Oct. 15, 1963 O. F. KNOELL 3,107,114

SELF-DUMPING BUCKET WITH REMOVABLE BAIL

Filed Nov. 15, 1962 2 Sheets-Sheet 1

FIG. 1.

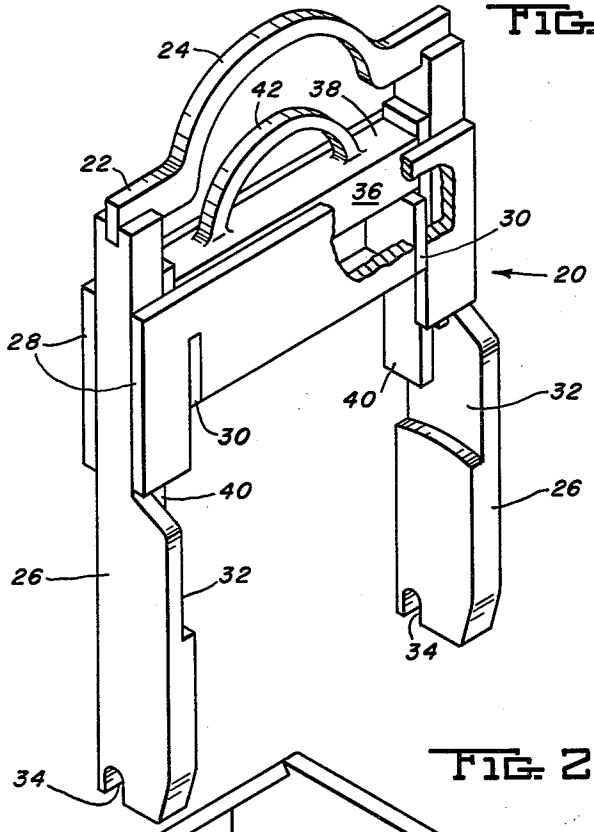
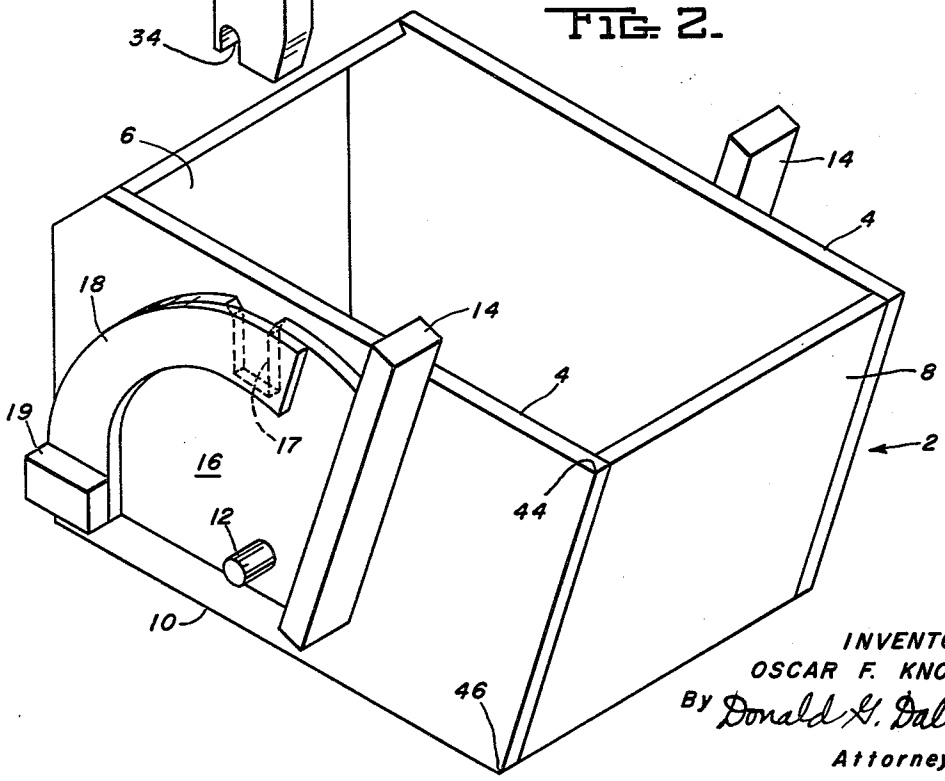



FIG. 2.




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Filed Nov. 15, 1962 2 Sheets-Sheet 2

FIG. 3.

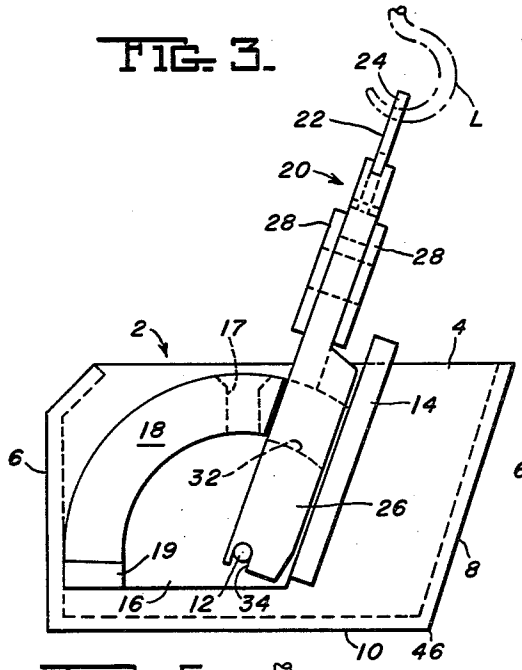



FIG. 4.

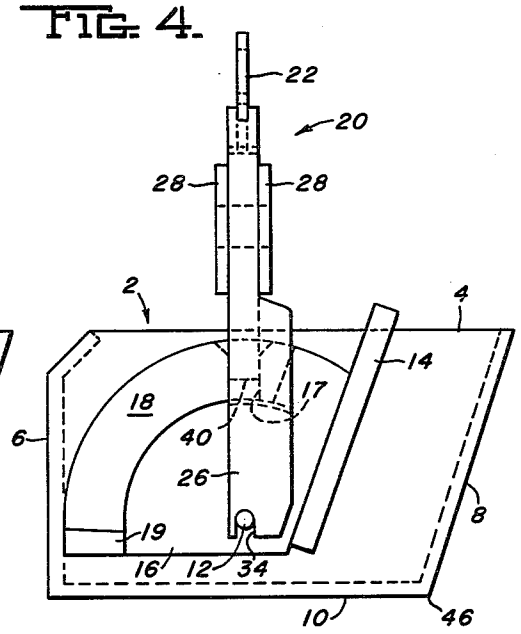
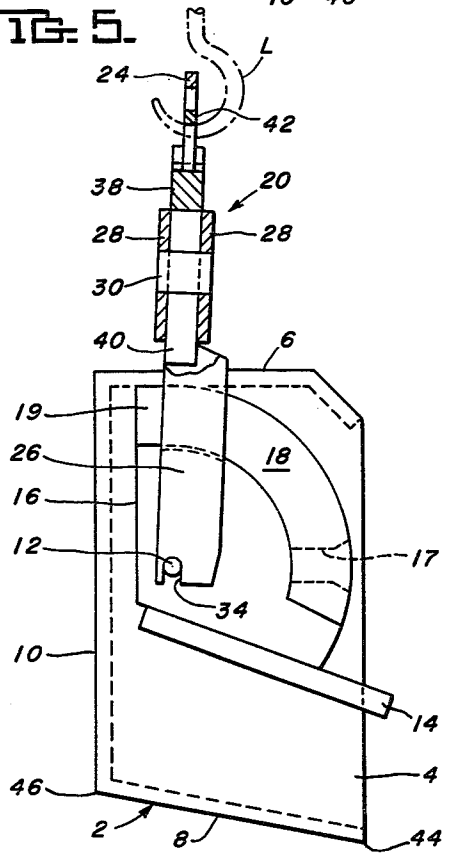



FIG. 5.




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3,107,114

# SELF-DUMPING BUCKET WITH REMOVABLE BAIL

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4 Claims. (Cl. 294—73)

The present invention relates generally to apparatus for handling material and more particularly to a self-dumping bucket with removable bail for transporting materials.

Prior to my invention, the movement of materials from one location to another in many industrial plants was frequently accomplished through the use of open top buckets or boxes equipped with lugs or holes for making sling or hook connections. After being loaded, the buckets were usually carried by an overhead lift crane to another location for unloading. This procedure required the services of a floorman or hooker who attached the lift sling or hook to the loaded bucket, followed the bucket to its unloading station, and there removed or rearranged the lift sling or hook from the bucket so it could be unloaded. Manual hooking and unhooking of the bucket was not only time consuming but frequently constituted a safety hazard for the floorman or hooker.

Certain types of buckets have been developed which can be lifted and dumped by manipulation of the crane hook without the use of a floorman, however, in each of the types of self-dumping buckets with which I am familiar the lifting apparatus or bail is a non-removable, integral part of the bucket which arrangement frequently interfered with loading and unloading of the bucket.

It is, accordingly, the primary object of my invention to provide a self-dumping bucket having a removable bail.

It is another object of my invention to provide a self-dumping bucket of the character described which is completely manipulatable by an overhead crane operator without the assistance of a floorman.

As a corollary to the above object it is another object of my invention to provide a self-dumping bucket having a removable bail which can be affixed to or removed from the bucket by an overhead crane operator without the assistance of a floorman.

These and other objects will become more apparent after referring to the following specification and attached drawing, in which:

FIGURE 1 is a view in perspective of the bail assembly of the invention;

FIGURE 2 is a view in perspective of the bucket of the invention;

FIGURE 3 is a side elevational view showing the detachable bail of the invention being applied to the bucket;

FIGURE 4 is a view similar to FIGURE 3 showing the bail in locked position on the bucket for carrying the bucket in upright position; and

FIGURE 5 is a view similar to FIGURE 4 showing the relative positions of the bail and bucket of the invention when the bucket is dumped.

Referring more particularly to the drawings, reference numeral 2 designates generally the bucket element of the apparatus of my invention. The bucket is generally rectangular in shape and is constructed with a pair of parallel side walls 4, a forward end wall 6, an inwardly sloping rearward end wall 8, a bottom 10 and an open top. A trunnion pin 12 is attached to and projects outwardly of the lower portion of each side wall 4 at a point toward the forward end wall 6 offset from the center of gravity of the bucket. A guide bar 14 is affixed to the outside surface of each side wall 4 sloping from the top of the bucket toward the center of the bucket, as best shown in FIGURES 2–5. The lower ends of the bars 14 are



spaced rearwardly of the trunnions. A flat quadrant plate 16 having a curved upper edge is disposed on the outer surface of each of the side walls 4 substantially covering the area thereof between the guide bar 14 and the forward end wall 6. The trunnions 12 project through the quadrant plates 16. Each of the quadrant plates is provided with a vertically extending opening 17 in the upper portion thereof which extends downwardly from the upper edge of the plate in the same vertical plane containing the trunnion 12.

The upper edge of each quadrant plate 16 extends in an arc about the trunnion 12 from a point adjacent the bottom of the bucket and the forward end wall 6 to a point at the top of the bucket immediately adjacent the guide bar 14. A raised quadrant guide rib 18 is provided on the outer surface of each of the quadrant plates 16 extending parallel with the upper edge of the plate from the bottom of the bucket to a point adjacent the top of the bucket short of the guide bar 14 for a purpose which will become apparent. A stop member 19 projects outwardly from the bottom portion of each quadrant guide rib adjacent end wall 6.

The various elements of the bucket 2 described above cooperate with elements of the removable bail assembly of the invention so that the bucket can be carried, dumped and otherwise handled solely by a craneman's manipulation of a crane lift hook, as will be more fully explained hereinafter.

The bail assembly of the invention includes a bail, designated generally by reference numeral 20, which is substantially U-shape in configuration and includes an angular web 22 formed with a concave hook-engaging portion 24 intermediate its length. The web 22 is provided with rigid legs 26 depending one from each end thereof. A pair of spaced cross members 28 span the legs 26 spaced below the web 22, as best shown in FIGURE 1. Spacer blocks 30 are provided between the lower portions of the cross members 28 one spaced inwardly from each leg 26. The legs 26 are provided with matching guide slots 32 on their inner surfaces below the cross members 28 to slidingly accommodate guide ribs 18 in a manner which will become apparent. A notch 34 is formed in the bottom edge of each leg 26 for engaging the trunnions 12.

A generally U-shape locking or latching bail 36 is slidably fitted between the legs 26 of the bail 20. Latching bail 36 is formed with a transverse member 38 extending between and connecting the upper portions of two parallel rigid legs 40. An eye or lift ring 42 is formed on the transverse member 38 intermediate its ends adapted to be engaged by a lift hook L.

The latch bail 36 is mounted in the bail 20 with the transverse member 38 disposed below and extending generally parallel with the web 22 and the legs 40 extending downwardly between the spaced cross members 28 parallel with the legs 26 of bail 20. As best shown in FIGURE 1, the spacer blocks 30 serve as stops to limit the downward movement of the latch bail 36 within the bail 20. When the latch bail 36 is in its downward position with the transverse member 38 resting on the spacer blocks 30, the lower portions of the legs 40 extend partially along the guide slots 32 in legs 26 and close the upper portions thereof for a purpose which will become apparent.

In operation, when it is desired to lift the loaded bucket 2 to carry it to another location to dump its contents, the hook-engaging portion 24 of bail 20 is engaged by the lift hook L and the entire bail assembly consisting of bail 20 and latch bail 36 is carried to and lowered over the bucket with the legs 26 straddling the side walls 4 just forward of the guide bars 14. As the bail assembly is lowered the legs 26 of bail 20 slide along the guide bars 14 until the notches 34 engage the trunnions 12, as

best shown in FIGURE 3. As the bail 20 is thus being positioned on the bucket, the bottoms of the legs 40 of the latch bail 36 abut the top edges of the quadrant plates 16 so that the latch bail is restrained from downward movement relative to bail 20. After the trunnions 12 have been engaged by the notches 34 of legs 26, the entire bail assembly is moved forward by manipulation of the lift hook until the bail assembly is in vertical position, as shown in FIGURE 4. As the bail assembly reaches vertical position the raised quadrant guide ribs 18 are engaged in the guide slots 32 of legs 26 and the legs 40 of the latching bail 36 drop into the vertical openings 17 of the quadrant plates 16 to lock the bail assembly in vertical position. After the bail assembly has been thus locked in vertically upright position, hook L, which is still in engagement with the web 22 of bail 20, is raised to lift the bucket and carry it to the dumping area. At the dumping area, the lift hook L is lowered until the bucket 2 comes to rest on its bottom and then the lift hook is lowered further to engage the lift ring 42. Raising the lift hook then causes the legs 40 of the latching bail 36 to lift out of the openings 17 of plates 16 and the bucket to be lifted. As the bucket is lifted, the rearward end thereof tips downwardly and the bucket pivots around the trunnions 12 to tilted dumping position. As the bucket tilts, the quadrant guide ribs 18 slide through the guide slots 32 until the stop members 19 abut the legs 26. After the contents of the bucket have been dumped and the bucket is still in tilted position, it is lowered toward the floor surface of the dumping area and the hook L is moved to the right as viewed in FIGURE 5. As the bucket is thus lowered, the upper edge 44 of the sloping rearward end wall 8 contacts the floor surface first and the sloping construction of the rearward end wall 8 causes the empty bucket to pivot about the offset trunnions 12 and around the lower edge 46 of end wall 8 to re-assume upright position on the floor surface. As the bucket returns to upright position the raised quadrant guide ribs 18 slide through the guide slots 32 in the legs 26 of bail 20 and the bottoms of legs 40 of latch bail 36 ride along the curved upper edges of the quadrant plates 16. After the bucket has pivoted back to upright position resting on its bottom, the hook L is lowered to permit legs 40 of bail 36 to drop into the slots 17 of the quadrant plates 16. Then the hook is disengaged from the lift ring 42 and raised to engage the hook-engaging portion 24 of web 22. The bucket is then lifted in upright position by hook L and carried away from the dumping area.

If desired, the bucket can be returned to the loading area in tilted position and then be pivoted to upright position in the manner explained above.

After the emptied bucket has been returned to the loading area, the bail assembly may be removed by engaging the lift ring 42 with the lift hook to lift the legs 40 out of slots 17 and tilt the bail assembly toward the guide bars 14 until the guide slots 32 are clear of the guide ribs 18. Then the bail assembly can be lifted from the bucket by raising the lift hook. The bail assembly can then be either placed on a storage rack or be used to lift, carry and dump another loaded bucket.

While one embodiment of my invention has been shown and described, it will be apparent that other adaptations



and modifications may be made without departing from the scope of the following claims.

I claim:

1. Material handling apparatus comprising a bucket having vertical side walls and end walls, and a normally horizontally disposed bottom, a trunnion projecting outwardly from each of said side walls in a common horizontal plane, said trunnions being offset toward one of said end walls to one side of a vertical plane extending transversely through the center of gravity of the bucket from one side wall to the other and below a horizontal plane extending transversely through the center of gravity of the bucket from one side wall to the other, a plate affixed flatwise to the outer surface of each of said side walls, the upper edge of each of said plates extending in an arc about one of said trunnions from a point adjacent the bottom of the bucket and said one of said end walls to a point adjacent the top of the bucket beyond the vertical plane containing said trunnions, said trunnions projecting beyond said plates, a raised guide rib on each of said plates extending parallel with the upper edge thereof from a point adjacent the bottom of the bucket and said one of said end walls to a point adjacent the top of the bucket but short of the edge of the plate opposite said one of said end walls, each of said plates having a vertical opening therein extending downwardly from the top edge of the plate in vertical alignment with one of said trunnions, a generally U-shape bail having two spaced legs and a web connecting said legs at one end thereof, opposed guide slots one on the inner surface of each of said legs intermediate the ends thereof, each of said legs having a notch in the bottom thereof for rotatably receiving one of said trunnions, and a latch means slidable on the inner surfaces of said legs from a first position extending partially across said guide slots and a second position clear of said slots, said bail being removably mounted on said bucket with said legs straddling said side walls and said trunnions received in said notches and said ribs received in said guide slots, said latch means being adapted to fit in said openings in said plates for locking said bail in upright position, said bucket being pivotable about said trunnions within said bail when said latch means is not fitted in said openings, and stop means adjacent the ends of each of said ribs for limiting the pivotal movement of said bucket.

2. Apparatus as defined by claim 1 including a stop on said bail for limiting the movement of said latch means.

3. Apparatus as defined by claim 1 including a handle affixed to said latch means whereby said latch means can be engaged for moving said latch between said first and second positions and for lifting said bail.

4. Apparatus as defined by claim 1 characterized by each of said ribs terminating short of the stop adjacent the upper end of the rib whereby said bail can be applied and removed from said bucket clear of said ribs.

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