

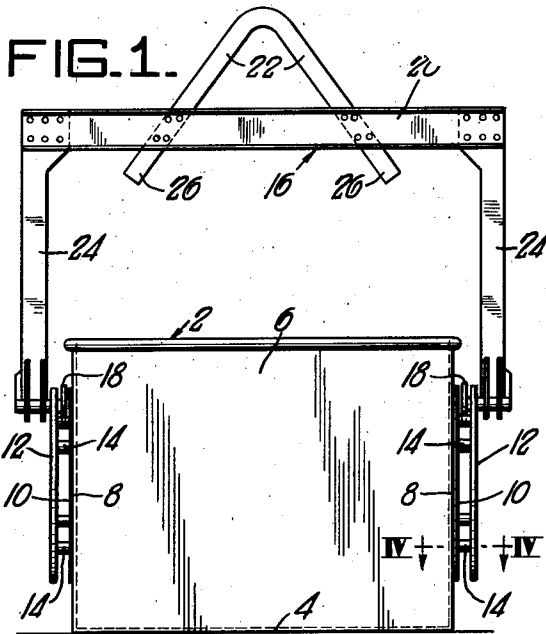
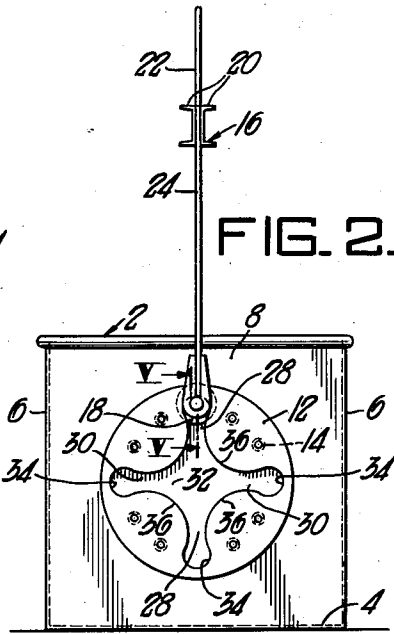
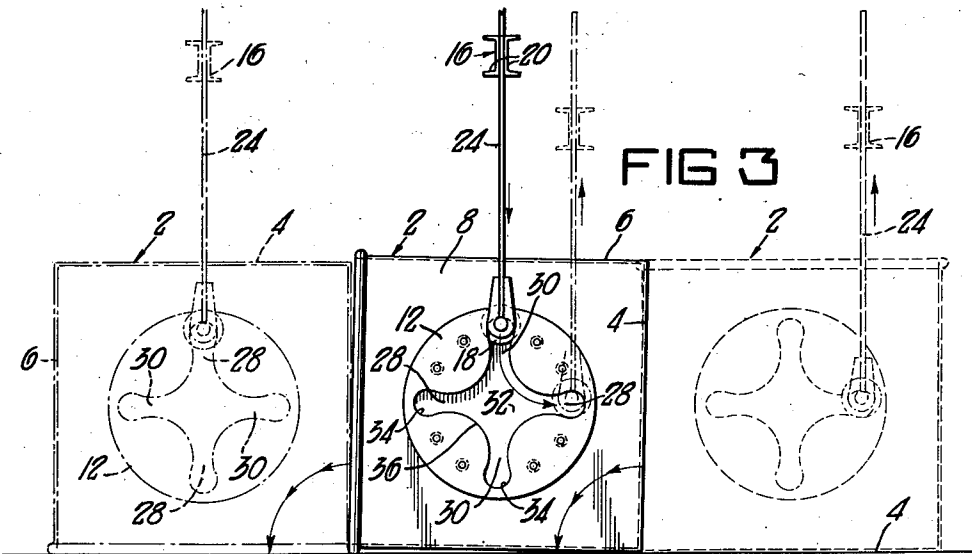
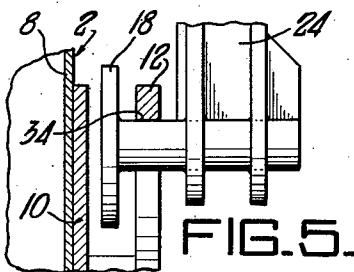
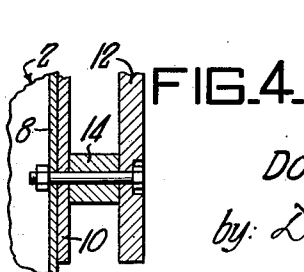
June 18, 1957

D. W. GRAZIER
SELF-DUMPING BUCKET

2,796,283

Filed May 29, 1953

2 Sheets-Sheet 1



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DORE' W. GRAZIER,
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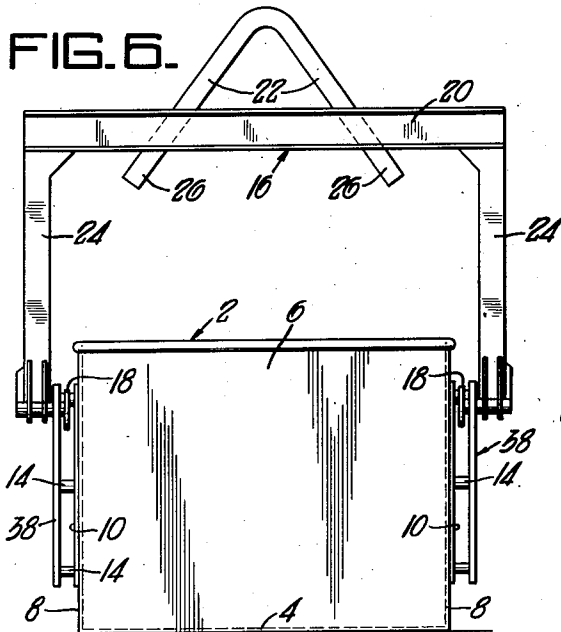
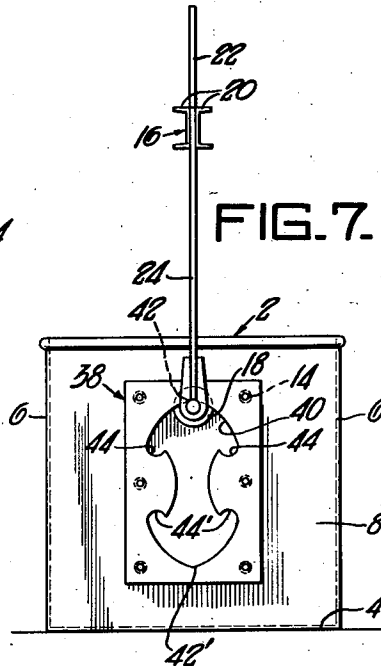
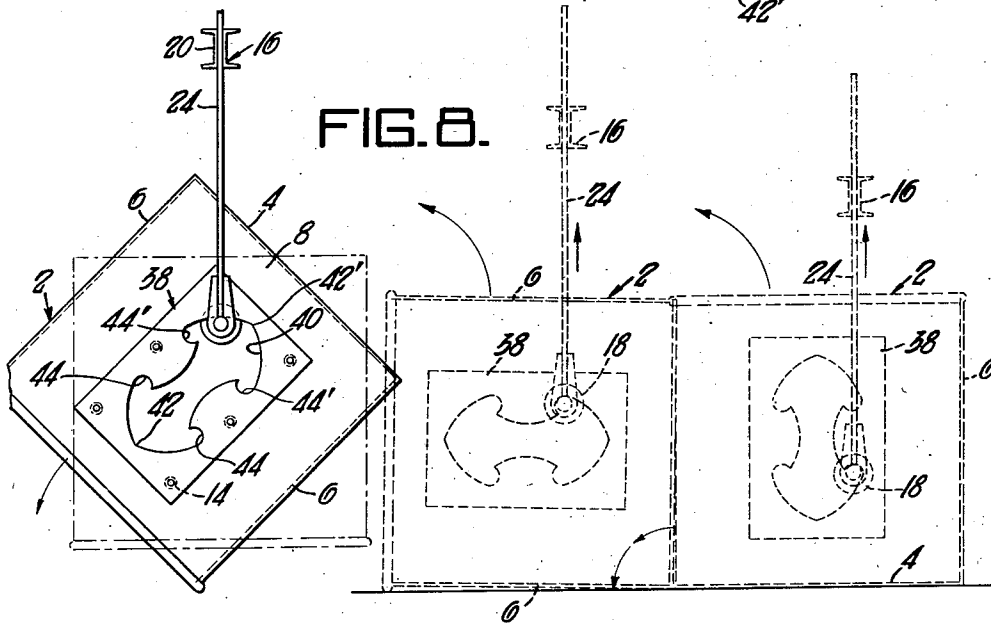
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2 Sheets-Sheet 2



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SELF-DUMPING BUCKET

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3 Claims. (Cl. 294—73)

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

Bucket-and-bail type containers adapted to be carried by means of overhead cranes have long been an important tool of industry. Prior to my invention it was common practice to equip such containers with drop bottoms or gates, or, where drop bottoms or gates were not practical, to use auxiliary mechanical unloaders, to dump the contents of the bucket.

Where drop bottoms or gates were used, a latch or similar holding mechanism was required to retain the load until it was desired to dump it. Where the bucket was provided with a drop bottom and latch, a trip line was usually attached to the latch so that the latch could be released by a workman pulling on the line when it was desired to dump the load.

The trip line and latch presented a serious hazard to personnel working in the vicinity beneath the path of travel of the container since there was always present the danger that the latch would fail and release the load prematurely or that the trip line would snag causing the load to be released at the wrong time.

It is, accordingly, an object of my invention to provide an improved bucket-and-bail type container which is provided with means whereby the bucket may be tilted for dumping the contents thereof automatically by manipulation of the bail.

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

Figure 1 is a side elevational view;

Figure 2 is an end elevational view of Figure 1;

Figure 3 is a view similar to Figure 2 showing the sequence of movement of the bucket and bail of my invention as the bucket is turned 180 degrees.

Figure 4 is an enlarged sectional view taken on the line IV—IV of Figure 1;

Figure 5 is an enlarged detail view partly in section taken on the line V—V of Figure 4;

Figure 6 is a side elevational view of a modified form of my invention;

Figure 7 is an end elevational view of Figure 6; and

Figure 8 is a view similar to Figure 7 showing the sequence of movement of the modified form of my invention as the bucket is turned 180 degrees.

Referring more particularly to the drawings, reference numeral 2 designates a material handling bucket, which may be of any conventional type, and which I have shown as an open top type having a flat bottom 4, vertical sides 6 and connecting end walls 8. Reinforcing plates 10 may be bolted or otherwise fastened exteriorly of the end walls 8 in a more or less centrally located position to support slotted lift plates 12 which are attached to each of the reinforcing plates 10 in spaced relation by means of sleeve spacers 14.

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The lifting bail 16, by which the bucket is both carried and manipulated, is of conventional design with the exception of the trunnions 18 which are carried thereby and which cooperate with the slotted lift plates to tilt the bucket. The bail 16 includes a pair of horizontal cross beams 20 welded or otherwise rigidly fastened together in parallel relation, a lift yoke 22 attached to and projecting upwardly from the center portion of the joined beams 20 and a vertical leg 24 attached to and depending from each end of the joined beams 20. The inwardly directed trunnions 18 are carried by the free ends of the legs 24. The branch ends 26 of the yoke 22 project below the beams 20 a short distance so as to provide stops to engage the edge of the bucket and prevent the bail from falling over either side wall when the bail is lowered to disengage the crane hook.

The slots 28 and 30 in each of the lifting plates extend vertically and horizontally, respectively, of the plate and intersect at approximately their centers. The intersecting junction 32 of the slots is enlarged so that the trunnions of the bail may freely enter the slots and engage the edges thereof. The blind ends 34 of the slots are slightly enlarged and constitute bearing points for the trunnions 18. The edges 36 of the slots may be curved, as best shown in Figure 2, to allow the trunnions to pass freely from one bearing portion to another.

In operation, the bail is manipulated by the crane man so that the trunnions engage the upper end or bearing portion of the vertical slots 28 to lift the bucket vertically and transport it to its destination. When the destination has been reached, the bucket is lowered until its bottom rests on the floor or on the pile of material previously dumped. After the bucket has been lowered to resting position, the crane man continues to lower the bail until the trunnions 18 are positioned in the junction 32, then he racks the crane slightly to one side to move the bail laterally so that the trunnions move to the bearing portion at one end of the horizontal slots 30. After the trunnions have been thus positioned in one of the blind ends of the slots 30, the crane man raises the bail vertically to cause the bucket to tilt 90 degrees. If it is desired to turn the bucket over completely, the operation is repeated. Figure 3 illustrates the several stages of manipulation to turn the bucket over 180 degrees. At the right in Figure 3 the trunnions are shown in position preparatory to tilting the bucket the first 90 degrees. In the center of Figure 3, the bucket and bail are shown in position after the bucket has been turned the first 90 degrees and the bail is shown in broken lines in position preparatory to turning the bucket another 90 degrees. At the left in Figure 3 the bucket and bail are shown in position after the bucket has been turned 180 degrees. Tilting of the bucket is carried on in 90 degree stages because of the excessive amount of "back-lash" or "whip" that is created when large size buckets are turned completely over in one operation. In like manner the bucket may be righted after it has been dumped.

It will be noted that the bucket may be tilted in either direction and may be carried in any of four positions when empty. There are no levers, trip lines or other auxiliary equipment necessary to dump a load from the bucket.

Figures 6 and 7 illustrate a modified form 38 of the lift plate of my invention, which form I have found especially suitable for use with relatively small buckets which may be turned completely over without excessive back-lash or whip. The plates 38 are attached to the bucket in the same manner as are plates 12. The slotted or cut-out portion 40 of the plate 38 is in the form of a substantially double mushroom shape extending on

either side of the horizontal center line of the plate. The mushroom shape of the cut-out on one side of the horizontal center line is a mirror image of the mushroom shape on the other side of the center line. The peaks 42 and 42' at each end, respectively, of the cut-out portion provide the bearing points for the trunnions to lift the bucket vertically. The pairs of bearings 44 and 44' formed at the bottom of the two sides of the mushroom head on each side of the horizontal center line, respectively, are adapted to be engaged by the trunnions for simultaneously lifting and turning the bucket 180 degrees. It will be noted that points 42 and 42' are coplanar with the center of gravity of the bucket while bearings 44 and 44' are offset therefrom.

In operation, to dump a bucket equipped with the lift plate 38, the bail is manipulated by the crane to insert the trunnions 18 in the center of the cut-out portion 40 after which the bail is lifted vertically to engage the bearing point at the peak 42 at the top of the cut-out portion as shown in Figure 7. Continued raising of the bail lifts the bucket vertically and it is thus carried to its destination. At its destination, the bucket is lowered until it rests on the floor or on the pile of material previously dumped. After the bucket has been lowered to resting position, the crane continues to lower the bail and rack his crane slightly to one side to cause the trunnions 18 to engage one of the bearings 44'. When the trunnions 18 are in engagement with the bearing 44', the bail is lifted. Lifting of the bail in this position causes the bucket to turn 180 degrees due to the offset position of bearing 44' from the center of gravity of the bucket. As the bucket turns, the trunnions travel from bearing 44' to the bearing at the peak 42' along the curved edge of the cut-out portion. Figure 8 illustrates the sequence of movement of the bucket as it is being turned 180 degrees. The direction in which the bucket will tilt is dependent upon which bearing 44' is engaged by the trunnions. If the bearing 44' on the right is engaged, the bucket will tilt to the left, as shown in Figure 8, and if the bearing 44' on the left is engaged, the bucket will tilt to the right.

When it is desired to right the bucket after dumping, the operation is repeated with the bucket being lowered to rest, the trunnions being positioned to engage one of the bearings 44 and then lifted. The trunnions then travel along one of the curved edges of the cut-out portion to the peak 42.

While two embodiments of my invention have 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. In a material handling device including a bucket, and a bail for lifting and rotating said bucket, said bail including spaced legs depending one on each of two opposite sides of said bucket, the combination therewith of a trunnion on the lower end of each leg extending normal to said leg toward said bucket, a lifting plate rigidly secured to the outer surface of each of said two opposite sides of said bucket in spaced parallel side-by-side relation thereto, each of said plates having a plurality of intersecting cut-out slots therethrough forming at least two sets of bearing portions engageable by said trunnions, one set of said bearing portions being substantially aligned and parallel with a central vertical plane through said bucket, said plane extending normal to the vertical plane of said lifting plates, said other bearing portions being offset from said central vertical plane, said cut-out slots providing free passage of said trunnions from one set of bearing portions to the other, said trunnions having flanged outer ends which slidably engage the surfaces of said plates which face the bucket to thereby effect retention of the trunnions in the plates during the lifting and rotating of said bucket, each of said lifting plates having an aperture at the intersection of said slots, said aperture being larger than the flanged outer ends of said trunnions whereby said trunnions can be inserted into or withdrawn from engagement with said lifting plates so that said bail can be used with other buckets provided with duplicates of said lifting plates.

2. In a material handling device, the combination therewith as defined by claim 1 wherein the cut-out slots in each plate form mirror image mushroom shapes on each side of the transverse center line of the plate when said bucket is in a vertically upright position.

3. In a material handling device, the combination therewith as defined by claim 1 wherein the cut-out slots are elongated in the direction of said vertical plane of said bucket and having a laterally offset portion at each end of each of said cut-out slots.

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