No. 848,287. PATENTED MAR. 26, 1907.

V. R. BROWNING.

HOISTING APPARATUS.

APPLICATION FILED MAY 10, 1904.

2 SHEETS—SHEET 1.

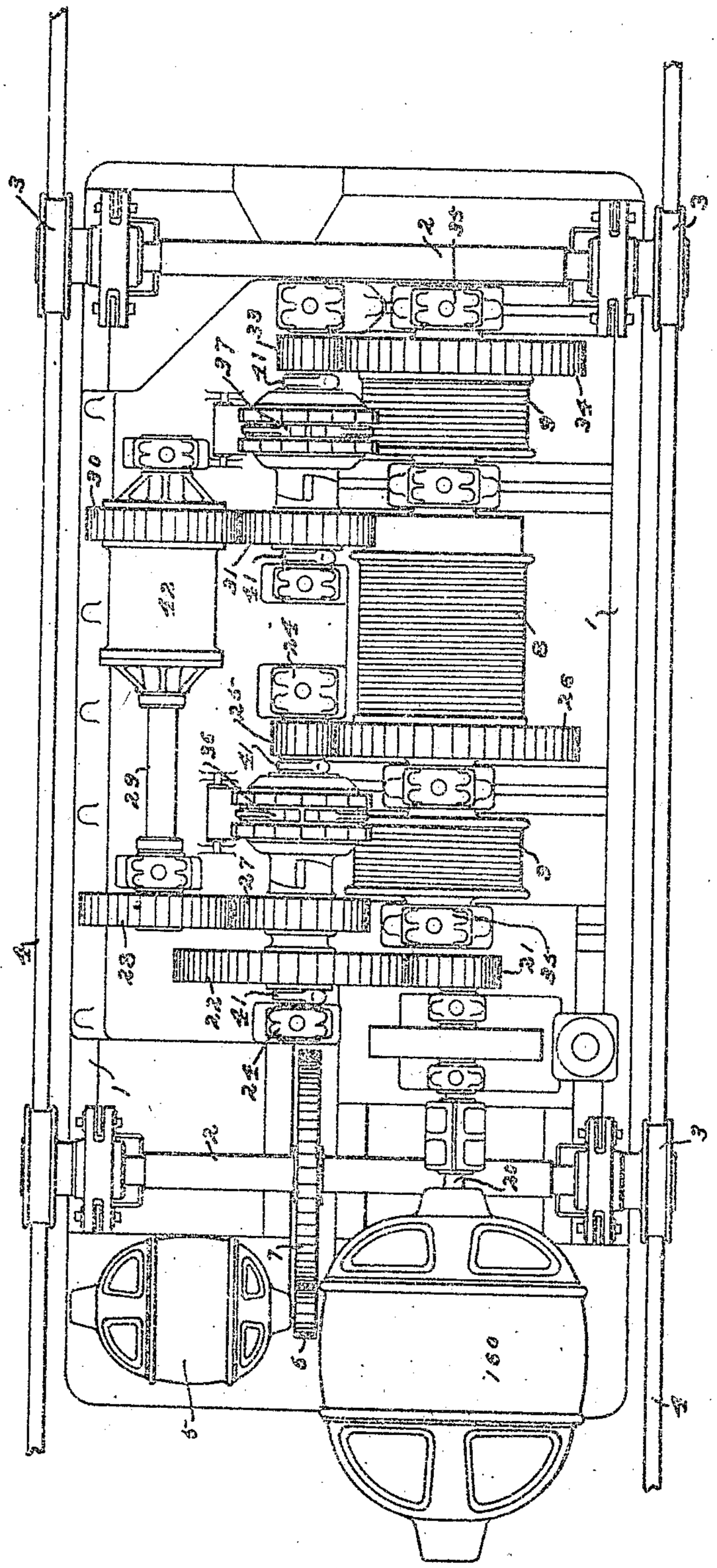

Fig. 1.

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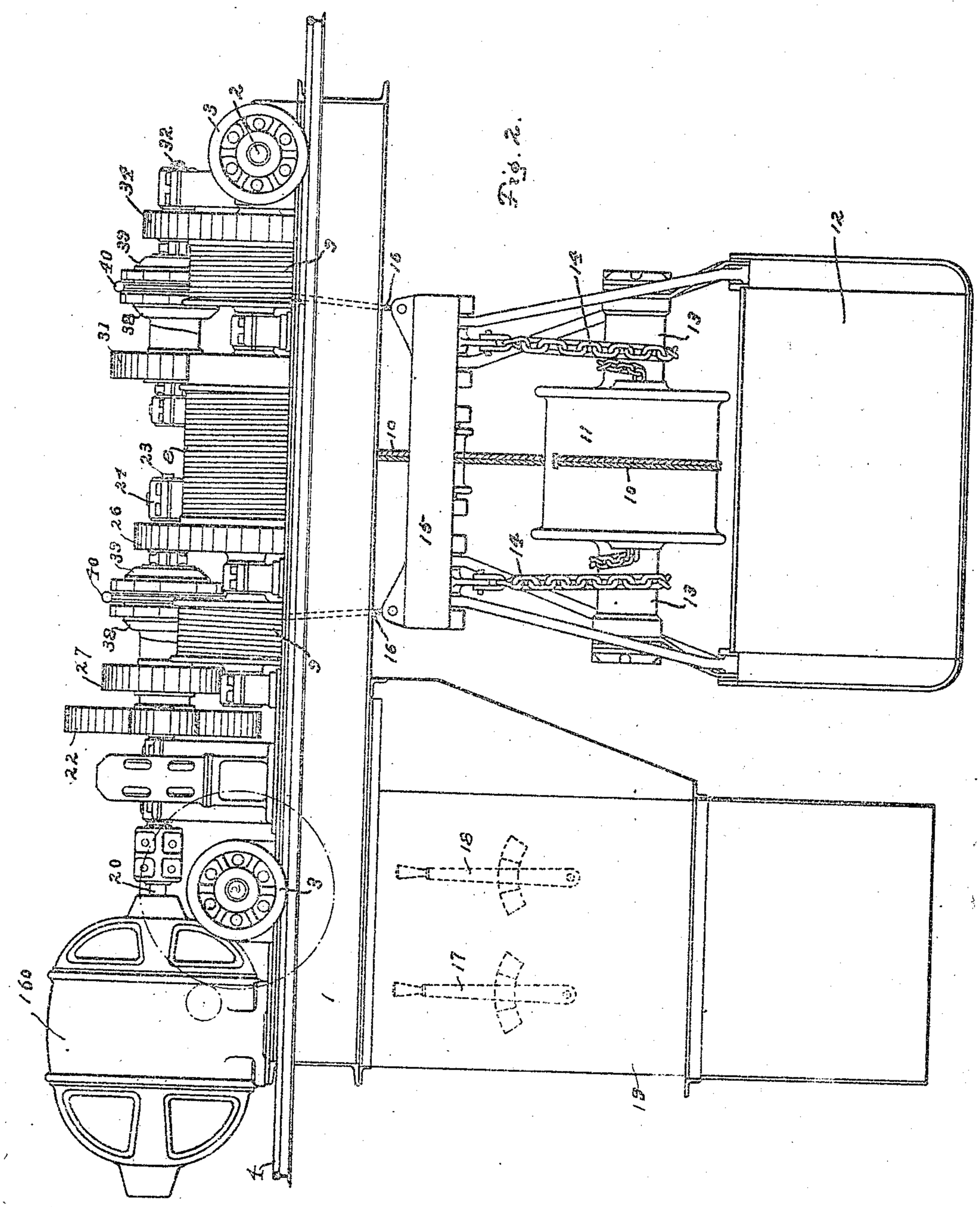

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UNITED STATES PATENT OFFICE.

VICTOR R. BROWNING, OF NOTTINGHAM, OHIO.

HOISTING APPARATUS.

No. 848,287. Specification of Letters Patent. Patented March 26, 1907.

Application filed May 10, 1904. Serial No. 207,226.

To all whom it may concern:

Be it known that I, VICTOR R. BROWNING, a citizen of the United States, residing at Nottingham, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Hoisting Apparatus, of which the following is a specification.

This invention relates to hoisting apparatus, and has particular reference to the drums and their driving mechanism which are employed for operating clam-shell or orange-peel buckets. In the operation of a bucket of such a character it is necessary to completely close the same before it is hoisted and to hold it closed while it is being hoisted and moved to the desired point for dumping.

It is the object of my invention to simplify the mechanism and to add to its safety and efficiency, which I do by so combining mechanical brakes with the hoisting mechanism that the entire device can be controlled by a single reversible electric motor, which is itself controlled by a single lever. The brakes are of sufficient power to hold the bucket with its load suspended in any position, and it can be lowered only by positively driving the motor in a reverse direction. Thus the load is always under complete control of the motor, which must be driven to either hoist or lower the same, and if the motor is stopped the load also comes to rest.

In the accompanying drawings, forming part of this application, Figure 1 is a plan view of a trolley provided with my invention; and Fig. 2 is a side elevation of the same, showing the bucket.

Similar reference characters represent corresponding parts throughout the several views of the drawings, in which—

1 represents the frame of the trolley, upon which are journaled the axles 2, that carry the wheels 3, that run back and forth upon the tracks 4. While I have shown my invention as applied to a movable trolley, it is by no means so limited in its application, as it may be mounted upon a stationary structure, upon a locomotive-crane, or upon numerous other structures and devices.

5 is an electric motor that is geared to one of the axles 2 through the pinion 6 and gear 7. By this means the axle is turned and the trolley moved back and forth along the tracks.

8 is a bucket-closing drum, and 9 the dumping-drum, which for convenience and by preference is made in two parts, said parts being on the same shaft with and separated by the bucket-closing drum 8. The bucket-closing cable 10 is secured at each of its ends to the drum 8 near its end flanges, and at its center it is secured to a drum 11, that is carried by the closing-arms of the bucket 12. Of course instead of a single cable secured at its center a pair of shorter cables secured at their opposite ends to the drums 8 and 11 may be employed. Fig. 2 shows the bucket suspended and closed, and from it it will be seen that the cable 10 is passed about the drum 11 before it is secured thereto, so that the weight of the bucket will tend to turn and lift the drum. As stated, this drum is carried by the arms of the bucket, and as it is lifted these arms are swung so as to close the bucket, which will be held closed as long as the weight of the same is sustained by the cable 10. In order to multiply the power which the weight exerts toward closing the bucket, the drum is very much reduced in diameter at each of its ends, as shown at 13 13, and upon these portions are wound chains 14 14, said chains being secured at their lower ends to the drum and at their upper ends to the frame 15 of the bucket. The chains and the cable are wound upon the drum in opposite directions, so that as one unwinds therefrom the other will be wound thereabout. From this it will be obvious that the pull upon the cable 10 will exert a much stronger pull upon the chains, which pull being sustained by the closing-arms of the bucket will hold the latter in a closed position. This type of bucket being well known in the art, it is not thought necessary to illustrate or describe it further.

The bucket-dumping cables, which are shown at 16, are secured at one of their ends to the two parts of the dumping-drum 9 and at their other ends to the frame 15 of the bucket. The points of attachment of the cables to the frame are separated for a distance substantially equal to the distance between the parts of the drum 9, so that the cables will wind properly thereon and so that the bucket will not rotate when it is suspended.

The drums 8 and 9 are suitably geared with and driven from a motor 160. Both of the motors 5 and 160 are controlled by means of levers 17 and 18, respectively, which are located in the operator's cage 19, said cage being carried by the trolley-frame 1.

The shaft 20 of the motor 160 is provided on its inner end with a pinion 21, which

meshes with and drives a gear-wheel 22, which is loosely mounted on a longitudinal shaft 23, that is journaled on the trolley-frame at 24. At its inner end this shaft has a pinion 25 keyed thereto, said pinion meshing with the gear 26 on the drum 8. The shaft 23 also carries intermediate the gear 22 and the pinion 25 a gear-wheel 27, which meshes with and drives a similar gear 28, that is carried by the shaft 29. The gears 22 and 27 are rigidly connected together, and both turn loosely on the shaft 23. The shaft 29 drives a gear 30, that meshes with and drives a similar gear 31, that is loosely mounted on one end of a shaft 32, on the other end of which is keyed a pinion 33, that meshes with and drives a gear 34 on the right-hand portion of the dumping-drum 9. The shaft of the dumping-drum is journaled at 35 in the trolley-frame, and the said drum is keyed or otherwise secured thereto, so that the two parts of the drum turn together. The bucket-closing drum 8, however, is mounted loosely on the said drum-shaft and turns independently thereof. From this description it will be understood that when the gear 22 is driven power will be transmitted directly to the drum 8 through the pinion 25 and gear 26 and indirectly to the drum 9 through the gears 27, 28, 30, 31, 33, and 34.

Inasmuch as the cables 10 and 16 must be run off or wound on their respective drums at the same speed, it is necessary that the drums be given the same circumferential velocity, and if they are of the same diameter, as shown, they must be rotated at the same speed. For this reason the gears 26 and 34 are made of the same size, and the same may be said of the pairs of pinions 25 and 33 and the pairs of gears 27 and 31 and 28 and 30.

Mounted upon the shafts 23 and 32, between the gear 27 and pinion 25 and the gear 31 and pinions 33, respectively, are mechanical friction-brakes or safety lowering devices 36 and 37. These brakes are known in the art, and they may be sufficiently described by stating that they comprise three members 38, 39, and 40, the members 38 and 39 being loose upon the shafts, while the members 40 are keyed thereto, so as to be capable of slight lateral motion. The pinions 25 and 33 are keyed to their respective shafts. Thrust-collars 41 are arranged on these shafts outside the gears 22 and 31 and their corresponding friction-brakes 36 and 37. The members 38 and their coöperating gears 27 and 31 are provided with matched helical surfaces, and all the members 38, 39, and 40 are provided with frictional surfaces on their adjacent faces, so that when they are forced tightly together they will turn in one direction as one piece or be held against rotation in the opposite direction, except as the motor 160 is driven backwardly, when the member 40 is permitted to turn. The peripheries of the members 38 and 39 are formed with ratchet-teeth, with which engage detent-pawls (not shown) to prevent rotation of these parts in the reverse direction. Having thus described these parts, it may be stated that when the gear 27 is driven forwardly the helical surfaces on the gear and its coöperating member 38 are cammed apart and the friction-surfaces of the members 38, 39, and 40 are so jammed together that the shaft and the pinion 25 are also turned. The shaft 32 and its pinion 33 are likewise turned through the friction-brake 37. The amount of friction between the members is always sufficient to hold the shafts against reverse rotation, except when the motor is driven backwardly, which movement tends to separate the helical surfaces and loosens the pressure between the members, so that the member 40 and the shaft to which it is keyed may turn. At the instant that the motor and the gears 27 and 31 stop, however, these members are again jammed together by the camming action of the helical surfaces, and the shafts stop until the motor is again started. By this means the load on the drums 8 and 9 is always under complete control of the motor.

As has been stated, the dumping-drum 9 must not be rotated until just after the drum 8 has closed the bucket. Thereafter the two drums must turn together. Similarly, the drum 9 must be held against backward rotation, so as to support the bucket while the drum 8 is running out its cable to dump the latter. It follows from this that some form of lost-motion device must be placed in the train of gearing for the dumping-drum. This device is shown conventionally at 42, and preferably consists of a threaded member and a traveling nut—such, for example, as is shown in the patent to E. H. Browning, No. 684,599, dated October 15, 1901.

The operation is as follows: Assuming the bucket to be lowered and open and the trolley in the proper position, the operator throws the lever 18 to the left and starts the motor 160 forward. This turns the gear 27, which cams the member 38 to the right, compressing the member 40 between itself and the member 39. As the member 40 is keyed to the shaft 23, this shaft and its pinion 25 are turned to rotate the drum 8, thereby closing the bucket. In the meanwhile the gear 28 and shaft 29 have been turning, but the gear 30 has remained stationary, owing to the lost motion in the device 42. Just after the bucket has closed and the weight of the same is thrown upon the cable 10 the lost motion is fully taken up and the gears 30 and 31 are driven. The gear 31 transmits its motion to the pinion 33 and drum 9 through the safety lowering device 37 in the manner heretofore described. Thereafter the drums 8 and 9 are rotated together, hauling in their cables at equal speeds until the bucket is elevated

to the required height, when the motor 160 is stopped. The operator then moves the lever 17 backwardly or forwardly, depending upon the desired direction of travel, thus starting the motor 5 and moving the trolley along the tracks 4. When the trolley is brought to the desired place for dumping, the motor 5 is stopped. Since the elevation of the bucket it has been sustained by the safety lowering device 36. The lever 18 is now moved to the right, which immediately permits the safety lowering device 36 to yield, although the device 37 holds fast. This throws the weight of the bucket on the dumping-cables 16, and as the motor 160 continues to run the bucket opens and dumps its contents. When it is fully opened, the lost motion in the device 42 is fully taken up and the bucket is lowered by the dumping-cable. After the trolley is brought back to its original position, which would preferably be done before the bucket is lowered or while this part of the operation is being performed, the bucket is again ready for filling.

It will be understood that any kind of a motor device that is reversible may be employed instead of the electric motors shown. The term "motor" as used in the claims is to be construed broadly unless limited to an electric motor by the specific wording of the claims.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a device of the character described, a bucket, a closing and a dumping cable connected with said bucket, drums for said cables, a motor for turning said drums, and means requiring a positive operation of the motor for turning the drums in either direction.

2. In a device of the character described, a bucket a pair of drums, cables connected with said drums for operating the bucket a motor for driving said drums in one direction, and means requiring a positive backward operation of the motor before the drums can turn in the other direction.

3. In a device of the character described, a bucket, a motor, and means requiring a positive operation of the motor either to open or to close the bucket.

4. In a device of the character described, a bucket, means for closing, hoisting, opening and lowering the bucket, and a single lever for controlling all of said means.

5. In a device of the character described, a bucket, a motor, a closing and a dumping drum for said bucket, trains of gearing connecting said drums and the motor, and safety lowering devices in each of said trains, whereby the motor must be positively driven to turn the drums in either direction.

6. In a hoisting device, a bucket, a bucket-closing drum, a cable connecting said bucket and drum, a dumping-drum that is made in two parts, said parts being separated by the bucket-closing drum, and cables connecting the dumping-drum and frame of the bucket, the points of attachment of the cables on the said bucket-frame being separated substantially as far as the distance between the parts of the dumping-drum.

7. In a device of the character described, a motor, a pair of drums, a train of gearing connecting the motor with one of the drums so as to drive the same therewith, a second train of gearing connecting the motor with the other drum, a lost-motion device interposed in said train, and means whereby the motor must be positively driven in order to turn the drums in either direction, said lost-motion device permitting one of the drums to remain stationary for a predetermined time after the other has turned in either direction.

8. In a device of the character described, a motor, a shaft 23, a gear 27 loose on said shaft and a pinion 25 fixed thereto, a drum having a gear thereon meshing with the said pinion, a shaft 32, a gear 31 loose thereon and a pinion 33 fixed thereto, a second drum driven from said pinion 33, gearing connecting said gears 27 and 31, and a lost-motion device interposed in said gearing, for the purpose specified.

9. In a device of the character described, a motor, a shaft 23, a gear 27 loose on said shaft and a pinion 25 fast thereto, a safety lowering device connected with said shaft, a drum having a gear thereon meshing with said pinion, a shaft 32 in axial alinement with the shaft 23, a gear 31 loose thereon, and a pinion 33 fast thereto, a second safety lowering device connected with the shaft 32, a second drum driven from the pinion 33, gearing connecting the said gears 27 and 31, and a lost-motion device interposed in said gearing, all of which is so combined as to necessitate the positive operation of the motor in order to turn either drum in either direction, and to move the first drum a predetermined extent before the second is turned.

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

VICTOR R. BROWNING.

Witnesses:
S. E. FOUTS,
C. MCELROY.