

F. J. SCHRAEDER, JR.
CONVEYING SYSTEM.
APPLICATION FILED DEC. 27, 1910.

1,015,251.

Patented Jan. 16, 1912.

7 SHEETS—SHEET 1.

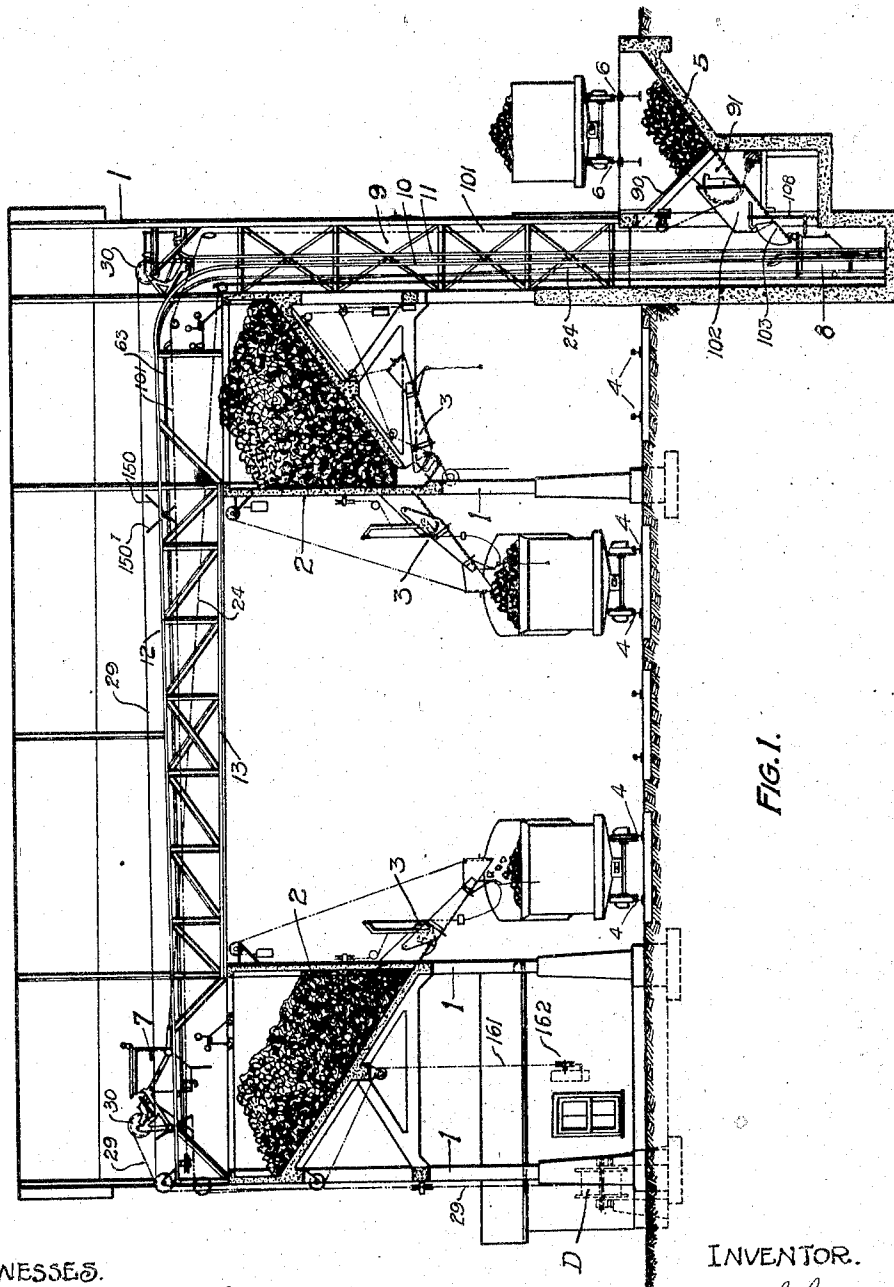


FIG. 1.

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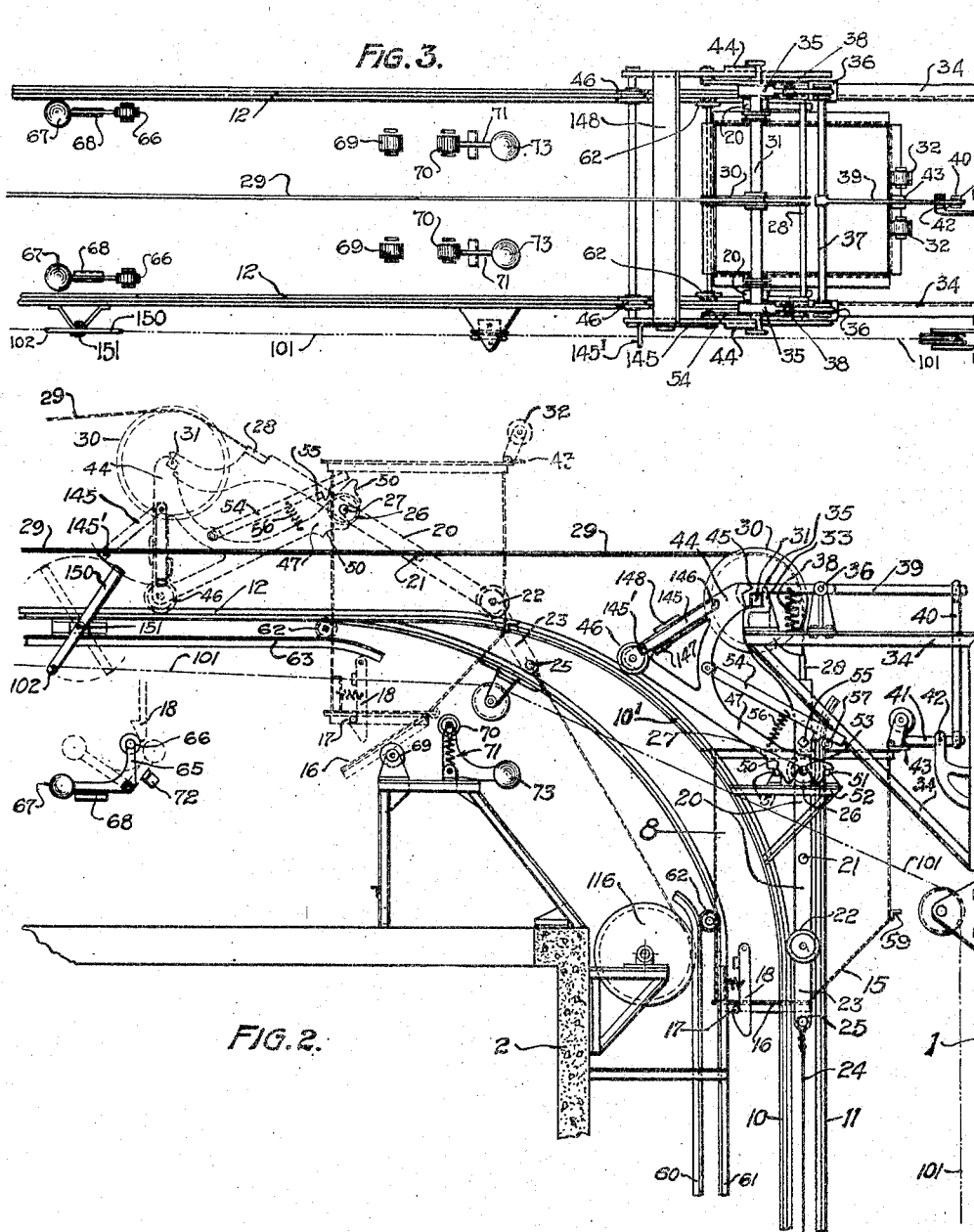
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7 SHEETS—SHEET 2.



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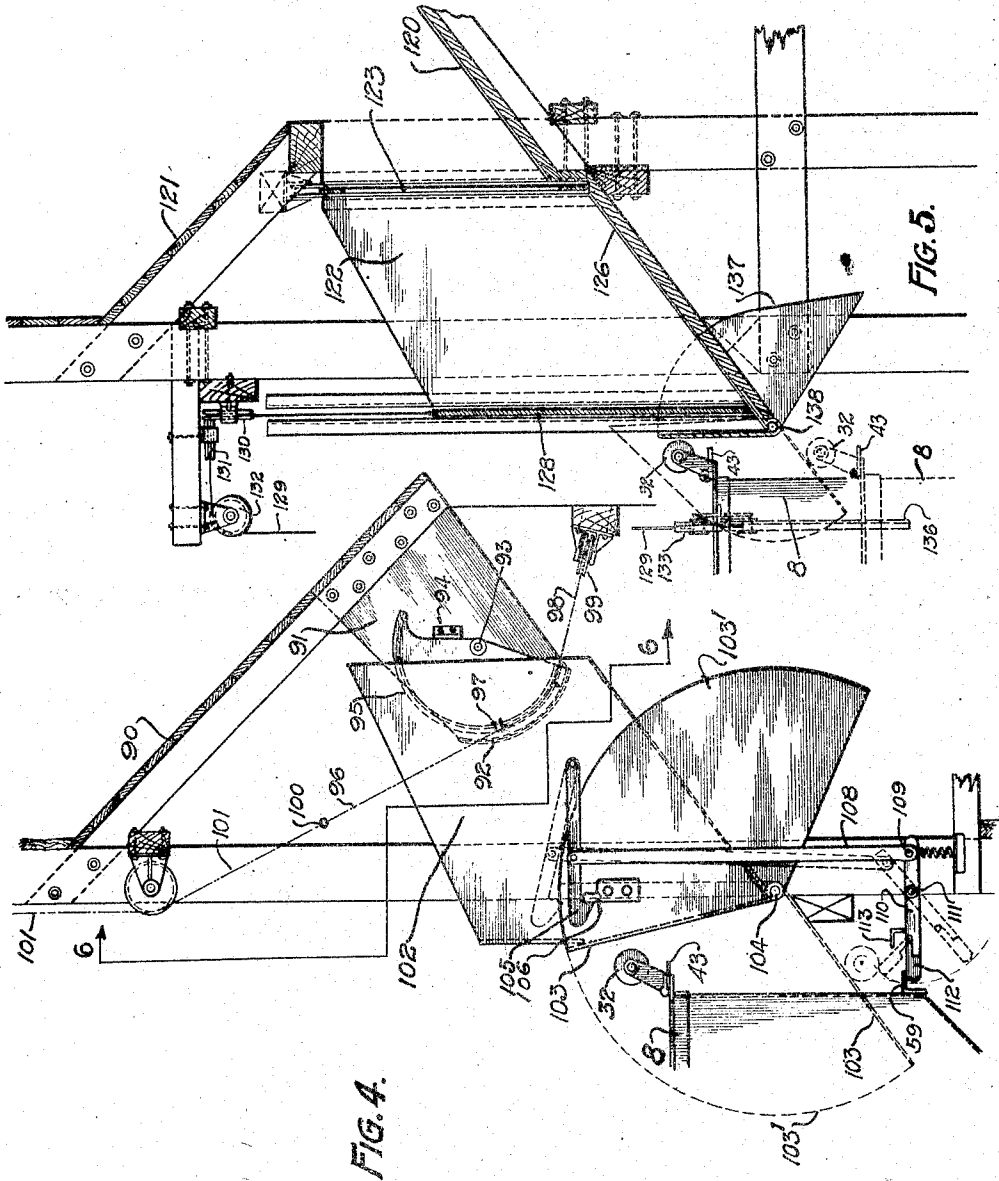
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7 SHEETS—SHEET 3.



WITNESSES.
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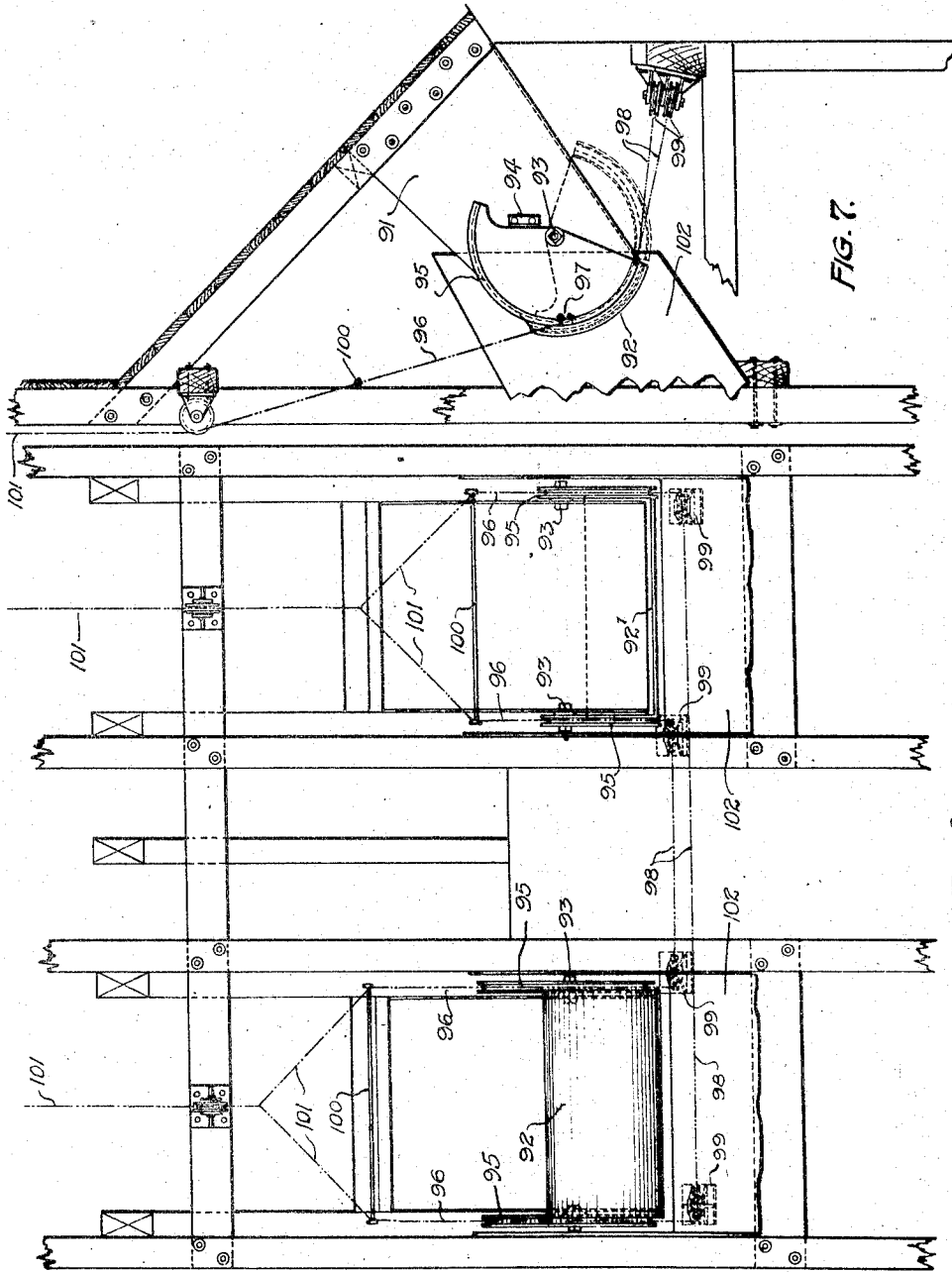
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7 SHEETS—SHEET 4.



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7 SHEETS—SHEET 5.

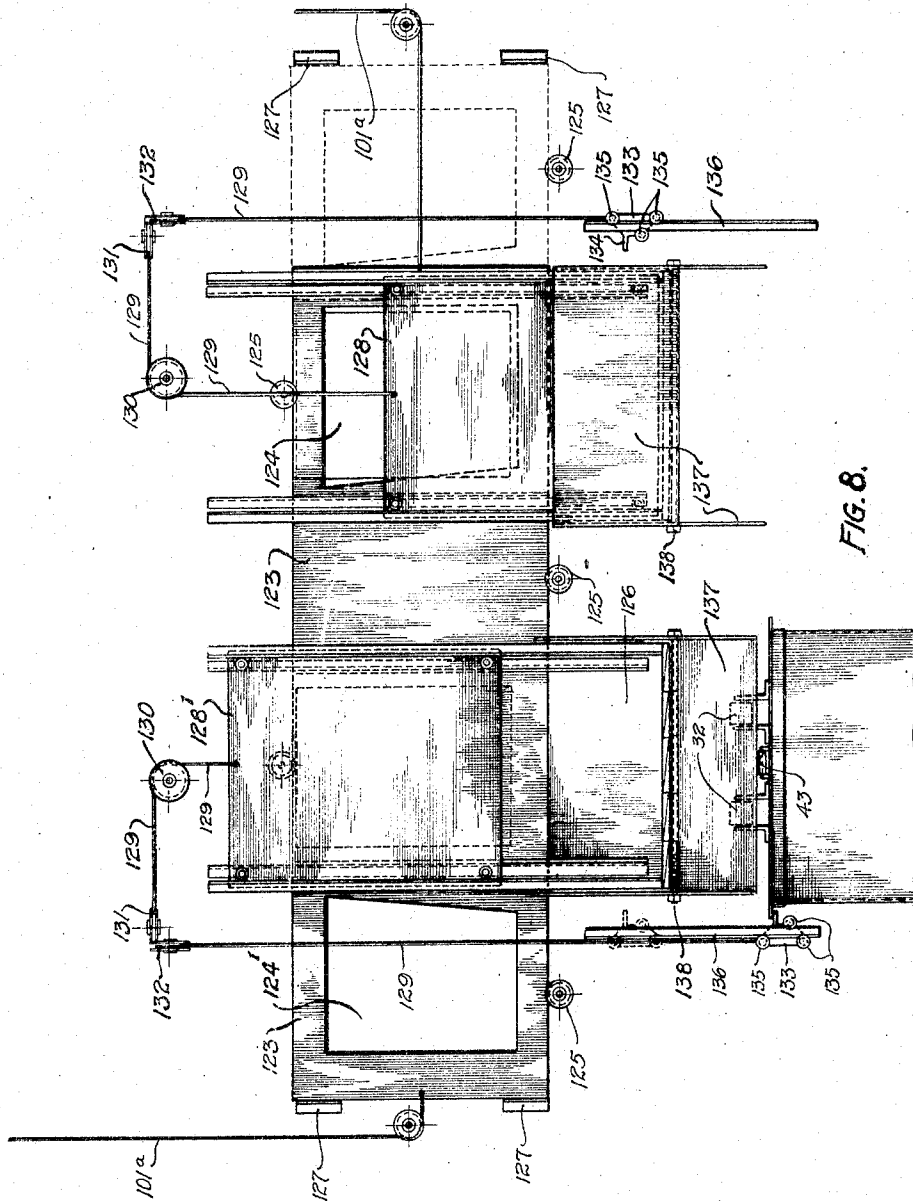


FIG. 8.

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7 SHEETS—SHEET 6.

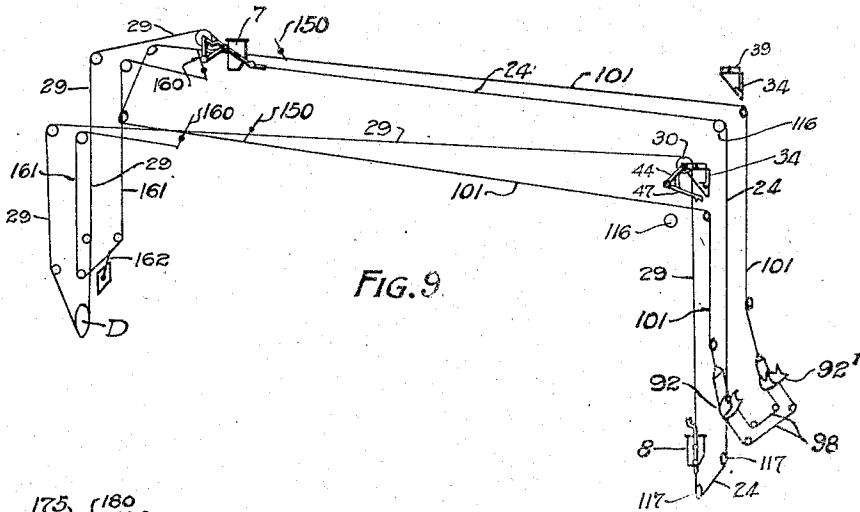


FIG. 9.

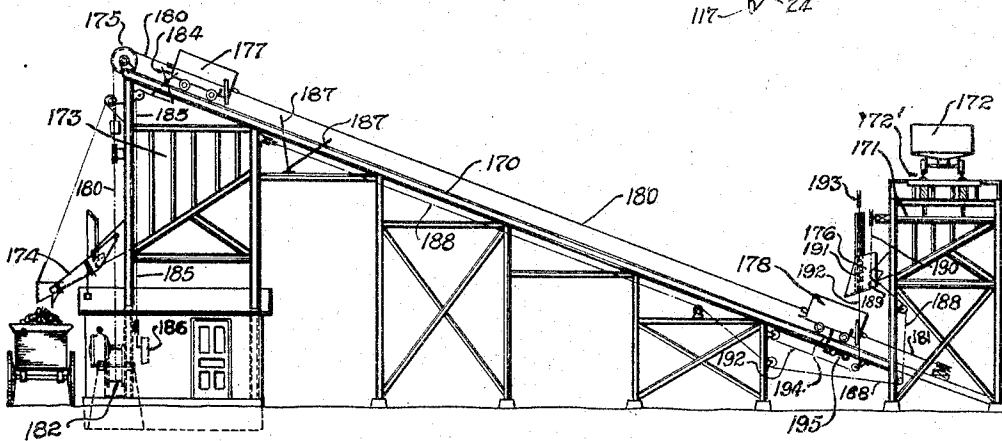


FIG. 10.

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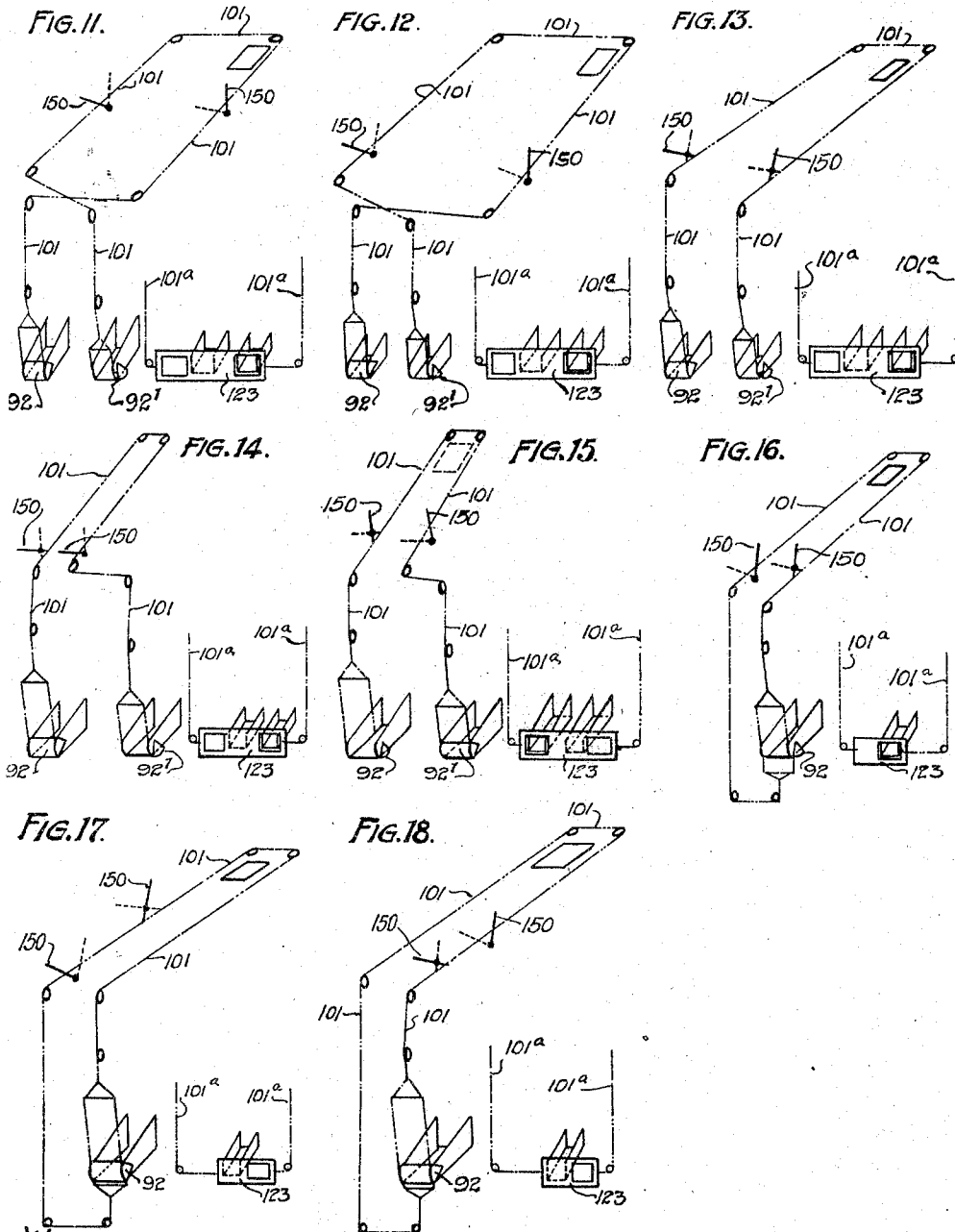
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7 SHEETS—SHEET 7.



WITNESSES

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CONVEYING SYSTEM.

1,015,251.

Specification of Letter's Patent.

Patented Jan. 16, 1912.

Application filed December 27, 1910. Serial No. 599,302.

To all whom it may concern:

Be it known that I, FRANK J. SCHRAEDER, Jr., a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Conveying Systems, of which the following is a description.

My invention belongs to that general class of devices known as conveying systems, and relates more particularly to an improved system and apparatus for receiving, measuring and distributing material as desired.

It is particularly applicable for the handling of coal, or the like, and is in the nature of an improvement over the system and apparatus shown and described in my pending application for conveying systems or the like, filed June 3, 1909, Serial No. 499,857. The device is not limited, however, to the materials mentioned, but may be used wherever found applicable, and with all or any of the parts of any other system or apparatus with which it may be suitably used.

The invention has among its objects the production of a simple, durable, efficient and satisfactory apparatus of the kind described for automatically handling the material to be transferred with a minimum of changing of receptacles and a simplicity of control. The control is such that the transferring is done automatically without requiring an operator, except in stopping or starting the apparatus at such times as may be desired.

To this end my invention consists in the novel construction, arrangement and combination of parts herein shown and described, and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts, Figure 1 is a sectional view of my system as applied to a railway coaling station. Fig. 2 is an enlarged side elevation of a portion of the apparatus. Fig. 3 is a top elevation of the same. Fig. 4 is an enlarged side elevation of one of the automatic measuring feeders for filling the buckets. Fig. 5 is a sectional view of a slightly modified form of automatic measuring feeder. Fig. 6 is a sectional view taken substantially on

line 6—6 of Fig. 4. Fig. 7 is substantially a side elevation of the same. Fig. 8 is a front elevation of the measuring feeder shown in Fig. 5. Fig. 9 is a diagrammatic view of my control system shown in Figs. 1, 2, 3, 4, 6 and 7. Fig. 10 is a side elevation of a slightly modified form of system and control. Fig. 11 is a diagrammatic view showing a modified feeder filling gate control, both buckets controlling. Fig. 12 is a diagrammatic view showing another modified feeder filling gate control. Fig. 13 is a diagrammatic view showing another modified feeder filling gate control. Fig. 14 is a diagrammatic view showing a feeder filling gate control, in which one bucket controls. Fig. 15 is a diagrammatic view of a modified feeder filling gate control, in which one bucket controls. Fig. 16 is a diagrammatic view showing a feeder filling gate control for a single bucket system. Fig. 17 is a diagrammatic view showing a modified feeder filling gate control for a single bucket system. Fig. 18 is a diagrammatic view showing still another modified feeder filling gate control for a single bucket system.

Referring to the drawings, in which my preferred form of system and apparatus is shown as applied to a railway coaling station, 1 represents the frame work of the station, 2—2 suitable storage bins from which the coal may be discharged through suitable chutes 3 or their equivalents into cars or locomotive tenders upon the tracks 4, etc., or other vehicles. In the station shown the coal or other material is discharged from cars upon the track 6 into the receiving hoppers 5, from whence it is conducted by my system to the storage bins 2, etc. In the station shown I show two buckets or traveling receptacles 7 and 8, which alternately convey the coal from the receiving hoppers 5 up the shafts 9, and thence laterally to the desired bin. As will be seen, it is of course obvious that by immaterial or simple changes, the system may consist of one bucket, or by duplicating the parts shown, the station may consist of any number of buckets.

Inasmuch as the buckets and various parts are similar, a detached description of one will suffice for the system. Referring first to Figs. 1, 2 and 3, the shaft 9 is provided with

tracks or guides 10 and 11 on both sides of the bucket, spaced so as to allow the bucket to travel between them. The rail or guide 10 is extended up as indicated at 10¹, and thence laterally as at 12, and it will be noted by referring to Fig. 1 that the track 12 gradually slopes downward from the mouth of the shaft, the same being suitably supported by a suitable truss 13 or the equivalent for the purpose. The bucket 8 is provided with a sloping bottom 15, and with a pivoted or hinged bottom 16, which is normally maintained closed by latches 18 on each side of the bucket, engaging the pins 17 on the hinged bottom. The bucket is provided with a bail, consisting of the side members 20, which are pivotally secured at 21 at both sides of the bucket and connected by a cross member 28, to which is secured the hoisting and operating cable 29. The bail members 20 are provided with flanged wheels or rolls 22 and 26, arranged to travel between the rails 10 and 11 when the bucket is in the shaft. When the bucket is on the tracks 12 the wheels 22 carry a portion of the load, as hereafter described. To the bail members 20 are pivotally secured links 23 connected by a bar 25, which has a cable 24 secured thereto, the opposite end of which is connected to a similar bar on the other bucket, when two buckets are used in the system. When one bucket is used the cable 24 is connected to cable 29, or is cable 29 extended.

When the bucket is in the shaft it is carried by a sheave or pulley 30, over which the cable 29 passes. The sheave 30 is provided with an axle or shaft 31, which is carried by brackets 33 on the brackets 34 when the bucket is in the shaft. Locking members 35, having hooked ends 45, normally lock the shaft 31 on the bracket 33. Resilient members 38 normally maintain the locking members 35 in operative position. The locking members 35 are keyed to the shaft 37, which is pivotally supported at 36. Keyed to the shaft 37 is a bar 39, the opposite end of which is connected by a bar 40 to a lever 41, pivotally supported at 42. On the bucket is provided a hinged lid or extension 43, which is arranged to cooperate with the lever 41 to release shaft 31, when the upper end of the bail members 20 are interposed substantially as shown in Fig. 2.

Arranged to cooperate with the bucket and sheave 30 is a frame 44, provided with a pair of wheels 46, formed to cooperate with the shaft 31 and bail members 20. The frame 44 is extended as at 47 arranged to be supported by a bracket 52 when substantially positioned as shown in Fig. 2, with the notches 53 in line with the pins 27 and the notches 50 seated on pins or brackets 51. A locking member 54 is provided on one or both sides of the frame and arranged to engage pins 55 when the bucket is drawn later-

ally, a spring 56 maintaining the lock in position. When the bucket is in the shaft the locking members 54 are maintained open by the pins 57 (see Fig. 2) the weight of the frame 44—47 being sufficient to overcome the tension of the springs 56.

As the bucket is raised the bail members pick up the shaft 31, the frame-part 47 being engaged by the pins 27, so that the shaft 31 and sheave 30 are carried by the two parts, substantially as shown by the dotted lines in Fig. 2, the frame and bail being locked together by the locking members 54. It will thus be seen that the bail members 20 and the frame members 44—47 form substantially a rigid carriage supported on wheels 22 and 46, in which carriage the bucket 8 is carried, and propelled by the cable 29. It might be noted that the sheave and its axle or shaft 31 can be attached directly to the frame 44—47, in which case the locking members, various supporting brackets, etc., might be omitted.

The bucket is prevented from swinging while in the shaft by means of rails 60 and 61 spaced so as to permit the wheels 62 arranged on the bucket to travel between them. The rails 61 are extended up to join the track rails 12, so as to guide and prevent swinging of the bucket until it is supported upon the tracks 12, after which swinging is prevented by the rails 63, between which and the rails 12 the wheels 62 are positioned. Suitably positioned where desired over one or the other of the bins are the trippers 65, provided with rolls 66, which cooperate with the latches 18 to disengage the same from the pin 17 to discharge the contents of the bucket. The stops 68 and 72 limit the movement of the tripping arms 65, which are normally maintained in position by the weights 67. As the bucket returns to the shaft the trippers 65 tip to permit the latches 18 to pass (as indicated by the dotted lines). Positioned preferably where shown, near the mouth or top of the tracks, is provided a closer 70 for closing the bucket door or bottom 16. As shown, the door is partially closed by the rolls 69 and completely closed by the resiliently supported rolls 70 carried on the tripping arm 71, which are also preferably weighted as at 73, the same tipping to permit the loaded bucket to pass, but extending up so as to close the door on the return trip of the bucket.

In the preferred construction, the discharge of the coal from the receiving bins or hoppers 5 into the buckets is controlled by the buckets, as will be more fully explained hereafter. In the drawings, I show two forms of automatic measuring feeders for controlling the discharge of coal or loading of the buckets, either one to be adapted to be similarly controlled by the buckets. Referring first to the feeder illustrated in

Figs. 1, 4, 6 and 7, 90 represents a portion of the hopper wall provided with a chute 91, from which the flow of coal is controlled by a filling gate 92, pivotally supported at 93. Where the system consists of two buckets the gates 92 are connected by cables 98 and 101, cable 101 being secured to bars 100 (see Figs. 4 and 6); to the ends of which are secured cables 96, which are secured in the grooved segments 95 at 97. The cables 98 are also secured at 97, to the segments 95, and extend over pulleys or blocks 99, connecting the gates, as most clearly shown in Figs. 4, 6 and 7. As one end of the cable 101 is strained or pulled, it closes the one gate and opens the other. The movement of the gate is limited by stops 94. The chutes 91, when the gates 92 are opened, discharge into the measuring chutes or hoppers 102, each of which has a capacity equal to one of the buckets. Referring particularly to Fig. 4, the measuring feeders being similar, the coal is retained in the hopper 102 by a pivoted gate 103, which is pivoted at 104. The gates 103 are normally locked by latches 105 on each side of the bucket, which engage pins or lugs 106. The latches 105 are controlled by bars 108 pivotally secured thereto, which are connected by a rod or bar 109, to the center of which is attached the lever 110, pivotally supported at 111. The lever 110 is operated by the angle or extension 59 near the bottom of the bucket, so that as the bucket descends it engages the lever 110 on its extended end 112 and raises the latches 105. The gate, however, is prevented from immediately opening by the rolls 32, which allow the gate to open gradually. As the bucket descends farther, the gate 103 entirely opens, owing to the weight of coal bearing against the same, as indicated by the dotted lines in Fig. 4, discharging a bucketful of coal into the bucket. At this time, however, the filling gate 92 is closed, the time of opening the gates or operation of same and the buckets being more fully explained hereafter. However, the gates work alternately, one being closed when the other is opened, first measuring a bucketful and closing the filling gate, and then discharging the same into the bucket, the operation being continued. The lever 110 is provided with an end 112, pivotally secured thereto, and arranged to cooperate with the extension 59, as was heretofore noted, so that as the bucket is hoisted in the shaft, the rollers 32 close the gate 103, which is locked by the latch 105, and the extension 59 passes by the end 112, which pivots so as to permit the extension to pass by. If it were not so pivoted it would engage the other side of the lever 110 and draw it beyond its limited position, which is controlled by the stop 113.

In the measuring feeder shown in Fig. 5, 120 represents the bottom of the hopper 5,

121 also representing a portion of the same. The bins are provided with openings into the measuring hoppers 122, the openings being controlled by a sliding gate 123 (see Fig. 8), which is provided with openings 124 and 124' therethrough. As shown in Fig. 8, the gate 123 is supported and retained in position by a plurality of guiding rolls 125, the travel of the gate being limited by stops 127, or their equivalents. The right hand opening from the hopper 5 to the measuring chute or hopper is shown open in Fig. 8, while the opposite opening is closed by the gate 123. It will be noted that one edge of each opening is at an incline so as to have somewhat of a cutting effect when it is drawn through the coal. The discharge of the coal or material from the measuring hoppers or chutes 122 is controlled by gates 128—128', (see Figs. 5 and 8), which are each controlled by their respective buckets when the same are in the respective shafts. Each gate 128 is provided with a cable 129, which passes over pulleys 130, 131 and 132, and is connected to a traveler 133 having an extension 134 arranged to engage the flange or its equivalent on the top of the shaft. The carrier or traveler 133 is guided by a rail 136, the same being provided with suitable rolls or wheels 135. A movable chute or apron 137 pivotally secured at 138 carries the coal from the bottom 126 of the measuring hopper 122 to the bucket, the same being opened by the pressure of the coal when the door or gate 128 is raised, which is only after the bucket is in position to receive its load. After receiving its load at the end of its travel the bucket rises, and in so doing permits the gate 128 to close, at the same time positively closing the bridging apron 137, which is maintained closed by its own weight. The cables 29 connecting the buckets 7 and 8 pass over a drum D (see Fig. 9), which is controlled by a motor or other source of power maintained so that driving the drum in one direction or the other alternately raises and propels the buckets, suitable sheaves being provided from the drum D up to the far end of the tracks 12, so that the buckets may travel the entire length of the tracks if desired. The cables 24 connecting the buckets, extend into the shafts 9, over suitable sheaves 116—117, so that as one bucket is raised and laterally moved along its tracks 12, the other bucket is positively returned to the bottom of the shaft. By inclining the tracks toward the mouth of the shaft, as heretofore mentioned and as illustrated in Fig. 1, the loaded bucket is easily propelled owing to the action of gravity. Cables 101 each control the operation of the feeder filling gates 92 or 123, passing over suitable sheaves and connect the gates. To operate the cables 101, I provide levers 130

150 (see Figs. 1, 2, 3 and 9) pivotally connected or supported at 151 and secured to the cables 101, as at 102. The number of controlling levers 150 and arrangement thereof may be varied, as will be more fully explained hereafter. The levers 150 are operated by the extensions 145¹ on the pivoted levers 145, pivotally secured to the frame 44 as at 146. (See Fig. 2.) In the form shown in Fig. 2, 147 is the stop which limits the movement of the lever 145, so that as it is carried by the frame 44 it trips the lever 150 and throws it into the dotted position shown in Fig. 2. Under certain circumstances or conditions hereafter described, the stop is placed on the opposite side, as for example 148 is extended and 147 omitted, so that the lever 150 is tripped when the bucket is going in the opposite direction. This will be more fully explained in the modified controlling systems for the gate.

The operation of the system may be described as follows: The rotation of the drum D (referring to Fig. 9) is controlled by the switch 162, assuming the drum D to be electrically driven, or by equivalent means when other power is used, which is controlled by the cables 161 operated by the tripping levers 160. The cable 29 which is operated by the drum D is connected to the bails 20 of the two buckets. The links 23 secured to the lower end of the bucket bails, are connected by a bar 25 to which is fastened cable 24. The feeder filling gates 92 and 92¹ (or 123—123¹) are connected by the cable 101, the tripping or operating levers being provided. The feeder filling gates 92 and 92¹ are also connected by cables 98 or their equivalents. Assuming for example, that the buckets are in the positions shown in Fig. 9, that the bucket 7 has discharged its load and reversed the drum D, and that bucket 8 is filled and is at the foot of the shaft. In this case gate 92 is shut and gate 92¹ open, while the feeder discharging gate 103 is open, as indicated by the dotted lines in Fig. 4, and the feeder discharging gate 103 for feeder bucket 7 is closed. As bucket 8 is hoisted in the shaft, it closes gate 103 and bucket 7 is drawn toward the foot of its shaft. When the bucket 8 reaches the mouth of the shaft, the bail 20 picks up the shaft 31 and with the frame 44, the lock 35 having been raised, carries the sheave 30 and shaft 31 substantially as shown in the dotted lines in Fig. 2, the bucket traveling along the tracks toward the drum end of the track. As soon as the bucket starts up the shaft it closes its gate 103, which is automatically locked by the latch 105, and as the bucket travels along the track on the upper level it engages its lever 150 opening its own feeder filling gate 92 and at the same time closing feeder filling gate 92¹.

At the end of its travel the bucket engages the lever 160 and reverses the direction of rotation of the drum D. In the meantime the bucket 7 has traveled to the bottom of the shaft 9 and opened its gate 103, so that the bucket is filled. The trips 66 (see Fig. 2) for opening the buckets are placed where desired over the first or second bin. The levers 150 may of course be placed where desired, as for example in Fig. 9, they are shown near the extreme end of the tracks 12, while in Fig. 1 they are shown near the shaft. As the buckets return and before entering the shaft, the bottoms are closed by the rolls 69 and 70 and locked by the latches 18. In the system just shown and described, the levers 150 are operated by the loaded bucket on its going trip. The operation of the gate shown in Figs. 5 and 8 is substantially similar, the cables 101^a representing the cables 101, so that as the buckets trip the lever 150 the slide 123 is moved to fill the different measuring hoppers in the same manner as the filling gates 92. The feeder discharge gates 128 are raised by the buckets engaging the extensions 134. It will be seen therefore that the system is substantially the same for controlling either form of measuring feeder.

Figs. 11 to 18 respectively represent forms of control for the feeder filling gates. In Fig. 11 the loaded bucket going, opens its hopper filling gate 92 and at the same time closes the filling gate 92¹ for the other bucket before reaching the end of its travel. If the trips 145 are changed so that the trips are engaged by the extension 148, and not by the extension 147, the empty bucket returning will close its filler feeding gate and at the same time open the other feeder filling gate before it reaches the bottom of the shaft. As illustrated in Fig. 12, the empty bucket closes its own hopper filling gate 192¹ before reaching the bottom of the shaft, and at the same time opens the other hopper filling gate 92. By changing the arrangement of the trips 145 the loaded bucket opens its hopper filling gate and at the same time closes the other gate 92¹, or by changing the trips as described, the empty bucket closes its own gate and opens the other gate. As illustrated, Fig. 13 is substantially similar to Fig. 11. As illustrated in Fig. 14, one bucket controls both feeder filling gates, that is going it opens its own gate and in returning closes it, operating the other gate at the same time. In this case there is a trip 145 on each side, one operating in one direction and the other in the opposite direction of the travel of the bucket. Fig. 15 illustrates the system in which the empty bucket closes its own gate in returning and in going up loaded opens it, or it may be said that the empty bucket opens the other gate when the other bucket

is going with its load, and when loaded closes the other gate. Fig. 16 illustrates the system as applied to a single bucket and feeder filling gate, in which the bucket in going opens its gate and upon returning closes the gate before reaching the bottom of the shaft. In Fig. 17 the system is shown in which a single empty bucket opens and closes its filling gate before returning to the bottom of the shaft. Fig. 18 illustrates a single bucket system in which the loaded bucket opens and closes its feeder filling gate before reaching the end of its travel. As illustrated in these figures, the systems are applicable for the sliding feeder filling gates 123 illustrated in Figs. 5 and 8.

In the system shown in Fig. 10, the control is somewhat similar to that in the station described, the distinction being that in this case cars are substituted for buckets, and the same are drawn up an incline so that the coal is transferred both vertically and laterally as in the other system. This form of system is also applicable to a horizontally traveling car and measuring feeder. Referring to the figure, 170 represents inclined tracks, 171 the receiving bins which receive the coal from cars 172, or the equivalent, arranged on the trestle 172' above the receiving hoppers. The storage bin 173 is arranged at the upper end of the incline, and under the same, so that the cars can discharge directly into the bins, from whence it is discharged through chutes 174 as desired. The cars 177 and 178 may be of any suitable design, but are preferably dump cars, suitable means being provided for automatically causing the cars to discharge their loads over the storage bin 173. The dumping mechanism used in this construction is not shown in detail, as the same forms no part of the present invention. A cable 180, having its ends secured to the front of each car, and passing over sheaves 175 down to a drum 182, forms the means for propelling the cars, the cables being operated by rotating the drum in one direction or the other, as in the bucket system described. The operation of the drum 182 is controlled by the switch 186, operated by cables 185 and trips 184, similar to the other system. The rear ends of the cars are connected by a cable 181, so that as one car is drawn up the incline, it positively draws the other car back. The receiving bin 171 is provided with an automatic measuring feeder substantially similar to those described, the same being a combination of the two forms illustrated in Figs. 4 and 5. As shown, each measuring hopper 176 is provided with the hopper filling gate 189 and a discharging gate 191. The gates 189 are connected by cables 190 and by cables 188, which are provided with operating levers 187, so that operation of one or the other of the levers operates the two

filling gates 189. Each of the gates 191 is operated by a cable 192 extending over the sheave 193, and thence to a member 194, carried by a little carriage 195. The member 194 is engaged by the car just prior to the end of its travel to the foot of the incline. The operation of this form may be briefly described as follows: Car 177 at the top of the incline has just discharged its load and turned the switch 186, and the car 178 is ready to be drawn to the top, and car 177 returned to the foot of the incline. On its upward travel car 177 has operated, one of the levers 187 opening its own hopper filling gate 189 and closing the filling gate 189, controlling the material for the other car. As car 178 moves toward the top, gate 191 closes (both gates being now closed). When it reaches the lever 187 on its track it opens its own gate 189, permitting the measuring hopper to fill, but at the same time it closes gate 189 on the other track. When it has reached the top of the incline it dumps its load and reverses the drum 182, the car 177 in the meantime having traveled to the foot of the incline, and by engagement with its tripping member 194, opened its gate 191 and received its load. Continued operation is the same as described.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the same without departing from the spirit of my invention, hence I do not wish to be understood as limiting myself to the exact form, arrangement and combination of parts herein shown and described, or uses mentioned.

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

1. In a conveying system, a vertically and horizontally movable receptacle and means for propelling the same in either direction between a receiving point and a discharging point, a hopper at said receiving point, a plurality of gates for controlling the discharge of material from said hopper into the receptacle, a measuring chute arranged between said gates, and means coöperating with the receptacle for operating said gates.

2. In a conveying system and in combination, a receiving hopper, a vertically and horizontally movable bucket, means for propelling the bucket in either direction between said receiving hopper and a discharging point, a plurality of gates for controlling the discharge of material from the hopper into the bucket, a stationary measuring chute arranged between said gates and means coöperating with the bucket for alternately operating said gates.

3. In a conveying system and in combination, a receiving hopper, a vertically and horizontally movable bucket, means for propelling the bucket in either direction between said receiving hopper and a discharg-

ing point, a plurality of gates for controlling the discharge of material from the hopper into the bucket, comprising a rotatable undercut filling gate and an apron discharge gate, and a measuring chute arranged therebetween, and means cooperating with the bucket for alternately and independently controlling said gates.

4. In a conveying system, a receiving hopper, a vertically and horizontally movable bucket, means for propelling the bucket vertically and horizontally in either direction between said receiving hopper and a discharging point, means for controlling the discharge of material from the hopper into the bucket, comprising a plurality of gates and a measuring chute arranged therebetween, one of said gates comprising a rotatable undercut filling gate and the other an apron discharge gate, means arranged in the path of the bucket between the hopper and discharging point for operating said rotatable gate, and independently controlled means arranged in the path of the bucket for controlling said apron discharge gate when the bucket is in loading position.

5. The combination in a conveying system of a shaft and tracks extending therefrom, a bucket movable in said shaft and on said tracks, means for hoisting said bucket and drawing the same on the tracks, means for positively returning the bucket to the foot of the shaft, a receiving hopper at the foot of said shaft and an automatic measuring device comprising a chute extending from said hopper, a filling gate for controlling the discharge of material from the hopper into said chute, a discharge gate for controlling the discharge of material from the chute into the bucket, and means cooperating with the bucket for alternately and independently controlling said gates.

6. The combination in a conveying system of a shaft and tracks extending therefrom, a bucket movable in said shaft and on said tracks, means for hoisting said bucket and drawing the same on the tracks, means cooperating with the bucket bail for supporting the bucket on said tracks, means for positively returning the bucket to the foot of the shaft, a bin at the foot of said shaft, and an automatic measuring device comprising a chute extending from said hopper, a filling gate for controlling the discharge of material from the hopper into said chute, a discharge gate for controlling the discharge of material from the chute into the bucket, and means cooperating with the bucket for alternately and independently controlling said gates.

7. The combination in a conveying system of a pair of shafts and tracks extending therefrom, a bucket movable in each of said shafts and on each pair of tracks, means for alternately hoisting said buckets and draw-

ing the same on the tracks, means for returning the buckets to the foot of the shaft, a hopper at the foot of each shaft and an automatically operatable measuring feeder for each hopper, comprising a chute connected with each of the hoppers and arranged to discharge into said buckets when at the foot of the shaft, a filling gate for each hopper arranged to control the discharge of material from the hoppers into their respective measuring chutes, a discharge gate for each chute arranged to control the discharge of material from the chute into its respective bucket, and means cooperating with the buckets for alternately controlling the filling and discharge gates of each hopper, and alternately operating the similar gates of both hoppers.

8. In a conveying system and in combination, a plurality of shafts and tracks extending therefrom, a bucket for each shaft movable in its respective shaft and on the tracks therefrom, means for alternately hoisting said buckets and drawing the same on the tracks, means cooperating with the buckets for supporting the same when on said tracks, means for returning the buckets to the foot of the shafts, a hopper at the foot of each shaft, a measuring feeder for each hopper comprising a stationary chute provided with a gate at each end, and means interposed in the path of the buckets for operating said gates.

9. In a conveying system and in combination, a plurality of shafts and tracks extending therefrom, a bucket for each shaft movable in its respective shaft and on the tracks therefrom, means for alternately hoisting said buckets and drawing the same on the tracks, means cooperating with the buckets for supporting the same when on said tracks, means for returning the buckets to the foot of the shafts, a hopper at the foot of each shaft, a measuring feeder for each hopper, each feeder comprising a stationary chute provided with a pair of gates, and means interposed in the path of the buckets for automatically and alternately operating said gates.

10. In a conveying system and in combination, a pair of shafts, a pair of tracks leading from each shaft, a bucket for each shaft movable therein and on said tracks, means for hoisting and drawing the buckets on their respective tracks, each of said buckets provided with a bail having wheels thereon, means cooperating with said bails and wheels for supporting said buckets, a hopper at the foot of each shaft, a measuring chute for each hopper extending therefrom and arranged to discharge the material into the buckets when at the foot of their respective shafts, filling gates arranged to control the discharge of material from hoppers into said measuring chutes, means for

operating said gates, including means interposed in the path of the buckets in their travel, a discharge gate for each chute arranged to control the discharge of material from the chutes into the buckets, and means cooperating with the buckets for releasing said discharge gates when the buckets reach the foot of their respective shafts.

11. In a conveying system and in combination, a pair of shafts, a pair of tracks leading from each shaft, a bucket for each shaft movable therein and on said tracks, means for hoisting and drawing the buckets on their respective tracks, each of said buckets provided with a bail having wheels thereon, means cooperating with said bails and wheels for supporting said buckets, a hopper at the foot of each shaft, a measuring chute for each hopper extending therefrom and arranged to discharge the material into the buckets when at the foot of their respective shafts, filling gates arranged to control the discharge of material from the hoppers into said measuring chutes, means for automatically operating said gates during the travel of the buckets, a discharge gate for each chute arranged to control the discharge of material from the feeder chutes into the buckets, and means cooperating with the buckets for automatically operating said gates when the buckets reach the foot of their respective shafts.

12. The combination in a conveying system of a shaft and a pair of tracks extending therefrom, a bucket movable in said shaft provided with a bail having wheels thereon, means cooperating with said wheels for guiding the bucket when in the shaft, a cooperating part provided with wheels thereon arranged to cooperate with said bail, said wheels on said part and on said bail arranged to travel on said tracks and support the bucket when the bucket is out of the shaft, means for hoisting said bucket and drawing the same along said tracks, said means comprising a cable secured to said bail and a sheave, means for supporting the sheave when the bucket is in the shaft, means for locking said sheave on its support, said sheave carried by said part and bail during the travel of said buckets on said tracks, means for operating said cable, and means for returning the bucket to the foot of the shaft.

13. The combination in a conveying system of a shaft and a pair of tracks extending therefrom, a bucket movable in said shaft provided with a bail having wheels thereon, means cooperating with said wheels for guiding the bucket when in the shaft, a cooperating part provided with wheels thereon arranged to cooperate with said bail, said wheels on said part and on said bail arranged to travel on said tracks and support the bucket when the bucket is out of

the shaft, means for hoisting said bucket and drawing the same along said tracks, said means comprising a cable secured to said bail and a sheave, means for supporting the sheave when the bucket is in the shaft, means for locking said sheave on its support, said sheave carried by said part and bail during the travel of said bucket on said tracks, means for operating said cable and means for returning the bucket to the foot of the shaft, and means for automatically loading the bucket when it reaches the foot of the shaft.

14. In a conveying system, a pair of tracks, a bucket having a bail pivotally secured thereto, said bail provided with a plurality of wheels arranged to travel on said tracks, a part provided with wheels and arranged to cooperate with said bail to support said bucket upon the tracks, and means for laterally drawing said bucket upon the tracks.

15. In a device of the kind described and in combination, a receiving hopper, a storage bin and a bucket, an automatic measuring feeder operated by said bucket, an elevator shaft, a sheave over said shaft arranged to support the bucket while in the shaft and to travel with the bucket when the bucket is out of the said shaft, means for locking said sheave over the shaft, means for releasing said sheave locking means, means for carrying the sheave with the bucket, means for automatically discharging the contents of the bucket, and means for returning the bucket to the bottom of the shaft.

16. In a device of the kind described and in combination, a hoisting bucket, an automatic measuring feeder, an elevator shaft and a sheave over said shaft arranged to support the bucket while in the shaft, means for locking said sheave over the shaft, means for releasing said sheave locking means, means for carrying said sheave with the bucket when the bucket reaches the top, means for discharging the contents of the bucket, and means for returning the bucket to the bottom of the shaft.

17. In a device of the kind described and in combination, a hoisting bucket, and automatically controlled means for hoisting and laterally moving the same, an automatic measuring feeder, an elevator shaft and a sheave over said shaft arranged to support the bucket while in the shaft, means for locking said sheave over the shaft, means for releasing said sheave locking means, means for carrying said sheave with the bucket when the bucket reaches the top, means for discharging the contents of the bucket, and means for returning the bucket to the bottom of the shaft.

18. In a device of the kind described and in combination, an elevator, a bucket and a

measuring feeder controlled by said bucket, said feeder having an undercut filling gate and an apron discharge gate, said discharge gate controlled by the bucket when at the
 5 bottom of the shaft, a hoisting drum, a cable connecting the top of the bucket with the hoisting drum, and thence passing back to the bucket and connected to the bottom of the same, means for carrying the bucket
 10 laterally, means for discharging the contents of the bucket, and means for returning said bucket to the bottom of the shaft.

19. In a conveying system, a bucket provided with a hinged bottom, and means for
 15 normally maintaining the bottom in closed position, an elevator shaft and pair of tracks extending from the bottom of said shaft upward, and thence extending laterally from the mouth of the shaft, a bail
 20 pivotally secured to said bucket, a sheave and supporting shaft therefor, a cable connecting said bail with the hoisting drum, said cable extending over said sheave, a support for said sheave shaft when the
 25 bucket is in the shaft, means controlled by the bucket for locking said sheave shaft on its support, said bail provided with means for guiding the bucket when in its shaft, including a wheel on each side, said
 30 wheels movable upon said tracks when the bucket is in or out of the shaft, means for maintaining said wheels on their tracks when the bucket is in the shaft, and means provided with wheels and cooperating with
 35 said bail for supporting the bucket and sheave, and carrying the same when the bucket is moving along the tracks from the mouth of the shaft.

20. In a conveying system, a bucket provided with a hinged bottom, and means for
 40 normally maintaining the bottom in closed position, an elevator shaft and pair of tracks extending from the bottom of said shaft upward, and thence extending laterally and inclined downwardly from the
 45 mouth of the shaft, a bail pivotally secured to said bucket, a sheave and supporting shaft therefor, a cable connecting said bail with the hoisting drum, said cable extending
 50 over said sheave, a support for said sheave shaft when the bucket is in the shaft, means controlled by the bucket for locking said sheave shaft on its support, said bail provided with means for guiding the bucket
 55 when in its shaft, including a wheel on each side, said wheels movable upon said tracks when the bucket is in or out of the shaft, means for maintaining said wheels on their tracks when the bucket is in the shaft, means
 60 for preventing swinging of the bucket when in or out of its shaft, and means provided with wheels and cooperating with said bail for supporting the bucket and sheave, and carrying the same when the bucket is moving
 65 along the tracks from the mouth of the

shaft, and means for automatically loading the bucket when it reaches the bottom of its shaft.

21. In a conveying system and in combination, a vertically and laterally moving
 70 bucket, tracks for guiding said bucket in its vertical and lateral travel, a sheave and a hoisting drum, a bail on said bucket, a cable extending over said sheave and connecting
 75 said drum and bail, and means for supporting the sheave when the bucket is in the shaft, means cooperating with said bail for carrying the bucket when on the laterally extending tracks, and cooperating means
 80 arranged to pick up said sheave and carry the same laterally with the bucket, means controlled by the bucket for locking the said sheave on its support during the vertical travel of the bucket, means for positively returning the bucket to the shaft and to the
 85 lower end of its vertical travel, and means for supporting said cooperating bucket and sheave carrying means during the vertical travel of the bucket.

22. In a conveying system of the kind described and in combination, a pair of elevator
 90 shafts, tracks extending from the bottom of said shafts to the mouth thereof, and thence laterally from the shafts, and means for conveying material from the bottom of
 95 said shafts upward in the shaft, and thence laterally along said tracks therefrom, said means comprising a bucket in each shaft, each bucket having a bail pivotally secured
 100 hereto, a traveling sheave for each bucket, and means for supporting said sheaves over their respective shafts when the buckets are in their shafts, a hoisting drum, a cable having its ends connected to said bails and extending
 105 over said sheaves to said drum, means controlled by said buckets for locking their respective sheaves on their supports when the buckets are in their shafts, a carriage part for each bucket provided with
 110 wheels thereon and mounted upon said laterally extending tracks, means for supporting said carriages at the mouths of the shafts when their respective buckets are therein, said carriages arranged to cooperate with the bails of their respective buckets
 115 and support the bucket and sheave during the lateral travel of the buckets, and a cable extending to the bottom of said shafts and connecting the buckets.

23. In a conveying system and in combination, a sheave, a vertically and transversely movable bucket provided with
 120 wheels thereon, an operating cable arranged over said sheave and connected with the bucket, means for supporting said sheave during the vertical travel of the bucket, and
 125 means for securing the same thereto, a laterally extending track arranged at the point of the highest vertical travel of the bucket and means cooperating with the

bucket and mounted upon said track for
carrying said sheave during the transverse
movement of the bucket on said track, com-
prising a frame provided with wheels there-
on, and means for locking said frame and
5 bucket together.

In testimony whereof, I have hereunto

signed my name in the presence of two sub-
scribing witnesses.

FRANK J. SCHRAEDER, JR.

Witnesses:

ROY W. HILL,
CHARLES I. COBB.