

July 1, 1924.

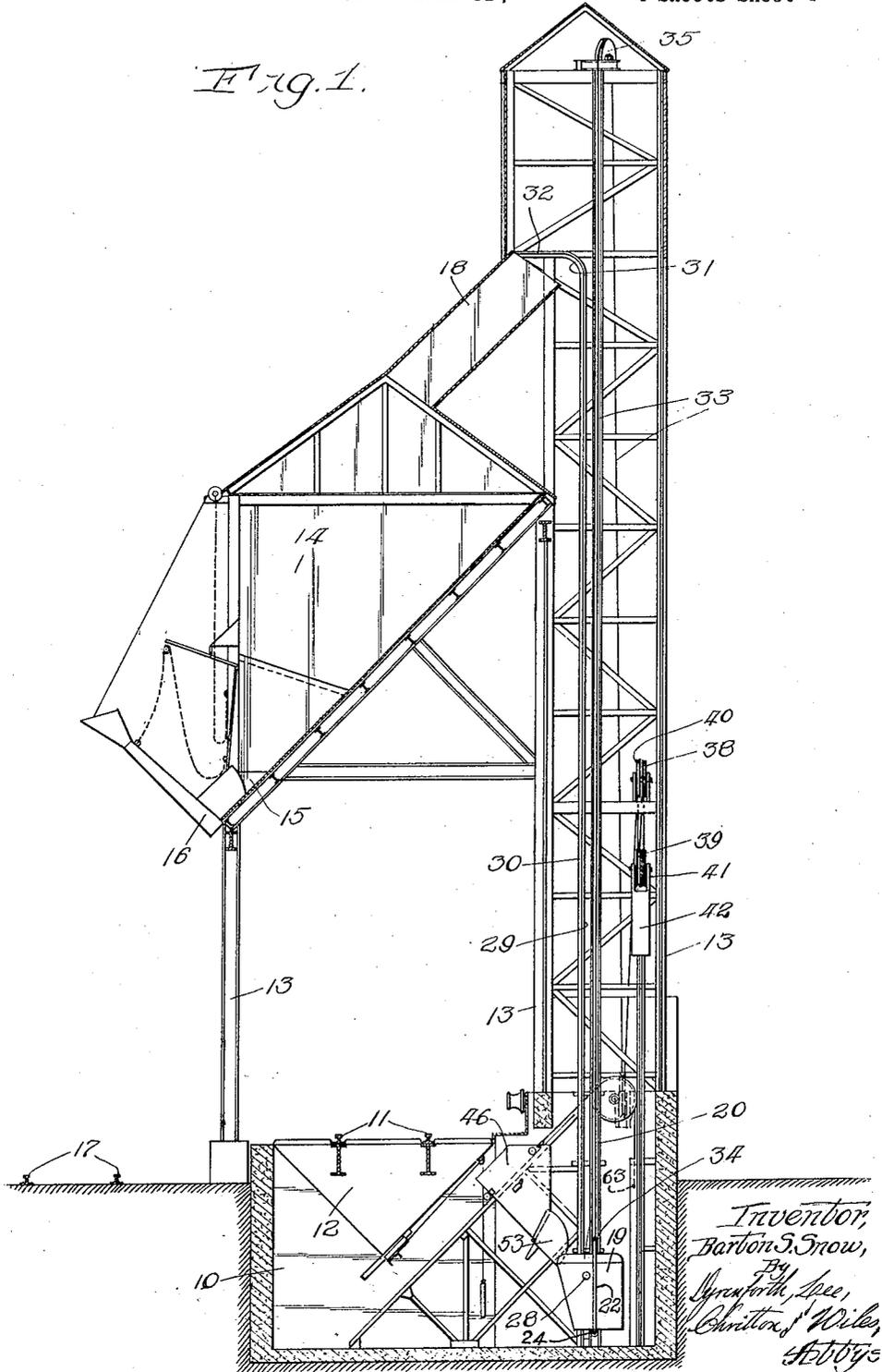
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B. S. SNOW

MATERIAL ELEVATING APPARATUS

Filed March 31, 1922

4 Sheets-Sheet 1



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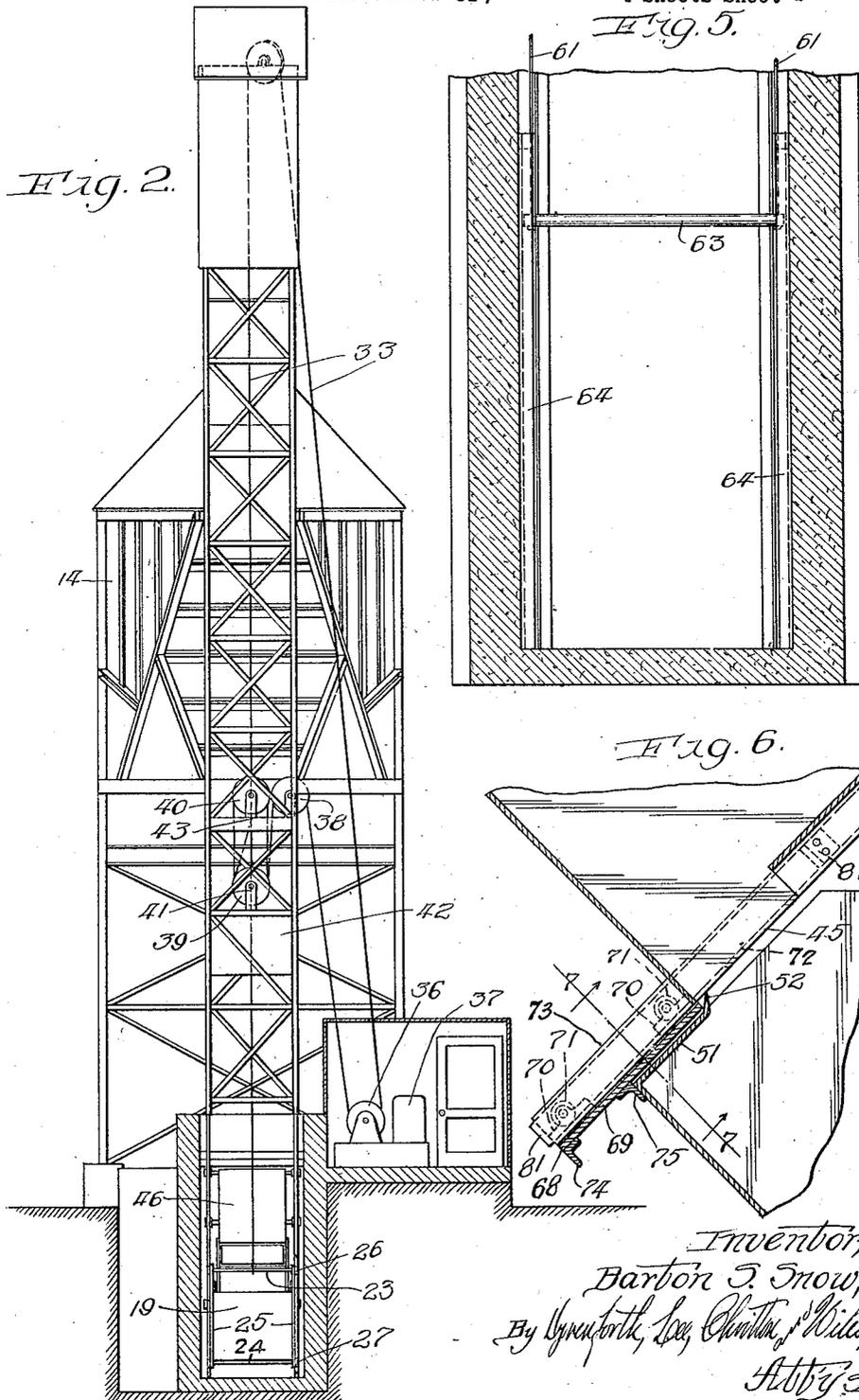
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4 Sheets-Sheet 2



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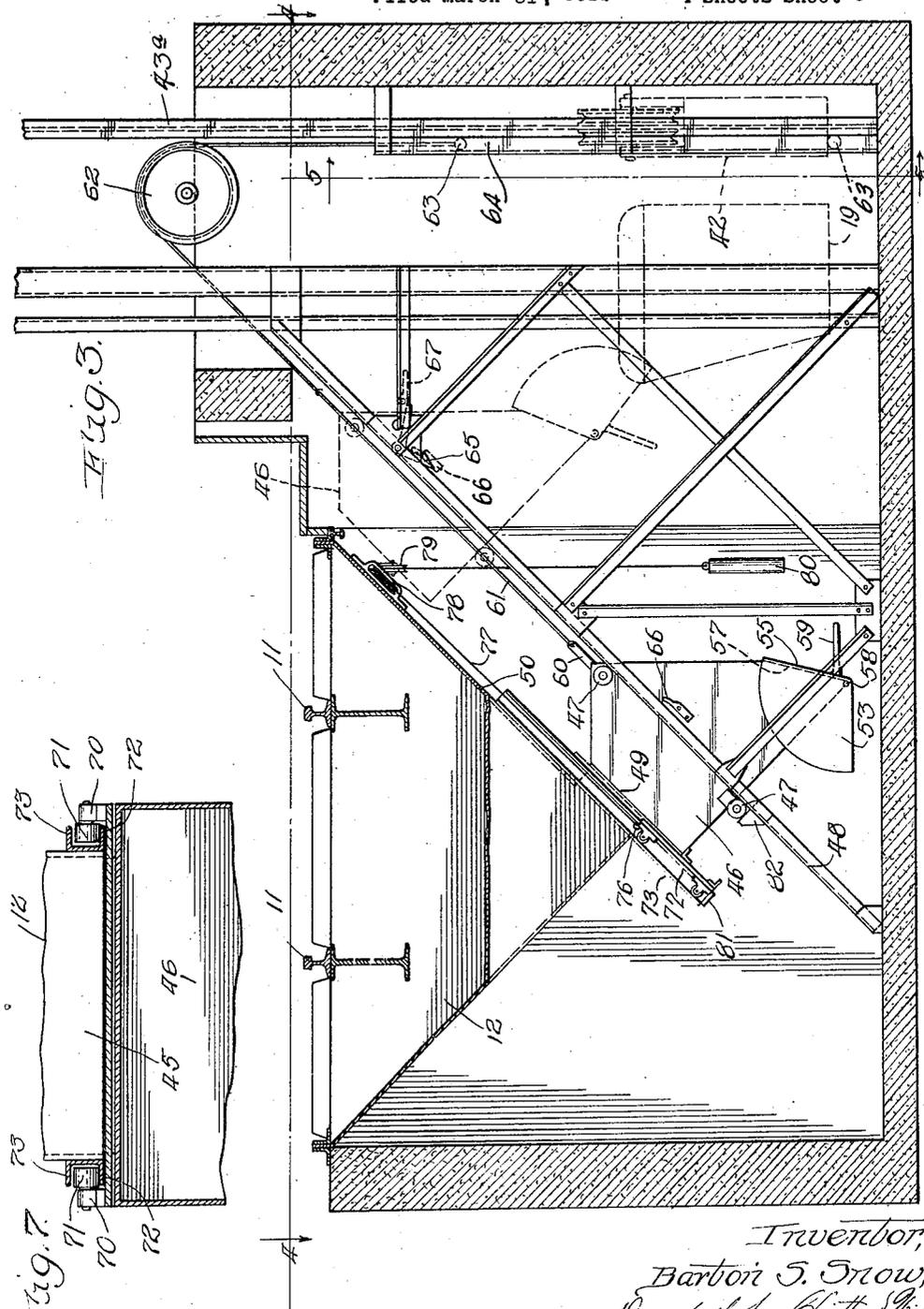


Fig. 5.

Fig. 7.

Inventor,  
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# UNITED STATES PATENT OFFICE.

BARTON S. SNOW, OF BATAVIA, ILLINOIS, ASSIGNOR TO T. W. SNOW CONSTRUCTION CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## MATERIAL-ELEVATING APPARATUS.

Application filed March 31, 1922. Serial No. 548,365.

*To all whom it may concern:*

Be it known that I, BARTON S. SNOW, a citizen of the United States, residing at Batavia, in the county of Kane and State of Illinois, have invented a new and useful Improvement in Material-Elevating Apparatus, of which the following is a specification.

My invention relates to apparatus of the general type commonly used for elevating material such as, for example, coal from a hopper into which the material is dumped from railway cars located on tracks above the hopper, into a storage bin above the tracks from which the material is permitted to discharge as, for example, into the tenders of locomotives, this type of apparatus comprising a vertically-operating bucket, or skip, for elevating the material into the uppermost hopper and power-operated cable means for operating the bucket, connected with the bucket and with a counterweight for the bucket.

One of my objects is to provide improvements in apparatus of the type referred to whereby the bucket may be elevated substantially to dumping position at a relatively high speed and the desired deceleration of the bucket at the end of its elevating movement accomplished without undue expenditure of power; another object is to provide a construction of apparatus whereby a shallower pit for receiving the bucket when in loading position, may be provided, than in the case of prior structures, thereby greatly reducing the expense of forming the pit and greatly reducing the danger of encountering water in digging the pit. Another object of my invention is to provide for the automatic filling of the bucket, elevating it and dumping its contents into the uppermost hopper, and thereafter lowering the bucket and repeating the operation stated, all in an automatic manner. Another object is to provide in conjunction with the lower hopper, a charge-receiving receptacle for the purpose of receiving the charge from the hopper, lifting this charge above the outlet of the hopper and dumping the charge into the bucket in lowered position and before the bucket, after it has been raised and dumped, has returned to lowered position, returned to a position for receiving the charge and again elevated for dumping the discharge into the bucket in lowered position, these operations being automatic, and

the charge-receiving receptacle being elevated by the action of the counterweight for the bucket as distinguished from separate hoisting mechanism requiring power. Another object is to provide an apparatus of the character above stated which will be positive, simple and economical of operation and be better suited for performing the functions for which it is provided.

Referring to the accompanying drawings: Figure 1 is a view in vertical elevation of a railway coaling station equipped with my improvements, certain of the parts shown being represented in elevation, this view showing the bucket in lowermost, loading, position and the parts associated therewith in the positions they assume in this position of the bucket. Figure 2 is a view in end elevation of the structure shown in Fig. 1, certain parts of the structure being shown in section, the apparatus being viewed from the right hand side of Fig. 1. Figure 3 is an enlarged elevational view of the lower part of the structure shown in Figs. 1 and 2, with certain parts sectioned, this view showing, by full lines, the position occupied by the parts cooperating with the bucket when the bucket is rising but before it reaches dumping position, and by dotted lines the positions assumed by these parts when the bucket is in either loading or dumping position, the bucket being shown in loading position by dotted lines. This view is taken at the line 3—3 on Fig. 4 and viewed in the direction of the arrows. Figure 4 is a section taken at the line 4—4 on Fig. 3 and viewed in the direction of the arrows. Figure 5 is a section taken at the line 5—5 on Fig. 3 and viewed in the direction of the arrows. Figure 6 is a sectional view of the lower hopper, the charge-receiving receptacle, a gate device for the hopper, portions of the hopper and the charge-receiving receptacle being broken away; and Figure 7, a broken section taken at the line 7—7 on Fig. 6 and viewed in the direction of the arrows.

The apparatus shown comprises a pit structure which extends below the level at which the tracks, represented at 11, and on which the cars containing the material to be elevated are run, extend, this pit containing a hopper 12 open at its upper end and across which the tracks 11 extend, this hopper being provided for receiving the material from the cars. Rising from the ground ad-

jacent the pit 10 is a frame superstructure 13 on which is mounted a hopper 14 shown as provided at its outlet 15 with spout and valve mechanism represented at 16 for controlling the flow of material from the hopper 14 into the receptacle to be charged therewith, as for example a tender which will be located on the track 17. The hopper 14 and the control mechanism therefore may be of any suitable construction, and as this part of the apparatus is of common construction, detail description thereof is unnecessary. The framework 13 at the side of the hopper 14 opposite that at which the device 16 extends projects upwardly above the hopper which latter communicates with an inlet chute 18, and provides the support and guiding means for a vertically movable bucket, or skip, represented at 19 and provided for the purpose of elevating material from the hopper 12 to a position in which it discharges into the bin 14 through the inlet chute 18. The last-referred-to portion of the framework 13 is provided at opposite sides of the chute 18 with pairs of vertical bars 20 spaced apart to provide guides for the bucket 19. The bucket 19 is of a construction commonly provided in apparatus of this general type, this bucket being provided with a bail 22 pivotally connected at its lower end with the underside of the bucket. The bail shown is formed of the upper cross-bars 23, the lower cross-bar 24 which extends beneath the bucket 19 and with which the bucket is pivotally connected, and side bars 25 connected with the end portions of the cross-bars 23 and 24, these cross-bars at their extremities being provided with rollers 26 and 27 which extend into the vertical guideways 20, for guidance. The bucket, as shown, is of such construction that it is overbalanced tending to tilt on the cross-bar 24 of the bail, to the left in Fig. 1 when in loaded condition. The bucket is provided at opposite sides with laterally-extending rollers 28 which bear, under the tilting action of the bucket, against the adjacent vertical guide surfaces 29 of guide bars 30 carried by the framework 13, the upper extremities of these guide bars being curved toward the hopper 14, as represented at 31, and terminating in the substantially horizontal portions 32, whereby when the bucket 19 is elevated to its extreme upper position, it will automatically tilt to the left in Fig. 1 at its pivotal connection with the bail 22 and discharge its contents into the chute 18, and in the lowering of the bucket will be automatically rocked to upright condition.

The cable which controls the vertical movement of the bucket 19 is represented at 33, this cable being connected at one end with the upper end of the bail as represented at 34. The cable extends upwardly from

the bail and around a supporting sheave 35 journaled on the framework 13, and thence extends downwardly to a drum 36 upon which it is wound, the drum 36 being a hoisting drum operated from any suitable source of power, as from the engine represented at 37. The cable 33 thence passes over a pulley 38 journaled on the framework 13 and thence around pulleys 39 and 40 constituting a block-and-tackle, the pulley 40 being journaled on the framework 13 and the pulley 39 journaled in the upwardly-extending spaced arms 41 of the counterweight 42, the end of the cable 33 opposite the end connected with the bucket 19, as stated, being connected with the framework 13 as represented at 43. The counterweight 42 is vertically movable, it being guided in this movement in any suitable way, as for example by means of the T bars 43<sup>a</sup> supported on the framework 13 at opposite edges of the counterweight and extending at portions thereof into vertical grooves 44 contained in opposite edges of the counterweight 42.

It will be understood from the foregoing description that the arrangement of the bucket, counterweight and the cable mechanism connecting these parts, is such that the counterweight required for producing the counterweighting function, viz, to substantially counterweight the bucket plus one-half the weight of the material which constitutes a charge for the bucket, is very much greater than in those cases, as is the common practice, where the counterweight is so connected with the bucket, through the cable mechanism, that it travels at the same speed as the bucket, the purpose of providing a relatively heavy counterweight being hereinafter explained.

Cooperating with the hopper 12, the outlet of which is represented at 45, is mechanism for receiving a charge from this hopper, elevating the charge and thereafter dumping it into the bucket 19 when the latter is in the position shown in Fig. 1, a description of this mechanism being as follows: The mechanism referred to comprises the charge-receiving receptacle 46 shown as provided at opposite sides with rollers 47 at which this receptacle is rollingly supported upon inclined guideways 48 between which the receptacle 46 is located. The upper end of the receptacle 46 is open and presents the inclined portion 49 which is spaced from, and arranged substantially parallel with, the adjacent inclined wall 50 of the hopper 12 and in which wall the outlet 45 is located. The lower end of the inclined portion 49 being formed with a cover plate 51 having an outwardly-turned lip 52 which extends closely adjacent the lower edges of the wall of the outlet 45. The lower end of the receptacle 46 is provided with a trough-shaped apron 53 formed of the side walls 54 located

at opposite sides of the receptacle 46, and a front connecting plate 55, this apron being located at the outlet 57 of the receptacle 46 and serving to control the discharge from the latter of the material charged into it. The apron 53 is pivotally supported on the receptacle 46 as indicated at 58 and in the full line position shown in Fig. 3 maintains the outlet of the receptacle in closed condition, the apron being preferably so weighted that the force exerted against it by the material in the receptacle 46 will not swing it to open condition. The apron 53 is also provided with an arm 59 which, in the full line position of the apron 53 in Fig. 3, extends substantially horizontally in a direction toward the bucket 19. The receptacle 46 is connected by means of pivoting links 60, with the lower ends of cables 61 which pass over pulleys 62 journaled on the frame of the structure, the other depending ends of these cables being connected with the ends of a cross-bar 63 guidingly confined at its ends in upright guides 64 stationarily secured in the pit 10. The parts of the structure just described are so constructed and arranged that when the receptacle 46 is in lowermost position, the position shown by full lines in Fig. 3, the cross-bar 63 occupies the full line position shown in Fig. 3, in which it extends into the path of movement of the counterweight 42 in moving downwardly, the counterweight 42 being of such weight that as it descends in contact with the cross-bar 63 it will draw the receptacle 46 upwardly along the inclined guideway 48 to the dotted position represented in Fig. 3 in which position the receptacle 46 becomes automatically locked, by the interlocking of latches 65 pivoted on the framework of the apparatus, with keepers 66 connected with the opposite sides of the receptacle 46, the latches 65 normally extending into the path of movement of the keepers 66 and being automatically operable, to permit these latches to interlock with the keepers upon moving the receptacle 46 to the position just referred to. The latch devices 65 cooperate with trip levers 67 pivoted on the frame of the apparatus and superposing at ends thereof the adjacent ends of the latches 65, their other ends extending into the path of movement of the adjacent upper corners of the bucket 19 whereby the bucket in ascending operates the latches 65 to a position in which they disengage from the keepers 66.

The receptacle 46, constructed, as hereinbefore described, operates in its movement from full line position in Fig. 3 to the dotted line position represented therein, to cut through the material at the outlet 45, and in order that this outlet shall be closed except when the receptacle 46 is being charged with material, I provide a slide valve, represented

at 68, this valve having a plate-like portion 69 located below the outlet 45 and paralleling the latter and provided at opposite edges with brackets 70 carrying rollers 71 which rollingly engage the lower flanges 72 of channel bars 73 secured to the hopper 12 to extend at opposite sides of the outlet 45, as more clearly represented in Fig. 7. The valve 69 is shown as reenforced at its lower edge by an angle bar 74, and above this bar is provided with an angle-shaped stop-bar 75. The valve 68 is connected at opposite edges thereof, as indicated at 76, with the lower ends of cables 77 which extend over pulleys 78 and 79 journaled on the wall portion 50 of the hopper 12, the lower ends of these cables being connected with a weight 80 of such weight that it will positively draw the valve 68 upwardly, causing it to follow the movement of the receptacle 46 in traveling up the guideway 48, to a position where this valve completely closes the outlet 45. In the arrangement shown stops 81 are provided on the guide members 73 in position to be engaged by the lowermost ones of the brackets 70.

A description of the operation of the apparatus is as follows: Assuming the parts of the apparatus to be in a position in which the charge-receiving receptacle 46 is in lowermost position, as represented in Fig. 3, in which position it is in communication with the outlet of the hopper 12 and thus receives a charge of material therefrom, the apron 53 of the receptacle 46 being in the full line position represented in Fig. 3, the bucket 19 in the position of the receptacle 46, as stated, will be ascending and will extend above the dotted position of the receptacle 46 in Fig. 3. As the bucket 19 continues its upward movement toward dumping position, the bucket upon reaching the upper end of the guide-bar 30, automatically dumping the charge previously introduced therein, into the chute 18, the counterweight 42 continues to descend, and as it nears the limit of its lowermost movement it engages the cross-bar 63 forcing the latter downwardly with the result of moving the receptacle 46 in an upward direction along the support 48, to a position in which the latches 65 automatically interlock with the keepers 66. The bodily movement of the receptacle 46, as stated, operates, at its portion 52 to cut through the material located at the outlet 45 of the bin 12, the gate device 68 under the action of the weight 80 closely following the movement of the receptacle 46 and serving to close the outlet 45. Following the dumping of the contents of the bucket 19 into the chute 18, the bucket descends and the counterweight 42 rises, the receptacle 46 remaining in elevated position. As the bucket 19 nears the limit of its descent, it strikes the arm 59 of the apron 53, with

the result of rotating the apron to the dotted position represented in Fig. 3, in which position the apron overlaps the adjacent upper edge of the bucket 19 and serves as a chute through which the material discharges from the receptacle 46 into the bucket 19 as shown by dotted lines in Fig. 3. When the bucket 19 is operated to hoist it to dumping position, the bucket, by engaging with the apron 53 as stated first swings the latter in counter-clockwise direction in Fig. 3 to a position in which it is overbalanced on its pivot 58, whereupon the apron assumes the full line position relative to the receptacle 46 as shown by full lines in Fig. 3 in which the outlet of the receptacle is closed. As the bucket 19 continues upwardly its upper edge engages the levers 67 with the result of rocking the catches 65 in clockwise direction in Fig. 3 to a position in which they disengage from the keepers 66, whereupon the receptacle 46 is free to run down the inclined support 48 to the full line position represented in Fig. 3. Any suitable means for stopping the receptacle 46 in the lowered position stated may be provided, as for example the stop blocks 82 shown as secured to the inclined support 48 in a position to be engaged by the lowermost set of rollers 47.

It will be understood from the foregoing that the movement of the receptacle 46 from lower, filling, position to upper, discharging, position is effected by the force exerted by the counterweight 42 in lowering, it being possible, by providing the block-and-tackle mechanism hereinbefore described, to provide this counterweight of sufficient weight to actuate the receptacle 46 as stated, without exerting an undue amount of lifting force on the bucket 19, it being desirable that the counterweight 42 substantially counterbalance only the weight of the bucket and one-half the load carried by the bucket.

Furthermore the provision of the receptacle 46 movable from a lower filling, to a higher discharging, position, is of advantage as the pit into which the bucket lowers may be very much more shallow than where a chute for delivering material from the hopper 12 to the bucket, and not having the bodily movement as stated of the receptacle 46, is provided.

The apparatus provided in accordance with my invention is not only of comparatively simple construction and positive in operation, but is automatically operable in the various ways stated, with the expenditure of the minimum power.

The arrangement of the various parts is such, as shown, that the counterweight 42 does not engage the cross-bar 63 until the bucket nears the point at which it discharges, and as the weight presented by the charged receptacle 46 is relatively great, the

bucket is automatically slowed down before it reaches the discharge position. Thus the bucket may be raised at relatively high speed and the speed of its movement is automatically reduced to the desired degree before it reaches dumping position. Furthermore the counterweight being compounded as explained, by the block and tackle, it moves relatively slowly, while the bucket moves rapidly, and thus it acts upon the charging receptacle, to raise the latter, at a slow and positive speed.

While I have illustrated and described a particular construction embodying my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

2. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, an inclined guiding support, a receptacle bodily movable along said support and which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending for moving said receptacle to raised position.

3. In material elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, a cable connected with said receptacle, and a member connected with said cable and extending into the path of downward movement of said counterweight for bodily moving said receptacle, said receptacle when in lower position receiving material from said hopper, and, when in raised position, positioned to discharge into said bucket.

4. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the ma-

terial, hoisting means for said bucket, a counterweight for said bucket, an inclined guiding support, a receptacle bodily movable along said support and which when in lower position receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, a cable connected with said receptacle, and a member connected with said cable and extending into the path of downward movement of said counterweight for bodily moving said receptacle upwardly along said support, said receptacle when in lower position receiving material from said hopper, and, when in raised position, positioned to discharge into said bucket.

5. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, the connections between said counterweight and bucket being such that said counterweight travels at a reduced speed compared with the bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

6. In material elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, a cable through the medium of which said bucket is operated, a counterweight for said bucket connected with said cable, means engaged by said cable whereby said counterweight travels at a reduced speed compared with the speed of said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

7. In material elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, a cable through the medium of which said bucket is operated, a counterweight for said bucket connected with said cable, block-and-tackle means engaged by said cable and so arranged that said counterweight travels at a reduced speed compared with the speed of said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

8. In material-elevating apparatus, the combination of a hopper for the material

to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, means actuated by said counterweight in descending, for moving said receptacle to raised position, and means releasably holding said receptacle in raised position when the counterweight rises.

9. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position, and means releasably holding said receptacle in raised position when the counterweight rises and releasable by the bucket in ascending to permit said receptacle to descend.

10. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position, said receptacle being provided with means controlling the discharge of the material from said receptacle, operative to open position by the downward movement of said bucket.

11. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position, said receptacle being provided with means controlling the discharge of the material from said receptacle, operative to open position by the downward movement of said bucket and operative to closed position by the upward movement of said bucket.

12. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which when in lower posi-

tion receives material from said hopper, means for elevating said receptacle, said receptacle having a portion which operates, in the raising of said receptacle to cut through the material at the outlet of the hopper, and means following said receptacle in its movement, to close said outlet.

13. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which when in lower position receives material from said hopper, means for elevating said receptacle, said receptacle having a portion which operates, in the raising of said receptacle to cut through the material at the outlet of the hopper, means following said receptacle in its movement, to close said outlet, comprising a valve part which moves across said outlet, and means tending to cause said valve to move across said outlet.

14. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which when in lower position receives material from said hopper, means for elevating said receptacle, said receptacle having a portion which operates, in the raising of said receptacle to cut through the material at the outlet of the hopper, means following said receptacle in its movement, to close said outlet, comprising a valve part which moves across said outlet, a weight, and means connecting said weight with said valve device tending to move said device to a position for closing said outlet.

15. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which when in lower position receives material from said hopper, means for elevating said receptacle, said receptacle having a portion which operates, in the raising of said receptacle to cut through the material at the outlet of the hopper, said portion extending upwardly toward said outlet, and means following said receptacle in its movement, to close said outlet.

16. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which when in lower position receives material from said hopper, means for elevating said receptacle, said receptacle having a portion which operates, in the raising of said receptacle to cut through the material at the outlet of the hopper, said portion having an upwardly and forwardly-inclined edge which extends adjacent said outlet, and means following said receptacle in its movement, to close said outlet.

17. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movable conveying element for receiving material from said hopper, a counterweight operatively connected with said element, a device through which the material passes from said hopper to said conveying element and controllable to control

discharge to said element, and means actuated by said counterweight in descending, for moving said element to raised position.

18. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movable conveying element for receiving material from said hopper, a counterweight operatively connected with said element, a device through which the material passes from said hopper to said conveying element and controllable to control discharge to said element, and means actuated by said counterweight for controlling said device.

19. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which when in one position receives material from said hopper, means for moving said receptacle, said receptacle having a portion which operates, in the moving of said receptacle in one direction to cut through the material at the outlet of the hopper, and means following said receptacle in its movement, to close said outlet, said portion of said receptacle extending in a plane substantially not below the plane in which the part of said last named means which forms the closure, operates.

20. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

21. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, an inclined guiding support, a receptacle bodily movable along said support and which, when in lower position, receives material from said hopper, and, in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

22. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, a cable connected with said receptacle, and a member connected with said cable and extending into the path of downward movement of said counterweight for bodily moving said receptacle, said receptacle when in lower position receiving ma-

terial from said hopper, and, when in raised position, positioned to discharge into said bucket.

23. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, an inclined guiding support, a receptacle bodily movable along said support and which when in lower position receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, a cable connected with said receptacle, and a member connected with said cable and extending into the path of downward movement of said counterweight for bodily moving said receptacle upwardly along said support, said receptacle when in lower position receiving material from said hopper, and, when in raised position, positioned to discharge into said bucket.

24. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, the connections between said counterweight and bucket being such that said counterweight travels at a reduced speed compared with the bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position.

25. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, means actuated by said counterweight in descending, for moving said receptacle to raised position, and means releasably holding said receptacle in raised position when the counterweight rises.

26. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position, and means releasably holding said receptacle in raised position when the counterweight rises and releasable by the bucket in ascending to permit said receptacle to descend.

27. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position, said receptacle being provided with means controlling the discharge of the material from said receptacle, operative to open position by the downward movement of said bucket.

28. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a movably supported bucket for elevating the material, a counterweight for said bucket, a bodily movable receptacle which, when in lower position, receives material from said hopper, and, when in raised position, is positioned for discharge into said bucket, and means actuated by said counterweight in descending, for moving said receptacle to raised position, said receptacle being provided with means controlling the discharge of the material from said receptacle, operative to open position by the downward movement of said bucket and operative to closed position by the upward movement of said bucket.

29. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which in one position receives material from said hopper, means for moving said receptacle, said receptacle having a portion which operates, in the movement of said receptacle to cut through the material at the outlet of the hopper, and means following said receptacle in its movement, to close said outlet.

30. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which in one position receives material from said hopper, means for moving said receptacle, said receptacle having a portion which operates, in the movement of said receptacle to cut through the material at the outlet of the hopper, means following said receptacle in its movement, to close said outlet, comprising a valve part which moves across said outlet, and means tending to cause said valve to move across said outlet.

31. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which in one position receives material from said hopper, means for moving said receptacle, said receptacle having a portion which operates, in the movement of said receptacle to cut through the material at the outlet of the hopper, means following said receptacle in its movement, to close said outlet, comprising a valve part which moves across said outlet, a weight, and means con-

necting said weight with said valve device tending to move said device to a position for closing said outlet.

32. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which, when in one position, receives material from said hopper, means for moving said receptacle, said receptacle having a portion which operates, in the movement of said receptacle to cut through the material at the outlet of the hopper, said portion extending upwardly towards said outlet, and means following said receptacle in its movement, to close said outlet.

33. In material-handling apparatus, the combination of a hopper, a bodily movable receptacle which, when in one position, receives material from said hopper, means for moving said receptacle, said receptacle having a portion which operates, in the movement of said receptacle to cut through the material at the outlet of the hopper, said portion having an upwardly and forwardly inclined edge which extends adjacent said outlet, and means following said receptacle in its movement, to close said outlet.

34. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counter-weight for said bucket, an upwardly traveling receptacle adapted when in lowered position to receive material from said hopper and when in raised position to discharge into said bucket, and means actuated by said counter-weight in descending for moving said receptacle into raised position.

35. In material-elevating apparatus, the combination of a hopper for the material to be elevated, a bucket for elevating the material, hoisting means for said bucket, a counter-weight for said bucket, an up-

wardly traveling receptacle adapted when in lowered position to receive material from said hopper and when in raised position to discharge into said bucket, and means actuated by said counter-weight in descending for moving said receptacle into raised position, the connections between said counter-weight and bucket being such that said counter-weight travels at a reduced speed compared with the bucket.

36. In material-elevating apparatus, the combination of a hopper for the material to be elevated, an upwardly moving receptacle, a movable element into which said receptacle discharges, said receptacle being movable from a position in which it receives material from said hopper into elevated position for discharge into said element, means for moving said receptacle to elevated position, said receptacle moving to lowered position by gravity, and means controlled by said element in the elevating of the latter for retardingly controlling the movement of said receptacle to lowered position under the action of gravity.

37. In material-elevating apparatus, the combination of a hopper for the material to be elevated, an upwardly moving receptacle, a movable element into which said receptacle discharges, said receptacle being movable from a position in which it receives material from said hopper into elevated position for discharge into said element, means for moving said receptacle to elevated position, said receptacle moving to lowered position by gravity, a member movable up and down and positioned to engage said element and rise in the lowering of said receptacle, and a cable engaging said member and receptacle, said element in rising retarding upward movement of said member under the action of gravity exerted on said receptacle.

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