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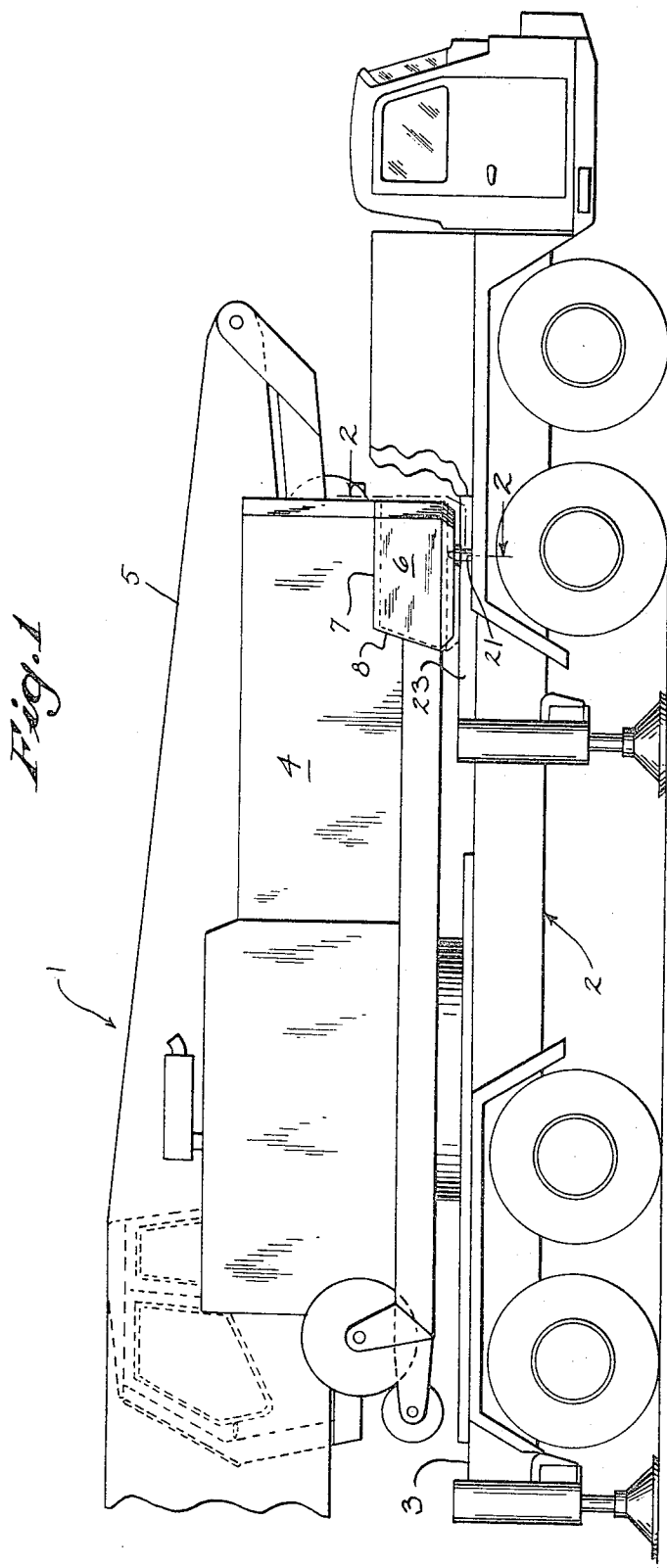
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3,419,156

COUNTERWEIGHT ATTACHING MEANS FOR CRANES

Filed May 5, 1967

Sheet 1 of 2



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Fig. 2

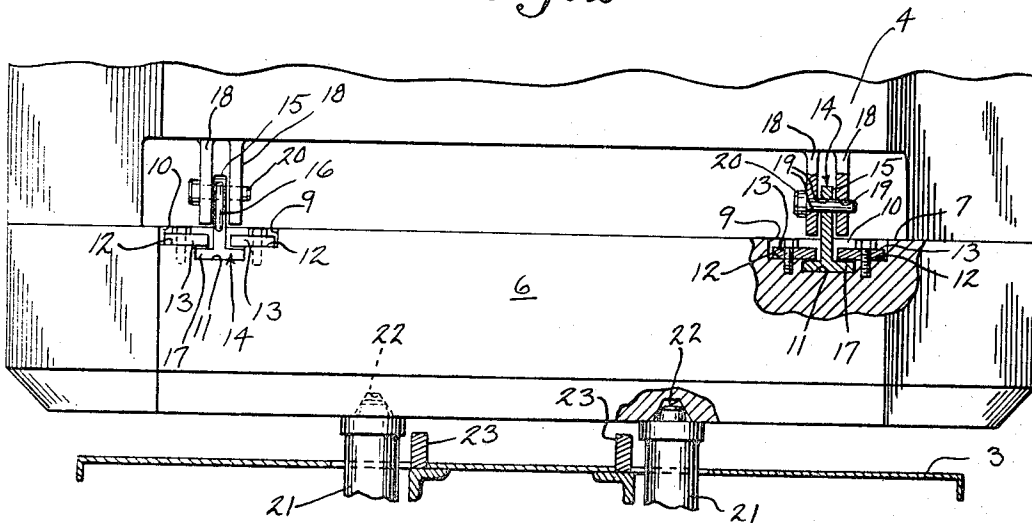
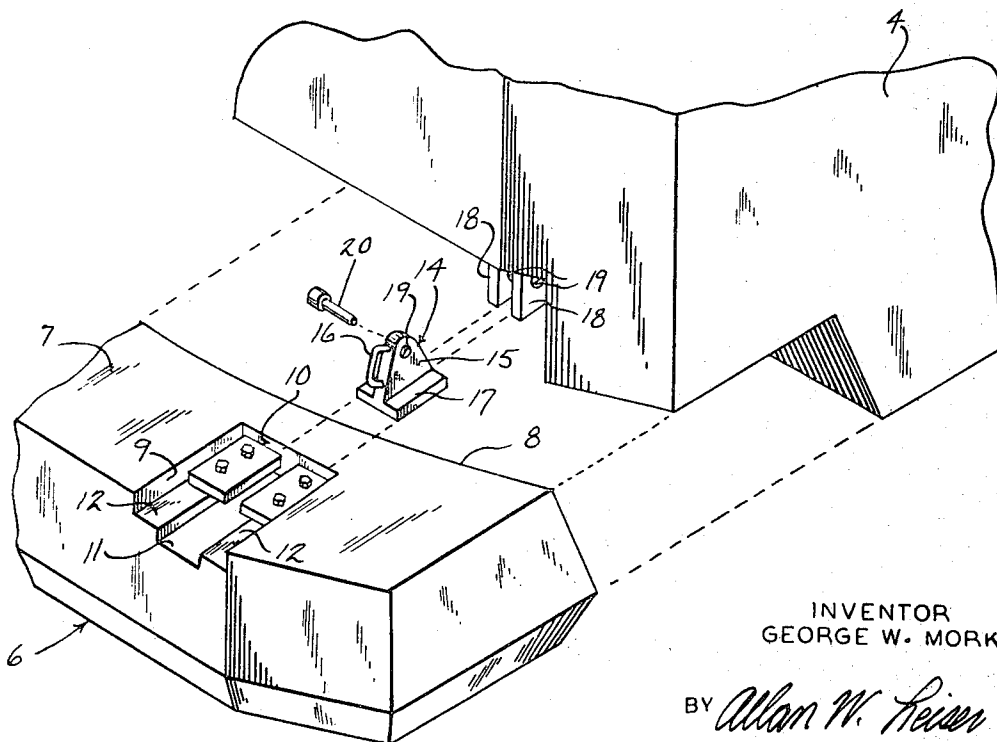


Fig. 3



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COUNTERWEIGHT ATTACHING MEANS FOR CRANES

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3 Claims. (Cl. 212—49)

ABSTRACT OF THE DISCLOSURE

This disclosure relates to means for removably attaching a counterweight at the lower rear edge of the revolving frame of a truck mounted crane or the like. The top surface of the counterweight is provided with parallel, upwardly opening, inverted T-shaped grooves which open rearwardly through the counterweight and which slidably receive the crossbars of inverted T-shaped hangers, the counterweight being suspended from the hangers. The hangers have vertical legs that extend above the counterweight, and there are two pairs of rearwardly extending mounting bracket ears on the frame. When the hangers are at the forward ends of the grooves the legs are received between respective ears, and transverse pins extending through openings in the legs and ears mount the hangers, and therefore the counterweight, on the frame. To dismount the counterweight, hydraulic jacks on the bed of a carrier vehicle are used to raise the counterweight slightly to allow the transverse pins to be removed and then to lower the counterweight to the bed. The hangers are then slid rearwardly out of the grooves so that the frame is able to rotate past the counterweight without interference.

Background of the invention

Truck mounted cranes are provided with heavy counterweights to counterbalance the working load on the boom, and in many cases the weight of the counterweight causes the entire machine to exceed legal load limits for highway travel. It is desirable, therefore, to provide means for removing the counterweight so that it can either be repositioned on the carrier vehicle for more even load distribution or moved to another vehicle for separate transportation. It is also desirable to be able to rotate the revolving frame of the machine past the counterweight when it has been disconnected so that the boom can be used to remove the counterweight to another vehicle, thus making it unnecessary to bring up another crane. While these problems are particularly pertinent to truck mounted cranes which are specifically designed for highway travel, it will be obvious that it may be desirable to remove the counterweight from other machines for transportation or other purposes. The invention is not, therefore, intended to be limited to use in any particular type of machine.

Various arrangements have been devised in the past to removably mount counterweights. Many of these, however, do not provide sufficient mechanical strength for use with extremely large counterweights. Other arrangements require expensive and intricate equipment, and still others require excessive space for operation and thus present serious problems in machine design.

Summary of the invention

This invention provides relatively simple and inexpensive counterweight attaching means that is adapted for use with extremely large counterweights but requires minimum operating space. These objects are attained primarily by the use of removable hangers for supporting the counterweight on the revolving frame. The hangers

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provide great mechanical strength and are easily connected to and disconnected from the revolving frame, but they may easily be removed to allow the frame to be rotated past the counterweight so that the boom can be used to transfer it to another vehicle. This eliminates the necessity, for example, of lowering the counterweight a substantial vertical distance as required with older mechanisms, and thus allows the revolving frame to be spaced a minimum vertical distance above the bed of the carrier vehicle providing distinct design advantages.

Brief description of the drawings

FIG. 1 is a schematic view in elevation of a truck mounted crane embodying the invention, a lowered position of the counterweight being shown therein in dotted lines.

FIG. 2 is an enlarged fragmentary end view in elevation, with parts shown broken away, illustrating the counterweight attaching means of the invention, and

FIG. 3 is an enlarged fragmentary exploded view in perspective further illustrating the invention.

Description of the preferred embodiment

FIG. 1 shows a truck mounted crane 1 which is of the type shown and described in the copending application of George W. Mork, Ser. No. 600,541, filed Dec. 9, 1966. The crane 1 includes a carrier vehicle 2 which has a bed 3 on which there is a revolving frame 4 which is rotatable through a full circle. The frame 4 supports a boom 5, which is shown in FIG. 1 in a folded condition. The crane 1 is not shown and will not be described in further detail since the construction and operation of such machines are well known to those skilled in the art and since the invention is not restricted to any particular form of machine.

The lower rear edge of the revolving frame 4 is recessed and receives a heavy counterweight 6 which is of generally rectangular configuration with a flat top surface 7 and an arcuate vertical forward surface 8. The top surface 7 is provided with a pair of parallel, upwardly opening, fore and aft grooves 9. The grooves 9 open rearwardly through the counterweight 6, but terminate short of the forward surface 8 to define a vertical wall 10.

The side walls of the grooves 9 are stepped to define a lower slide portion 11 which is flanked by horizontal ledges 12. At the forward end of each groove 9 there are a pair of heavy steel plates 13 which are bolted to the ledges 12 and overhang the slide portion 11 from both sides to define what is in essence an upwardly opening, inverted T-shaped groove.

A pair of heavy metal hangers 14 are provided to support the counterweight and attach it to the frame 4. The hangers 14 are also of inverted T-configuration, and include vertical legs 15 which extend above the counterweight 6 and are provided with handles 16. The lower crossbar portions 17 of the hangers 14 are received in the grooves 9 and are slidable therein to forward positions against the wall 10 wherein the crossbars 17 are under the plates 13. The opposite ends of the crossbars 17 then serve as shelves which are under the overhangs formed by the plates 13 so that the hangers 14 support the counterweight 6. The hangers 14 may be slid rearwardly out of the grooves 9 by means of the handles 16.

Mounting brackets are provided on the frame 4 above the counterweight 6, and in the embodiment shown these comprise two sets of laterally spaced ears 18. These may be provided specially for supporting the counterweight 6, or standard frame members of the frame 4 may be used for this purpose. In any event, when the counterweight 6 is in place and the hangers 14 are in their forward positions, the vertical leg 15 of each hanger 14 is received between the members of a respective pair of ears 18, the

ears and legs being provided with apertures 19 which are then in alignment. Pins 20 pass through the aligned apertures 19 and constitute connecting means which serve to mount the hangers 14 (and therefore the counterweight 6) on the frame 4. The pins 20 are removable, and appropriate clips or other means (not shown) are used to prevent them from accidentally being dislodged. The frame 4 is appropriately recessed to allow access to the pins 20 for removal.

When the various elements are in place, the counterweight 6 is held against rearward movement with respect to the frame 4 by the engagement of the hanger 14 with the wall 10. Forward movement is prevented by engagement of the counterweight 6 with the rear of the frame 4, and special frame members may be provided on the frame 4 for this purpose.

Near the forward end of the bed 3 are a pair of laterally spaced hydraulic jacks 21. The underside of the counterweight 6 is provided with sockets 22 which are in alignment with and adapted to receive the extensible ends of the jacks 21 when the machine is in the position of FIG. 1.

When it is desired to remove the counterweight 6, the frame 4 is rotated to the position of FIG. 1 and the jacks 21 are extended just enough to remove the load of the counterweight 6 from the transverse pins 20, which are then removed. The jacks 21 can then be retracted to lower the counterweight 6 to supports 23 on the bed 3, this being the position shown in dotted lines in FIG. 1.

While the counterweight 6 is disconnected from the frame 4 as soon as the pins 20 are removed, the upwardly extending legs 15 are still in position to engage the ears 18 or otherwise interfere with rotation of the frame 4 past the counterweight 6. Accordingly, the hangers 14 are now slid out of the grooves 6. Frame 4 is then free to rotate past the counterweight 6 and the boom 5 can be used to move the counterweight 6 to another vehicle if desired.

The counterweight 6 is remounted on the frame 4 by placing it above the jacks 21 and sliding the hangers 14 back into the grooves 9. The jacks 21 are then extended enough to raise the counterweight 6 to the point where the apertures 19 are in alignment. The pins 20 are then reinserted and the jacks 21 are retracted.

It will be apparent that the counterweight attaching means shown and described herein is of extremely simple construction but that it is readily adaptable for use with large counterweights. In the particular embodiment shown, the counterweight has the weight of approximately 18,000 pounds, and a counterweight of this size would be difficult or impossible to handle with attaching means heretofore devised. A primary advantage of the construction shown is that the hangers 14 can be removed from a position where they might interfere with rotation of the frame 4 simply by sliding them out of the grooves 9, thus eliminating the need for substantial lowering of the counterweight 6. If the hangers 14 were not thus removable, it would be necessary to lower the counterweight 6 to a point where the tops of the legs 15 were completely below any portion of the frame 4 which might rotate past them. This would in essence require that the revolving frame 4 be spaced a substantially greater distance above the bed 3 which would be quite undesirable from the design standpoint.

Although a preferred embodiment of the invention has been shown and described herein, it will be apparent that various modifications might be made without departure from the invention. An L-configuration instead of a T-configuration could be provided for the grooves 9 and hangers 14, for example, or any other equivalent configuration could be used that would provide a shelf and overhang. Also, the desired configuration could be formed directly by casting or machining and it is not necessary to use the separate plates 13. Further, the hangers need not be entirely removable from the grooves so long as they can be

moved rearwardly far enough so that they do not interfere with rotation of the frame.

What is claimed is:

1. In a truck mounted crane or the like having a revolving frame, the combination comprising: a counterweight at the lower rear edge of the frame that has an upper surface provided with an upwardly opening fore and aft groove, the groove including an overhang near its forward end; a hanger received in the groove and including a lower portion defining a laterally extending shelf, the hanger being slidable in the groove to a forward position where the shelf is under the overhang and adapted to supportingly engage the same, the hanger including a vertical leg that extends above the counterweight and is in a position to interfere with rotation of the frame with respect to the counterweight when the hanger is in its forward position, the hanger being slidable rearwardly from its forward position to a position where it will not interfere with rotation of the frame; a mounting bracket on the frame above the counterweight and near the hanger leg when the hanger is in its forward position; and removable connecting means for connecting the bracket and the hanger leg to mount the hanger on the frame.

2. The combination of claim 1 wherein the groove terminates short of the forward end of the counterweight to define a vertical wall engageable with the hanger; and wherein the groove opens rearwardly through the counterweight to allow the hanger to be removed completely therefrom.

3. In a truck mounted crane or the like having a revolving frame and a laterally extending counterweight removably mountable on the frame at a lower rear edge thereof,

the improvement wherein:

the lower rear edge of the frame is recessed to receive the counterweight; and the counterweight has an upper surface provided with a pair of laterally spaced, upwardly opening fore and aft grooves, each groove terminating short of the forward end of the counterweight to define a vertical wall and opening rearwardly through the counterweight and being provided with an overhang at least at its forward end; and there are a pair of hangers received in respective grooves, each hanger including a lower portion defining a laterally extending shelf, each hanger being insertable into and removable from its respective groove through the open rear end thereof and being slidable forwardly in its groove to a forward position near the vertical wall in which the shelf is under the overhang to be adapted to supportingly engage the same, each hanger further including a vertical leg that extends above the counterweight; and the frame is provided with laterally spaced ear means which lie alongside respective hanger legs when the hangers are in their forward positions; and there are removable transverse pin means to connect respective legs and ears to mount the hangers and the counterweight on the frame.

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