

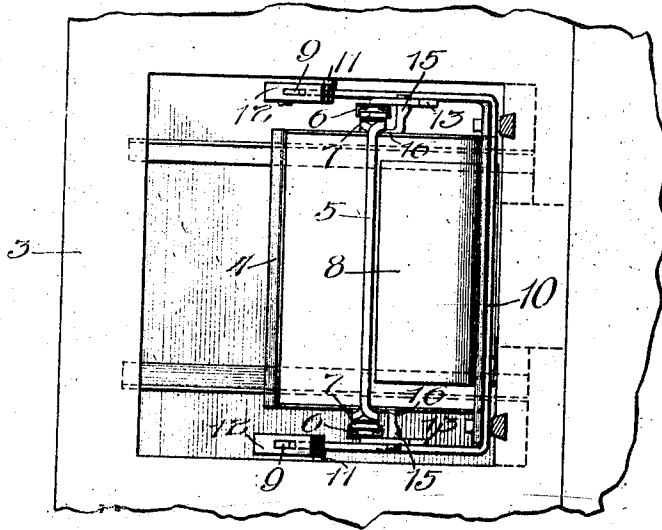


R. ELDER & W. T. KRAUSCH.  
 HOISTING MECHANISM.  
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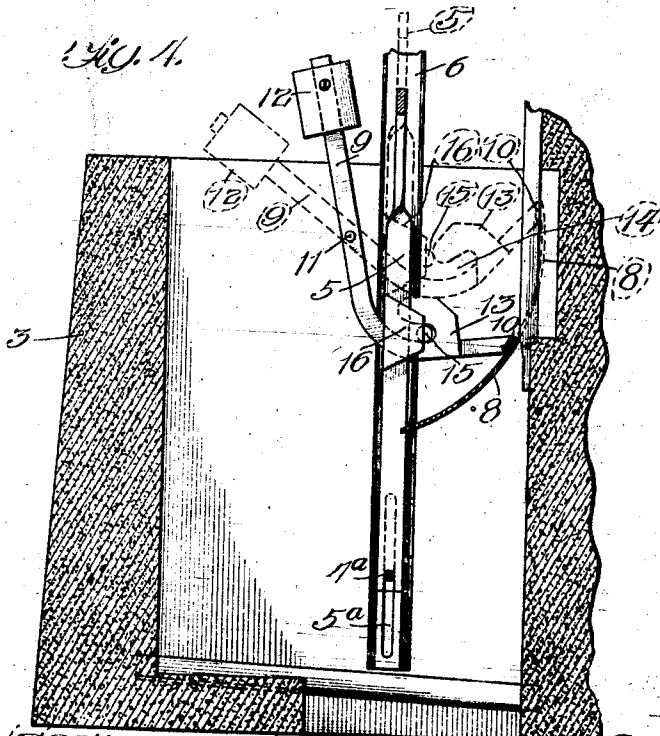
1,007,343.

Patented Oct. 31, 1911  
 2 SHEETS—SHEET 2.

*Fig. 3.*



*Fig. 4.*



*Witnesses:*  
*Edw. D. Perry*  
*J. H. Bennett*

*Inventors*  
*Robert Elder & Walter Krausch*  
*By Rector, Hibben & Davis*  
*Their Attys*

# UNITED STATES PATENT OFFICE.

ROBERT ELDER AND WALTER T. KRAUSCH, OF LA GRANGE, ILLINOIS, ASSIGNORS TO FAIRBANKS, MORSE & COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## HOISTING MECHANISM.

1,007,343.

Specification of Letters Patent. Patented Oct. 31, 1911.

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*To all whom it may concern:*

Be it known that we, ROBERT ELDER and WALTER T. KRAUSCH, citizens of the United States, residing at La Grange, Cook county, Illinois, have invented certain new and useful Improvements in Hoisting Mechanism, of which the following is a specification.

Our invention relates to hoisting mechanism adapted for the handling of granular material capable of flowing, such as coal, ore, stone, gravel, etc., and the object thereof is to provide for such mechanism a hoisting bucket cooperating with an automatic gate which not only controls the flow of the material into the bucket but also insures a full bucket and no more than a full bucket at each operation.

Heretofore it has been the practice to manually operate a gate for controlling the flow of the material into the bucket, but this method is objectionable particularly because the receiving pit, in which the bucket is positioned in the loading operation, is ordinarily filled with dust, so that the operator cannot see the material flowing into the bucket to ascertain when the proper amount has been introduced, but must judge by sound when it is full. As a result the operator frequently closes the gate before the bucket is full but sometimes permits it to overflow, thereby causing delay while such overflow is being shoveled up and removed.

Speaking in general terms, our invention comprises in connection with the hoisting bucket a gate which is adapted to control the flow of the material into the bucket and to be automatically opened and closed by the bucket itself as it descends and ascends, with the result that a full bucket is always assured without any care or attention on the part of the operator. To accomplish this result the gate is permitted to swing inwardly into the bucket during the loading operation, so that an open space is at such time formed in the bucket below the gate, which space becomes filled with the material when such gate is operated to close off the flow, this space being equal in area or cubical contents to the amount of material located in front of the gate and above the level of the top of the bucket. The bucket and gate are so constructed and related that the operation of lowering the bucket will automatically open the gate and the oper-

ation of hoisting the bucket will automatically close the gate.

In the drawings, Figure 1 is a sectional elevation of a portion of a hoisting mechanism illustrating our hoisting bucket and gate, this view showing the gate open and the bucket being loaded; Fig. 2 a view similar to Fig. 1, but illustrating the bucket filled and the gate closed just prior to the act of hoisting the bucket; Fig. 3 a plan view of the parts illustrated in Figs. 1 and 2; and Fig. 4 a view showing in full lines the position of the parts when the gate is open and in dotted lines the position when closed, the bucket being removed.

Inasmuch as our invention relates to the hoisting bucket and the gate cooperating therewith, we have not illustrated the details of the complete hoisting plant, especially as the same are well known.

Referring to the present embodiment of our invention, the material designed to flow from a hopper 1 through an opening or chute 2 into a pit 3 in which the bucket 4 is adapted to be raised and lowered. This bucket is provided with a bail 5 which has a vertical movement independent of the bucket by means of a pin and slot connection therewith. As shown, the members or arms of the bucket bail are provided with slots 5<sup>a</sup> and the bucket with laterally extending pins 4<sup>a</sup> entering the slots 5<sup>a</sup>. As a result of this construction, the bail continues its downward movement after the bucket has come to rest upon its support in the bottom of the pit until the upper ends of said slots contact the pins 4<sup>a</sup> as illustrated in Fig. 1. In the hoisting operation the bail moves upwardly a distance equal to the length of the slots before taking up and raising the bucket. When the bucket begins to rise its pins 4<sup>a</sup> are at the bottom of said slots, as illustrated in Fig. 2. It will be understood that this bail is connected with any of the usual hoisting ropes or cables usually employed in hoisting plants of this general character. In practice and by preference the bail and consequently the bucket are guided vertically during their travel by means of vertical guides 6 in which travel the rollers 7 journaled on the sides of the bail, as clearly indicated in Figs. 1 and 3.

The gate consists of an arc-shaped portion 8 forming the gate proper and a three-sided frame 9 to which it is attached and

by which it is swung into open or closed condition as the case may be. This frame comprises the two parallel arms 9' and the cross bar 10, which latter is secured to the gate proper. This frame is pivoted to the inner sides of the pit at the points 11 intermediate the length of said arms, which are bent or curved in the manner indicated in the drawings. This gate frame is counter-balanced by means of the weights 12 adjustable upon the outer ends of the arms 9'. These arms are each provided with brackets 13 which are so formed as to provide slots 14 between them and the upper edge of said arms. These slots are designed to cooperate with rolls 15 journaled upon the outer ends of brackets 16 secured to and movable with the bail. As a result, after the bucket has come to its position of rest, the bucket bail in its independent movement will cause its rolls 15 to press upon the upper edges of the arms 9' of the gate frame and, owing to the described curvature thereof, such frame will be rocked so as to remove the gate from the hopper opening and be swung in the inner side of the bucket, whereupon the parts assume the relative position indicated in Fig. 1. The gate is maintained in this lowered or open position by means of the brackets 13 inasmuch as the rolls 15 are confined in said slots 14. The bail of the bucket is made rather heavy, the excess of weight being utilized to open the gate as the bail descends in the manner explained. The brackets are not essential, but are preferable inasmuch as it enables the bucket bail and counterweights to be made lighter than otherwise, which is desirable. The gate is not only automatically opened just as the bucket comes to rest in the manner described, but it is also automatically closed and swung clear from the bucket. In this operation the first upward movement of the bail is obviously not communicated to the bucket, inasmuch as the bail has a certain amount of independent vertical travel, but such first movement of the bail is at once communicated to the gate frame by the rolls 15 which are caused to rock said frame to the position indicated in Fig. 2, owing to the engagement of such rolls with the brackets 13. Thus, because of the slots in the bail, this action of opening and closing the gate takes place after the bucket is in position and before it begins to rise with its load. When the gate is thus swung in the bucket the same occupies a position at one side thereof, so that as the material flows from the hopper into the bucket a space 17 will be left or reserved, as substantially indicated in Fig. 1, with the result that when the gate is raised, as the bail begins its upward movement, that portion of the material lying in front of the gate and above the level of the top of the bucket will fall

into the space thus provided. It will be understood that were it not for the provision of our invention and unless the gate was closed before the bucket was filled and coal between the bucket and hopper had come to rest, a portion of the coal would be left above the level of the top of the bucket, so that when the bucket was raised, such portion would necessarily fall into the pit. In practice the flow of material automatically stops when the line of flow is as shown in Fig. 1, at which time, to use the technical expression, the line of flow is at the angle of repose. Of course this action is true only of material such as coal, stone, etc., and it would not be true of fluids such as water or the like. By the use of our invention we are thus enabled to always insure a full bucket load and no more and this without any particular attention from the operator other than starting the hoisting operation as soon as he observes that the flow of the material has ceased, indicating that the bucket is full. What would otherwise amount to overflow in the absence of our invention is compensated for by space provided underneath the gate when in its lowered or open position. As soon as the gate is automatically raised to clear the bucket, the bucket load is automatically leveled, inasmuch as what would otherwise be overflow is taken care of by the described space.

We claim:

1. In mechanism of the class described, the combination of a hopper and gate for closing the same, a bucket, hoisting means for raising and lowering it to a position to be filled from the hopper, said means adapted to engage and operate the gate, and connections between the hoisting means and the bucket whereby initial movement independent of the latter is permitted the hoisting means.

2. In mechanism of the class described, the combination of a hopper, a gate for closing the same, a bucket, hoisting means for raising and lowering it to a position to be filled from the hopper, said means adapted to engage and operate the gate, and lost motion connections between the hoisting means and the bucket whereby initial movement independent of the latter is permitted the hoisting means.

3. In mechanism of the class described, a hopper having a discharge opening, a plate forming a gate for controlling the flow of material therethrough so mounted that when open it is in a position outside the hopper opening to form a chute and support a body of material and in closing cuts off such material outside the hopper.

4. In a device of the class described, a hopper having a discharge opening, a plate forming a gate controlling the same, a support for the gate pivoted outside of and at

a point remote from the opening whereby the gate may be swung down into a position to form a chute and support a body of material and swing up to discharge such material outside the opening and to close the latter.

5 5. In a device of the class described, a hopper, a plate forming a gate controlling the discharge opening thereof mounted to swing substantially edgewise from a position to form a chute and support a body of material outside the opening to a position to close the opening.

10 6. In a device of the class described, a hopper having a discharge opening, a bucket mounted to be lowered into a position to receive the discharge from the hopper, a gate bodily movable edgewise to a position in which it closes the opening from a position in which it supports a body of material discharged from the hopper within the bucket.

15 7. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of an arc-shaped swing gate supported from pivots outside of and remote from the hopper discharge opening for controlling the flow of such material and arranged to be swung into the bucket during the loading thereof whereby a space is preserved in the bucket below the gate, and means for normally holding the gate in closed condition; substantially as described.

20 8. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of a gate for controlling the flow of such material and arranged to be swung into the bucket during the loading thereof whereby a space is preserved in the bucket below the gate, a swinging frame on which such gate is mounted pivoted on an axis remote from the hopper opening, and means on the bucket for engaging and operating said frame and gate; substantially as described.

25 9. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of a gate for controlling the flow of such material and arranged to be swung into the bucket during the loading thereof whereby a space is preserved in the bucket below the gate; a swinging frame on which such gate is mounted and which comprises parallel arms on opposite sides of the bucket pivoted outside of and at a point remote from the hopper and a cross-piece connected with the gate proper, and means on the bucket for engaging and operating said frame and gate; substantially as described.

30 10. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of a gate for controlling the

flow of such material and arranged to be swung into the bucket during the loading thereof whereby a space is preserved in the bucket below the gate, a swinging frame on which such gate is mounted and which comprises parallel arms on opposite sides of the bucket pivoted outside of and at a distance from the opening of the hopper and a cross-piece connected with the gate proper, and projections extending laterally from the bucket structure for engaging and operating said frame and gate; substantially as described.

35 11. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of a gate for controlling the flow of such material and arranged to be swung into the bucket during the loading thereof whereby a space is preserved in the bucket below the gate, a swinging frame on which such gate is mounted and which comprises parallel arms on opposite sides of the bucket pivoted outside of and at a distance from the opening of the hopper and a cross-piece connected with the gate proper, and rolls extending laterally from opposite sides of the bucket structure for engaging and operating said frame and gate; substantially as described.

40 12. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, a bail on the bucket having some travel independent thereof, and a gate governed by the movements of said bucket bail and adapted to control the flow of such material; substantially as described.

45 13. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, a bail having a pin and slot connection with the bucket whereby the bail has an independent travel subsequent to the time when the bucket comes to rest for loading and an independent travel preliminary to the hoisting of such bucket, and a gate governed by the movements of said bucket bail and adapted to control the flow of such material; substantially as described.

50 14. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of a bail having a pin and slot connection with the bucket whereby the bail has an independent travel subsequent to the time when the bucket comes to rest for loading and an independent travel preliminary to the hoisting of such bucket, rolls projecting from the parallel arms of the bail, and a gate adapted to be operated by said rolls and adapted to control the flow of such material; substantially as described.

55 15. In hoisting mechanism, the combination, with the hoisting bucket structure

adapted to receive material from a hopper or the like, of a bail having a pin and slot connection with the bucket whereby the bail has an independent travel subsequent to the time when the bucket comes to rest for loading and an independent travel preliminary to the hoisting of such bucket; rolls on the parallel arms of the bail, and a gate for controlling the flow of such material operated by the movements of the bail, said gate comprising a gate proper and a frame having two parallel arms pivoted at points at one side of the bail and positioned in the path of movement of the rolls; substantially as described.

16. In hoisting mechanism, the combination, with the hoisting bucket structure adapted to receive material from a hopper or the like, of a bail having a pin and slot connection with the bucket whereby the bail has an independent travel subsequent to the time when the bucket comes to rest for loading and an independent travel preliminary to the hoisting of such bucket, and also having brackets 13 forming slots 14 with which said rolls cooperate; substantially as described.

17. In hoisting mechanism, the combination with the hoisting bucket structure adapted to receive material from a hopper or the like and with a pit for the bucket, of a gate governed by the movements of the bucket structure for controlling the flow of such material, said gate being pivoted upon the pit outside of and remote from the opening of the hopper and positioned in the path of movement of the bucket structure so as to be operated thereby; substantially as described.

18. In a mechanism of the class described, a hopper having a discharge opening, a gate for controlling the flow of material from the

hopper so mounted that when opened it is in a position outside the hopper opening to form a chute over which the material in the hopper may freely flow and in closing cuts off such material outside the hopper.

19. In a mechanism of the class described, a hoisting bucket; a hopper for feeding the same; a gate bodily movable edgewise from a position within the bucket when the latter is in position beneath the hopper to a position in which it closes off the flow of material.

20. In a mechanism of the class described, a hopper having a discharge opening at its lower part, a bucket and hoisting means adapted to raise and lower the bucket from and to a position beneath the hopper opening, and a chute carried by a frame which is pivoted at a point remote from the hopper opening whereby the chute in lowered position projects within the bucket to form a space within the latter unoccupied by material discharged over the chute, and when raised discharges the material supported thereby into the bucket.

21. In a mechanism of the class described, a hopper having a discharge opening, a bucket, means for raising and lowering the bucket into and out of operative relation with the hopper opening, a gate for the hopper opening, curved in vertical section and pivoted remote from the hopper opening and above the lower edge thereof adapted to swing substantially in the arc of its curve from a position below the hopper opening to a position in which it substantially closes the same.

ROBERT ELDER.  
WALTER T. KRAUSCH.

Witnesses:

H. B. SAUERMAN,  
ROSCOE C. BAKER.