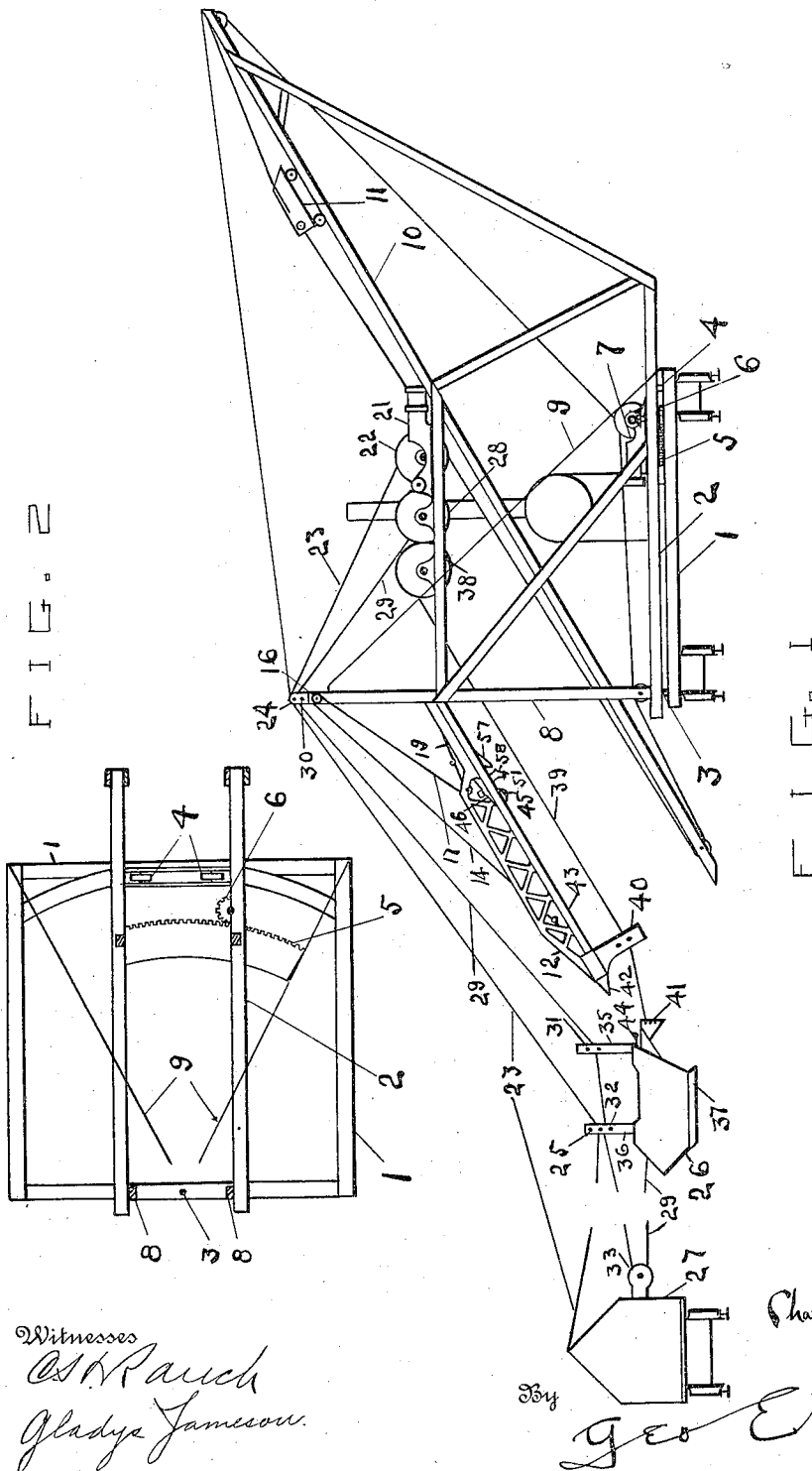


C. A. FRAYER.
MATERIAL HANDLING MECHANISM.
APPLICATION FILED JAN. 20, 1910.

Patented Aug. 20, 1912.

3 SHEETS—SHEET 1.

1,036,481.



Witnesses
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Charles A. Frayer

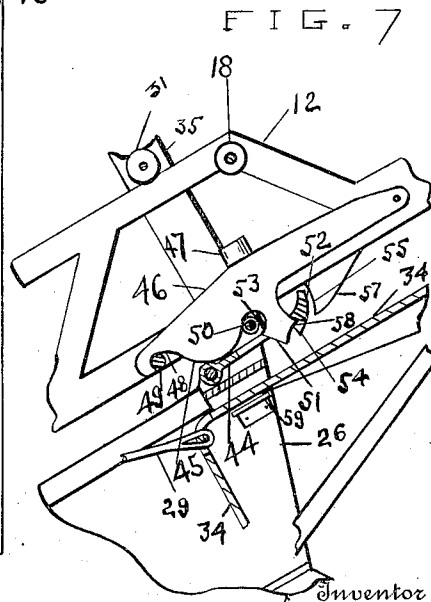
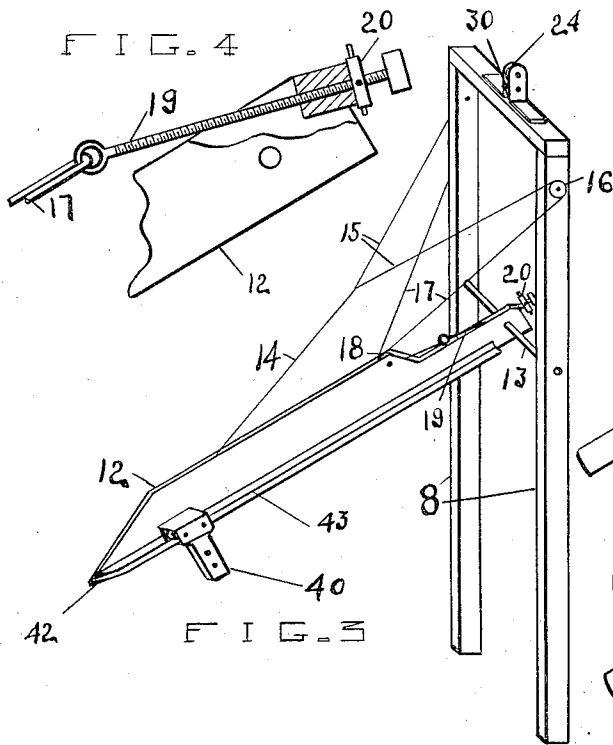
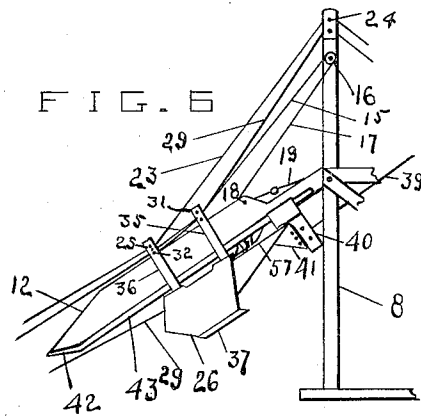
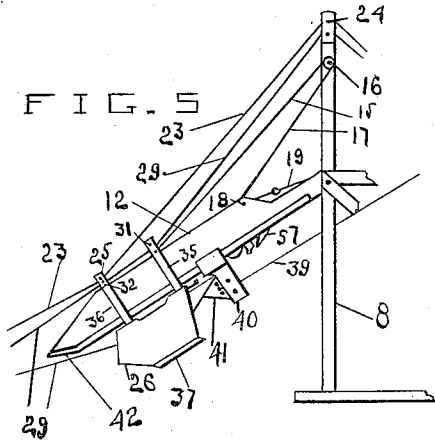
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

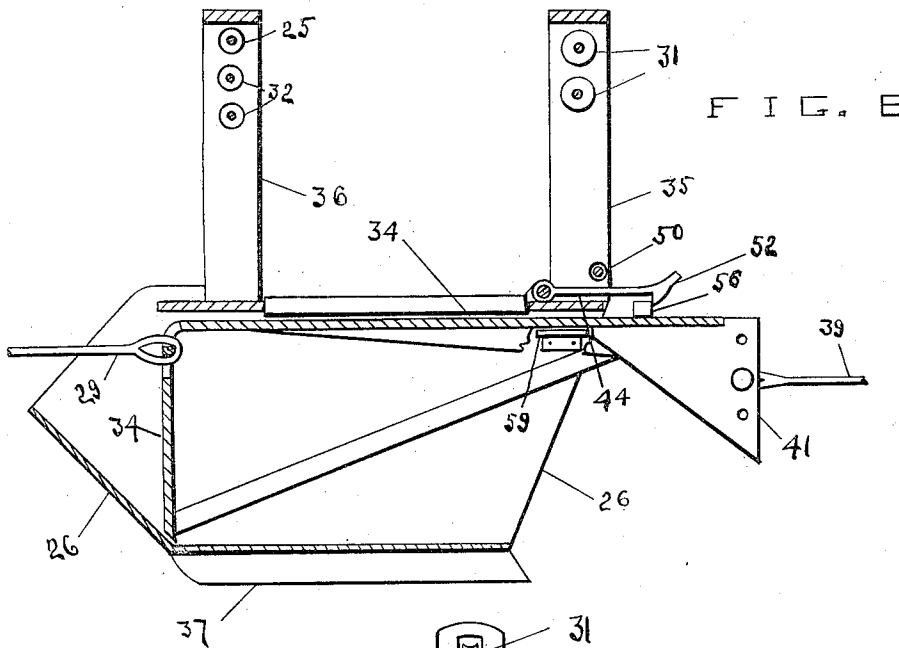
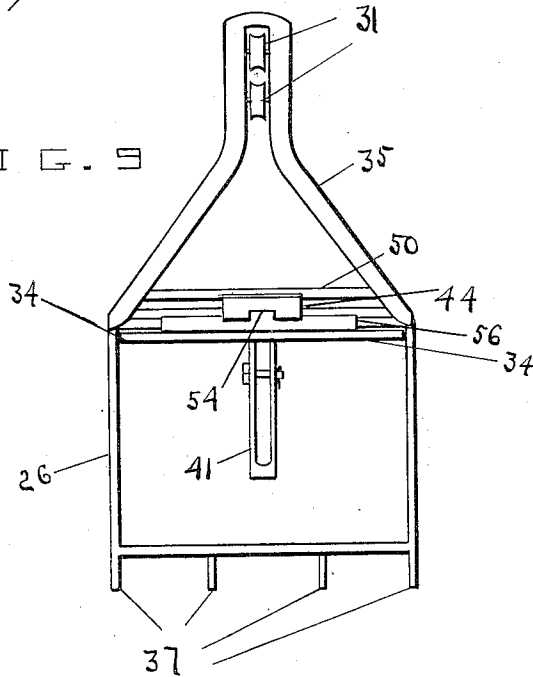


FIG. 9



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UNITED STATES PATENT OFFICE.

CHARLES A. FRAYER, OF TOLEDO, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE BUCYRUS COMPANY, OF SOUTH MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

MATERIAL-HANDLING MECHANISM.

1,036,481.

Specification of Letters Patent.

Patented Aug. 20, 1912.

Application filed January 20, 1910. Serial No. 539,047.

To all whom it may concern:

Be it known that I, CHARLES A. FRAYER, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented new and useful Material-Handling Mechanism, of which the following is a specification:

This invention relates to mechanism for gathering and transporting material.

This invention has utility when embodied in drag line excavator and loading mechanism.

Referring to the drawings: Figure 1 is a side elevation of the invention for drag line bucket adapted to discharge into a skip; Fig. 2 is a sectional view looking down on the lower portion of the pivoted derrick frame and its supporting base; Fig. 3 is a perspective view of the mast and boom carried by the derrick frame; Fig. 4 is a fragmentary view of the adjusting device for varying the inclination of the boom; Fig. 5 is a side elevation of the mast and boom, showing the bucket being elevated by the boom; Fig. 6 is a view similar to Fig. 5, but with the bucket in dumping position; Fig. 7 is an enlarged detail of the trip and retaining devices, showing the parts of the bucket in dumping position; Fig. 8 is a longitudinal section of the bucket; and Fig. 9 is a front view of the bucket.

The platform or base 1 carries the frame 2 mounted on the base by the pivot pin 3 and the rollers 4. This pair of rollers 4 and the pivot pin 3 form a three point bearing for the frame. To move this frame about the pivot, the base is provided with an arcuate rack or segment 5 with which meshes the gear 6 driven by the prime mover 7. Disposed over the pivot 3 are the uprights forming the mast 8, which is braced as to the base 1 by guys 9. Extending through the uprights of the mast 8 and inclining upwardly is the way 10 for the skip receptacle or dump car 11, the travel of which car along the way 10 in transporting material is controlled by the prime mover 7.

Freely swinging outward from the frame 2 and over the lower end of the way 10, is the boom 12, pivotally mounted on the bar 13 in the mast 8. This boom has extending from near its outer free end, the guy 14 with divided sections 15 continuous over guides 16 on the mast 8, to the after guy sections 17 which pass over the guide 18 carried by the boom 12, to be engaged by

the rod 19, adjusted by the block 20. These divided or A-guys permit the boom to automatically assume medial position downwardly inclined over the way 10, if dumping is to be into the skip car 11 instead of into vehicles or other receptacles coming under the boom 12. The angle of this inclination of the boom 12 is readily varied from the single adjusting block 20, owing to the guys being continuous. While normally the boom assumes the medial position, it is free to swing laterally, due to the form of guys adopted. It is to be further noted that the three point bearing, has one of the points disposed centrally of the mast 8. The single point of the bearing under the mast proper permits the free rocking of the mast to vertical position instead of tilting to some inclined position which the forward portion of the base may assume. This operation is insured by the guys 9.

Carried by the frame 2 is the prime mover 21, which through drum 22 controls the guide line 23, extending over guide 24 in the mast 8, through guide 25 of bucket 26 to the remote anchor or dead-man 27. Also driven from the prime mover 21 is the drum 28 connected to actuate return line 29 extending over guide 30 in the mast 8, through guides 31, 32 of bucket 26, about guide 33 on the dead-man 27 to the dumping or inner telescopic section 34 of the bucket having the body section 26. Upwardly extending from the forward end of the bucket body 26 are the standards 35 for the guides 31, while from the rearward end of the bucket body 26 rise the standards 36 for the guides 25, 32. Longitudinally extending along the under side of the body 26 are the vanes 37 serving to guide the bucket in its drag travel, as well as to score or loosen the material in order that it may more freely be gathered into the bucket in the subsequent bucket travels. The third drum 38, actuated by the prime mover 21, actuates drag line 39, extending through the movable guide block 40 to the adjustable connection 41 with the dumping bucket section 34. The bucket section 34 is normally held in material retaining position as to the bucket section 26, by the latch 44, as the block 40 travels along the boom 12. The lower end of the boom 12 has a deflected portion serving as a stop to limit the downward travel of the block 40 along the way 43 of the boom. Accordingly as the drag line 39

hauls the assembled bucket sections toward the boom 12, the readily deflected boom, will be actuated by the block 40 to swing into line with the approaching bucket, and point
5 between the upright standards 35, 36, as the bucket rides onto the boom. Guide rollers 31 and 32 roll along the top rib of the boom 12, while the bucket pushes the block 40 up the guide or way 43.

10 As the bucket latch 44 rides against the cam 45, the pivoted member 46 is lifted against the action of its weight 47, which weight 47 normally holds the notch 48 of the member 46 riding on the pin 49 in the
15 boom 12. The continued travel of the bucket brings the bar 50 to move against the cam 45, as the incline 51 of the member 46 coacts with the upwardly curved face 52 of the latch 44 as it rides past. Bar 50 now
20 riding against the curved face 53 of the member 46, and aided by the action of the weight 47, forces the extension of the member 46 including the incline 51, into the opening 54 in the latch 44, while the latch is
25 lifted by the incline 52 riding up the incline 55, thus resulting in a retaining device automatically operated, to maintain the body section 26 in held position.

The lifting action of the trip 55 releases
30 the latch 44 from the bar 56 on the dumping section 34, so that continued actuation of the line 39 drags the dumping section through the body section 26 to effectively expel all material from the bucket. This
35 automatic dumping, as well as elevating of the bucket is effectively accomplished by simple and ordinary manipulation of the single drag line 39. During this drag operation for filling and elevating as well as
40 dumping into the skip 11 for still further removal from the place excavated, the return line 29 has been running freely, while the guide line 23 may be controlled to pay out, take up slack, or still further shortened
45 to have the bucket swing free of the material between the dead-man 27 and the mast 8, as desired.

With the bucket dumped, the drag line 39 is slacked, this of itself being effective to
50 start the downward travel of the section 34. However for maximum speed in handling, thereby working the mechanism for greatest possible output, the return line 29 may accelerate the travel of section 34. As latch
55 bar 56 goes back, it is guided by incline 57, to strike cam face 58 of the member 46, which action forces the member 46 out of the retaining position in the latch 44, thus allowing the latch to be forced by this cam
60 face 58 into holding relation with the bar 56, thus locking the bucket sections assembled as they travel down the boom 12. The outward limit of travel of the section 34 as to the section 26 is limited by the stops 59 on
65 the section 26.

All connections to the bucket are within the normal bucket width, thus permitting of close lateral working for clean removal of material, a feature of considerable value in many instances not only in time but in labor
70 expense. Even without adjusting the frame to swing laterally on its bearings, the device has considerable range of action, for the boom 12 may, owing to its short bearing on rod 13 and to equalizing guys 15, 17, swing
75 quite a little out of line to nose into and lift the approaching loaded bucket. As the approach line of the bucket is lowered, owing to the removal of material, the boom 12 may be adjusted to incline down farther to
80 properly receive the bucket. By varying the point of connection of the drag line 39 to the connection 41 the angle of draw of the bucket into the material may be adjusted, so that a shallow cutting occurs, or a cutting
85 of greater depth in the regular filling operation.

What is claimed and it is desired to secure by Letters Patent is:

1. A material handling mechanism comprising a vertically pivoted frame having
90 at one side thereof a pivot bearing, and laterally of the pivot bearing a pair of bearings movable as to the pivot for sustaining the frame as to the pivot bearing, a vertical
95 mast centrally of the pivot bearing point, a boom pivoted to said mast and extending away from said pair of bearings, a drag bucket, bucket actuating means comprising
100 a line coacting with the boom and extending from the boom to the bucket, and a line extending from the bucket and away from the boom, said bucket actuating means being for drawing the bucket toward and from as
105 well as along the boom, and flexible means extending from the boom to the mast to adjust the boom for bucket travel therealong.

2. A material handling mechanism comprising a frame, a bucket, drag and return
110 lines for the bucket, a pivoted member mounted on the frame and provided with means to nose into said bucket toward and from which member said lines are connected to actuate said bucket, bucket guiding and
115 dumping means carried by the member, and a controlling device for the bucket effective through the drag and return lines to actuate the bucket toward and from the dumping means.

3. A material handling mechanism comprising a frame, an overhanging member
120 mounted thereon and provided with means to nose into and guide a bucket, a bucket guide line, and a drag line bucket movable in filling along said guide line to coact with
125 the guiding means of the overhanging member.

4. A material handling mechanism comprising a frame, an overhanging pivoted
member mounted thereon and movable to 130

nose into a bucket, said overhanging member provided with a guide and a trip, a bucket engageable by said member and movable along said guide to be dumped by the trip, a controlling line guide beyond the member, and a controlling line about the guide to actuate the bucket toward and from the member.

5. A material handling mechanism comprising a frame, an overhanging boom mounted thereon, said boom movable to nose into a bucket and provided with an inclined guide and a retaining device, a bucket engageable by said boom and movable along said guide to be engaged by the retaining device, a line guide beyond the boom, and a controlling line for the bucket coacting with the line guide to actuate the bucket from the boom.

6. A material handling mechanism comprising a frame, a boom mounted thereon, said boom movable to nose into a bucket and provided with an inclined guide, a trip and a retaining device, a bucket engageable by said boom and movable along said guide to be held by the retaining device during the dumping of the bucket by the trip, a line guide beyond the boom, and a controlling line for the bucket coacting with the line guide to actuate the bucket from the boom.

7. A material handling mechanism comprising a frame, a boom mounted thereon, said boom movable to nose into a bucket and provided with a retaining device and a trip, a bucket engageable by said boom and movable to be engaged by the retaining device during the tripping of the bucket for dumping, a line guide beyond the boom, and a controlling line for the bucket coacting with the line guide to actuate the bucket from the boom.

8. A material handling mechanism comprising a frame, an adjustable boom mounted thereon, said boom movable to nose into a bucket and provided with an inclined guide, a bucket having guide coacting means spaced from the bucket bottom to permit bucket travel along the inclined guide engageable by said boom and a line guide beyond the boom, and a control line coacting with the line guide to actuate the bucket from said boom and along said inclined guide.

9. A bucket elevating device comprising a pivotally mounted boom provided with a bucket guide, a drag line for the bucket extending beyond the boom, a return line, a line guide beyond the boom with which said return line coacts, a bucket engaged by the line to be actuated toward the boom and along said guide, and adjusting means for directing the boom into receiving position for the bucket.

10. A material handling mechanism comprising a frame, a bucket, a boom pivotally

mounted on the frame for movement relatively thereto, a block mounted to slide longitudinally of the boom, said boom provided with a guide to engage the bucket, means on the bucket for embracing the guide on the boom in its movement along the same and a drag line from the bucket through the block to guide the bucket to the boom, said line drawing the bucket into position for the boom to nose into said means on the bucket and then cause the bucket to ride up the boom guide.

11. A material handling mechanism comprising a frame, a bucket, a boom pivotally mounted on the frame for movement relatively thereto, adjusting means for varying the position of the boom, said boom provided with a guide to engage and lift said bucket, means on the bucket for embracing the guide on the boom in its movement along the same, a block mounted to slide longitudinally of the boom, and a drag line from the bucket and through the block to draw the bucket into position for the boom to nose into said means on the bucket and then cause the bucket to ride up the boom guide.

12. A material handling mechanism comprising a frame, a boom mounted on the frame, said boom being laterally movable and having its free end downwardly extending, a block reciprocable along said boom, a bucket, and a drag line from the bucket and through the block, to cause the block to deflect the boom in line with the approaching bucket.

13. A material handling mechanism comprising a frame, a boom pivotally mounted on the frame for movement relatively thereto, said boom having its free end downwardly extending, a block mounted to slide longitudinally of the boom, a bucket, a bucket guide on the boom, means on the bucket for embracing the guide on the boom in its movement along the same, and a drag line from the bucket through the block to draw the bucket into position for the boom to nose into said means on the bucket and then cause the bucket to ride up the boom.

14. A material handling mechanism comprising a frame, a boom pivoted thereto, incline adjusting mechanism for the boom, including a flexible guy permitting lateral movement of the boom, a guide carried by the boom, a bucket movable along the inclined boom, flexible actuating means extending from the bucket and coacting with the guide, and a driving device to which the means is connected to haul the bucket toward the boom.

15. A material handling mechanism comprising a frame, an inclined boom pivoted thereto, guy connections permitting lateral movement of the boom, boom incline adjusting means for the connections, a guide

carried by the boom, a bucket movable along the inclined boom, flexible actuating means extending from the bucket and coacting with the guide, and a driving device to which the means is connected to haul the bucket toward the boom.

16. A material handling mechanism comprising a frame, an inclined boom pivoted thereto, incline adjusting mechanism for the boom including a divided forward guy and an after guy having sections continuous with the forward guy, a guide carried by the boom frame, a bucket movable along the inclined boom, flexible actuating means extending from the bucket and coacting with the guide, and a driving device to which the means is connected to haul the bucket toward the boom.

17. A material handling mechanism comprising a frame, an inclined boom pivoted thereto, forward and rear guys from the frame to the boom, boom incline adjusting means for one of the guys to vary the angle of the boom relatively to the frame, a guide carried by the boom, a bucket movable along the inclined boom, flexible actuating means extending from the bucket and coacting with the guide, and a driving device to which the means is connected to haul the bucket toward the boom.

18. The combination with a sectional bucket of an elevating boom, a bucket section assembling mechanism comprising a retaining device on the boom for a first bucket section having means to stop said section from forward travel and hold said section from backward travel, guiding means on the boom to permit actuation of the bucket sections into assembled material retaining position, said retaining device provided with holding means for engaging the first bucket section, said second bucket section provided with releasing means coacting with the holding means as the second bucket section comes into assembled position relatively to the first bucket section to disconnect it from the retaining device, and a line operable to assemble said sections.

19. The combination with a guide of a bucket having a releasable body section movable along said guide, there being a dumping section for said bucket, holding means for maintaining said sections assembled, and bucket assembling mechanism comprising stopping means on the guide to engage and trip the holding means to release the sections to permit operation of the dumping section as to the stopping means, said stopping means having return prevention means engaging and holding the body section for re-assembling.

20. The combination with a guide of a sectional bucket movable along said guide, holding means for maintaining said sections assembled, a trip mounted on the

guide to release the holding means to free the sections for relative movement by stopping one of the sections, and a bucket assembling mechanism comprising a retaining device on the guide engaging the holding means to thereby hold the stopped section from backward travel relatively to the guide, said device having releasing means operable by relative travel of the section.

21. The combination with a guide having a trip thereon, and bucket assembling mechanism comprising a retaining device, of a bucket having a releasable body section, a dumping section, and holding means for maintaining said sections assembled, said body section movable along said guide to be stopped by the trip as the dumping section is released by the trip, said body section being held from backward travel by the retaining device during the operation of the dumping section, thereby providing a positive holding of the body section when released from the dumping section for subsequent re-assembling.

22. The combination with a guide having a trip and bucket assembling mechanism comprising a retaining device on the guide, of a single working and sectional bucket, holding means for retaining the bucket sections in material retaining position, and a line to one of the bucket sections to actuate the bucket along the guide, said trip having means for disconnecting the section holding means and means for stopping one of the bucket sections independently of the others, said retaining device being provided with means for preventing backward travel of the stopped section to permit re-assembling of the sections, said line connected bucket section provided with a release for the retaining device effective to bring about reassembling of the bucket sections on the return movement of the line connected bucket section along the guide to the stopped section.

23. The combination with a guide having a trip and bucket assembling mechanism comprising a retaining device thereon, of a sectional bucket, holding means for maintaining the bucket sections in material retaining position, a line to one of the bucket sections to actuate the bucket along the guide, said trip having bucket section stopping means to free the section holding means and release the sections, said retaining device having means to hold the stopped bucket section from movement along the guide, and a second line coacting with said sections and actuable to move the said sections into material retaining position, said line actuated section having means to free the held section from the retaining device in re-assembling.

24. The combination with a mast, and remote from the mast an anchor, of a line ex-

tending from the mast to the anchor, a bucket mounted on the line, drag and return lines for the bucket, a movable boom supported by the mast, and a line guide on the boom for the drag line, said boom deflected by the drag line toward the bucket and provided with a guide to lift the bucket. 15

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES A. FRAYER.

Witnesses:

GEO. KIRK,
GLADYS JAMESON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

It is hereby certified that in Letters Patent No. 1,036,481, granted August 20, 1912, upon the application of Charles A. Frayer, of Toledo, Ohio, for an improvement in "Material-Handling Mechanism," an error appears in the printed specification requiring correction as follows: Page 4, line 93, for the word "and" read *end*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of September, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.