging a load to be raised by a hoist or crane, and more particularly to means for maintaining the load engaging member in a predetermined position, e. g. substantially level or horizontal throughout the loading and unloading cycle.

In the lifting or hoisting of certain types of material it has been found desirable to have the load-engaging member or arm of the lifting hook maintained in a substantially horizontal position while loaded and also while unloaded. Such types of material as coils of wire, and of strip metal and pipe of large diameter are effectively handled with this type of horizontal work engaging hook or device. Considerable difficulty has been encountered in finding a suitable means of suspending the horizontal hook so that it will maintain its level position when in a loaded and unloaded condition. When a hook of this type is suspended from a crane cable in the conventional manner, generally the outer end of the work engaging arm will dip down under the weight of the load, and when unloaded the outer end will tend to rear up. That is to say, the center of gravity of an unloaded hook occupies a different position, laterally, from that of a hook fully loaded with coils of wire, steel strip or the like, and attempts to approximate a level position of the hook arm in each condition by suspending the hook on a vertical line between the centers of gravity, usually fall short of providing such approximation in either case. When the outer end of the empty hook arm rears up, it is difficult to insert it in the coils or other material to be lifted. Once loaded and raised, however, the hook is unbalanced the other way, causing the arm to dip, and holding the load in a precarious manner which presents a constant hazard to persons below; any jar or sudden movement might tilt the arm to the critical point where at least the outer coils would slide off and fall.

An important object of the present invention is to provide improved means by which the load engaging arm will be maintained in a horizontal position, substantially parallel to the ground or floor, in either its loaded or unloaded condition.

Further objects of the invention are to provide a means by which this type of hoisting apparatus is made more efficient and simpler to load and unload, and less hazardous for those engaged in loading and unloading during the lifting operations.

By way of illustrative example one embodiment

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of the invention is shown in the accompanying drawings, to which reference is made as follows:

Fig. 1 is a view of the device of the invention in side elevation, in unloaded condition;

Fig. 2 is a view of the device in side elevation in loaded condition;

Fig. 3 is an enlarged cross-sectional view taken along the line 3—3 in Fig. 2;

Fig. 4 is a cross-sectional view showing a load of relatively small diameter, with the apparatus at rest; and

Fig. 5 is also a cross-sectional view showing a load of relatively large diameter, with the apparatus at rest.

In the apparatus shown, the hook 10 is comprised of a lower work-engaging arm 11 which is to be kept substantially horizontal, an intermediate vertical portion 12 and an upper arm or member 13. The upper arm or member 13 is preferably horizontal, being substantially parallel with the lower arm 11, and in effect both arms may lie in the same vertical plane. The upper arm is cradled in a yoke 14 which can be suspended from the crane cable or other support (not shown) by a crane hook 15. The yoke straddles the arm 13 and includes transverse members 14a which are adapted to engage and support the under, flat side of the arm, the members 14a being substantially spaced along the arm, and thus constituting, in effect an elongated platform or cradle portion. The yoke and the upper arm 13 of the hook are connected by links 16 and 17 which are pivoted at both ends and are arranged in parallel sets. Thus the links are pivotally mounted at their upper ends on pins 18 carried by lugs 19 which are spaced, in pairs, along the upper side of arm 13. The lower ends of the links are pivotally mounted by studs 20, which are secured in the links and carry retaining nuts 21 outside the yoke.

In operation the unloaded hook 10 is lowered with the yoke 14 supporting it at the position shown in Fig. 1, the point of suspension being such that the lower arm 11 is then substantially horizontal or level. While the hook is suspended slightly above the floor level the work engaging arm 11 is moved into engagement with the load to be lifted. The loading operator may use the handle 22 mounted on the vertical portion 12 of the hook to guide the arm 11 under or into the load e. g. in the case of coils of wire or strip metal 22a (Fig. 2), within the coils. When the arm 11 is thus positioned the hook 10 is lowered until the weight of the hook is removed from the crane hook 15 and particularly from the yoke 14,

and the yoke swings down out of contact with the under side of the upper arm 13 in an arc (as shown in Fig. 1) defined by the length of the links 16, 17. The crane hook 15 can then be moved in the direction of the outer end of the arm, e. g. by moving the crane trolley or bridge and as the yoke 14 is correspondingly moved, the links positively guide it somewhat upward and into or toward the alternative position of contact and support for the upper arm 13 which is shown in Fig. 2. The load 22a is then lifted with the lower work-engaging arm 11 remaining substantially horizontal or level during the hoisting operation by virtue of the fact that the added weight on the lower arm 11, especially that weight near the outer end, has been compensated for by moving the yoke 14 and thus the effective locality of suspension by the crane cable, toward the outer end of the arm 13 to a point above the center of gravity of the load.

In unloading, the load is set down and the crane hook lowered to relieve the yoke 14 of the weight. The yoke swings down in an arc as indicated in Fig. 2, i. e. toward a free, central position. The crane trolley or bridge is moved in the direction of inner end 12 of the hook 10 so that the yoke 14 swings further along the indicated path into or toward contact with the upper arm 13 at the points shown in Fig. 1. The hook again assumes the position in which the arms 11 and 13 are horizontal and substantially parallel to the floor and may then be readily removed from the load of coils 22a. Indeed, if desired, the reversal of the yoke position and the withdrawal of the hook from the load may be done with a single, continuous movement; or the coils 22a may be separately removed by hand. In any case, the hook is now ready for another loading cycle.

When the yoke 14 is shifted from its loaded to its unloaded position or vice versa, it is necessary to relieve it of the weight of the hook 10 so that the yoke may swing down to be shifted to its proper point of suspension. To permit the yoke to swing down freely on the links 16 and 17, i. e. at times when a load is disposed on the arm 11 but is resting on the ground either just after loading or just before unloading, it is important that the apparatus as a whole be maintained in a substantially upright position. For this purpose and generally to keep the device from tipping when the yoke 14 is relieved of the weight at the stated times, stabilizing lugs 27 are positioned on the lower arm 11, projecting at either side near the bottom, and constitute means operable with loads of small diameter, to hold the hook 10 in a vertical position when the arm 11 comes to rest on the curved inside surface of the coils or the like which are being loaded or unloaded (Fig. 4). In this connection it will be noted that during both the loading and the unloading operations the yoke 14 is relieved of the weight of the hook 10 while the latter is in engagement with the load. Therefore the stabilizing elements which are used are designed to bear against the load, i. e. the lugs 27 are shaped to conform to the curved inner surface of the load as shown in Fig. 4. In addition to the lugs 27 the shield member 23, whose safety function is described below, also advantageously constitutes hook-stabilizing means of similar purpose when the load is of large diameter as illustrated in Fig. 5. Thus when coils of large diameter are being handled the weight of the hook 10 is carried by the lower transverse wall or bottom of shield 23 resting on the outside of the coil whereas when small diameter coils are being handled the lower arm 11 rests on the inside of the coils and is stabilized by the lugs 27 bearing against the curved inner surface of the coil.

To protect the loading crew it has been found desirable to enclose the moving members 14, 16 and 17 of the pivoting linkage system with a guard or shield 23, clearing the sides and the lower path of the yoke. The crane hook 15 may also be provided with a safety latch 24, shown in Fig. 3 as an added precaution to prevent the crane hook 15 from disengaging the yoke 14 when these parts are relieved of the weight of hook 10 during the shifting of the yoke 14 between the positions shown in Figs. 1 and 2. A chain, cable or other safety device may be used in place of the latch 24 to prevent the crane hook from disengaging the yoke when these parts are relieved of the load.

It will be noted that a load raising device having the new and improved structure of the present invention will facilitate the handling, loading and hoisting of loads and will provide greater safety for the loading crews. Throughout the loading operation the unloaded hook is horizontal to the floor and may be readily inserted in the coils or other objects to be moved. Likewise the hazards of dropping the load in transit are substantially overcome by the present device for when it is in a loaded condition as shown in Fig. 2 the lower working arm remains in a horizontal position because the point of suspension has been shifted to compensate for the change in the center of gravity resulting from the weight and distribution of the load. The parallel links 16 and 17 effectively guide or direct the yoke or cradle device 14 from one to the other of the predetermined supporting positions, and hold it in each against lateral displacement when the hook is suspended. In intermediate localities the links keep the yoke clear of the under side of the upper arm, and also automatically effectuate the desired, square supporting engagement of the cradle portions 14a with the arm whenever the crane cable is raised to lift and move the loaded or unloaded hook, i. e. after the yoke has been shifted laterally toward or near the correspondingly selected position. If desired, transverse guard members 25, 26 may be secured to the upper arm 13 at the ends of its under side, to cooperate in locating the cradle device and in preventing its displacement from a supporting position.

The links between the yoke and the upper arm may be shortened or lengthened as necessary in adapting the apparatus for embodiment with different size hooks, and other changes in dimensions and proportions, or other adjustments and variations may be made without departing from the spirit of the invention for it will be understood that the scope of the invention is not to be confined to the specific device described and shown but extends to a variety of modifications within the definition of the claims.

What is claimed is:

1. In combination, a lifting hook having a lower arm to be maintained substantially horizontal and an upper arm connected to said lower arm, a suspendable yoke in which the upper arm is cradled to support the hook, a linkage system comprising at least one link pivotally mounted at one end to the upper arm and at the other end to said yoke, said yoke being displaceable relative to the upper arm upon relief of the weight of the

hook, and said linkage system being adapted to control the displacement of the yoke, for shifting the region of application of lifting force from one position to another along the upper arm.

2. A hook apparatus comprising a lifting hook having a lower arm to be maintained substantially horizontal and an upper arm substantially parallel thereto, a suspendable yoke in which the upper arm is cradled for support thereby, said yoke being releasable to move along the arm, and a linkage system having at least one link pivotally mounted at one end to the upper arm and the other end pivotally mounted to said yoke, for preventing movement of the yoke when the latter is engaged with the upper arm in each of a plurality of positions, said linkage being adapted to permit shift of the yoke from one to another of said positions when the yoke is released to move.

3. A hook apparatus comprising a lifting hook having a lower arm and an upper arm substantially horizontal and parallel to each other, a suspendable cradle device for supporting the upper arm, said cradle device including platform means elongated in the direction of said upper arm to engage the under side of the latter at least at both ends of said platform means, and said cradle device being movable along the upper arm, and linkage means comprising links pivotally mounted at one end to the upper arm, at points spaced lengthwise of said arm and pivotally mounted at the other end to the cradle device, the pivot points on said device being spaced by the same distance as the pivot points on the upper arm, said links providing a positive connection between the upper arm and the cradle device and being adapted to swing to guide the cradle device from one predetermined point to another along the upper arm.

4. In combination, a hook comprising a load-engaging arm and an upper arm spaced therefrom, suspendable cradle means engageable with said upper arm to support the hook, said cradle means being adapted to engage the upper arm at each of two predetermined positions, and linkage connecting the cradle means in swinging relation to the hook for directing the cradle means selectively into one or another of said positions.

5. In combination, a hook having an upper arm adapted to extend substantially horizontally, suspendable cradle means engageable with said upper arm to support the hook, said cradle means being adapted to engage an underside of the arm at a plurality of positions, and linkage connecting the cradle means to the hook, to swing relative to the latter for selectively disposing the cradle means in either of two predetermined positions of engagement with the underside of the arm.

6. In combination, a hook having an upper arm, suspendable means for engaging the arm to support the hook, said means including a set of substantially spaced portions disposed for simultaneous engagement with the arm at a set of localities correspondingly spaced along the arm, and said means being selectively engageable with the arm at each of a plurality of such sets of localities at respectively different positions along the arm, and means linking the suspendable means to the hook, to swing from one to another of said sets of localities through a path, for the set of arm-engaging portions, which extends below the aforesaid sets of localities, said linking and suspendable means being thereby cooperatively adapted, in response to the weight of the hook, to prevent displacement of said arm-engaging portions from full hook-supporting engagement with the selected set of localities of the arm, when the suspendable means is carrying the weight of the hook.

7. In combination, a hook having an upper arm adapted to extend substantially horizontally, suspendable cradle means engageable with said upper arm to support the hook, said cradle means being adapted to engage an underside of the arm at a plurality of positions, linkage connecting the cradle means to the hook, to swing relative to the latter for selectively disposing the cradle means in either of two predetermined positions of engagement with the underside of the arm, and means associated with the hook adapted to support the hook in a substantially upright position while the cradle is moved out of engagement with the upper arm.

8. In combination, a hook comprising a load-engaging arm and an upper arm spaced therefrom, suspendable cradle means engageable with said upper arm to support the hook, said cradle means being adapted to engage the upper arm at each of two predetermined positions, linkage connecting the cradle means in swinging relation to the hook for directing the cradle means selectively into one or another of said positions and means associated with the load-engaging arm to stabilize the hook when the latter is resting on the inside surface of load.

9. In combination, a hook adapted to handle a load and having an upper arm adapted to extend substantially horizontally, suspendable cradle means engageable with said upper arm to support the hook, said cradle means being adapted to engage an underside of the arm at a plurality of positions, linkage connecting the cradle means to the hook, to swing relative to the latter for selectively disposing the cradle means in either of two predetermined positions of engagement with the underside of the arm, and a shield means sized to enclose the linkage and cradle means in their several positions and having a bottom surface adapted to engage the upper surface of a load and support the hook in substantially upright position when the cradle is relieved of the weight of the hook.

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