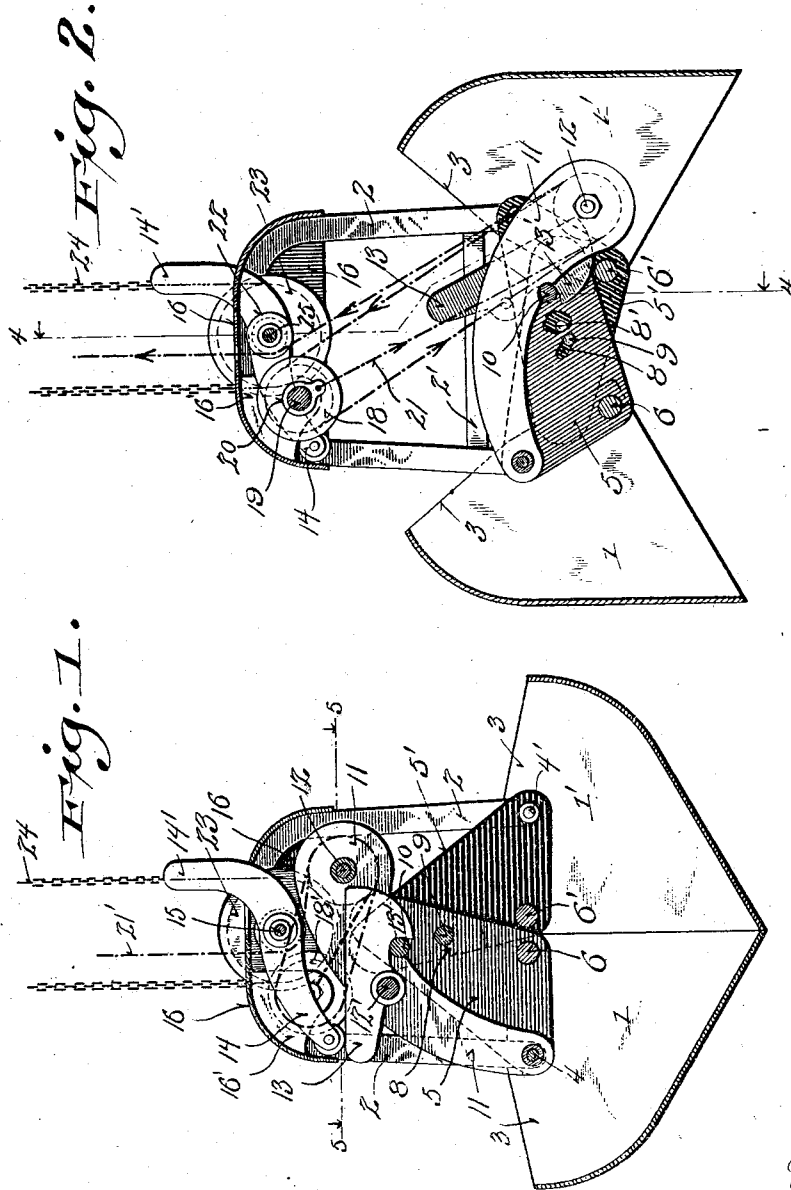


1,058,028.

Patented Apr. 8, 1913.

4 SHEETS—SHEET 1.



Witnessed:
Charles Young
May 1913

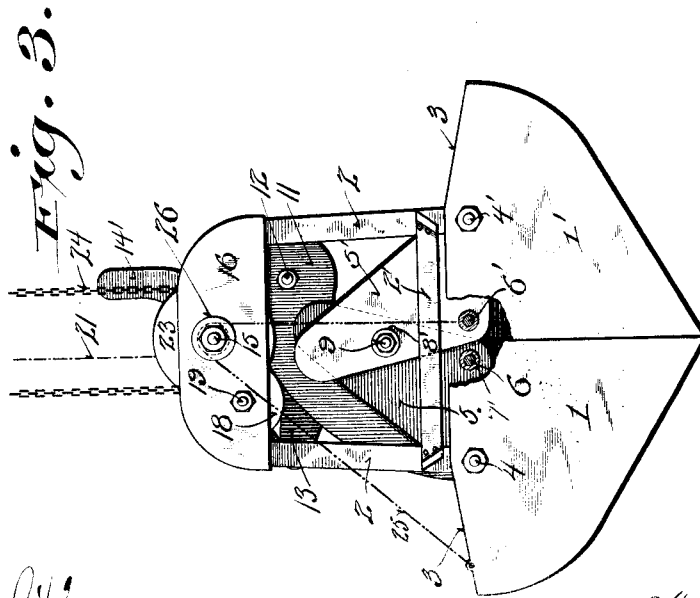
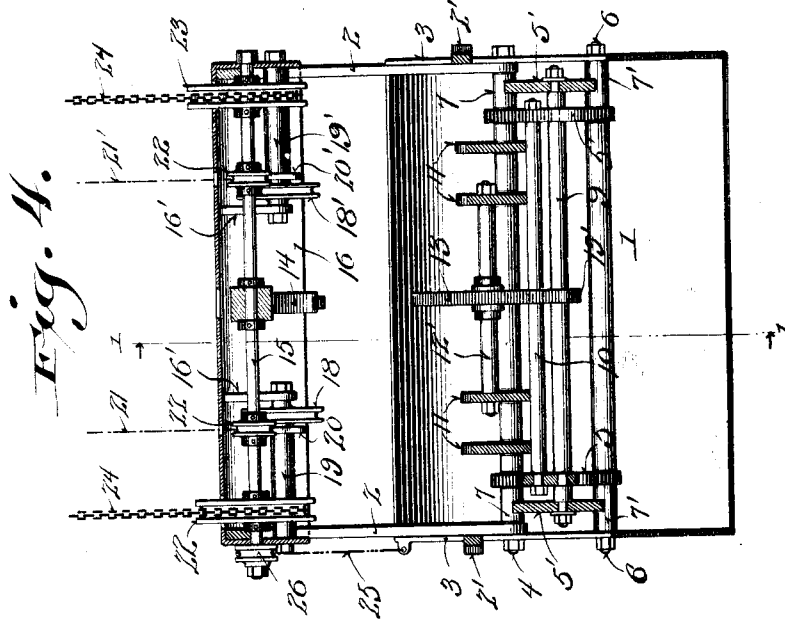
Inventor:
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C. BERGHOEFER.
CLAM SHELL BUCKET.
APPLICATION FILED NOV. 4, 1911

Patented Apr. 8, 1913.

4 SHEETS—SHEET 2.

1,058,028.



Witnessed:
Carroll Young
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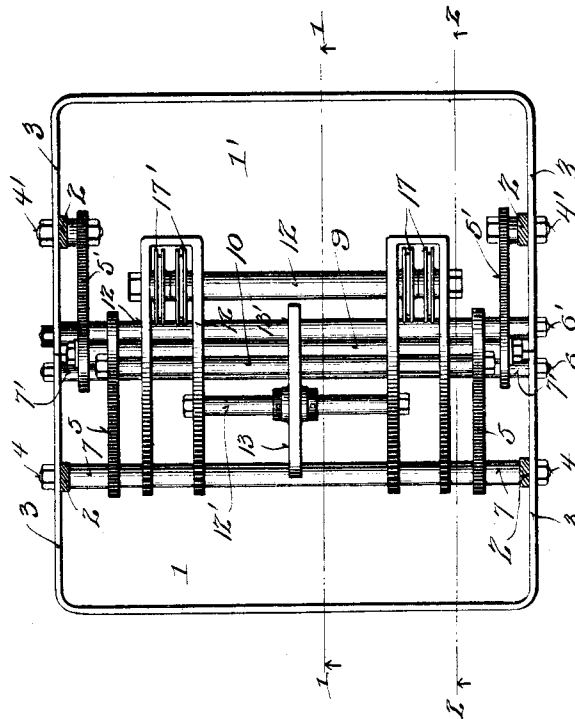
C. BERGHOEFER.
CLAM SHELL BUCKET.
APPLICATION FILED NOV. 4, 1911.

1,058,028.

Patented Apr. 8, 1913.

4 SHEETS—SHEET 3.

Fig. 5.



Witnessed:
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CLAM SHELL BUCKET.
APPLICATION FILED NOV. 4, 1911.

1,058,028.

Patented Apr. 8, 1913.

4 SHEETS—SHEET 4.

Fig. 4.

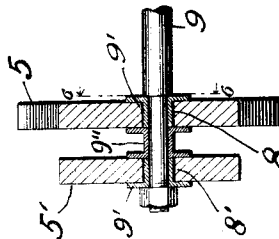
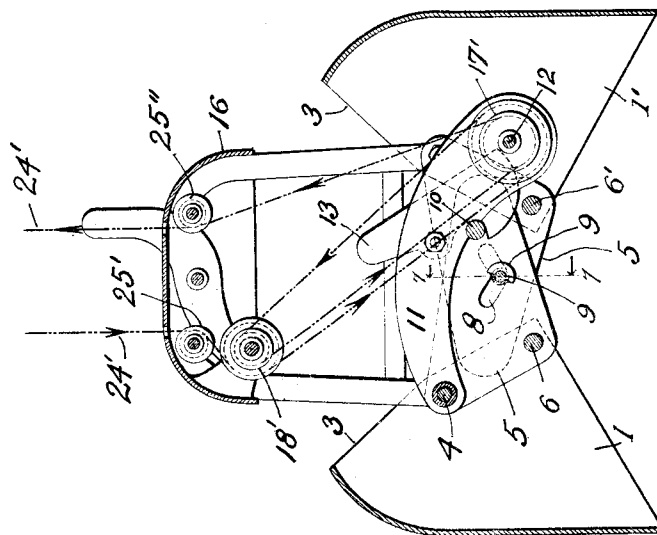


Fig. 6.



Witnessed:
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May Downey.

Invented:
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UNITED STATES PATENT OFFICE.

CHARLES BERGHOEFER, OF MILWAUKEE, WISCONSIN.

CLAM-SHELL BUCKET.

1,058,028.

Specification of Letters Patent.

Patented Apr. 8, 1913.

Application filed November 4, 1911. Serial No. 658,488.

To all whom it may concern:

Be it known that I, CHARLES BERGHOEFER, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Clam-Shell Buckets; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention refers to carrier buckets of the clam-shell type and is particularly applicable to that form of clam-shell bucket patented by me November 26, 1905, No. 805,521.

The primary object of my invention is to provide a bucket that is simple, economical, efficient and capable of being manipulated with an expenditure of minimum power in proportion to its load capacity.

Specific objects are to provide fulcrum points for the swinging bucket sections so located that the load area of the bucket sections is approximately balanced; to provide lapped pairs of operating arms for the bucket sections, the opposite arms of each bucket section being linked together by a floating tie-rod, which floating tie-rod has sliding play within oppositely inclined slots of the pair of arms, whereby said bucket sections are held in their opened and closed positions, the tie-rod being disposed between the fulcrum points of the aforesaid bucket-sections and adapted to rise and fall above and below an imaginary line intersecting their fulcrum points; to provide a bail-rod connection for the arms of one of the bucket sections; to provide an oscillatory bail grip-lever the same being fulcrumed about the axis of that bucket section which carries the bail, said grip-lever being provided with a snatch-dog, whereby the grip-lever and bail are connected and disconnected incidental to a closing or opening operation of the bucket sections; to provide a skeleton hanger for the bucket sections; to provide pulleys in connection with the hanger and free end of the grip-lever in conjunction with an operating chain or cable whereby the bucket-sections are controlled; to provide means for tripping the grip-lever snatch-dog and auxiliary means for holding the bucket sections in their closed position whereby they are held against tendency to sag open when loaded.

With the above objects in view the invention consists in certain peculiarities of con-

struction and combination of parts as fully set forth hereinafter with reference to the accompanying drawings and subsequently claimed.

In the drawings Figure 1 represents a sectional elevation of a clam-shell bucket in its closed position embodying the features of my invention, the section being indicated by lines 1—1 of Figs. 4 and 5; Fig. 2, a similar sectional view of the same shown in its open position; Fig. 3, a side elevation of the bucket with parts broken away and parts in section, the view being shown with the bucket members in their closed position; Fig. 4, a cross-section of the clam-shell bucket, the section being indicated by line 4—4 of Fig. 2, the bucket sections being shown in their open position; Fig. 5, a sectional plan view of the same, the section being indicated by line 5—5 of Fig. 1; Fig. 6, a sectional elevation of a clam-shell bucket in accordance with my invention provided with a single bucket controlling and hoisting chain or cable, and Fig. 7, a detail cross-section indicated by line 7—7 of Fig. 6, the section illustrating the connection between the pairs of bucket actuating arms comprising a stay-rod provided with rollers for engagement with angular slots formed in said arms.

Referring by characters to the drawings, 1, 1', represent bucket sections which are adapted to articulate at their inner vertical and horizontal edges when closed to form a carrier of any predetermined load area. The bucket sections are pivotally mounted upon the ends of struts 2, 2, which struts constitute members of a hanger frame. The fulcrum points of the bucket sections are disposed approximately midway of the width of the same as shown, and adjacent to the upper edges of the side wall 3 of said buckets, whereby the load area is approximately balanced, the bucket member 1' being suspended by pivot-bolts 4', while the bucket member 1 is suspended upon a rod 4 that extends crosswise of the hanger, being connected to the opposite struts 2. The struts 2 extend downward upon the inner faces of the side walls of the bucket sections and secured to the respective fulcrum bolt 4' and fulcrum rod 4 are actuating arms 5, 5', the same being also secured to the side walls of the bucket sections by stay-rods 6, 6', which stay-rods serve as braces for their respective bucket sections. The pair of actuating arms 5 are spaced inwardly from the

bucket-wall 3 by thimbles 7, 7', that are respectively mounted upon the rod 4 and stay-rod 6, whereby the said actuating arms 5, 5', are adapted to overlap the actuating arms 5' of the opposite bucket-section. Each pair of the lapped arms 5 and 5' are provided with angularly disposed slots 8, 8', the same being inclined in opposite directions. Mounted in these slots 8, 8', is a floating tie-rod 9, which rod is reduced at its ends for the reception of anti-friction rollers 9', 9', that engage the slots, the said rollers being held apart by spacing thimbles 9'', while the end rollers are held in position by suitable nuts, as best shown in Fig. 7 of the drawings. By this floating tie-rod connection it will be observed that when the bucket sections are in their closed position said rod will rise to the highest point in each pair of slots and thus hold the buckets from swinging open, the slots at the same time permitting each bucket section to describe an arc of a circle about its axis incidental to an opening movement, whereby the floating tie-rod will drop to a position below an imaginary horizontal line intersecting the fulcrum points of said bucket sections, in which position said tie-rod will settle at the extreme opposite ends of the slots, as shown in Fig. 2. Particular attention is called to the fact that floating tie-rod rollers 9', 9'' play freely in their slots and when the bucket section 1 is positively closed (by mechanism hereafter described) the closing force of the opposite bucket section 1' is imparted thereto from said first named bucket section through the tie-rod.

The inner pair of actuating arms 5 are connected by a bail-rod 10, which bail-rod is provided for the purpose of operating the bucket sections. Loosely mounted upon the rod 4 is an oscillatory grip-lever 11, the same being formed in separate sections, which sections are connected by a tie-rod 12 at the free end of the grip-lever and a second tie-rod 12' intermediate of its free end and its point of oscillation, each of the tie-rods being provided with spacing sleeves, whereby rigidity is added to the aforesaid grip-lever. Mounted upon the sleeve of the tie-rod 12' is a snatch-dog 13, the nose 13' of which is adapted to engage the bail-rod 10, whereby the same is locked into engagement with the grip-lever 11, which lever, as shown, is slightly notched upon its lower edges to form a seat for the bail. The tail of the snatch-dog is arranged to be engaged by one arm 14 of a bell-crank lever, which lever is mounted upon a spindle 15 that is secured to end-walls of a housing 16, that forms part of the bucket hanger frame. The opposite arm 14' of the bell-crank extends upwardly through a slot formed in the housing 16 and is adapted to be engaged by any suitable trip or

stop disposed in the path of travel of the bucket from its loading to its point of discharge. The said stop and overhead carrying mechanism forms no part of my present invention and is therefore not shown.

Mounted upon the tie-rod 12 at the free end of the grip-lever and within each section thereof is a pair of sheaves 17, 17' respectively. These sheaves are provided to operate in conjunction with single sheaves 18, 18', that are journaled upon studs 19, 19' which are mounted within the side walls of the housing and intermediate ears 16' that extend therefrom. Also loosely mounted upon the studs 19 are collars 20, 20', to which are secured the ends of chains or cables 21, 21'. From their collar connection these cables pass downwardly and over one of the sheaves of the pair which are in alignment therewith and from thence each cable passes up and around its fixed sheave and downwardly over the second sheave of the pair carried by the grip-lever and from thence it is returned upwardly and engages a guide sheave 22, from which point it travels vertically through an aperture formed in the housing to a suitable winding drum not shown. The cables 21, 21', being in pairs will thus maintain perfect balance with respect to the operation in connection with an opening or closing movement of the bucket sections. The spindle 15 has also loosely mounted thereon adjacent to the ends of the hanger housing a pair of lifting and conveying sheaves 23 which carry suitable hoisting and conveying chains 24 that are connected in any desired manner to mechanism not shown, whereby the bucket is raised and lowered. The struts 2, 2', adjacent to their lower ends are also connected by brace-bars 2', the ends of which bars are offset and obliquely disposed to form stops for limiting the opening movement of the bucket sections, the upper edges of which bucket sections are arranged to engage the offset ends of the bars when said bucket sections are fully opened.

In some instances, in actual practice, it has been found that when the bucket sections are closed there is a slight tendency for the same to sag open at their articulated joint and in order to overcome this tendency I provide an auxiliary means for holding the bucket member 1' closed, which member is not positively held by the grip-lever, it being understood that the bucket section 1 cannot swing outwardly owing to the fact that its bail is latched and securely gripped. To provide against this tendency of the bucket member 1' to open, I have shown a chain or cable 25 having one end connected to the stay rod 6' which is adjacent to its vertical open edge. The chain or cable is passed upwardly and over an idle pulley 26 that is mounted upon the end of the

spindle 15 and from thence said cable passes downwardly and is connected to the outer edge of the positively closed bucket section 1. Hence it will be seen that when the bucket section 1 is positively closed that the cable connection to the opposite bucket section 1' will afford a positive means or connection between said sections, whereby they will be held closed. It is apparent that, while I have shown a cable to accomplish the above result that a chain connection may be substituted for said cable without departing from the spirit of my invention.

In the operation the bucket is lowered in its open position as shown in Fig. 2 by paying out the hoisting cable 24 allowing said bucket sections to settle upon the material to be loaded. In the open position as shown it will be observed that the grip-lever and its snatch-dog are in locked engagement with the bail 10 and hence when the cables 21, 21', are wound upwardly in the direction indicated by the arrow heads, the grip arm will rotate upon the axis of swing of the bucket section 1, causing the same to dig into the material to be loaded with a shearing or rolling motion, this motion being imparted to the opposite bucket member through its operating arm and floating tie-rod connection. The buckets are thereafter closed, the parts assuming the position shown in Fig. 1. When the bucket is to be raised and conveyed to its point of discharge the slack in the cables 21, 21', is taken up by a suitable winding drum mechanism. After the bucket has reached its point of discharge the bell-crank lever arm 14' will be rocked and thus exert a tripping movement upon the snatch-dog by its tail engagement with said bell-crank lever. The bail being thus released from the grip-lever, the load will cause the bucket members to swing about their points of suspension and open, whereby the load is discharged, the slight overbalanced weight of the operating arms being sufficient to hold the bucket sections in their open position until such time as they again rest upon the pile of material for reloading. The cables 21, 21' are then slacked off to permit the grip-arm to swing downward to the position shown in Fig. 2, whereby the nose of the snatch-dog will pass over the bail in position to again close the bucket members under suitable manipulation of the cables.

From the foregoing description it will be understood that by providing a grip-lever and snatch-dog as shown with cable connections that friction of the parts is reduced to a minimum, all gearing being dispensed with and that when the bucket sections are rocked about their fulcrum points, owing to their perfect balance, their effectiveness is increased, while at the same time the minimum of power is expended to close the

same, the oscillatory or rolling motion due to the position of the axis of the bucket sections being particularly efficacious, whereby the buckets will dig smoothly into the material to be lifted.

Fig. 6 illustrates a form of bucket particularly designed for light duty wherein a single chain 24' is employed to operate both as a hoisting and bucket section controller, thus dispensing with one set of cables. In this instance the chain or cable 24' passes downward and over a guide-pulley 25', thence under one face of sheave 18'' and about one face of sheave 17'' that is carried by the grip-lever 11, from which point the chain or cable passes up and over a second face of sheave 18'' and is again returned over a second face of the sheave 17''. The chain or cable 24' thus looped over the several sheaves, passes up and over a guide pulley 25'', the ends being under suitable sheave and drum control whereby said cable is manipulated to lower the bucket, close and raise the same, in an obvious manner.

I claim:

1. A bucket comprising a pair of bucket sections, a hanger frame, a pivotal connection between the hanger frame and each of the bucket sections, arms extending from the bucket sections adapted to overlap each other intermediate of their fulcrum points, the arms being provided with angularly disposed slots, a rod connection engageable with the arm slots, a bail connecting the arms of one of the bucket sections, a grip-lever having one end fulcrumed to the hanger frame, a snatch-dog carried by the lever for engagement with the bail, a cable in connection with the free end of the grip-lever, whereby the same is actuated, and a tripping mechanism for the snatch-dog.

2. A bucket comprising a pair of bucket sections, a hanger frame, a pivotal connection between the hanger frame and each of the bucket sections, arms extending from the bucket sections adapted to overlap each other intermediate of their fulcrum points, the arms being provided with angularly disposed slots, a rod connection engageable with the arm slots, a bail connecting the arms of one of the bucket sections, a grip-lever having one end fulcrumed about the axis of that bucket section to which the bail is connected, a snatch-dog carried by the lever for engagement with the bail, a cable in connection with the free end of the grip-lever, whereby the same is actuated, and a tripping mechanism for the snatch-dog.

3. A bucket comprising a hanger frame, bucket sections pivotally secured to the hanger frame, slotted arms extending inwardly from each bucket section adapted to overlap each other, a tie-bolt fitted in the arm-slots, a bail connecting the arms of one bucket section, a gripping lever fulcrumed

about the pivotal point of the bail-connected bucket section, a snatch-dog carried by the grip-lever, sheaves carried by the hanger frame, other sheaves mounted upon the free end of the grip-lever, a cable connection between the sheaves whereby the grip-lever is raised and lowered, and tripping means carried by said hanger frame for the snatch-dog.

10 4. A bucket comprising a hanger frame, bucket sections pivotally suspended from the hanger frame, arms extending upwardly from the bucket sections adapted to overlap each other, the arms being provided with
15 angularly disposed slots, a rod connection engageable with the arm slots, a bail connecting the arms of one of the bucket sections, a grip-lever fulcrumed to said hanger frame, bail locking means carried by the
20 grip-lever, means for tripping the bail locking means, and means for raising and lowering the aforesaid grip-lever.

5. A bucket comprising a hanger frame having depending struts, bucket sections
25 pivotally suspended from the ends of said struts, the pivots being disposed approximately midway of the load area of said bucket sections, whereby they are approximately balanced, slotted arms extending upwardly from the bucket sections adapted to
30 overlap each other, the slots in the opposite arms being disposed at angles to each other, a floating tie-rod engageable with the slots, a bail connecting the arms of one of the
35 bucket sections, grip-lever members mounted about the axis of that bucket section carrying the bail, the grip-lever members being connected, sheaves carried at the free

ends of the grip-lever members, other sheaves carried by the hanger frame, a pair
40 of cables having ends connected to the hanger frame, the cables being passed about the sets of hanger frame sheaves and grip-lever member sheaves, a snatch-dog pivotally mounted between said grip-lever mem-
45 bers, a bell-crank trip-lever for the snatch-dog carried by said hanger frame, and hoisting sheaves mounted upon said hanger frame.

6. A bucket comprising a hanger frame, 50 bucket sections pivotally secured thereto, arms extending from the bucket sections adapted to overlap each other, the arms being provided with angularly disposed slots, a rod connection engageable with the arm
55 slots, a bail connecting the arms of one of the bucket sections, a gripping lever fulcrumed about the pivot point of that bucket section carrying the bail, locking means carried by the grip-lever for engagement with
60 the bail, means for releasing the bail locking means, and a cable and sheave connection between said grip-lever and hanger frame, whereby the grip-lever is oscillated
65 incidental to movement of the aforesaid bucket sections in a closing or opening operation.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee in the county of Milwaukee and State of Wis-
70 consin in the presence of two witnesses.

CHARLES BERGHOEFFER.

Witnesses:

J. M. ETTENHEIM,

WALTER L. BERGHOEFFER.