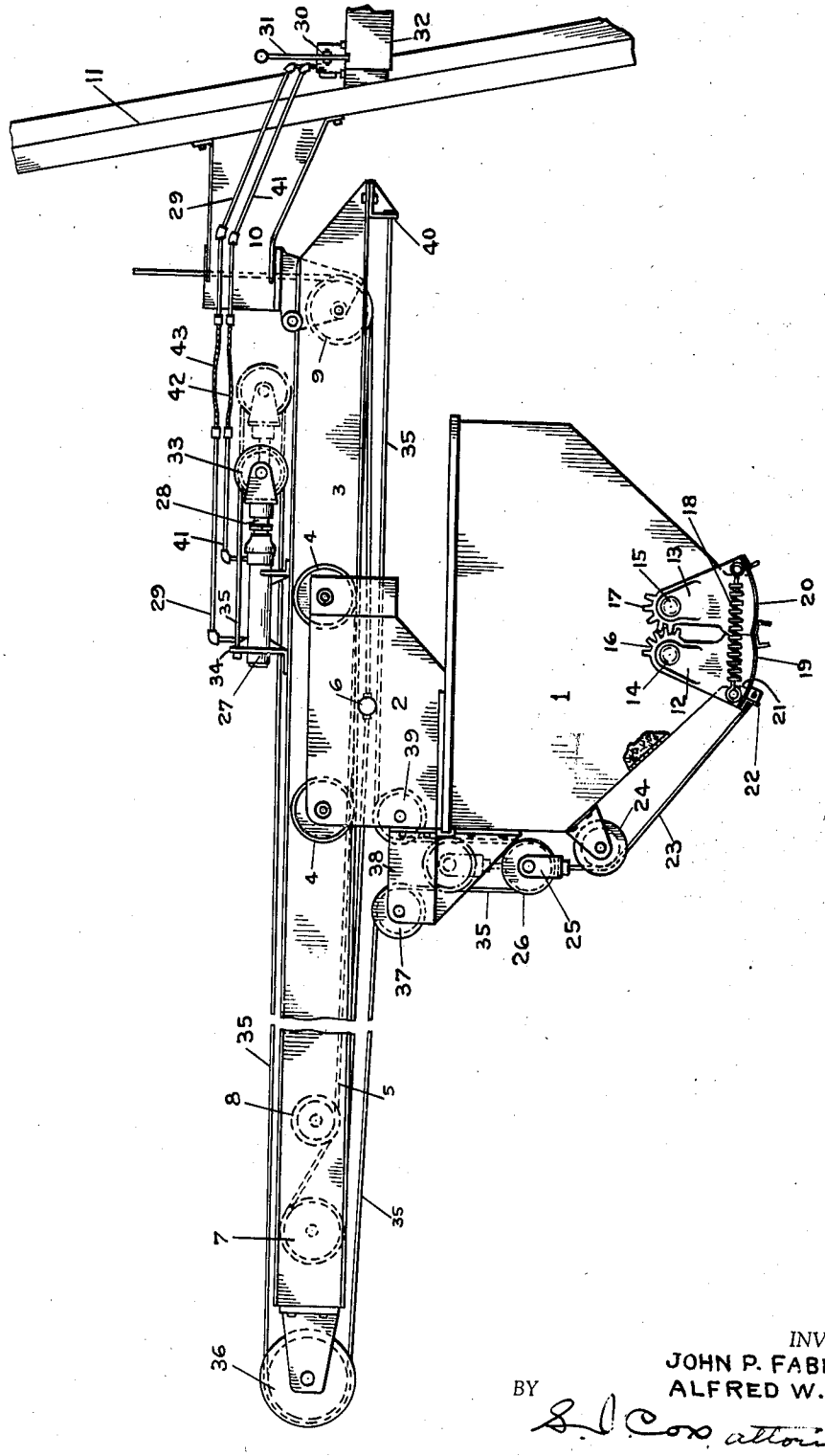
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CONCRETE DISTRIBUTING APPARATUS

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CONCRETE DISTRIBUTING APPARATUS

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The improvements relate to mechanism of the boom and bucket type for conveying and distributing plastic concrete which has been mixed in a mixing drum apparatus and is discharged from the mixer thereinto.

Among their objects are the provision of means for receiving, conveying and depositing the concrete quicker and more effectively and at any desired point within the radius of the boom and in any desired quantity, and to effect a certain spreading thereof when necessary or desired, thus facilitating the manual work of distributing, spreading and leveling. Other objects are to improve the construction of such mechanism and make it quicker and more certain and accurate in operation and less likely to become damaged or to cause damage to manholes, forms or other structures in or adjacent to the area of the work. Still other objects and advantages will be apparent from the following description.

Heretofore it has been the usual practice to have a cable operated distributing bucket, mounted to travel to and from the mixer on a swinging boom, provided with a bottom dumping door or doors for the discharge of its contents operated by a special cable or by a return pull of the bucket operating cable, the said door or doors swinging downwardly by gravity when released and hanging below the bottom of the bucket until restored to closed position by a cam or other means when the bucket returns to or toward the mixer, and discharging the entire contents of the bucket. An illustration of this construction is found in Patent No. 1,738,012, granted December 3, 1929, and assigned to the assignee of the present invention, to which reference may be had for a fuller illustration and description of parts not herein fully described and shown.

There are several objections to this construction, which, so far as we are informed, have never been overcome. One is that while the bucket can be dumped at any point along the boom, it dumps its entire contents at one point and requires that this load of concrete be spread and distributed by hand or that only a part of the batch of concrete mixed and ready for distribution be discharged into the bucket and distributed, which greatly reduces the normal output of the concrete paver or other machine and results in serious loss to the contractor, since batches of one cubic yard per minute can ordinarily be turned out by such machines and unless the concrete mixed can be distributed at the normal mixing rate a part of the heavy cost per minute of operation, for labor, power and overhead, is wasted. To overcome this objection double buckets were devised, which could receive an entire batch of concrete and dump it one-half batch at a time. An illustration of this is found in Patent No. 2,074,073 granted March 16, 1937, and assigned to the assignee of the present invention. There are various objections, however, to this solution, which it is thought will be obvious when it is compared with the present improvements. Another objection is to the hanging discharge doors which when the bucket is moved along the boom were likely to collide wtih the objects below the bottom of the bucket and injure or be injured by them.

With the present improvements all these difficulties are overcome, and each batch of concrete is dumped into the distributing bucket as soon as it is mixed, conveyed and distributed to the point or points where it is needed, spread when it is desired or necessary over a considerable area lengthwise of the boom or laterally, the bucket bottom immediately closed after each discharge and the bucket returned to receiving position at the mixer.

An embodiment of the improvements is illustrated in the accompanying drawing, referred to herein, in which the figure is a side elevation of a boom and bucket concrete conveying and distributing apparatus.

In the said drawing, 1 is the conveying and distributing bucket supported in suspended position on the traveling carriage 2 which in turn is mounted to travel back and forth on the swinging boom 3 by rollers 4 preferably running on the lower flanges of said boom, as shown in the patent first mentioned. The bucket is towed by a cable 5, fixed to the carriage at 6, running over sheaves 7, 8 and 9 mounted on the boom, and operated in one direction or the other by suitable power operated double winding means (not shown). The boom is mounted to swing horizontally on the bracket 10 which is in turn fixed to the frame member 11 of the mixing machine. All these provisions are old and common in the art and require no further illustration or description.

The bottom door or gate of the bucket 1 is made in two sections 12 and 13 each substantially U-shaped in vertical cross section, mounted on pintles 14 and 15 on both sides of the bucket and geared together by the meshing teeth 16 and 17 near their pivots for movement in

unison but in opposite directions. These gate members are normally held in close contact and in closed position by the use—preferably on both sides thereof—of a tensioned spring 18 having one end secured to each member and their bottoms 19, 20 which have reinforcing angle strips along their edges normally close the bottom opening 21 of the bucket and are in close contact with its edges which conform to their curvature at the sides.

A short cable 23 is connected with the gate member 12 by means of the eye lug 22 so that a pull on this cable causes the two gate members to open wholly or partly against the tension of the spring 18, and as soon as this pull is released the spring 18 will close the gate members instantly, causing them to cut through the outflowing concrete and return to close contact. The short cable 23 runs over a sheave 24 mounted on the bucket and is secured to the U-shaped bracket 25 in which the sheave 26 is mounted for rotation.

The bucket gate opening means are operated by the following mechanism. Mounted on the top of the boom 3 is hydraulic cylinder 27 which has within it the usual piston or plunger on the inner end of the rod 28. As shown in the drawing, this piston is at the extreme left hand position. Therefore, when pressure fluid is admitted to the tube 29, by the valve 30 operated by the valve handle 31 mounted on a platform 32 fixed to the frame member 11 and convenient to the operator, the piston will be forced to the opposite end of the cylinder 27 causing the rod 28 to move to the right with the sheave 33 rotatably mounted on its end, to the position indicated by dotted lines. To the frame 34 of the pressure cylinder 27 is secured one end of the cable 35, and this cable extends around over the sheave 33, over the sheave 36 rotatably mounted on the end of the boom 3, over the sheave 37 on the bracket 38 of the carriage 2, under the sheave 26, over the sheave 39 on the said carriage and to the securement 40 at the inner end of the boom. As the sheaves 37 and 39 are mounted on fixed pivots, as is also the sheave 36, while the sheaves 26 and 33 are mounted on movable pivots and the ends of the cable 35 are fixed, the movement of the piston rod 28 to the right will cause a pull and taking up of the cable 35 which in turn will raise the sheave 26 and pull the short line or cable 23 causing it to open the bottom gate.

The movement may be to any desired extent, so that the bottom gate will be opened as far as desired, depending upon the manipulation of the valve member 30 by the operator, and may be instantly reversed by admitting fluid pressure to the tube 41 through manipulation of the said valve, automatically cutting off pressure in the tube 29, to permit the bottom gate to close under the tension of the spring 18. The upper position of the sheave 26 is indicated by dotted lines above its position shown in full lines.

The fluid pressure tubes 29 and 41 have flexible hose sections 42 and 43 in them which permit lateral swinging and vertical adjustment of the boom 3. It will be understood that both movements of the bottom gate members may be caused by the fluid pressure cylinder 27 if desired, by duplicating the opening sheave mechanism and the cables using double grooved sheaves and connecting the closing mechanism to the gate member 13 so that when the gate member 12 is released and the gate member 13 is pulled to the left the gate will be closed.

In this pressure closing arrangement the pulling cable is secured to a member fixed to the right of sheave 33, on the inner end of the boom, runs under and over the sheave 33, over a sheave on the member to which it is secured then under and over the sheave 36 in the end of the boom, thence around sheaves identical with the sheaves 37, 26 and 39, which may be mounted on the opposite side of the bucket and connected through the lower movable sheave corresponding to sheave 26 and line corresponding to 23 to the opposite side of gate member 13. With this arrangement the two gate operating cables will always be taut, because when one is let out the other is taken in, and vice versa. The spring closing arrangement, however, has proved highly effective and satisfactory in operation, but a spring may be used for opening the gate and the cable for closing it.

Moreover, the cable for moving the gate may be operated by hand or by mechanical means instead of the fluid pressure cylinder, although the latter has advantages.

Various other modifications in the embodiment of the improvements shown and described, may also be made without departing from the scope of the invention.

As the bucket travels along the boom the cable 35 runs over the sheaves 37, 26 and 39 freely and does not cause any movement of the dumping gate. This gate may be operated, however, to any desired extent while the bucket is in motion and also while the boom is swinging laterally as well as when these parts are stationary, by simply manipulating the valve 30 to admit pressure to the cylinder 27. Thus it is possible to discharge the contents of the bucket wholly or partly while the bucket is moving along the boom or laterally with the boom, and the contents of the bucket may thereby be spread over a considerable length and width of the work.

The construction and operation of the fluid pressure valve, piston, cylinder and source of fluid under pressure need not be described since they are well known and have long been in common use in this and other arts. It is sufficient to note that the opening of the valve 30 to admit fluid under pressure to the cylinder 27 through the pipes 29, and 41 may be so controlled as to move the piston only part way of the length of the cylinder and to hold the piston, and consequently the gate, at the point to which it has been moved, and that when it is admitted to one tube it is first closed off to the other tube which is at the same time opened to the fluid return conduit. The fluid employed in the cylinder 27, which has been called hydraulic herein, and in the fluid pressure system of which it is a part may, of course, be any fluid, such as air, oil or water, suitable for the purpose.

We claim:

1. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in opening direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and its operating means comprising a line in freely slidable relation with said bucket and moving means and means for moving and controlling the movements of said line and means for moving said gate in

another direction operable when the first gate moving means is rendered inoperative.

2. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same comprising a swinging door movable across the said discharge opening, means for moving said gate in opening direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and its operating means comprising a line in freely slidable relation with said bucket and moving means and means for moving and controlling the movements of said line and means for moving said gate in another direction operable when the first gate moving means is rendered inoperative.

3. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in opening direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and its operating means comprising a line in freely slidable relation with said bucket and moving means and means for moving and controlling the movements of said line and while the same are in operation.

4. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in opening direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and boom and their operating means comprising a line in freely slidable relation with said bucket and moving means and means for moving and controlling the movements of said line while the same are in operation.

5. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in opening direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and boom operating means comprising a line or cable in freely slidable operative relation with said member, a fluid pressure piston device mounted on the boom connected with said line to draw the same, guides on said boom over which said line passes from said member to said piston device and over which said line is so drawn.

6. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in one direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and boom and their operating means comprising a line or cable connected with said member, a piston device mounted on the boom and connected with said line to draw the same, guides on said boom and bucket, over which said line passes from said member to said piston device and over which said line is so drawn, the guides on the bucket moving therewith and the line arranged to travel through the same when the bucket is moved on the boom, and means for moving said gate in another direction when the first gate moving means is not operating.

7. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in one direction comprising a movable member attached thereto, means for moving said member operable independently of the bucket and boom and their operating means comprising a line or cable connected with said member, a piston device mounted on the boom and connected with said line to draw the same, guides on said boom and bucket, over which said line passes from said member to said piston device and over which said line is so drawn, the guides on the bucket moving therewith and the line arranged to travel through the same when the bucket is moved on the boom, and a movable guide suspended on said line through which said gate is connected with said piston device for operation.

8. In apparatus of the character indicated, a swinging boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate for opening and closing the same, means for moving said gate in one direction to open it and for holding it in different open positions comprising a movable member attached thereto, means for moving said member mounted on the boom and operable independently of the bucket operating means, means for holding said moving means in different positions in its movement and means for moving said gate in closing direction.

9. In apparatus of the character indicated, a swinging boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith and having a bottom discharge opening, means for operating said boom and bucket, a gate for opening and closing the said discharge opening of the bucket, means for moving said gate to open it wholly or partly and hold it in open or partly open positions operable independently of the bucket and boom and their operating means, comprising a line or cable connected with said gate, a fluid pressure cylinder and piston device connected with said line to move the same, guides associated with said boom and bucket, over which said line passes from said gate to said device and over which said line is so moved, valve means for admitting fluid under pressure to said device to move it and for controlling and checking the same and the movements of the said device, and means for moving said gate in another direction when the first gate moving means is not so in operation.

10. In apparatus of the character indicated, a

swinging boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith and having a bottom discharge opening, means for operating said boom and bucket, a gate for opening and closing the said discharge opening of the bucket, means for moving said gate to open it wholly or partly and hold it in open or partly open positions operable independently of the bucket and boom and their operating means, comprising a line or cable connected with said gate, an operating device connected with said line to move the same, guides associated with said boom and bucket over which said line passes from said gate to said device and over which said line is so moved, said device constructed and arranged to be moved and to be controlled and checked by the operator and to control and check the movements of the said gate at different positions of the bucket, and means for moving said gate in another direction when the first gate moving means is not so in operation.

11. In apparatus of the character indicated, a swinging boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith and having a bottom discharge opening, means for operating said boom and bucket, a gate for opening and closing the said discharge opening of the bucket, means for moving said gate to open it wholly or partly and hold it in open or partly open positions operable independently of the bucket and boom their respective and relative positions and their operating means, comprising a line or cable connected with said gate, an operating device connected with said line to move the same, said device comprising means adapted to be moved and to be controlled and checked by the operator and to control and check the movements of the said gate at different positions of the bucket on the boom, and means for moving said gate in another direction when the first gate moving means is not so in operation.

12. In apparatus of the character indicated, a boom extending from a source of mixed concrete, a concrete distributing bucket mounted to move thereon and therewith, means for operating said boom and bucket, said bucket having a bottom discharge opening, a gate thereon for opening and closing the same, means for moving said gate in opening direction comprising a movable connection connected therewith, means for moving said connection operable while the bucket operating means is operating said bucket comprising a line or cable unsecured to said connection and movable with respect thereto but operatively connected therewith and operating when moved to move the same and the said gate as stated, and means for moving said gate in closing direction.

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