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G. A. P. PROVAY

BOTTOM DISCHARGE BUCKET AND THE LIKE

Filed March 22, 1922

2 Sheets-Sheet 1

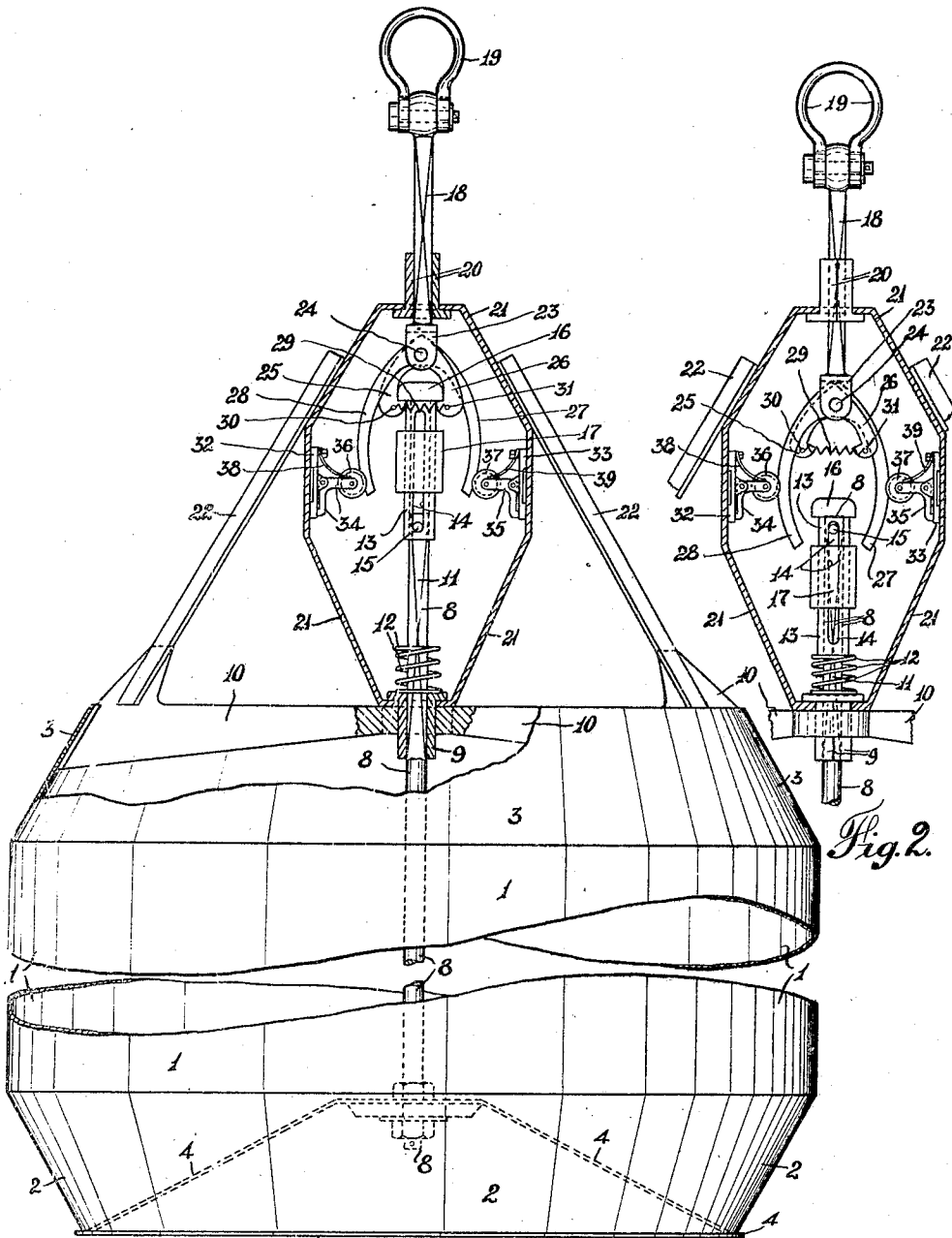


Fig. 2.

Witness:
Arthur Thompson

Fig. 1.

Inventor:
Giuseppe Antonio Pietro Provay

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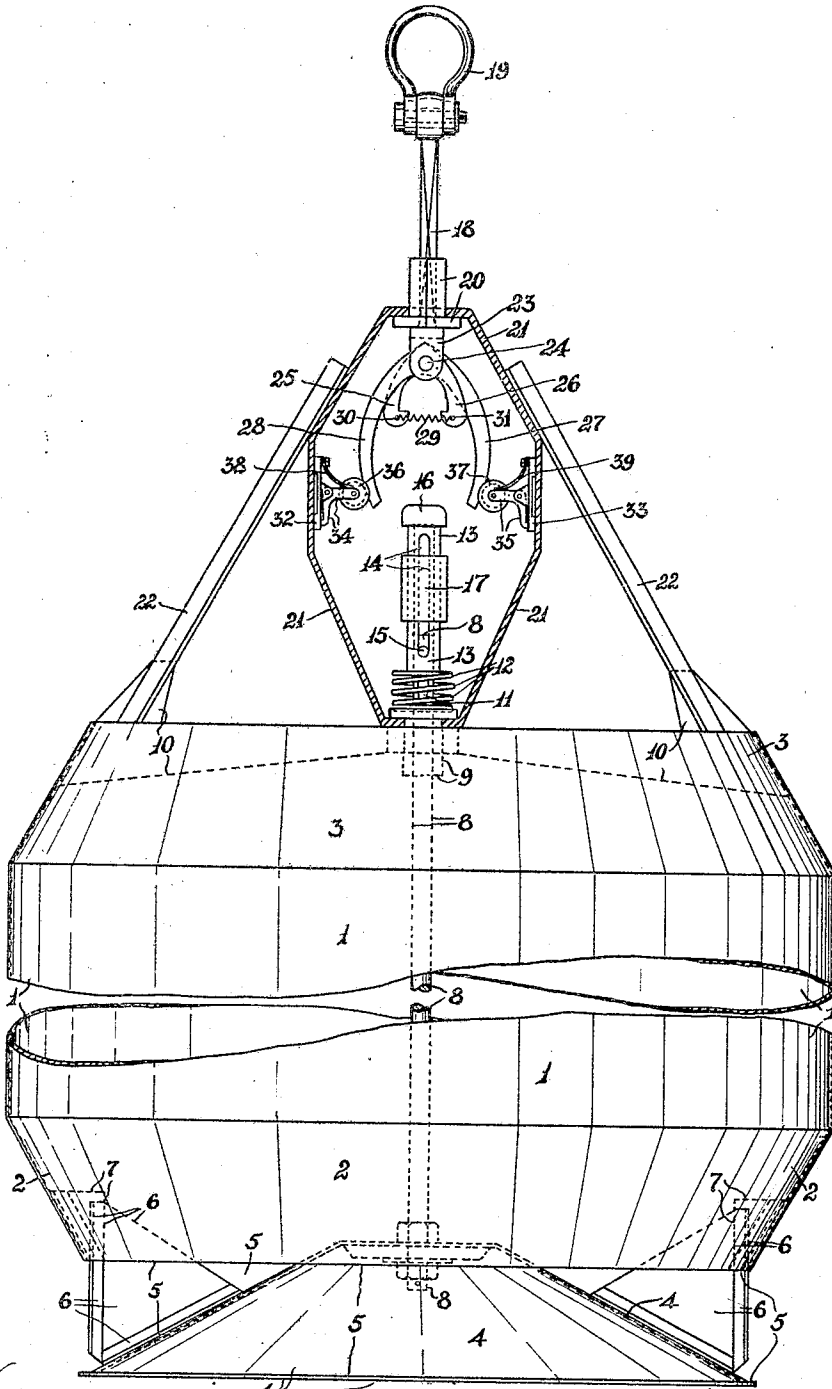
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Witness:
Arthur Thompson

Fig. 3.

Inventor:
Giuseppe Antonio Pietro Provay

UNITED STATES PATENT OFFICE.

GIUSEPPE ANTONIO PIETRO PROVAY, OF LOURENCO MARQUES, PORTUGUESE EAST AFRICA.

BOTTOM-DISCHARGE BUCKET AND THE LIKE.

Application filed March 22, 1922. Serial No. 545,729.

To all whom it may concern:

Be it known that I, GIUSEPPE ANTONIO PIETRO PROVAY, a citizen of the Republic of Portugal, and resident of Lourenco Marques, Portuguese East Africa, have invented certain new and useful improvements in Bottom-Discharge Buckets and the like, for which I have obtained British Patent No. 183,569, dated July 25, 1922, and of which the following is a specification.

This invention appertains to buckets or receptacles of the kind used for receiving, conveying and discharging fragmentary material, such as coal, rock, ore and the like, or granular material, such as grain, sand and the like, as well as pulverulent material. The bucket can, however, be adapted for use for the conveyance and discharge or delivery of liquids.

The object of these improvements is to construct a bucket or receptacle of the nature specified in such a way that it can be employed for any of the uses enumerated with an ordinary crane, winch or equivalent apparatus, as it can be manipulated with the aid of a single rope, chain or the like, and is entirely automatic.

The improved bucket after it has been loaded and conveyed to the point at which the load is to be discharged will be caused to empty or discharge its load by merely lowering it on to a support or on to the dump, then raising the sides or body of the bucket off the bottom and then lifting the open bucket off the support. Upon returning the bucket to the loading point and lowering it into position on the support for re-loading, the body or sides are lowered and reassume the closed position in relation to the bottom, and the means which operate to retain said bottom in its closed position operate automatically on the further lowering of the rope.

For the practical application of the invention the bucket comprises the body or sides which may be of cylindrical or any other preferred shape and a bottom movable relative to said body to form or provide between them the opening through which the material is discharged. The bottom is shaped to fit the open lower end of the body and means are provided for guiding it into its proper closing position in the lower end thereof.

The body at the top is provided with

means for suspending it from the rope, etc., of the crane, etc.

Means are connected to the movable bottom which serve for holding it in its closed position during the loading of the bucket and whilst it is being transported to the discharging point. This connection will support the weight of the bucket and its load whilst it is being transported from the loading to the discharging point. Such connection may conveniently consist of a centrally positioned rod or bar rigidly attached to the bottom and extending vertically up through the body and passing through a guide provided at or near the top of the sides or body of the bucket and extending to a suitable height above the same. The upper portion of the rod may be made of square or other suitable shape in cross section and the guide of corresponding shape to prevent rotation of said rod. Upon the upper end of this rod there is arranged a member which slidingly but non-detachably engages with the rod. This member is fashioned with a preferably square head or enlargement which forms shoulders or projections around the top of the member. It may be appropriately weighted to ensure its due operation.

The draw-bar which is provided at the upper end with means for connecting it to the rope, etc., of the crane, works through a guide in the top of the bucket frame. Said draw-bar may also be of square shape in cross section and the guide of corresponding shape to prevent the bar from rotating. This bar at its lower end below its guide is suitably constructed to pivotally carry a pair of bent levers which are oppositely disposed upon their common pivot and are made of hook or substantially hook shape at one end to engage with the head or enlargement on the sliding member, whilst their other and longer arms extend downwardly for a suitable distance at opposite sides of the sliding member. The hook shape extremities of the levers may be yieldingly connected by suitable means, such as a light helical spring or springs, which will operate to prevent the accidental disengagement of the same from the head or enlargement. In the frame at the top of the bucket there is pivoted a pair of L-shaped levers or brackets which at the end of the one and inwardly projecting arm carry grooved rollers which engage

with the longer arms of the bent levers. The brackets carrying the pivots for the roller levers may be fixed to plates which form portion of the upper part of the bucket frame or part of a casing enclosing the automatic bucket opening and closing arrangement. Springs are preferably provided for keeping the roller levers in their normal position with the roller arms substantially horizontal and the vertical arms in contact with the brackets.

A spring is preferably provided around the upper end of the rod or bar which is attached to the bottom, above the guide for said rod, which will serve to buffer the sliding member when it falls and also yieldingly to support the weight of the bottom when the body or sides are raised and the bottom suspended by its rod or bar.

If the bucket is to be used for the transportation of liquids then suitable means will be employed for making a water-tight joint between the lower edge of the sides or body and the movable bottom.

If the bucket is to be used for depositing material under water, then the automatic opening and closing means may be enclosed in a water-tight casing and the latter be fitted with stuffing boxes and glands for the draw bar and suspension rod or bar for the bottom of the bucket, to work through.

It is to be understood that the bottom of the bucket may be constructed in one or more parts hingedly connected to the body and said hinged parts be operated from the suspension rod through the medium of connecting rods or links.

In the accompanying drawings I illustrate an embodiment of the invention wherein,

Fig. 1 shows portion of the body of the bucket with the bottom in the closed position and the suspension and automatic releasing and re-engaging means in the positions they assume when the bucket is closed and the suspension means raised to lift said bucket.

Fig. 2 is a view of the automatic releasing and re-engaging means in the positions they assume after the bucket has been lowered on to the dump or support and the said means has operated to release the suspension means, and

Fig. 3 is a view similar to Fig. 1 with the bottom in the open position, and the suspension and automatic releasing and re-engaging means in the positions they assume when the bucket is open.

In Figs. 1 and 2, 1 denotes the body of the bucket—shown of cylindrical shape—2 the conical lower portion thereof and 3 the conical upper portion of the same. 4 is the bottom which is adapted, as shown in Fig. 3, to form the discharge opening 5 for the material when the bucket is open. 6 are

guides fixed to the bottom 4, which guides engage in parts 7 forming guideways and fixed to the bottom of the body 1 at the inside. These parts may be of any suitable construction.

The bottom, which is shown of truncated conical shape, so as to facilitate the discharge of the material through the opening 5 when the bucket is open, has attached to it at the centre, the vertical suspension rod or bar 8, which bar extends up through the bucket and passes through a guide 9 at the top of the bucket. 10 are the stays or cross pieces which carry the guide 9. The upper portion of the rod or bar 8 is preferably made of square or polygonal cross-section, as illustrated at 11, and the guide 9 of corresponding interior shape to prevent rotation of the rod or bar 8. 12 is a helical spring which rests upon the top of the guide 9, encircles the rod or bar and whose function will be hereinafter explained.

13 is the member which is slidingly but non-detachably connected to the upper end of the bar 8. This member is of square shape interiorly and is fashioned with opposing vertical slots 14 in which works a pin 15 fixed in the upper end of the rod or bar 8. 16 is the head or enlargement formed on the upper end of the member 13, and 17 represents a weight of suitable magnitude to ensure the due and proper operation of said member 13.

18 is the draw-bar which is shown provided with the shackle 19 for receiving the hook on the end of the rope of the crane, winch or the like. This draw-bar works through a guide 20 which may, as shown, be made of two parts suitably connected together. The guide 20 is fixed in a framework 21 which may constitute a housing for the automatic releasing and re-engaging means, and this framework or housing may, as shown, be rigidly attached to the top of the frame by means of the members 22 of the frame. The draw-bar 18 is made of square or other suitable polygonal shape in cross-section and its guide 20 is of similar internal shape to preclude rotation of the draw-bar in said guide. The draw-bar 18 is constructed with a bifurcated lower extremity 23 which carries the pin 24 which serves as the fulcrum for the two oppositely disposed bent or curved levers, 25, 26 are the hook-shaped arms of the two levers and 27, 28, the longer and depending arms, so that the one lever consists of the two arms 25, 27, and the other of the two arms 26, 28. The hook-shaped ends of the arms 25, 26, are shaped so that they are adapted to engage (as shown in Fig. 1,) with the shoulders or projections on the head or enlargement 15 of the sliding member 13. The hook-shaped extremities 25, 26, are yieldingly connected together by means of a suit-

able light helical spring (or springs) 29 which may, as shown, be attached to the arms 25, 26, by means of outwardly extending pins 30, 31, which extend outwardly sufficiently far to place the spring (or springs) 29 clear of the movement of the sliding member 13.

32, 33 are the oppositely disposed brackets fixed to the frame 21, and 34, 35, the L-shaped levers or brackets, which are pivotally carried by the brackets 32, 33, in such manner that the one arm is horizontal when the other is vertical and in engagement with its bracket 32 or 33, which serves as stops for the levers 34, 35, when in that position.

36, 37, are the grooved rollers which are rotatably supported in the outer ends of the levers 34, 35, respectively, in which grooves the outer sides of the long arms 27, 28, engage, and with which they preferably remain in contact in all positions of said levers under the influence of the springs (or spring) 29. 38, 39, are bow springs which are secured at their one end to the brackets 32, 33, respectively, and at their other ends engage the L-shaped levers 34, 35, respectively, at the sides of the rollers, and operate to tend to maintain said levers in the normal position, with the roller arms horizontal.

In the operation of the arrangement, when the load is being transported the parts are in the position in which they are shown in Fig. 1. The total weight of the bucket and its load is carried by the draw-bar 18, through the hook-shaped arms 25, 26, of the levers, sliding member 13, pin 15 and suspension rod or bar 8, which is attached to the bottom 4. When the full bucket has been lowered on to the support or dump at the discharging point, the rope of the crane, etc., is payed out for a suitable short distance, which results in the rollers 36, 37, forcing the longer arms 27, 28, of the levers towards each other, which moves the hook-shaped arms 25, 26, of the levers apart until they disengage the head or enlargement 16, whereupon the sliding member 13 falls down the squared upper portion 11 of the rod 8 on to the buffer spring 12. The parts are shown in this position in Fig. 2.

The motion of the crane rope is now reversed and the draw-bar is drawn upwards, so that it slides through the guide 20 until the bifurcated end engages with the bottom of the guide 20. In this movement the longer arms 27, 28, of the levers remain in contact with the grooved guide rollers 36, 37. Further upward movement of the draw bar 18 raises the sides or body 1 of the bucket off the bottom 4, which latter, if lifted, is then suspended by the rod or bar 8, the sliding member 13 then resting on the buffer spring 12. The parts are shown in this position in Fig. 3. The load is discharged

either by maintaining the body raised off the bottom or by lifting the body and suspended bottom together, after the former has been raised.

On returning to the loading point and lowering the bucket, the body 1 is lowered on to the bottom, and the rod or bar 8 is pushed up in the sliding member, so that the connecting pin 15 is now near the top of the slots 14. The crane rope is now payed out to lower the draw-bar which falls through its guide and lowers the levers 25, 27, and 26, 28. The longer arms 27, 28, of the levers pass down between and in contact with the rollers 36, 37, until the hook-shaped arms 25, 26, contact with the head or enlargement 16, which has the effect, under the influence of the weight of the draw-bar 18 and parts attached thereto, of moving the arms 25, 26, apart sufficiently to allow them to pass down the sides of the head or enlargement 16, whereupon they are drawn inwards or towards each other by the spring (or springs) 29, and so caused to reengage with the shoulders or projections on said head or enlargement 16.

The crane rope is now taken in by moving it in the opposite direction. This lifts the draw-bar 18 through its guide 20, and the hook-shaped ends 25, 26, of the levers raise the sliding member 13 until the pin 15 is again at the bottom of the slots 14, as shown in Fig. 1. During this upward movement of the levers, the longer arms 27, 28, move upwards in contact with their respective rollers 36, 37, and raise the latter about the pivots of their supporting brackets 34, 35, against the action of the springs 38, 39, which operate to return the rollers to their normal position, as the levers approach their uppermost position. This again places the parts in the position shown in Fig. 1.

What I claim as my invention and desire to protect by Letters Patent is:—

1. A bottom discharge bucket comprising, in combination, a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, suspension means slidably but non-detachably connected to the body portion and adapted to be actuated by a single rope, means for detachably connecting the bottom to the suspension means, and means carried by the suspension means and adapted automatically to make the direct connection between the suspension means and the bottom to close the bucket.

2. A bottom discharge bucket comprising, in combination, a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, a draw-bar slidably but non-detachably connected to the body portion and adapted to be actuated by a single rope, a rod for detachably connecting the bottom

to the draw-bar, said rod having a member which is slidingly but non-detachably connected thereto and means carried by the draw-bar which detachably engage with said member automatically to make the direct connection between the draw-bar and the rod to close the bucket.

3. A bottom discharge bucket comprising, in combination, a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, a draw-bar slidingly but non-detachably connected to the body portion and adapted to be actuated by a single rope, a rod for detachably connecting the bottom to the draw-bar, said rod having a member which is slidingly but non-detachably connected thereto, said member being constructed at or near the top with an enlargement forming shoulders and pivoted hook-shaped levers carried by the draw-bar and adapted to engage with the shoulders automatically to make the connection between the draw-bar and the rod to close the bucket.

4. A bottom discharge bucket comprising, in combination, a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, a draw-bar slidingly but non-detachably connected to the body portion and adapted to be actuated by a single rope, a rod for detachably connecting the bottom to the draw-bar, said rod having a member which is slidingly but non-detachably connected thereto, a guide for the rod, a spring arranged around the rod above the guide for buffering the member when it falls down said rod, and means carried by the draw-bar which detachably engage with said member automatically to make the direct connection between the draw-bar and the rod to close the bucket.

5. A bottom discharge bucket comprising, in combination, a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, a draw-bar slidingly but non-detachably connected to the body portion and adapted to be actuated by a single rope, a rod for detachably connecting the bottom to the draw-bar, said rod having a member which is slidingly but non-detachably connected thereto, said member being constructed at or near the top with an enlargement forming shoulders, oppositely disposed hook-shaped levers carried by the draw-bar and adapted to engage with the shoulders automatically to make the connection between the draw-bar and the rod to close the bucket, and a spring attached to the levers.

6. A bottom discharge bucket comprising,

in combination: a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, a draw-bar slidingly but non-detachably connected to the body portion and adapted to be actuated by a single rope, a rod for detachably connecting the bottom to the draw-bar, said rod having a member which is slidingly but non-detachably connected thereto, said member being constructed at or near the top with an enlargement forming shoulders, oppositely disposed hook-shaped levers carried by the draw-bar and adapted to engage with the shoulders automatically to make the connection between the draw-bar and the rod to close the bucket, a spring attached to the levers, said hook-shaped levers being constructed with downwardly extending bent or curved arms, and means which operate to move said arms towards each other and so cause the hooked ends to disengage the slidable and non-detachable member when the bucket is on a support and the single suspension rope is lowered.

7. A bottom discharge bucket comprising, in combination, a body portion having a bottom connected thereto, said parts being adapted to move apart in order to empty the bucket, a draw-bar slidingly but non-detachably connected to the body portion and adapted to be actuated by a single rope, a rod for detachably connecting the bottom to the draw-bar, said rod having a member which is slidingly but non-detachably connected thereto, said member being constructed at or near the top with an enlargement forming shoulders, oppositely disposed hook-shaped levers carried by the draw-bar and adapted to engage with the shoulders automatically to make the connection between the draw-bar and the rod to close the bucket, a spring attached to the levers, said hook-shaped levers being constructed with downwardly extending bent or curved arms, and means which operate to move said arms towards each other and so cause the hooked ends to disengage the slidable and non-detachable member when the bucket is on a support and the single suspension rope is lowered, said means comprising grooved rollers carried by L-shaped brackets pivoted to the body portion and springs for returning said brackets to the normal position on the upward movement of the levers.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GIUSEPPE ANTONIO PIETRO PROVAY.

Witnesses:

JOSÉ LEOPOLDO DE FARIA,
ARTHUR THOMPSON.