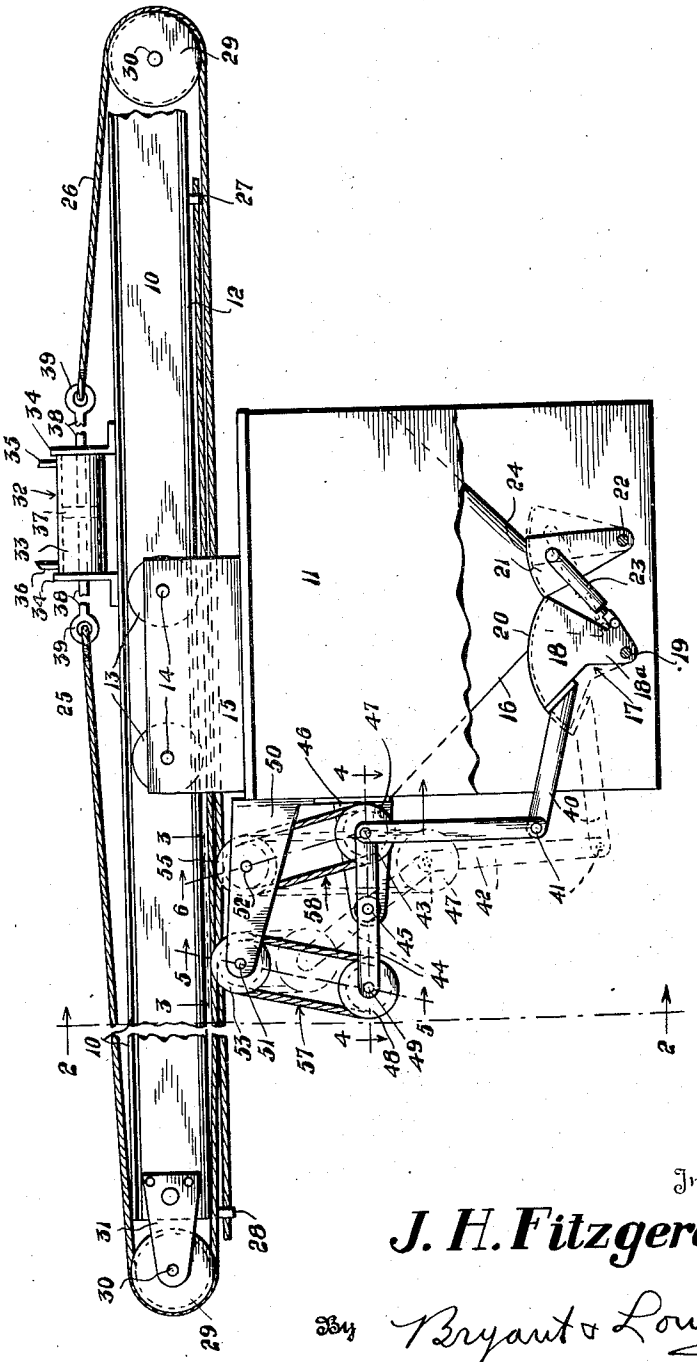
April 15, 1947. J. H. FITZGERALD 2,419,129

CABLE CONTROLLED BOOM BUCKET AND CLOSURE

Filed April 21, 1945 4 Sheets-Sheet 1

FIG. 1.



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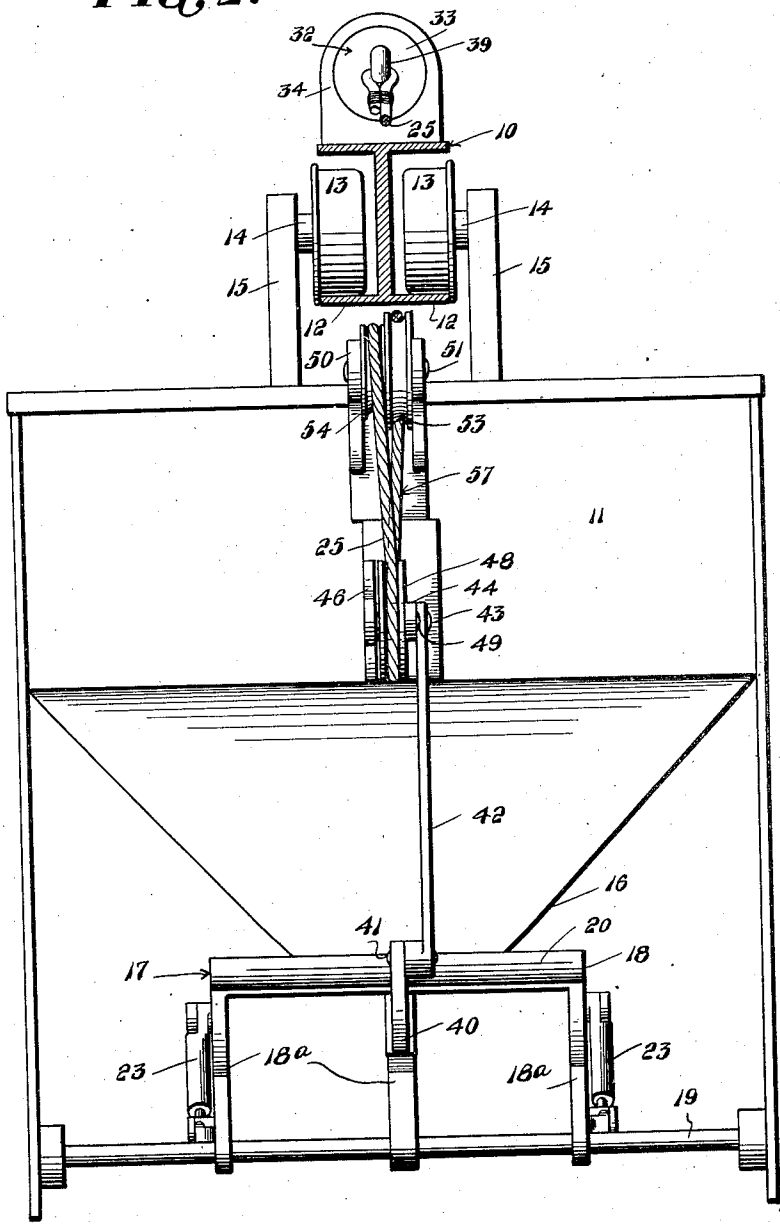
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CABLE CONTROLLED BOOM BUCKET AND CLOSURE

Filed April 21, 1945 4 Sheets-Sheet 2

FIG. 2.



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CABLE CONTROLLED BOOM BUCKET AND CLOSURE

Filed April 21, 1945 4 Sheets-Sheet 3

FIG. 3.

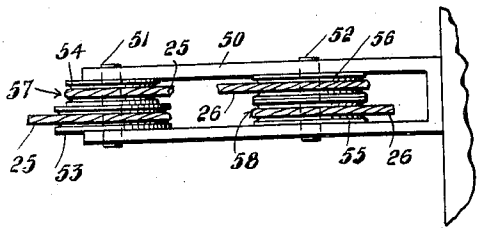


FIG. 4.

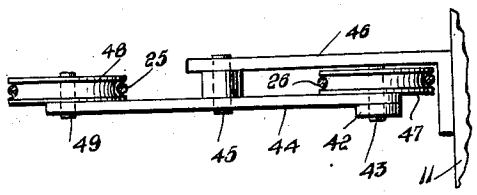


FIG. 5.

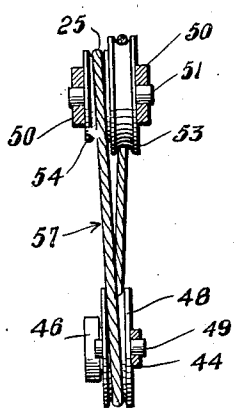


FIG. 6.

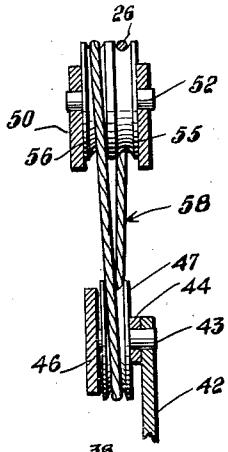
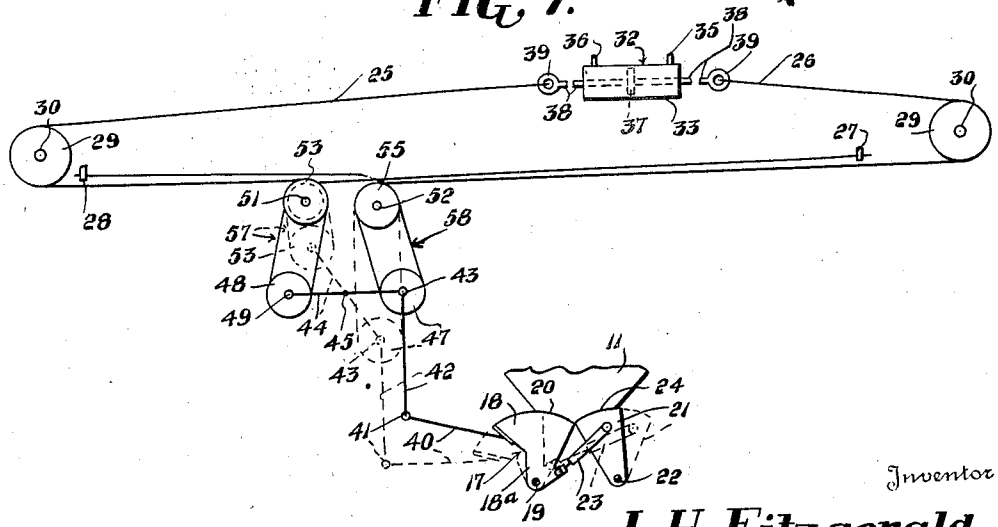


FIG. 7.



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CABLE CONTROLLED BOOM BUCKET AND CLOSURE

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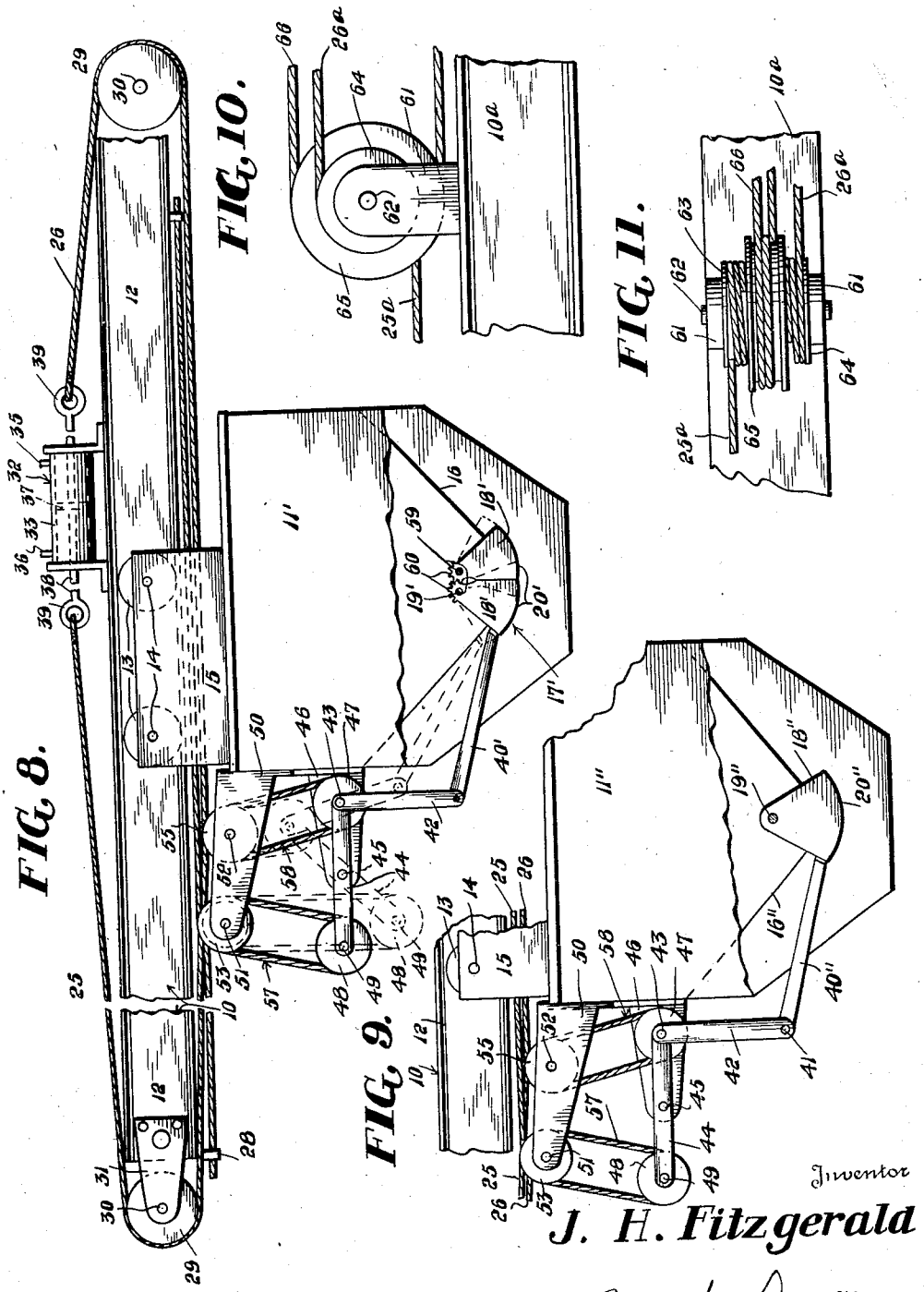


FIG. 8.

FIG. 9.

FIG. 10.

FIG. 11.

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UNITED STATES PATENT OFFICE

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CABLE CONTROLLED BOOM BUCKET AND CLOSURE

James H. Fitzgerald, Westfield, N. J.

Application April 21, 1945, Serial No. 589,650

14 Claims. (Cl. 214—59)

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This invention relates to a conveyor bucket of the type usually mounted for travel on a boom, and to the control of the closure for such bucket.

A prime object is to provide a novel, more efficient and simplified means which is operable to open or shut the closure means for the conveyor bucket in any position of the permissible travel of the conveyor bucket, whether the latter is stationary or in motion.

Another important aim is to provide in connection with a traveling bucket, flexible cable means or the like so mounted and connected to the bucket and its support, that the bucket is capable of travel on the support in opposite directions, notwithstanding association with the cable means, and which cable means is operable to open and shut the closure means of the bucket.

A third object is to provide the aforesaid cable means as two cables or other flexible elements, one adapted to be paid out as the other is retracted, and vice versa, and which elements are trained over an actuating mechanism for the closure means of the bucket.

Another important object is to provide a link and leverage mechanism to open and shut the closure means of the bucket, which in turn is actuated by novel cable means.

A further aim is to provide a lever and linkage to open and shut the closure means of the bucket, in association with the oppositely movable cable elements so looped and trained as to actuate the said lever.

Various additional objects and advantages will in part be pointed out and otherwise become apparent from a consideration of the description following, taken in connection with the accompanying drawings illustrating an operative embodiment by way of example.

In said drawings:

Fig. 1 is a view of the invention in side elevation;

Fig. 2 is a view in section, on an enlarged scale, taken on the line 2—2 of Fig. 1;

Fig. 3 is a section taken on the line 3—3 of Fig. 1;

Fig. 4 is a section taken on the line 4—4 of Fig. 1;

Fig. 5 is a section taken on the line 5—5 of Fig. 1;

Fig. 6 is a section taken on the line 6—6 of Fig. 1;

Fig. 7 is a diagrammatic view of the control parts;

Fig. 8 is a view of a modified form of the invention in side elevation;

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Fig. 9 is a fragmentary view of another modified form of the invention, in side elevation;

Fig. 10 is a fragmentary side elevation of the boom and a modified form of actuating device for the control cable elements employed; and

Fig. 11 is a fragmentary view, in plan, of the parts of Fig. 10.

Referring specifically to the drawings, wherein like reference characters designate like or similar parts throughout the different views, and first to the form of Figs. 1 to 7: 10 designates a support or boom which is to be taken as generic of the type on which a bucket 11 is mounted for longitudinal travel in opposite directions, and which bucket is adapted to convey concrete or any other desired material, the boom for instance being pivoted or mounted to swing at the right hand end thereof as on a horizontal axis or of the type wherein the boom moves in parallelism to the ground.

One specific example is that of a paving machine or other construction of machine wherein element 10 is a "swing boom." This boom specifically constitutes no part of my invention, nor does the particular mounting of the bucket 11 thereon. However, boom 10 may be an I-beam or two channel irons or any other desired type of track on which wheels or rollers 13 travel, and which in turn are journalled on stub-axles 14 supported by plates, risers or any equivalent 15 on the bucket 11. Horizontal flanges 12 constitute tracks as they are directly engaged by said rollers 13.

The bucket 11 is of that type usually open at the top and arranged to discharge through a hopper outlet 16 under control of closure or gate mechanism 17. This gate mechanism is to be considered as generic since many types may equally well be used, for instance one or more closures or gates such as 18 journaled on the bucket by shaft 19, and having an upper convex wall 20 to close the outlet of the hopper, and side walls 18^a fastened to said shaft 19 (Fig. 2).

While a single gate or closure 18 may be employed, I may also use a companion closure or gate 21 in connection therewith, the same being pivoted to the bucket 11 as at 22, and so connected to the closure 18 by mechanism 23 (forming no part of the invention) as to cause closure 21 to move simultaneously with the closure 18, that is to cause gates 18 and 21 to move apart at their closure walls 20 and 24 when rocked in one direction to move toward each other and into contact when rocked in the opposite direc-

tion, it being understood that the surface 24 is convex like the surface 20.

The instant invention primarily concerns the actuation of the closure means 17 while bucket 11 is in any position it may take with respect to the boom 10 and whether stationary or in motion. To this end, I provide a pair of cables or other flexible elements or any equivalents as at 25 and 26. Such cable elements 25 and 26 are respectively anchored or dead-ended at 27 and 28, respectively, usually adjacent opposite ends of the boom 10, such elements being trained over sheaves 29 journaled at 30 in brackets 31, or otherwise, on boom 10.

Said flexible elements 25 and 26 are connected to a prime mover or actuator 32 so that as one element 25 is paid out or moves in one direction, the other element will be paid out and correspondingly moved in the opposite direction, and vice versa. Such actuator 32, as shown in Fig. 1, is mounted on the boom 10, but this is not essential since the structure may be positioned or located wherever desired, and for instance on the frame of the paver or other machine carrying the boom 10.

In Fig. 1, in particular, the actuator 32 is shown as a double-ended, pneumatic or hydraulic cylinder 33 connected by end heads 34 to the boom and to the opposite sides of which the power medium is supplied and exhausted through the conduits 35 and 36 in the usual manner. Slidable within the cylinder 33 is a piston 37 having rods 38 projecting from opposite ends thereof axially of the cylinder and extending through the heads 34 to the exterior and terminating in eyelets 39 to which the adjacent ends of cables 25 and 26 are anchored, as shown.

Extending from the closure 18 is an arm or crank 40 pivoted at 41 to a link 42 which is in turn pivoted at 43 to one end of a control lever 44 which is pivoted intermediate its ends at 45 to a bracket 46 or otherwise to the bucket 11. Pivot 43 is in the form of a short shaft, on which a sheave 47 is journaled. A similar shaft 48 is located at the other end of control lever 44, being journaled on a short shaft 49 mounted thereby.

Above the bracket 46 or otherwise, I have shown a bracket 50 also fastened to the bucket 11, and which has stub-shafts 51 and 52 fixed thereon. Shaft 51 loosely journals separate sheaves 53 and 54 thereon, while shaft 52 loosely journals separate sheaves 55 and 56 thereon.

The cable or flexible element 25 is trained over the sheave 54, thence over the sheave 48, and thence over the shaft 53, thus forming a loop at 57. Cable or flexible element 26 is trained over the sheave 56, thence over the sheave 47, and thence over the sheave 55, forming a loop as at 58.

Said loops 57 and 58 as the cables or flexible elements 25 and 26 are moved in one direction, one loop will be shortened, while the other will be lengthened, and vice versa in order to swing the lever 44 on the fulcrum 45, thus alternately moving the closure 17 to open position and closed position. It will be noted that I avoid the use of springs or spring control, and the consequent objections in both the opening and shutting of the closure mechanism 17.

Briefly summarizing the operation and with particular reference to Figs. 1 and 7, the bucket 11 is capable of travel by means of the rollers 13 along the boom at all times, usually being manually pushed, and the loops 57 and 58 and

sheaves associated therewith, paying out and winding accordingly but without actuating the lever 44, and accordingly without operating closure means 17. However, at any position of the bucket 11 with respect to the boom, and regardless of whether the bucket is stationary or in movement, the prime mover or actuator 32 is used to open or close the associated closure mechanism 17 as desired. When the piston 37 is moved to the right in Figs. 1 and 7, cable 25 will be pulled to the right, shortening the loop 57 and with the cable 26 paying out and lengthening the loop 58. The shortening of the loop 57 moves sheave 48 toward the sheave 53, thereby locking the lever 44 to the dotted line position shown in Figs. 1 and 7, the paid-out cable of element 26 being taken up since the loop 58 will be lengthened by the movement of shaft 47 away from the shaft 53 to the aforesaid dotted line position. The said movement of lever 44 moves link 4 downwardly, thus rocking closure 18 on its pivot 19 to the left in Figs. 1 and 7 to the position opening the outlet of hopper 16, closure 21, when employed, simultaneously moving in the opposite direction to further expose such opening. The reverse operation will take place when the piston 37 is moved to the left, such operation shutting the closure mechanism 17 since cable element 26 will be pulled by the piston 37 while cable element 35 will be paid out, the loop 58 shortening while the loop 57 will lengthen, such operation restoring the parts to the full line position of Figs. 1 and 7.

While I have described the opening and shutting of the closure mechanism 17 completely to open and closed position, it will be realized that such opening and closing may be variable, that is to any desired extent intermediate full opening and closing.

Referring now to the second or modified form of Fig. 8, it corresponds in construction and operation to the first form with the exception of the closure mechanism for receptacle 11, which is here designated 17'. This mechanism may have one or more closure members 18', which preferably swing from axes 19' above their convex closure walls 20' rather than on axes below the same as in the first form, although either the upper or lower mounting may be resorted to as preferred. The axes 19', are afforded by parallel shafts 59 journalled on the bucket 11' and having intermeshing gears 60 thereon, so that as one closure 18' is moved, the other closure 18' will move therewith in the opposite direction. In order to actuate the closures 18', a crank 40' corresponding to that employed at 40 is attached to one of them. Otherwise the structure and operation are identical with that of the first form, and the same reference characters have been applied.

In the third or further modified form of Fig. 9, a single closure 18'' is employed for the outlet of the hopper 16'' of the bucket 11'' corresponding to that employed at 11 and 11' in the preceding forms. This closure 18'' has a convex closure wall at 20'', and it is hinged or pivoted on a rod 19'' journaled on the bucket 11'. Attached rigidly to the closure 18'' is a crank 40'' which is adapted for actuation to move the closure 20'' to the left for opening as suggested by the dotted lines in Fig. 9, and to the right for closing. This crank 40'' corresponds to the crank-case 40 and 41' in the preceding figures, and is pivoted at 41 to the link 42 as in the preceding form, and since the construction and operation is otherwise the

same as in the first form, the closure 20'' will be moved to open and closed positions. The similar reference characters employed in the first form are also used in Fig. 9.

As another form of prime mover or actuator member used in lieu of that suggested at 32, reference is directed to Figs. 10 and 11. In this form a support 10a is provided which may be the boom 10, a part of a paver, or otherwise, and it mounts bearings 61 which journal a shaft 62 adapted to be rotated by any suitable means in either direction so as to turn sheaves 63 and 64 rigidly mounted thereon, in one direction or the other. Sheave 63 has a cable element 25a dead-ended thereon and partly wrapped about the same as shown while shaft 64 has a cable element 26 dead-ended thereon and partly wrapped about the same. Thus through the rotation of shaft 62, the same result will be accomplished as through the sliding of the piston 37 since the elements 25a and 26a correspond to those employed at 25 and 26 and are similarly attached and mounted as in the described forms.

As one means for rotating the shaft 62 in opposite directions, a shaft 65 is keyed to the shaft 62 between the shafts 63 and 64, and a cable or other flexible element 66 is wrapped one or more turns about the shaft 65 and is arranged for actuation from any suitable source to draw element 66 in one direction while it is paid out in the other direction, and vice versa.

Various changes may be resorted to provided they fall within the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, flexible elements mounted on said boom, actuating mechanism for said closure means including a lever and sheaves on the lever on opposite sides of the pivotal axis of the lever, means including one of said sheaves over which one of the flexible elements is looped, means including the other of said sheaves over which the other flexible element is looped, and means to simultaneously move said flexible elements in opposite directions to control the opening and closing movements of said closure means.

2. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, normally taut flexible elements mounted on said boom, actuating mechanism for said closure means including loose sheaves, loops provided by said flexible elements trained about the sheaves, separate guide means coacting with the respective sheaves to maintain said loops, and means to simultaneously move said flexible elements in opposite directions proportionately to retract one as the other is paid out to respectively open and close said closure means through respective movement of the sheaves under action of the loops.

3. Apparatus of the class described comprising a boom, a conveyor bucket slidably mounted thereon, said bucket having an outlet, closure means for said outlet, flexible elements dead-ended on said boom, actuating mechanism for said closure means over which said flexible elements pass permitting the aforesaid movement of the bucket without actuating said closure means, means to simultaneously move said flexible elements in opposite directions to control the opening and closing movements of said closure means comprising sheaves loosely mounted on said bucket, a lever pivoted to said bucket having sheaves thereon one on each side of its pivotal axis, each of said flexible elements between its fixed and operated ends being looped around separate ones of said first and second-mentioned sheaves normally maintaining the lever against fulcruming, and an operative connection from the lever to the closure means to control the opening and closing movement of said closure means.

4. Apparatus of the class described comprising a boom, a conveyor bucket slidably mounted thereon, said bucket having an outlet, closure means for said outlet, flexible elements dead-ended on said boom, actuating mechanism for said closure means over which said flexible elements pass permitting the aforesaid movement of the bucket without actuating said closure means, means to simultaneously move said flexible elements in opposite directions to control the opening and closing movements of said closure means comprising sheaves loosely mounted on said bucket, a lever pivoted to said bucket having sheaves thereon one on each side of its pivotal axis, each of said flexible elements between its fixed and operated ends being looped around separate ones of said first and second-mentioned sheaves normally maintaining the lever against fulcruming, and linkage between the lever and closure means having crank connection to the latter to control the opening and closing movements of said closure means.

5. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, a lever pivoted to the bucket, flexible elements mounted on said boom each having a loop intermediate its ends, individual guide means carried by the bucket around which said loops are trained, each individual guide means having a guide member, said guide members being disposed on the lever on opposite sides of the pivotal axis of the latter, means to move said flexible elements in opposite directions to pay out one flexible element as the other flexible element is retracted and vice versa, and an operative connection from the lever to the closure means to control the opening and closing movements of the latter.

6. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, a lever pivoted to the bucket, flexible elements mounted on said boom each having a loop intermediate its ends, individual guide means carried by the bucket around which said loops are trained, each individual guide means having a guide member, said guide members being disposed on the lever on opposite sides of the pivotal axis of the latter, means to move said flexible elements in opposite directions to pay out one flexible element as the other flexible element is retracted and vice versa, comprising a cylinder, piston means operable in the cylinder having said flexible elements attached to opposite sides thereof, and an operative connection from the lever to the closure means to control the opening and closing movements of the latter.

7. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon having an outlet, closure means for said outlet, oppositely movable flexible elements trained on said boom, means operable to draw and pay out each of said elements, a lever on

the bucket, separate guide means on the lever on opposite sides of its pivotal axis, guide members on the bucket, one of said elements being looped around one of said guide means and one of said guide members, the other element being looped around the other guide means and other guide member, and mechanism operable by said lever to open and close said closure means.

8. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon having an outlet, closure means for said outlet, oppositely movable flexible elements having approximately parallel portions trained on said boom, each having one terminal dead-ended on the latter in longitudinally spaced relation, means operable to draw and pay out each of said elements, a lever on the bucket, separate guide means on the lever on opposite sides of its pivotal axis, guide members on the bucket, one of said portions being looped around one of said guide means and one of said guide members, the other portion being looped around the other guide means and other guide member, and mechanism operable by said lever to open and close said closure means.

9. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon having an outlet, closure means for said outlet, oppositely movable flexible elements having approximately parallel portions trained on said boom, each having one terminal dead-ended on the latter in longitudinally spaced relation, means operable to draw and pay out each of said elements, a lever on the bucket, separate guide means on the lever on opposite sides of its pivotal axis, guide members on the bucket, one of said portions being looped around one of said guide means and one of said guide members, the other portion being looped around the other guide means and other guide member, mechanism operable by said lever to open and close said closure means, said second-mentioned means comprising a double-ended actuating cylinder, and piston means movable in the cylinder connected to said flexible elements.

10. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon having an outlet, closure means for said outlet, oppositely movable flexible elements operable to draw and pay out each of said elements, a lever on the bucket, separate sheaves on the lever on opposite sides of its pivotal axis, separate guide sheaves on the bucket, one of said elements being looped around one of said sheaves and one of said guide sheaves, the other element being looped around the other sheave and other guide sheave, and mechanism operable by said lever to open and close said closure means.

11. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon having an outlet, closure means for said outlet, oppositely movable flexible elements on said boom, each having a portion dead-ended on the boom, said portions being approximately parallel, means operable to draw and pay out each of said elements, a lever on the bucket, separate sheaves on the lever on opposite sides of its pivotal axis, guide sheaves on the bucket, one of said elements being looped around one of said sheaves and one of said guide sheaves, the other element being looped around the other sheave and other guide sheave, and mechanism operable by said lever to open and close said closure means.

12. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, cables, means on the boom operable to draw one cable as the other is paid out, guide means on the boom traversed by said cables, said cables each being dead-ended on the boom, a lever on said bucket having a sheave on each side of its pivotal axis, means to actuate the closure means from said lever, a pair of guide sheaves on the bucket, one of said cables having a loop trained around one of said sheaves and one of said guide sheaves, and the other cable having a loop trained around the other sheave and other guide sheave.

13. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, cables, means on the boom operable to draw one cable as the other is paid out, guide means adjacent each end of said boom respectively traversed by said cables and having portions below the boom in approximate parallelism and dead-ended on the beam adjacent the ends remote to the respective guide means, said first-mentioned means being disposed above said portions, a lever on said bucket having a sheave on each side of its pivotal axis, means to actuate the closure from said lever, a pair of guide sheaves on the bucket, one of said portions having a loop trained around one of said sheaves and one of said guide sheaves, and the other portion having a loop trained around the other sheave and other guide sheave.

14. Apparatus of the class described comprising a boom, a conveyor bucket movably mounted thereon, said bucket having an outlet, closure means for said outlet, cables, means on the boom operable to draw one cable as the other cable is paid out, guide means on the boom traversed by said cables, said cables having approximately parallel portions dead-ended on the boom at remote locations longitudinally thereof, a lever on said bucket having a sheave on each side of its pivotal axis, means to actuate the closure means from said lever, a pair of guide sheaves approximately co-axially mounted on the bucket, a second pair of guide-sheaves co-axially mounted on said bucket, one of said portions having a loop trained in succession around a guide sheave of the first pair, one of said sheaves and the other guide sheave of the first pair, and the other portion having a loop trained in succession over one of the guide sheaves of the second pair, the other sheave, and the other guide sheave of the second pair.

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