R. F. TAYLOR.

CONCRETE POURING SYSTEM.

APPLICATION FILED OCT. 5, 1911.

1,039,213.

Patented Sept. 24, 1912.

2 SHEETS—SHEET 1.

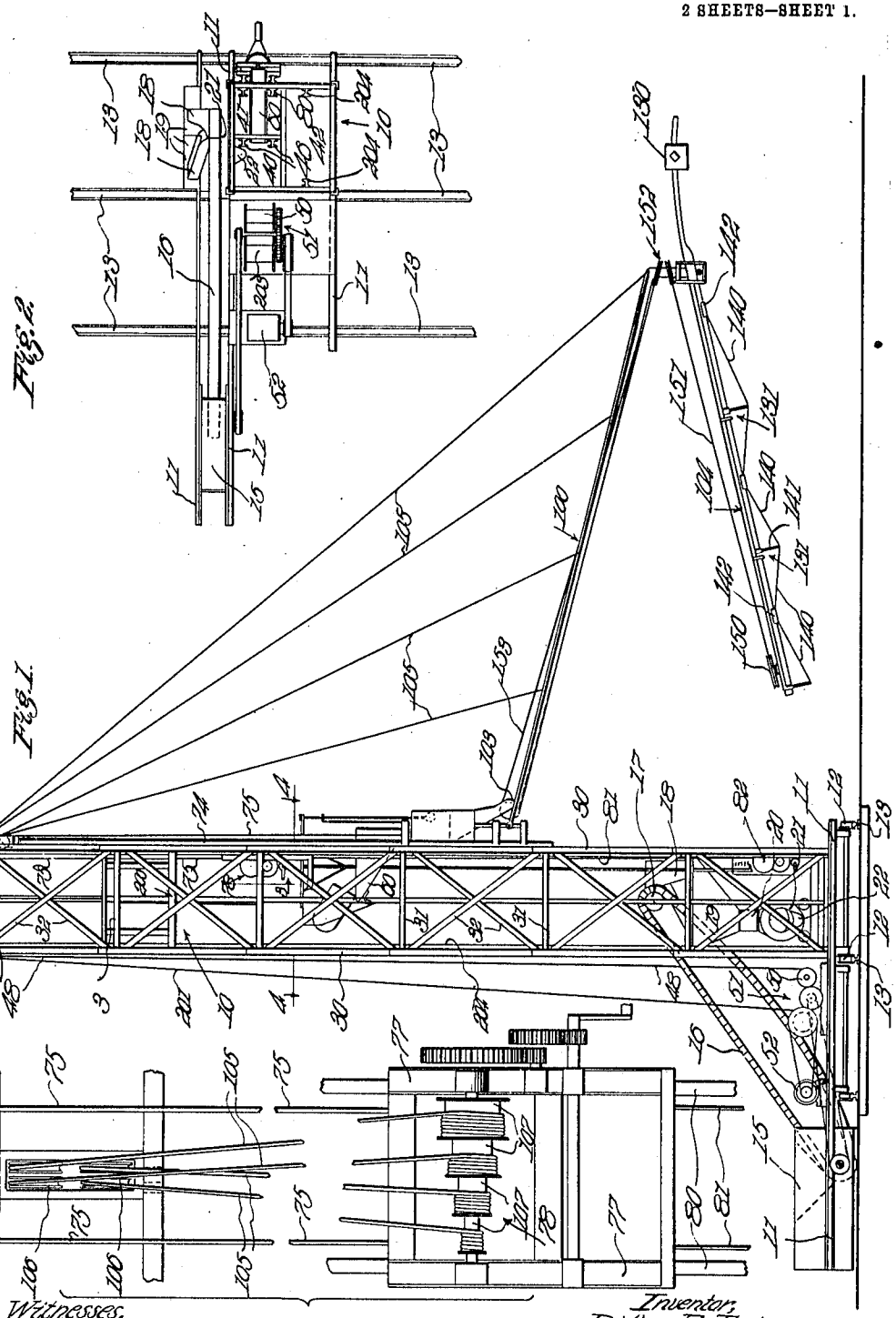

Fig. 2.

Fig. 1.

Fig. 3.

Witnesses.

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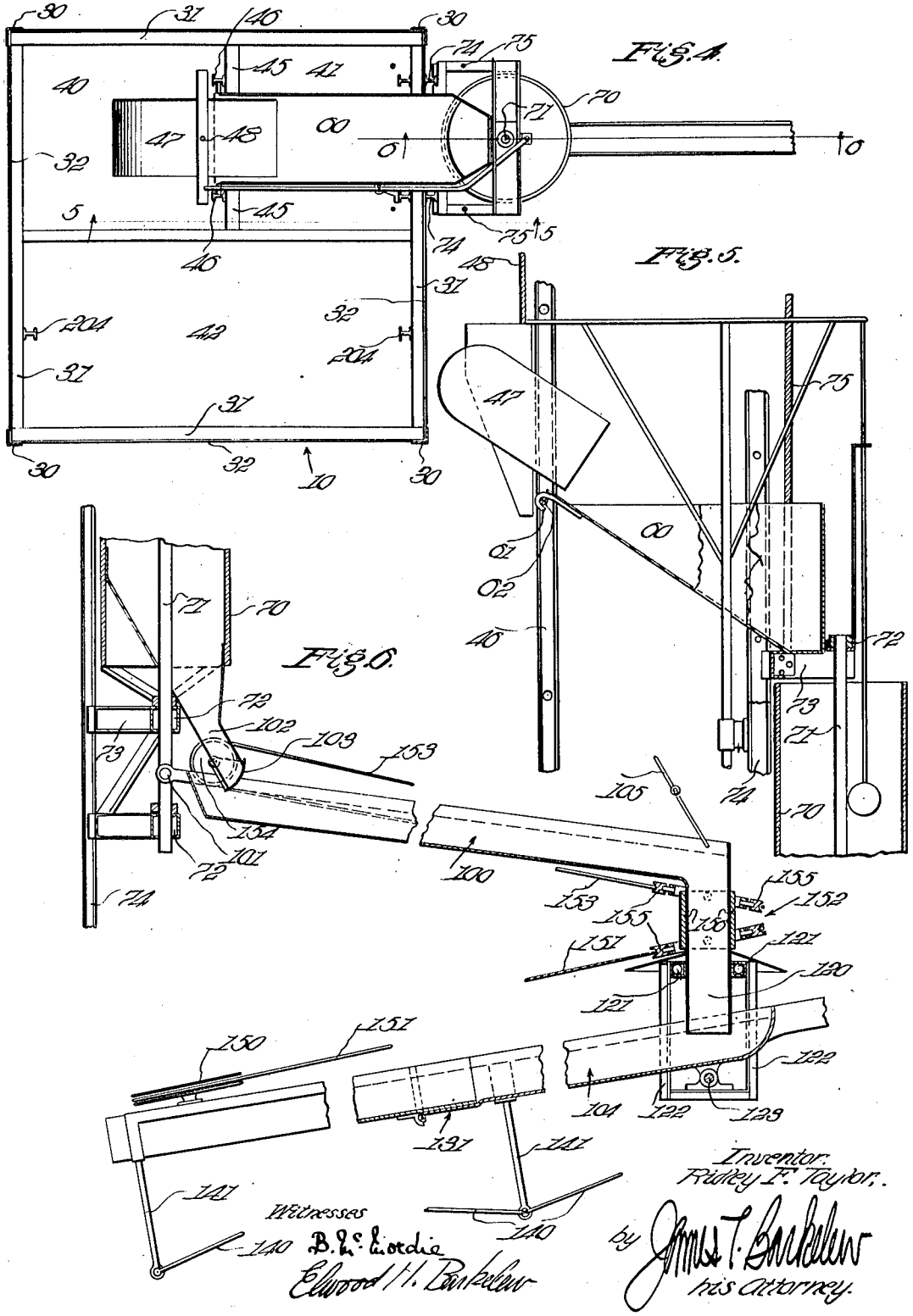

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UNITED STATES PATENT OFFICE.

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CONCRETE-POURING SYSTEM.

1,039,213. Specification of Letters Patent. Patented Sept. 24, 1912.

Application filed October 5, 1911. Serial No. 653,005.

To all whom it may concern:

Be it known that I, RIDLEY F. TAYLOR, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Concrete-Pouring Systems, of which the following is a specification.

This invention relates generally to a system and mechanism for handling concrete and pouring in forms for structures of any nature, such as bridges, buildings, or for road-beds and the like; and, broadly, the invention consists in certain mechanisms allowing the concrete to be handled from a central point, and efficiently distributed from this point.

Specifically, the invention consists in certain improvements in detail and combination allowing my improved mechanism to be easily handled by a minimum number of operators.

Broadly considered, my invention consists in a vertically extending structure, a hoisting mechanism on or in the structure for elevating material to some point above its base, and a gravity distributing system into which the material is delivered from the hoisting mechanism and through the medium of which any material, such as wet concrete, may be gravitated to any desired point within a certain radius.

The details of construction of my invention are mainly with an object to facilitate the handling of the machine, to make a strong and easily assembled device, to provide a mechanism easily adjusted to the progressing height of the wall of a building, and to provide for easy and efficient distribution of the material wherever it is needed. In fulfilling these minor objects there are several features of importance to which attention will be called before proceeding with the detailed description of the machine.

For the hoisting mechanism, I employ any ordinary material hoisting "skip" (a bucket or container which may be operated to automatically turn over and deliver its contents at any desired point on the ways along which it travels). This skip is arranged inside my tower construction on suitable ways and is moved vertically through the medium of any ordinary hoisting machine. The skip discharges directly into a chute or any other material guiding means which in turn delivers the material to a hopper located on the outside of the tower. This hopper is mounted on a frame which slides vertically on suitable ways outside the tower; and on this same frame is pivotally mounted the chute or pipe which forms a portion of the distributing system to carry the wet concrete to the point of final disposal. The chute is mounted on a vertical shaft so that it may be swung to any desired position, and, the hopper being mounted on this same shaft and revoluble with the chute, it is seen that the hopper will always bear a fixed relation to the chute and that the material will always properly flow from the hopper to the chute. The outer end of the chute is supported by suitable flexible supports, ordinarily cables, which pass over blocks at the upper end of the tower and down inside the tower to a suitable winch (commonly known as a "crab") which is mounted on a frame again slidably mounted on suitable ways arranged vertically inside the tower. The frame carrying the hopper and the inner end of the chute is connected by suitable cables with the frame carrying this winch in such manner that the winch frame is lowered when the hopper frame is raised and vice-versa. Means are provided for raising and lowering this winch and the hopper frame; and this may be done without altering the connection of the cables from the outer end of the chute to the winch drum.

Another novel and important feature of my invention is the construction of my distributing chute and its consequent novel method of operation and control. The hopper above referred to discharges through a suitable gate into the upper end of the chute; and means are provided for controlling this gate from the lower or delivery end of the chute, so that the man at the point of delivery may control that delivery. I have also provided a double jointed form of chute which allows the delivery point to be moved to any station within a certain limiting radius. There is also a special chute construction allowing the quick dismantling and assembly of the device.

One of the fundamental features which should now be noted comprises my novel method of supporting the tower so that it

may be moved from place to place as the work progresses. In constructing concrete bridges, road-beds, aqueducts and the like, it is extremely desirable to have a structure which may be moved along the line of work from time to time, as well as a structure which allows of a certain radius of action from any fixed location. My improved apparatus affords means for accomplishing both of these operations. I have shown the main structure as mounted on rolling supports on a set of rails. These rails may be either temporary or permanent, just as the character of the work will demand. In a given fixed location I am enabled to deliver concrete over a radius of, say, one hundred feet, and at any point within a circumference of that radius with the exception of the small space occupied by the structure itself. When the work within that radius has been finished the machine may then be easily moved bodily along the line of work through a suitable distance so that a new area may be reached.

In the accompanying drawings I have illustrated what I now conceive to be a preferred form of my invention; but in certain details therein shown I do not wish to limit myself, believing, on the contrary, that my invention is sufficiently broad in scope to cover details of construction equivalent to those shown and about to be described.

In these drawings: Figure 1 is a side elevation of my complete improved machine. Fig. 2 is a plan view of a portion thereof. Fig. 3 is an enlarged vertical elevation of portions of the mechanism, the view being taken as indicated by line 3—3 of Fig. 1. Fig. 4 is an enlarged sectional plan taken as indicated by line 4—4 of Fig. 1. Fig. 5 is a section taken on line 5—5 of Fig. 4, also showing portions in central section. Fig. 6 is a section taken as indicated by line 6—6 of Fig. 4.

In the drawings 10 designates a tower, the construction of which will be hereinafter explained, mounted on suitable sills 11 which are formed into a frame and supported on wheels 12. Wheels 12 run on tracks 13 which may be extended to any distance for moving the whole structure as is required. In the description of the operation of my invention, which follows near the end of this specification, it will be seen that this provision of a rolling or otherwise movable support is of great importance in facilitating my system of operation. Some of sills 11 extend, as is best shown in Figs. 1 and 2, and support a material hopper or bin 15 into which the various materials of the finished concrete may be deposited from wagons or other transportation means. The method of depositing these materials, sand, gravel and cement, in the hopper will depend upon the character of work being done by the machine. If the work is below the level of the ground (if rails 13 are laid below that level) then it can usually be easily arranged to drive the delivery wagons directly above the hopper and to discharge their materials downwardly thereinto. If the machine is placed upon the surface of the ground, other means must be employed for delivering the materials into this hopper; but any ordinary and well known means will suffice. From this hopper the materials are elevated by means of a belt elevator of any desired type to the upper portions of the mixing apparatus. I have shown a belt bucket elevator 16 which passes over a suitable pulley 17 at its upper end and discharges its load into suitable chutes 18 for distribution to hoppers 19. From hoppers 19 the material is gravitated through any suitable measuring apparatus 20 and sent directly into the mixing drum 21. This mixing drum may be of any desired construction, its details having no bearing on the present invention. It is so arranged on the platform, formed by the frame of which sills 11 form a part, that it discharges through its spout 22 to a point within the tower structure 10, discharging directly into the hoisting skip when the skip is at its lowermost point.

The tower structure is preferably composed of suitable corner legs made of angle iron or steel, these corner legs 30 extending from the bottom to the top of the structure. Each leg will necessarily be made in section, both for convenience of manufacture and for assembly. Preferably the length of each leg section will correspond to the height of a story of the tower, so that the tower may be assembled story by story and the different sections secured together by suitable bolts accurately and expeditiously. At each story of the structure I have provided girt members 31 and braces 32. These girts and braces are made of such configuration and proportions and are so placed as to make the structure extremely solid, and, at the same time, of light weight. The whole tower structure is preferably composed of a good grade of building steel; and this material at once makes the structure light and extremely strong, and also makes it durable and capable of repeated dismantling and assembly. As compared with a wooden structure, my steel tower has almost indefinite life. In a wooden structure of this character a large amount of the timbering is necessarily rendered useless after being wrecked a single time; while, in the steel structure, the operations of dismantling and re-assembly to not deteriorate the structure in any manner.

The interior of the tower structure is divided into three vertical compartments or wells 40, 41 and 42; well 40 accommodating

the material elevating or hoisting mechanism, well 41 accommodating the chute hoisting and supporting apparatus and cables, and well 42 accommodating a general material elevator for hoisting materials other than the wet or fluid concrete. This general material elevator has been found to be extremely useful.

In well 40, and mounted on suitable subframing 45, are placed suitable ways 46 upon which the skip 47 is adapted to run. This skip 47 may be of any desired height and operation and is raised and lowered through the medium of a cable 48 passing up over suitable pulleys or shelves on the upper end of the tower, these pulleys being designated in general by the numeral 49, and then passing downwardly to drum 50 of a suitable hoisting mechanism 51 operated from a suitable motor 52. This hoisting mechanism may be supplied with any suitable means of control whereby the skip may be raised and lowered as desired. The skip is lowered to a point opposite the discharge of the concrete mixer and is there filled with wet concrete from the spout of the mixer. Immediately it is elevated to a point above and opposite where a chute 60 is set, this chute extending across well 41 and discharging at a point outside the tower structure. The chute 60 is arranged to be easily removable so as to be placed at any height desired in the tower. To accomplish this I have shown a typical construction comprising suitable hooks 61 on the inner and upper end of the chute which engage with a rod or pins or other suitable members 62. These rods or pins or other members may be placed at any place along guides 46 so that the chute may be hung at any desired position.

It will be seen that the placement of the concrete hoisting skip within the tower puts all of the hoisting strain more centrally on the tower than would be the case should the skip be placed outside the tower structure at any point.

The outer and lower end of chute 60 hangs directly over the upper end of a preferably cylindrical hopper 70 supported on a vertical shaft 71 mounted in bearings 72 on a frame 73 vertically slidable along ways 74 on the outside of the tower structure. This frame 73 is supported by suitable cables 75, which cables pass over pulleys 76 at the upper end of the tower and then pass down inside the tower and through well 41 and are secured directly to frame 77 of hand winch 78. The frame 77 is slidably mounted on vertical ways 80 on the inside of the tower and within well 41, and the weight of this frame and the winch carried thereby balances a large part of the weight of the mechanism mounted on frame 73. From the lower end of frame 77 cables 81 extend downwardly through the well 41 to another small hand winch 82, located near the bottom of the tower. By pulling downwardly on cables 81 the frame 77 may be lowered and the frame 73 raised to any desired extent.

The concrete distributing system comprises a suitably constructed chute leading downwardly and outwardly from a point beneath the hopper 70. The inner end of a chute 100 is pivotally secured at 101 on horizontal trunnions attached to vertical shaft 71, so that the chute 100 has horizontal and vertical pivotal movement. A chute 102 leads downwardly from hopper 70 and has a gate 103 on its lower end which controls the delivery of wet concrete into the inner and upper end of chute 100. Chute 100 may be of any desired form, being shown in its preferred form as a trough. It may be of any desired length, and is preferably of a sufficient length to carry secondary chute 104 to a point where manipulations of the chute 104 will distribute the concrete as desired. Its outer portions are supported by means of suitable cables 105 attached to the chute 100 at points along its length and running inwardly and upwardly to the upper end of the tower structure and over sheaves 106 as illustrated. They thence pass downwardly to wind about drums 107 of hand winch 78. These drums are made of different sizes so that, upon their rotation, they will wind up or pay out unequal amounts of cables 105. It will be seen that, upon raising chute 100 vertically about its pivot 101, the outermost of cables 105 will be taken up more rapidly than any of the others, and the innermost cable the least rapidly of all. The differentiated sizes of the drums 107 provide for this action.

It will be seen that, through the medium of the mechanisms just described, the chute 100 may be raised bodily to any desired point on the tower structure and it may be placed at any desired angle of inclination. On account of the vertical shaft 71 which forms the vertical pivot for chute 100, being outside the tower structure, I am enabled, by this simple mechanism, to throw the chute 100 around through an angle of over 180 degrees. This, as will be explained later, suffices to allow the secondary chute 104 to reach to almost any desired position and to deposit wet concrete where necessary.

On the outer end of chute 100 is a downwardly extending pipe 120 which carries suitable ball bearings 121 supporting a frame 122 so as to rotate about a vertical axis. Frame 122 carries a horizontal pivot 123 upon which secondary chute 104 is mounted; the secondary chute thus having both horizontal and vertical pivotal movement. Secondary chute 104 is preferably not so long as chute 100 and it is made in

construction as light as possible consistent with sufficient strength, as this chute must be moved about considerably to distribute the wet concrete at the desired point. It is also provided with a suitable counter-balance 130 so that at least a portion of its weight may be taken off the men who move its discharge end about as the work progresses. The chute 104 is preferably made up of a number of sections having suitable joints, such as is illustrated at 131 in Fig. 6, these joints being of such a nature as to make a compression member out of the whole chute 104. The trough or pipe form of the chute lends itself very readily to the formation of a remarkably efficient compression member. It is only necessary to supply suitable tension members below the trough in order to make it sufficiently stiff to support the weight of the concrete carried therein . These tension members are provided at 140 and are connected to trucks 141 and to brackets 142 mounted on the chute. The brackets and trucks are so placed that the chute is braced at the joints and so that any tendency to bend the chute will merely place the braces in tension and the chute itself in compression.

Means of controlling the opening and closing of gate 103 is comprised in a suitable connection between that gate and a suitable hand wheel 150 on the lower end of chute 104. This is typically and preferably composed of suitable belt or cord connections 151 leading up and along chute 104 to a mechanism 152 mounted on vertical pipe 120. From this mechanism another belt 153 leads to a pulley 154 connected directly with gate 103. The mechanism 152 is comprised merely in a pair of pulleys 155 mounted upon a rotatable sleeve 156 through the medium of suitable universal joints so that either of the pulleys may assume any angle and still be rotated when sleeve 156 rotates or rotate that sleeve when either of them is rotated. This arrangement allows the chute 104 to be placed in any position with immediate and direct control of gate 103 by the operator at the end of the chute 104.

As my invention is mainly designed to be a labor saving device it will be well to briefly note the amount of labor needed for its operation. In the first place, there is only a single operator needed to tend the hoisting apparatus, both for the skip and for the general material hoist. This general materal hoist is illustrated at 200 and is operated through the medium of a cable 201 passing to drum 203 of the hoisting mechanism. Ways 204 in well 42 of the tower structure provide guides for the elevator. Another man is needed to superintend the mixing of materials in the concrete mixer; a third man is needed to direct the disposition of the concrete at the end of the distribution spout. In addition to these three operators a number of helpers or laborers are required; but this is the extent of the skilled help needed to operate my mechanism.

Having described my invention, I claim:

1. In combination, a vertically extending structure, a hoisting apparatus within the structure, vertical ways on the exterior of the structure, a frame on said ways, a material bin on said frame, means for directing material from the hoisting apparatus to the bin, a chute pivoted at its inner end to said frame, another set of ways on said structure, a hoisting drum mechanism slidably mounted on said ways, connecting means between said mechanism and said frame on the first mentioned ways whereby one is moved upwardly when the other is moved downwardly, and connections between the hoisting drum mechanism and the outer end of the chute for the support of the same.

2. In combination, a vertically extending structure, vertical ways thereon, a hopper movable on the ways, a chute extending outwardly and downwardly from the hopper and having its inner end vertically movable therewith, a frame vertically movable on the ways on the structure, adjustable supporting means for the outer end of the chute connected to said frame, connecting means between the frame and hopper whereby the frame is lowered or raised when the hopper is raised or lowered, and means in combination with the structure for hoisting material to the hopper.

3. In combination, a vertically extending structure, a hopper vertically movable thereon, a chute extending outwardly and downwardly from the hopper and having its inner end vertically movable therewith, a hoisting frame vertically movable on the structure, adjustable supporting connections between the hoisting frame and the outer end of the chute, connection between the frame and the hopper whereby the downward movement of one causes the upward movement of the other, and means in combination with the structure for hoisting material to the hopper.

4. In combination, a vertically extending structure, two sets of vertical ways on the structure, a hopper vertically movable on one set of ways, a chute extending outwardly and downwardly from the hopper and having its inner end vertically movable therewith, a hoisting mechanism comprising a frame and hoisting drum vertically movable on the other set of ways, flexible connecting means passing over the top of the structure and connecting between the hoisting mechanism frame and the hopper, means for moving the hoisting mechanism downwardly, and flexible connecting means be-

tween the hoisting mechanism drum and the outer portion of the chute, said means passing over the top of the structure.

5. In combination, a vertically extending structure, a chute carrying frame vertically movable thereon, a chute having its inner end movable with said frame and extending outwardly therefrom, another frame vertically movable on the structure, connecting means between the two frames so that when one is lowered the other is raised, adjustable supporting means for the outer end of the chute connected to said second mentioned frame, and means in combination with the structure for hoisting material to the inner end of the chute.

6. In combination, a vertically extending structure, a hopper vertically movable thereon, a chute having its inner end movable with said hopper and extending outwardly therefrom, a frame vertically movable on the structure, connecting means between the hopper and frame so that when one is lowered the other is raised, adjustable supporting means for the outer end of the chute connected with the frame, and means in combination with the structure for hoisting material to the hopper.

7. In combination, a vertically extending structure, a hopper vertically movable thereon, a chute having its inner end movable with said hopper and extending outwardly therefrom, a frame vertically movable on the structure, connecting means between the hopper and frame so that when one is lowered the other is raised, adjustable supporting means for the outer end of the chute connected with the frame, means in combination with the structure for hoisting material to the hopper and means controllable from the end of the chute to control the discharge of material from the hopper.

In witness that I claim the foregoing I have hereunto subscribed my name this 28th day of September, 1911.

RIDLEY F. TAYLOR.

Witnesses:
JAMES T. BARKELEW,
BESSIE MCMORDIC.