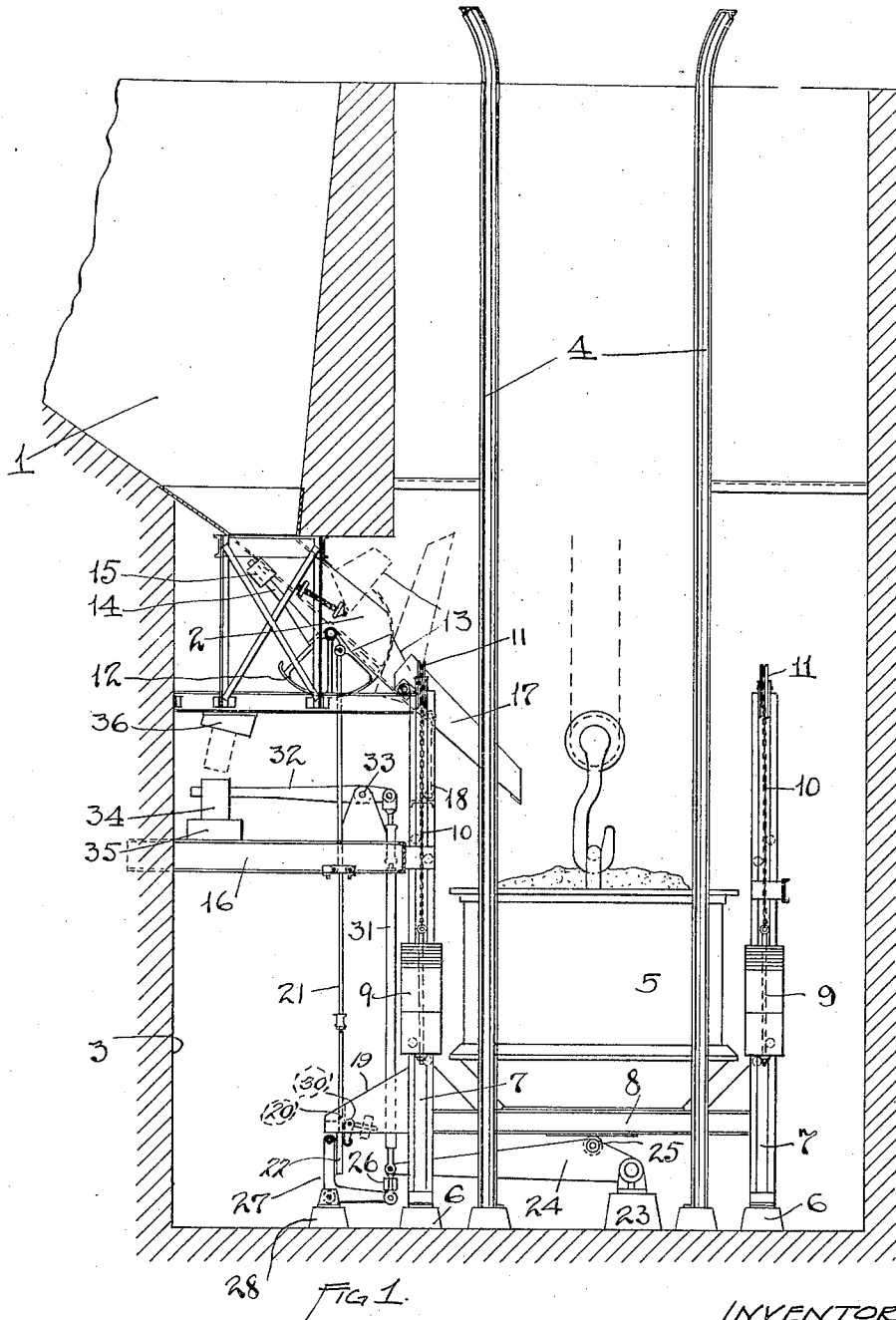


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 APPLICATION FILED APR. 14, 1917.

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Patented Dec. 14, 1920.

2 SHEETS—SHEET 1.



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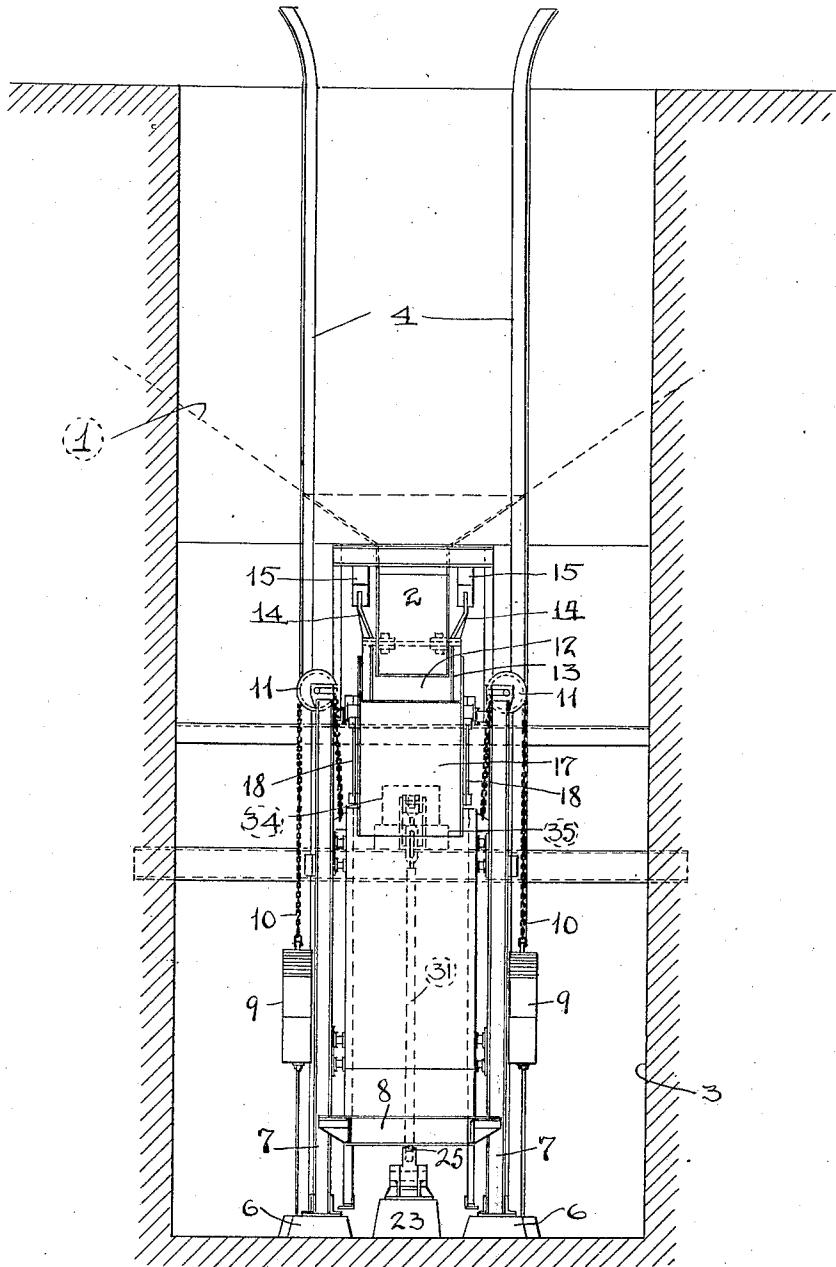


Fig. 2

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UNITED STATES PATENT OFFICE.

EDGAR P. SAWHILL, OF CLEVELAND, OHIO, ASSIGNOR TO THE C. O. BARTLETT AND SNOW COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

AUTOMATIC GATE-OPERATING MECHANISM.

1,362,441.

Specification of Letters Patent.

Patented Dec. 14, 1920.

Application filed April 14, 1917. Serial No. 162,035.

To all whom it may concern:

Be it known that I, EDGAR P. SAWHILL, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Automatic Gate-Operating Mechanism, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

The present invention relates to hoisting mechanism and has particular reference to automatic means for controlling the filling of the hoist or bucket. The means for opening and closing the gate controlling the discharge opening have been perfected so that the filling of the bucket stops when a predetermined load is reached. These means for opening and closing of the gate, and the means for lowering the discharge apron into position and for raising the same out of the path of the bucket have been provided and are arranged to operate in the correct order. The main object of the invention, however, is the automatic closing of the discharge gate when a predetermined load has been received in the bucket. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Figure 1 is a side elevation of the device; and Fig. 2 is a front elevation of the same.

The present mechanism will be employed with a bucket hoist or like apparatus and is particularly suitable for use in connection with a hoisting bucket which will be carried along a trolley. In the figures there is shown the usual hopper or supply chamber 1 terminating in a discharge opening 2. Guides or centering means 4 for the bucket 5 are mounted in the pit 3, and consist of upright members which are flared outwardly at the top, and are thus adapted to receive and

center the bucket as it is lowered. In the pit bottom, on suitable base members 6, are mounted guideways or upright members 7 in which is slidably mounted a cradle 8 upon which the bucket 5 will rest. The cradle is formed with upwardly extending side portions so that it will contact with the guideways over a large area to give a smooth action and prevent jamming. As shown, the cradle is balanced by counter-weights 9 which are attached to the cradle by means of chains 10 passing over pulleys 11 mounted in the top of the guides.

Closing the discharge opening in the hopper is a pivotally mounted gate 12, which moves upwardly to close the opening. At the upper end of this gate is a small apron 13 which is adapted to act as a discharge chute when the gate is opened. The gate has rearwardly extending arms 14 on which are mounted counterweights 15 to maintain the gate in its normal closed position.

Pivotally mounted upon the framework 16 which carries the hopper is a discharge apron 17 which is normally in an inoperative position, as shown in dotted outline, but is adapted to be lowered below the small apron on the gate to carry the material into the bucket or hoist. This apron is connected to the cradle by means of a link 18 and the counterweights 9 for the cradle 8 are also adapted to take care of the weight of the apron so that the apron will be maintained in its inoperative position until the weight of the bucket on the cradle lowers the cradle sufficiently to swing the apron down below the gate opening. When the bucket is hoisted the counterweights will immediately return the cradle 8 to its normal upward position and will thus move the apron 17 out of the path of the bucket 5.

The cradle is formed with an extension on the side toward the hopper and this extension is provided with an elongated slot 20, through which is mounted a rod 21 pivotally attached at its upper end to the gate 12, and this rod is adapted to open the gate upon being moved downwardly through the action of the cradle. The rod is formed at its lower end with an enlarged portion 22 adapted to be contacted by the lower edge 23 of the extension so that the cradle descending will contact with the rod and

cause the gate to open, thus letting the material discharge into the apron and the bucket.

The means for releasing the gate are mounted in the pit bottom below the cradle. Upon a suitable base 23 a lever 24 is pivotally mounted, and this lever has a bearing roller 25 on its upper side adapted to be contacted by the cradle 5 when the gate has been opened. At the other end this lever is attached to a link 26 which is connected to one end of a bell crank lever 27 mounted on a small base member 28 in the pit. The other arm of this bell crank is adapted to contact the rod below the cradle extension and a pre-determined downward movement of the cradle causes the bell crank to force the rod out of engagement with the extension, thus letting the gate close. To normally maintain the rod 21 in position to engage with the extension a small counter-weighted bell crank 30 is pivotally mounted on the extension and adapted to contact with said rod to keep it in the engaging position. Pivotally attached to the lever 24 is a rod 31, which is connected at its upper end to one end of a counter-weighted lever 32, pivotally mounted on a bearing 33 carried by the frame-work. This lever carries a counter-weight 34 which balances or compensates for the bucket load and this weight is made adjustable along the rod so the load may be varied or so that different types of materials may be handled. A block 35 is carried on the frame-work (upon which the counter-weight normally rests), and a second bumper 36 is attached to the frame work and adapted to limit the upward travel of the counter-weight and arm.

The operation of the device starts with the normal inoperative position of the gate 12 and the apron 17. As soon as the bucket 5 rests upon the cradle 8, the weight of the bucket will be sufficient to overcome the counterweights 9 for the cradle and thus lower the same sufficiently to bring the apron into its discharge position. The weight of the bucket will be sufficient to force the cradle down enough further to open the gate and when this has occurred the cradle will be resting upon the bearing roller 25 in the lever arm 14. The material will then discharge into the bucket and the added weight of the material will be sufficient to slowly overcome the counterweight 34 connected to the lever arm 32, and as soon as this counterweight is overcome the cradle will again drop sufficiently to operate the bell-crank lever 27 to disconnect the rod 21 holding the gate open and the gate will then be automatically shut by the action of its own counterweights 15. As soon as the operator begins hoisting the bucket the counterweights 9 for the cradle will immediately raise it and also bring the apron 17 up into

its inoperative position, allowing the bucket a clear path of travel upwardly out of the centering guides 4. The gate which operates upwardly to close the discharge opening will almost instantaneously cut off the discharge of the material and thus the slight increase in weight of the material discharged which will flow after the gate begins to close may be readily calculated, and the material in the bucket when it is ready to be hoisted will be practically an equal amount for each load. In this way the amount of material handled may be readily ascertained.

It will be clear that the gate cannot be opened except when there is an empty bucket on the cradle, thus preventing an accidental discharge of material. The use of the undercut gate stops the discharge of material so quickly that there is no material spilt into the pit or onto the cradle as has been the case in former types of automatic hoisting apparatus. Further, there is no loss of material from the bucket as it is not hoisted until the material has ceased to run down the discharge apron, and in this way there is no danger of having the material drop below or back into the weighing and operating mechanism as has been found to be the case in former types of apparatus.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In gate operating mechanism, the combination of a counter-weighted gate normally closed, a discharge apron normally in inoperative position, a movable cradle adapted to receive a bucket, said cradle being connected to said gate and said apron and being adapted to first lower said apron, and then open said gate during a predetermined range of movement.

2. In gate operating mechanism, the combination of a counter-weighted gate normally closed, a discharge apron normally in inoperative position, a vertically movable cradle adapted to receive a bucket, said cradle being connected to said apron and said gate and being adapted to lower said apron, open said gate and release said gate respectively during a predetermined range of downward movement.

3. In a gate operating mechanism, the combination of a counter-weighted gate normally closed, a discharge apron normally in inoperative position, a vertically movable cradle adapted to receive a bucket, said cradle being connected to said apron and said gate and being adapted to lower said apron,

open said gate and release said gate respectively during a predetermined range of downward movement, upward movement of said cradle being adapted to return said apron to its normal position.

4. In automatic gate operating mechanism, the combination of a gate normally closed, a discharge apron normally in its inoperative position, a vertically movable cradle adapted to be operated by the weight of a hoisting bucket, means operatively connecting said cradle and said apron and adapted to lower the latter upon slight downward movement of the former, and gate operating mechanism connecting said cradle and said gate, and adapted to open said gate upon further downward movement of said cradle.

5. In automatic gate operating mechanism, the combination of a gate normally closed, a discharge apron normally in its inoperative position, a vertically movable cradle adapted to be operated by the weight of a hoisting bucket, means operatively connecting said cradle and said apron and adapted to lower the latter upon slight downward movement of the former, gate operating mechanism connecting said cradle and said gate, and adapted to open said gate upon further downward movement of said cradle, and releasing means operated by still further downward movement of said cradle, and adapted to disconnect said gate operating means to close said gate.

6. In automatic gate operating mechanism, the combination of a gate normally closed, a discharge apron normally in its inoperative position, a vertically movable cradle adapted to be operated by the weight of a hoisting bucket, means operatively connecting said cradle and said apron and adapted to lower the latter upon slight downward movement of the former, gate operating mechanism connecting said cradle and said gate, and adapted to open said gate upon further downward movement of said cradle, and releasing means operated by still further downward movement of said cradle, and adapted to disconnect said gate operating means to close said gate, said apron operating means being adapted to return said apron upon upward movement of said cradle.

7. In automatic gate operating mechanism, the combination of a gate normally closed, a discharge apron normally in its inoperative position, guideways, a vertically movable counterweighted cradle mounted in said guideways, and being adapted to be moved by the weight of a hoisting bucket, means operatively connecting said cradle and said apron and adapted to lower the latter into its discharging position upon downward movement of said cradle through

a predetermined distance, gate operating mechanism connecting said cradle and said gate, and adapted to open said gate upon downward movement of said cradle through a further predetermined distance, and releasing means adapted to disconnect said gate-operating mechanism upon a still further predetermined downward movement of said cradle.

8. In an automatic gate operating mechanism, the combination of a counter-weighted gate normally closing a discharge chute, a vertically movable counter-weighted cradle, a link connected to said gate and adapted to be engaged by said cradle to open said gate during a predetermined downward movement of the cradle, and means operable by a further downward movement of said cradle to disengage said link from said cradle to allow said gate to close.

9. In an automatic gate operating mechanism, the combination of a counter-weighted gate normally closing a discharge chute, guideways, a vertically movable counter-weighted cradle mounted in said guideways and having a projection on one side thereof, a link connected to said gate and adapted to be engaged by such projection to open said gate upon a predetermined downward movement of said cradle, and means for disengaging said link from said projection upon a further predetermined downward movement of said cradle.

10. In an automatic gate operating mechanism, the combination of a counter-weighted gate normally closing a discharge chute, guideways, a vertically movable counter-weighted cradle mounted in said guideways and having an apertured projection on one side thereof, a link connected to said gate and being mounted in such aperture and having a lug adapted to be contacted by said projection to open said gate upon downward movement of said cradle through a predetermined distance, and releasing mechanism adapted to disengage said link and said projection upon downward movement of said cradle through a further predetermined distance.

11. In a gate operating means for bucket hoists and the like, the combination of a movable counter-weighted cradle adapted to receive a bucket, a counter-weighted gate normally closed, a rod connected to said gate and adapted to be engaged by said cradle to open said gate upon downward movement of said cradle, and other means operable by further downward movement of said cradle and adapted to release said rod to close said gate.

Signed by me this 12th day of April, 1917.

EDGAR P. SAWHILL.