Dec. 1, 1925. **1,564,041**

C. N. WINDECKER

GRAB BUCKET

Filed Feb. 25, 1924 7 Sheets-Sheet 1

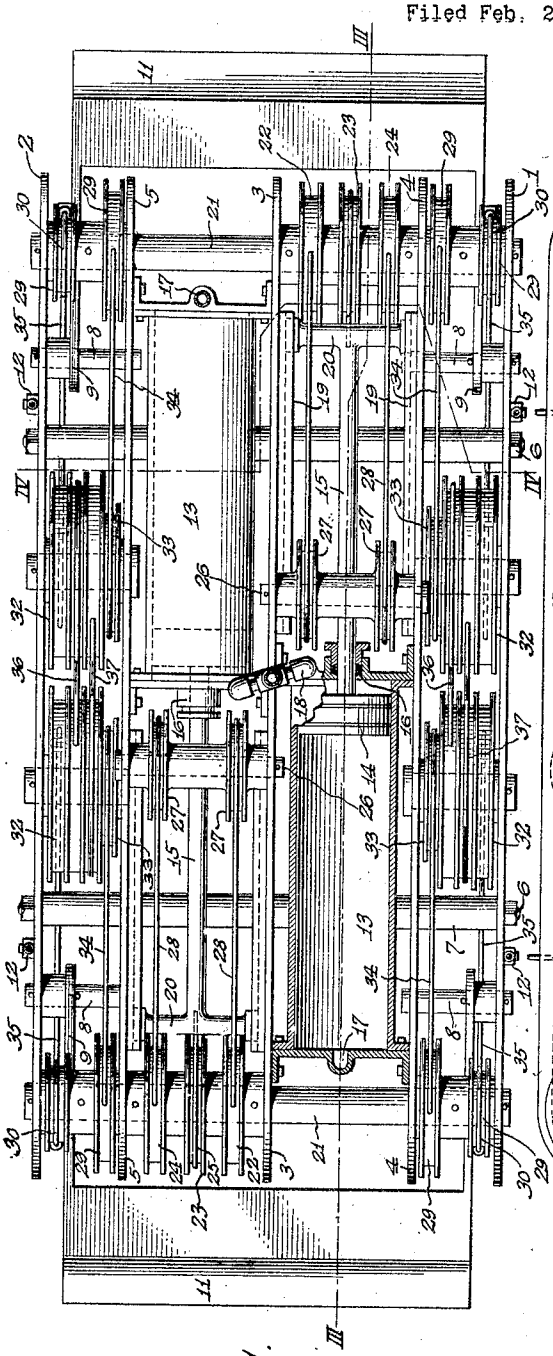


Fig. 1.

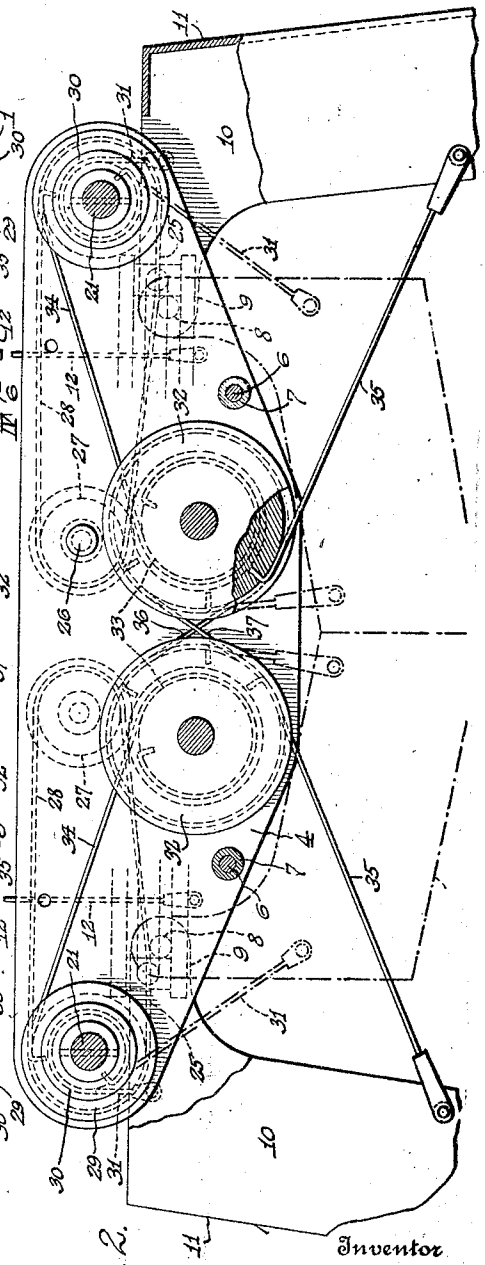


Fig. 2.

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Dec. 1, 1925. 1,564,041

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GRAB BUCKET

Filed Feb. 25, 1924 7 Sheets-Sheet 2

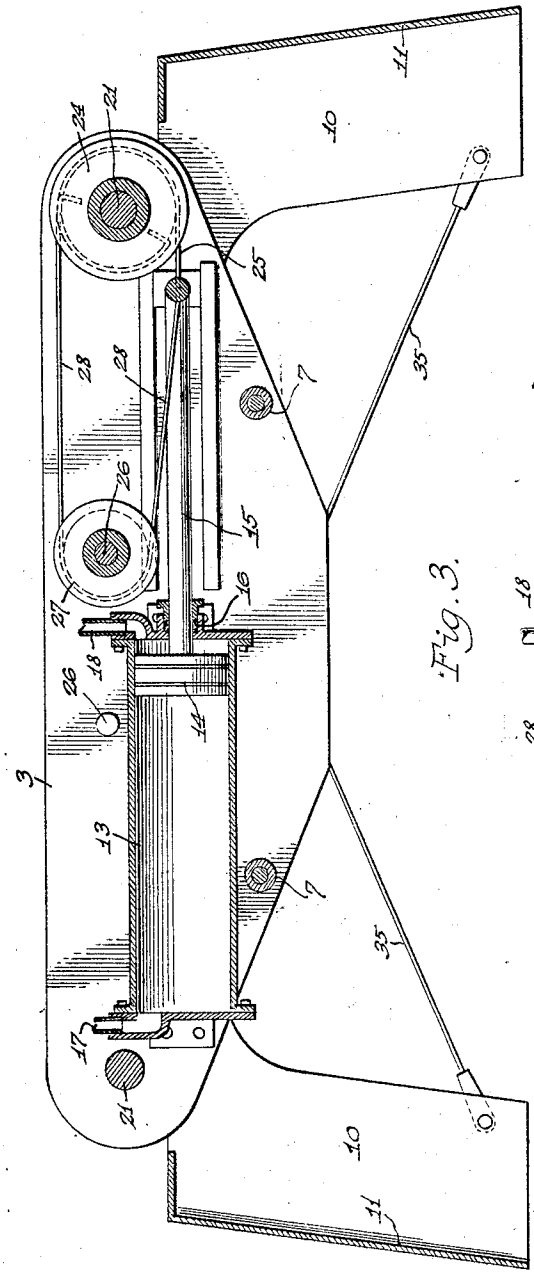


Fig. 3.

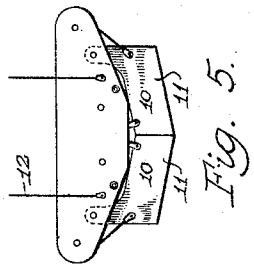


Fig. 5.

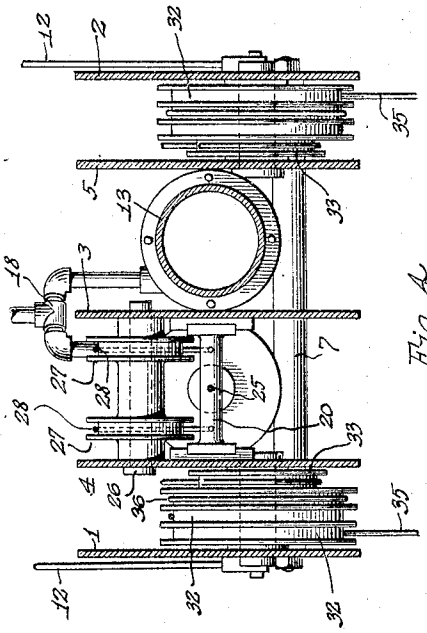


Fig. 4.

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Dec. 1, 1925. 1,564,041

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GRAB BUCKET

Filed Feb 25, 1924 7 Sheets-Sheet 3

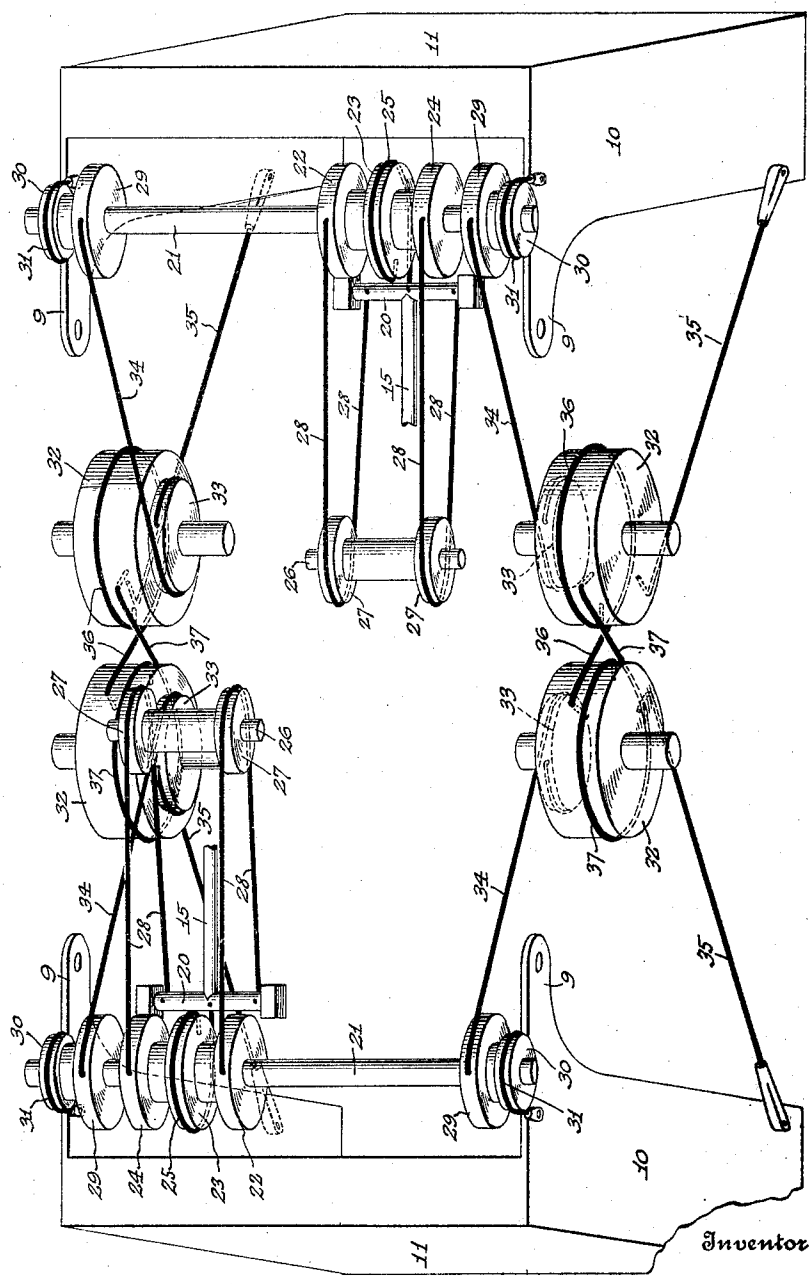


Fig. 6.

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GRAB BUCKET

Filed Feb. 25, 1924 7 Sheets-Sheet 4

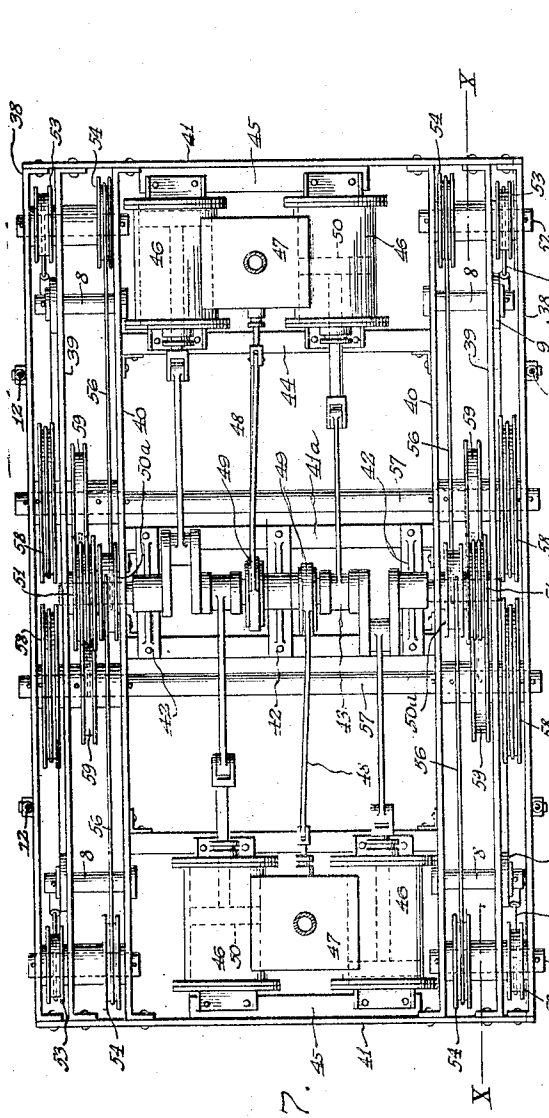


Fig. 7.

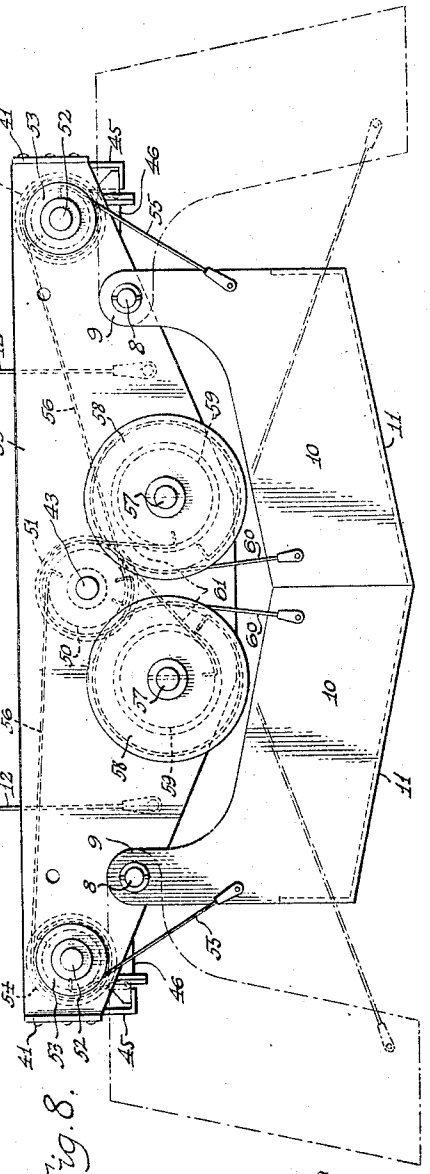


Fig. 8.

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Dec. 1, 1925. 1,564,041

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GRAB BUCKET

Filed Feb. 25, 1924 7 Sheets-Sheet 5

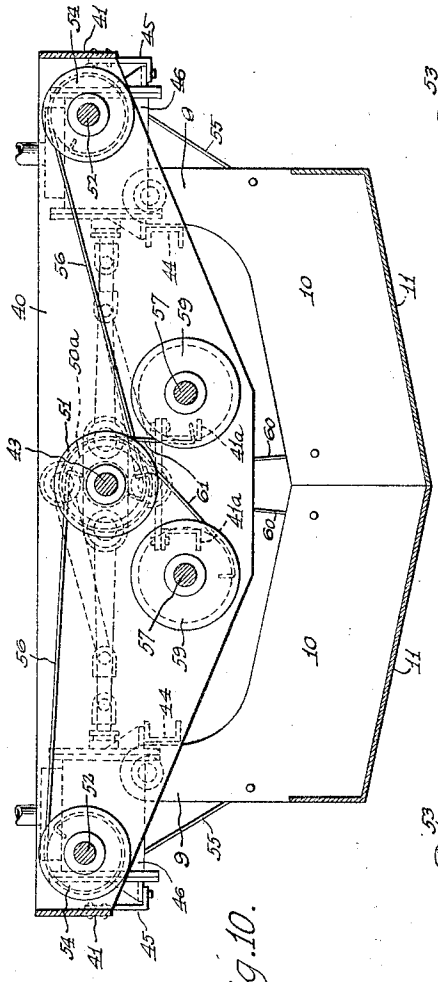


Fig. 10.

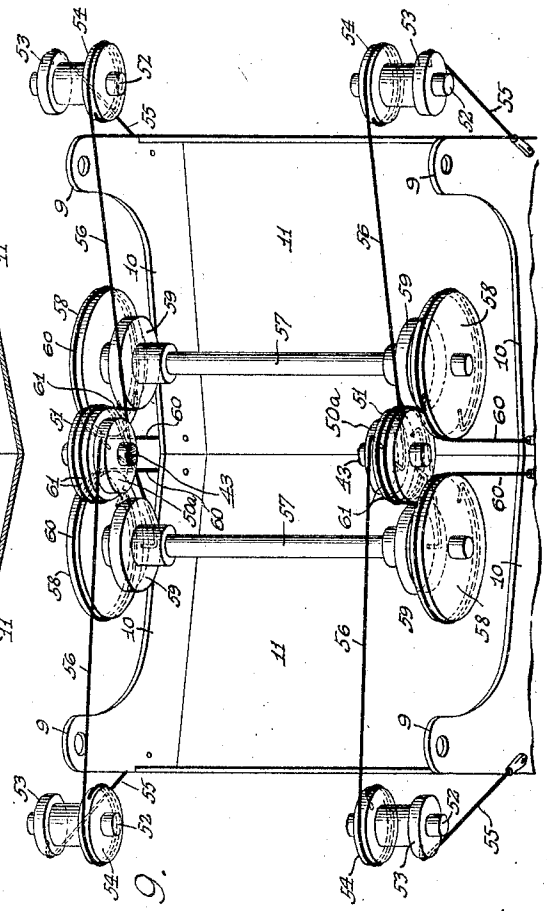


Fig. 9.

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GRAB BUCKET

Filed Feb. 25, 1924 7 Sheets-Sheet 6

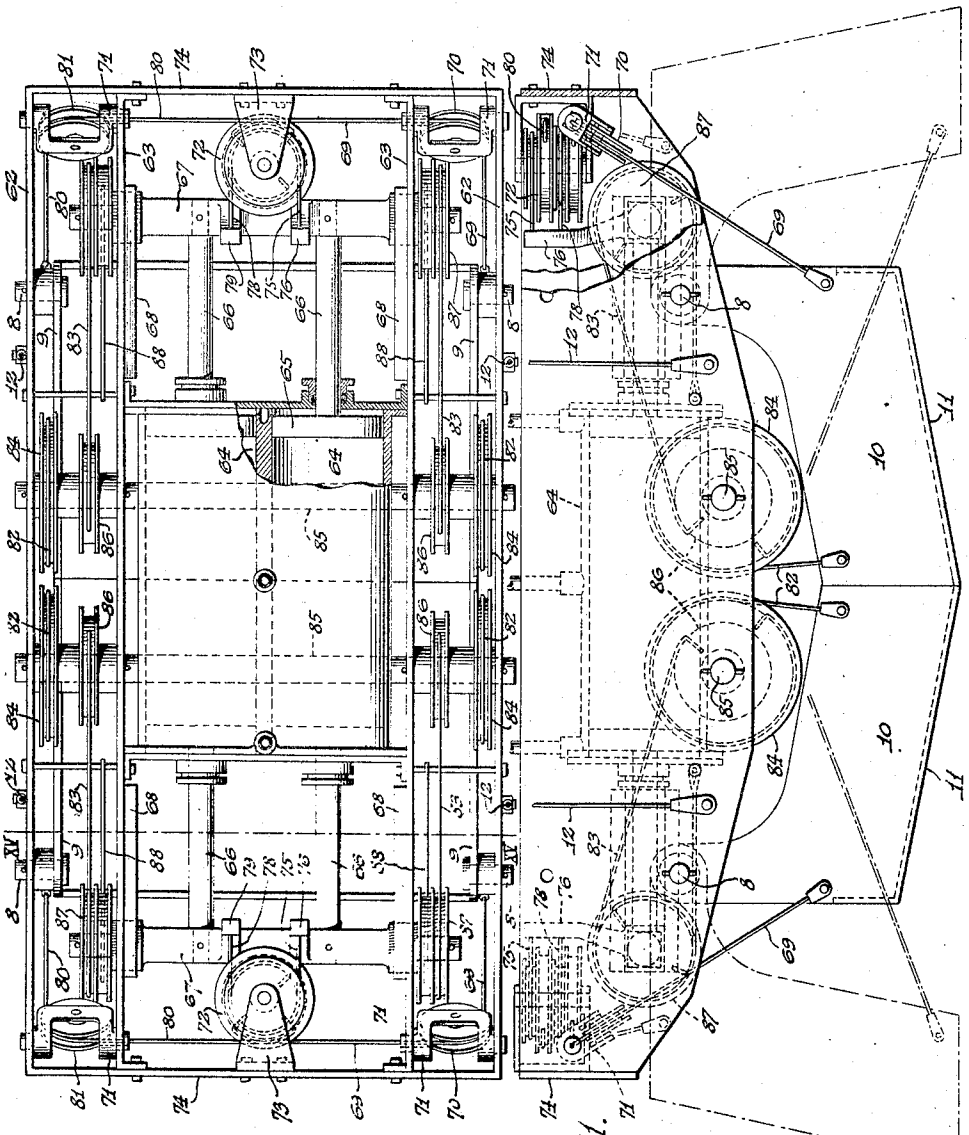


Fig. 12.

Fig. 11.

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1,564,041

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GRAB BUCKET

Filed Feb. 25, 1924

7 Sheets-Sheet 7

Fig. 15.

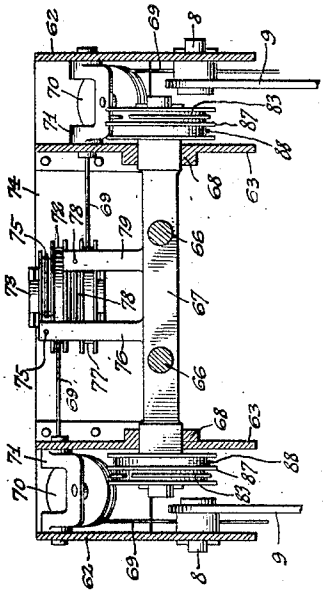


Fig. 13.

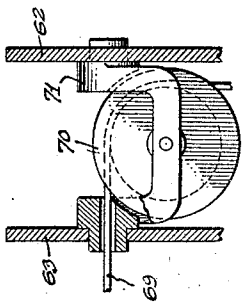
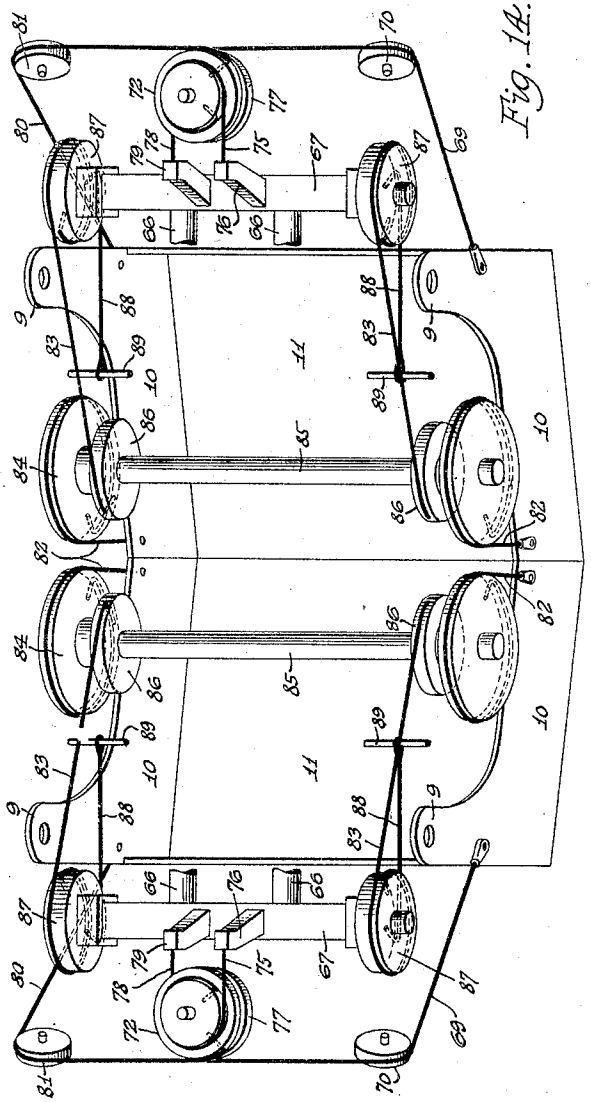


Fig. 14.



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Patented Dec. 1, 1925. 1,564,041

UNITED STATES PATENT OFFICE.

CLIFTON N. WINDECKER, OF PAINESVILE, OHIO.

GRAB BUCKET.

Application filed February 25, 1924. Serial No. 694,881.

To all whom it may concern:

Be it known that I, CLIFTON N. WINDECKER, a citizen of the United States, residing at Painesville, in the county of Lake and State of Ohio, have invented certain new and useful Improvements in Grab Buckets, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to grab buckets and has special reference to that class of buckets which are adapted to pick up a load and discharge it, either for bulk loading, unloading or transferring purposes. The bucket is characterized in many particulars, among the most important of which may be mentioned:—

First, a comparatively flat and shallow structure of maximum capacity which permits of the bucket being operated in a limited space prohibitive to the ordinary clam bucket.

Second, instead of depending on a remote mechanism for manipulating the grab spades, closures or shells of a bucket, I mount the operating mechanism in the bucket so that there are no arms, trolleys or other mechanism that would interfere with the operation of the bucket in a comparatively small space. The operating mechanism may utilize steam, air or other liquid as a motive fluid and by so arranging the cylinders, pistons, cables and sheaves the opening and closing of the bucket spades can be effected more efficiently and with a minimum of space. On account of the application of power being applied in proximity to the bucket spades it it obvious that the power may be exerted to greater advantage when grabbing a load; that there will be a more positive control of the bucket.

Third, the operating mechanism for opening and closing of the spades is entirely independent of the hoisting mechanism thereby permitting unusual and advantageous control of the bucket.

Fourth, there are various ways of using fluid pressure as a means of converting linear motion into rotary motion for winding and unwinding purposes where cables are arranged for opening and closing spades of a bucket, and the various forms of my invention will be hereinafter specifically described and then claimed.

Reference will now be had to the drawings, wherein,

Figure 1 is a plan of a grab bucket partly broken away and partly in horizontal section;

Fig. 2 is a side elevation of the bucket with one of the side plates thereof removed showing a bucket open in full lines and closed by dot and dash lines;

Fig. 3 is a longitudinal sectional view taken on the line III—III of Fig. 1;

Fig. 4 is a cross sectional view taken on the line IV—IV of Fig. 1;

Fig. 5 is a side elevation, on a reduced scale, of the bucket when closed;

Fig. 6 is a perspective view, somewhat diagrammatic, of the cable and sheave arrangement for opening and closing the spades of the bucket;

Fig. 7 is a plan of a grab bucket showing another form of operating mechanism;

Fig. 8 is a side elevation of the same with one of the side plates thereof removed;

Fig. 9 is a perspective view, somewhat diagrammatic of the cable and sheave arrangement for the bucket shown in Figs. 7 and 8;

Fig. 10 is a longitudinal sectional view taken of the line X—X of Fig. 7;

Fig. 11 is a side elevation of still another form of bucket, partly broken away and partly in section, showing the bucket closed in full lines and open in dot and dash lines;

Fig. 12 is a plan of the same;

Fig 13 is an enlarged detail sectional view of one of the pivoted sheaves for the bucket shown in Figs. 11 and 12;

Fig. 14 is a perspective view, somewhat diagrammatic, of the cable and sheave arrangement for the bucket shown in Figs. 11 and 12, and

Fig. 15 is a cross sectional view taken on the line XV—XV of Fig. 12.

Reference will first be had to Figs. 1 to 6 inclusive where the framework of the grab bucket is composed of outer plates 1 and 2, a central plate 3 and intermediate plates 4 and 5. These plates are disposed in parallelism with the central portions of said plates of greater depth than the ends thereof and said plates are maintained in spaced relation, particularly by tie rods 6 and spacing sleeves 7.

The outer plates 1 and 2 adjacent the ends thereof and on the inner faces of said plates are provided with pins 8 and pivotally mounted on said pins are the apertured ears 9 of side walls 10 of spades 11, each being

somewhat in the form of a scoop with the dimensions of the spades such that the open ends of the spades may confront each other, as shown in Fig. 5 and form an oblong receptacle. With the outer upper ends of the spades pivoted the spades may be swung downwardly to an open position and in such position enter loose bulky matter for grabbing a quantity of such matter as the spades are drawn towards each other to a closed position. The configuration of each spade is such that it is comparatively shallow, yet on account of the length of such spades affording a large capacity. It will be noted that when the spades are closed they are in close proximity to the framework of the bucket and the outer plates 1 and 2 of the bucket framework may cooperate with the side walls 10 of the spades in preventing large bulky matter from falling over the side walls 10 during movement of the bucket framework.

Attached to the outer plates 1 and 2 adjacent the ends thereof are suspension cables or members 12 by which the bucket may be raised and lowered or otherwise manipulated.

There is an operating mechanism for each spade 11 and the operating mechanisms are identical in construction and are adapted to operate in synchronism so that there will be an even and uniform movement of the spades 11 when opening or closing. I deem it only necessary to describe in detail one of said operating mechanisms and then refer to the cooperation of said mechanisms.

Between the central plate 3 and the intermediate plate 4, at one end thereof is a cylinder 13 containing a piston 14 provided with a piston rod 15 extending through a stuffing box 16 at one end of the cylinder, said cylinder having suitable connections 17 and 18 for the intake and exhaust of a motive fluid adapted to reciprocate the piston 14 in the cylinder. The motive fluid may be conducted to the cylinder from a remote source and the intake and exhaust of fluid to and from the cylinder controlled by the manipulation of a suitable valve (not shown.)

The confronting faces of the central plate 3 and the intermediate plate 4 have longitudinal slide-ways 19 for a cross head 20 on the outer end of the piston rod 15, and journaled in the plates 3 to 5 inclusive, at the outer ends of the slideways 19, is a main shaft 21 on which is fixed three sheaves 22, 23, and 24, between the plates 3 and 4. Attached to the sheave 23 and wound thereon is a cable or flexible member 25 connected to the cross head 20 whereby when the cross head is reciprocated in one direction the cable 25 will impart rotation to the shaft 21. Journaled in the plates 3 and 4 adjacent the inner ends of the slide-ways 19 is an auxiliary shaft 26 and mounted on said shaft are articulated sheaves 27 about which are trained cables 28, said cables being attached to the cross head 20 and to the sheaves 22 and 24. Movement of the cross head 20 in the opposite direction to that previously mentioned will cause rotation of the shaft 21 in an opposite direction.

On the shaft 21, between the plates 2 and 5 and also between the plates 4 and 1 are sheaves 29 and 30. Attached to the sheave 30 and wound thereon is a cable 31 which has its free end attached to the side wall 10 of the spade 11, contiguous to the apertured ear 9 of the side wall.

Rotatable between the side plates 2 and 5, also between the plates 1 and 4, are main sheaves 32 and 33. Attached to the main sheave 33 is a cable 34 which extends to the sheave 29 thus permitting of rotation being imparted to the sheaves 32 and 33 from the shaft 21.

Attached to the sheave 32 is a cable 35 which has its free end connected to a side wall 10 of the spade 11, adjacent its open end.

It is apparent by reference to Fig. 6 that the cables 35 are employed for closing the spades and the cables 31 employed for opening the spades, it being necessary that there be slack or an unwinding movement of the cables 35 when the spades are opened and slack or unwinding of the cables 31 when the spades are closed.

To insure uniform movement of the two spades the main sheaves 32 of one spade operating mechanism are connected to the main sheaves 32 of the other spade mechanism by cables 36 and 37 wound in reverse directions on said main sheaves and suitably connected thereto, consequently these main sheaves will be caused to rotate in synchronism and prevent one spade from lagging behind or moving in advance of the other.

By reference to Figs. 1 and 4 it will be noted that the connection 18 is for both cylinders and the connections 17 are adapted to communicate with each other whereby the pistons in said cylinders can be simultaneously moved to effect opening or closing of the spades through the medium of the novel arrangement of sheaves and cables just described. With the operating mechanisms housed in the framework there is no superstructure, such as levers, arms etc., which would interfere with the bucket occupying a comparatively small space, particularly when closed, and since power is applied in close proximity to the spades it is obvious that greater force may be exerted in connection with the spades for grabbing or scooping purposes, than if the power were transmitted from some remote point.

Another form of operating mechanism

for the bucket spades is shown in Figs. 7 to 10 inclusive and the framework for the bucket includes a set of outer side plates 38, a set of intermediate plates 39 and a set of central plates 40 with the outer ends of all of said plates connected by end plates 41. Connecting the central plates 40 are transversely disposed supports 41ª for bearings 42 provided with a crank shaft 43, said crank shaft having its ends extending through the intermediate plates 39.

Between the central plates 40 are supports 44 cooperating with supports 45 of the end plates 41 in supporting cylinders 46 arranged in pairs with a steam or air chest 47 connecting the cylinders of each pair, the steam or air chest containing a conventional form of slide valve mechanism connected by a pitman 48 to an eccentric 49 on the crank shaft 43, whereby steam or air may be admitted to said cylinders in timed relation. In the cylinders are pistons 50 connected at 90° to the crank shaft 43 so that said crank shaft may be driven by all of the pistons, thus providing a power plant somewhat similar to a steam engine, and provision may be made so that the operation of the engine may be reversed and the crank shaft 43 driven in a desired direction.

On the outer ends of the crank shaft 43, between the plates 40 and 39 are sheaves 50ª and 51.

Journaled in the outer ends of the plates 38, 39 and 40 are auxiliary shafts 52 for articulated sheaves 53 and 54, the sheaves 53 being connected by cables 55 to the pivoted ends of the spades, and the sheaves 54 connected by cables 56 to the sheaves 50ª.

Contiguous to the crank shaft 43 are main shafts 57 provided with sheaves 58 and 59. The sheaves 58 have cables 60 connected to the outer open ends of the spades 11 and the sheaves 59 are connected by cables 61 to the sheaves 51, the winding arrangement of the various cables being such as to be maintained taut as the spades 11 are either opened or closed by rotation of the crank shaft 43 in a desired direction.

Still another form of my invention has been shown in Figs. 11 to 15 inclusive wherein the bucket framework includes connected outer side plates 62 and intermediate plates 63 with the intermediate plates supporting cylinders 64 adapted to receive a motive fluid at either end thereof for shifting back and forth pistons 65 in each cylinder. The sets of pistons have rods 66 connected to cross heads 67 slidable in ways 68 carried by the intermediate plates 63.

The arrangement of sheaves and cables for each bucket spade are identical, therefore I deem it only necessary to describe one arrangement at one end of the bucket framework. The bucket spades 11 are pivotally supported from the side plate 62 and the pivoted ends of said spades are connected to cables 69 trained over sheaves 70 journaled in yokes 71 trunnioned in and between the plates 62 and 63 with one of the trunnions hollow so that the cable 69 may extend to and about a compound sheave 72 rotatable in a bracket 73 carried by an end plate 74 of the framework. The compound sheave 72 has another cable 75 attached thereto which extends to a post 76 on the cross head 67. Rotatable in the bracket 73 is another compound sheave 77 having a cable 78 to another post 79 of the cross head 67, and another cable 80 from the compound sheave 77 extends over the sheave 81, similar to the sheave 70 and is attached to the opposite side of the bucket spade from that of the cable 69. It is therefore apparent that reciprocation of the cross head 67 will cause winding and unwinding of the cables 69 and 80.

For moving the open ends of the bucket spades 11 sets of cables 82 and 83 are employed. The set of cables 82 are attached to the open end of the bucket spade 11 and to large sheaves 84 on a shaft 85 journaled in the bucket framework below the cylinders 64. Forming part of the sheaves 84 are small sheaves 86 to which are attached the cables 83, said cables being attached to compound sheaves 87 rotatable on the ends of the cross heads 67. Other cables 88 are attached to the compound sheaves 87 and to anchor rods 89 connecting the plates 62 and 63, the cables 88 being arranged the reverse of the cables 83 on the compound sheaves 87.

In all of the sheave and cable arrangements herein disclosed it is to be understood that the cables or flexible members are prevented from becoming accidentally displaced by grooved or flanged sheaves and that in training the cables relative to said sheaves there is an arrangement by which some cables are wound and others unwound with the transmission of power by said cables accomplishing the duty to be performed.

What I claim is:—

1. A grab bucket comprising a framework, spades pivotally connected to said framework adapted to close in proximity to said framework and when open extend downwardly from said framework, and means horizontally disposed in said framework adapted for swinging said spades on their pivots.

2. A grab bucket as called for in claim 1, wherein said spades are substantially rectangular and shallow and lie in parallelism with said framework when in closed position.

3. A grab bucket as called for in claim 1, wherein said means includes a cylinder and slide cross head for each spade.

4. A grab bucket as called for in claim 1,

wherein said means includes end and intermediate sheaves, cables extending longitudinally of said framework and motive fluid adapted to effect movement of said cables.

5. A grab bucket as called for in claim 1, wherein said means includes cylinders, pistons in said cylinders adapted to be shifted by motive fluid admitted to said cylinders, a set of sheaves for each spade, cables connecting the sets of sheaves, and cables on the other of said sheaves operated by said pistons to swing said spades.

6. A grab bucket comprising a framework, pivoted spades supported from said framework and adapted to open and close relative to each other, and motive fluid operated means horizontally disposed in said framework adapted for opening and closing said spades.

7. A grab bucket as called for in claim 6, wherein said motive fluid operated means includes cables for opening said spades, cables for closing said spades, all of said cables extending longitudinally of said framework, and sheaves by which said cables may be wound and unwound to effect opening and closing of said spades.

8. A grab bucket comprising a framework, spades supported from said framework and adapted to open and close relative to each other, cables extending longitudinally of said framework adapted for opening and closing each spade, cable operating means in one end of said framework for each spade and means articulating said cable operating means to cause synchronous movement of said spades.

9. A grab bucket as called for in claim 8, wherein said cable operated means includes motive fluid operated pistons and sheaves, the cables being arranged on said sheaves, so that some of the cables are wound and others unwound to effect opening and closing of said spades.

10. A grab bucket comprising a framework, spades supported from said framework and adapted to open and close relative to each other, a horizontal arrangement of cables and sheaves in each end of said framework for each spade, said cables being attached to said sheaves and trained thereon to cause opening and closing of said spades when said sheaves are rotated, and means in said framework to cause rotation of said sheaves.

11. A grab bucket as called for in claim 10, wherein said framework includes parallel plates with the last mentioned means between intermediate plates and said sheaves between other of said plates.

In testimony whereof I affix my signature.

CLIFTON N. WINDECKER.