Sept. 11, 1934. W. L. DAVIS 1,973,163

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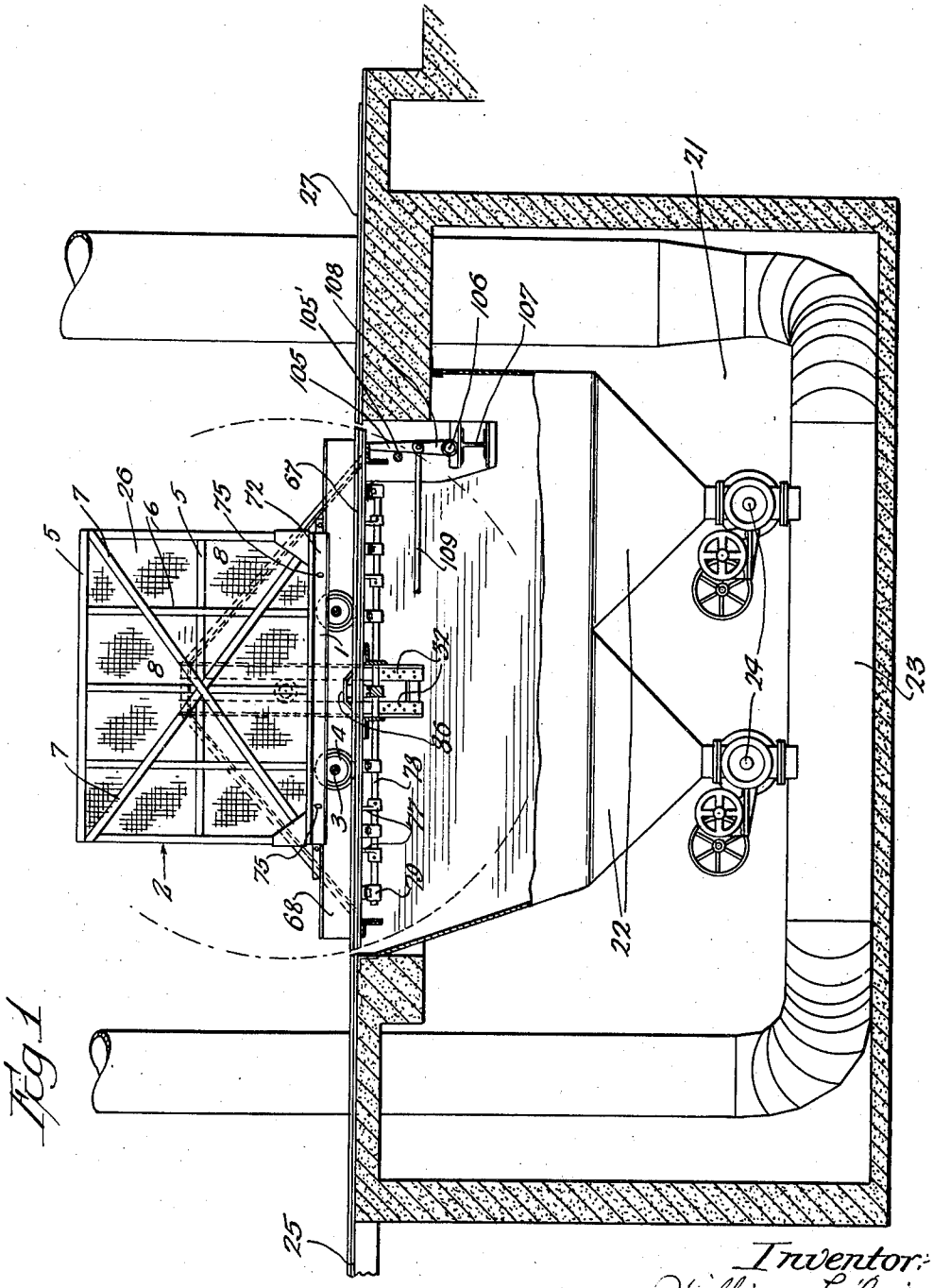

Fig. 1

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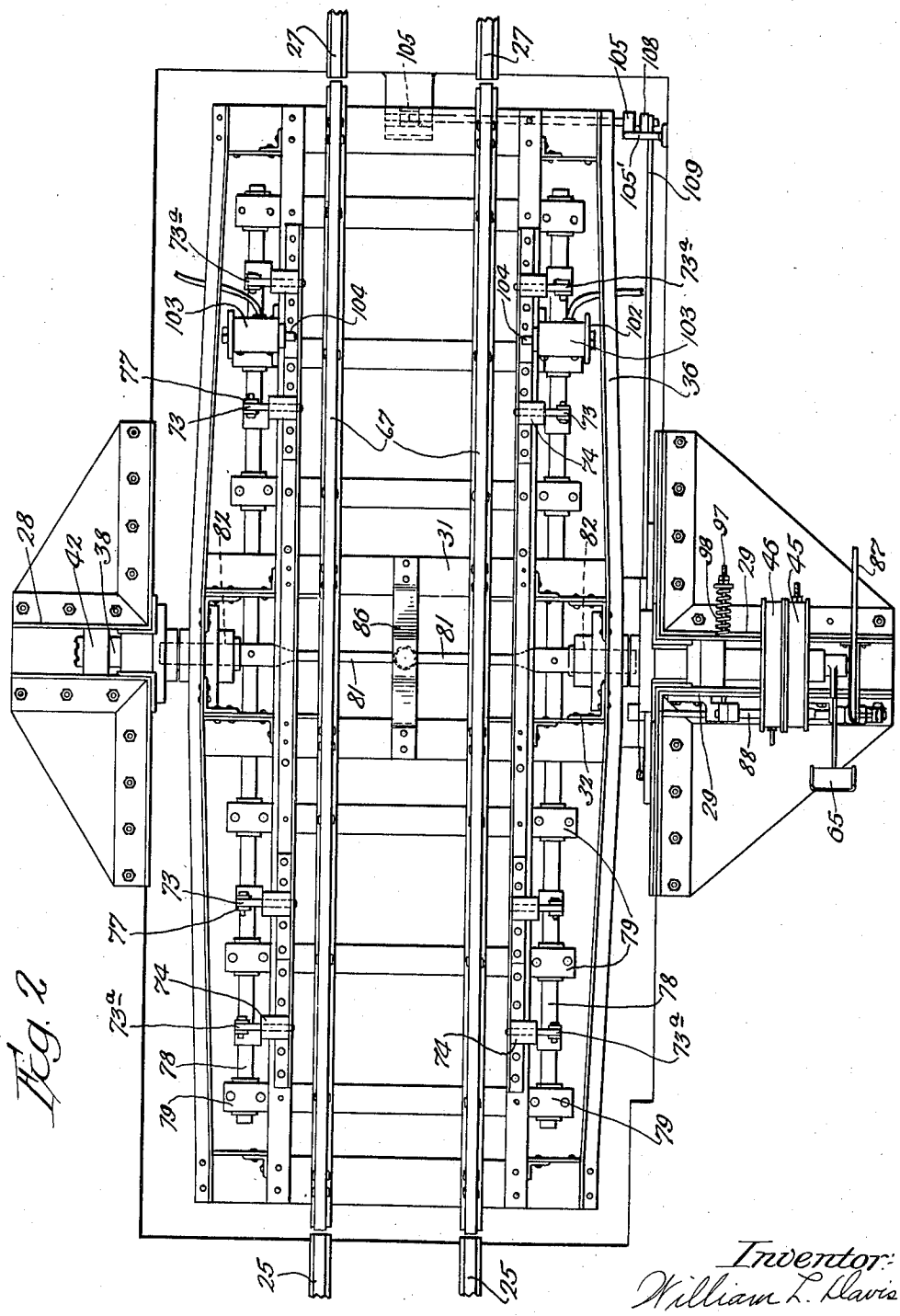

Fig. 2

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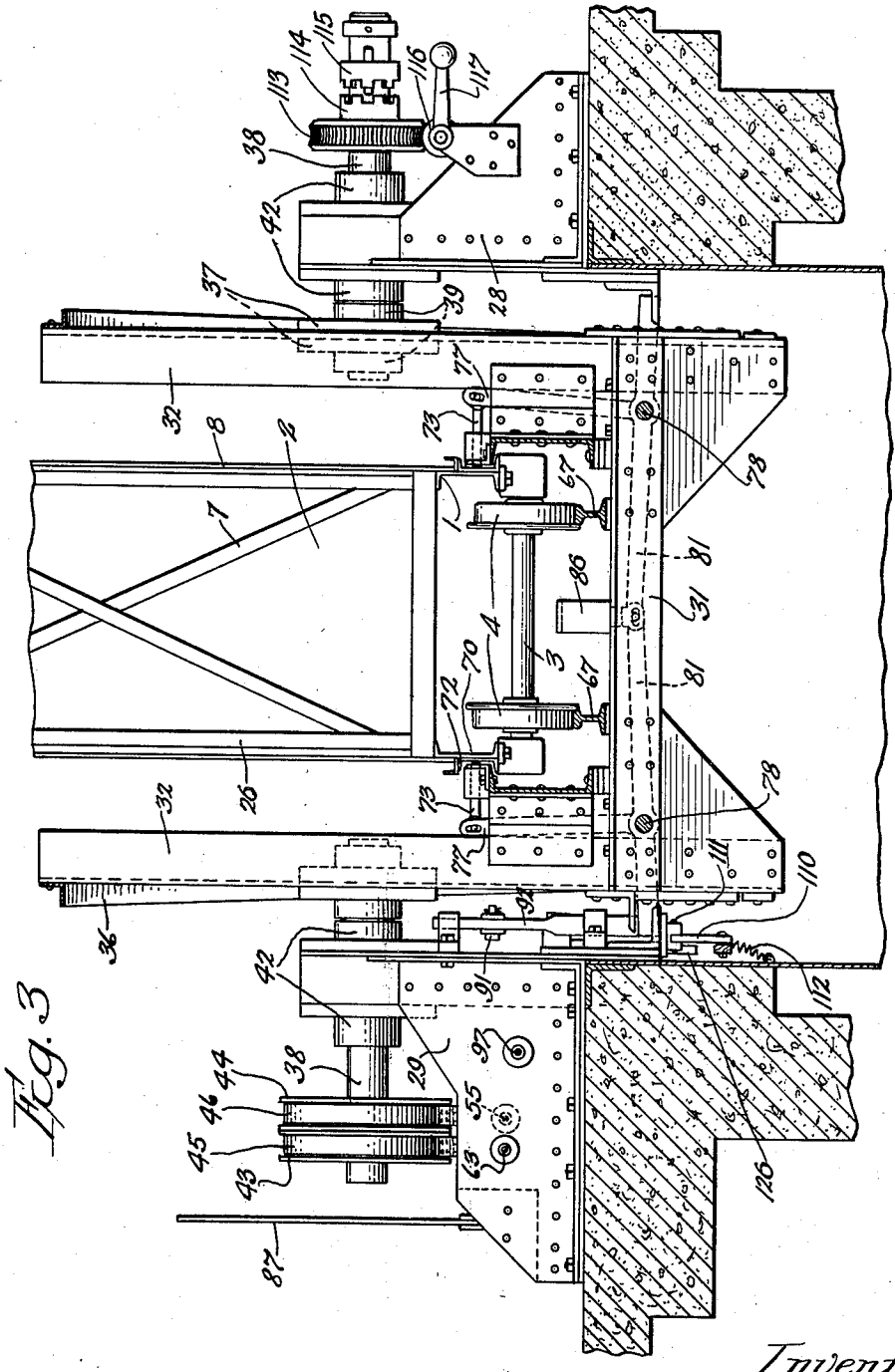

Fig. 3

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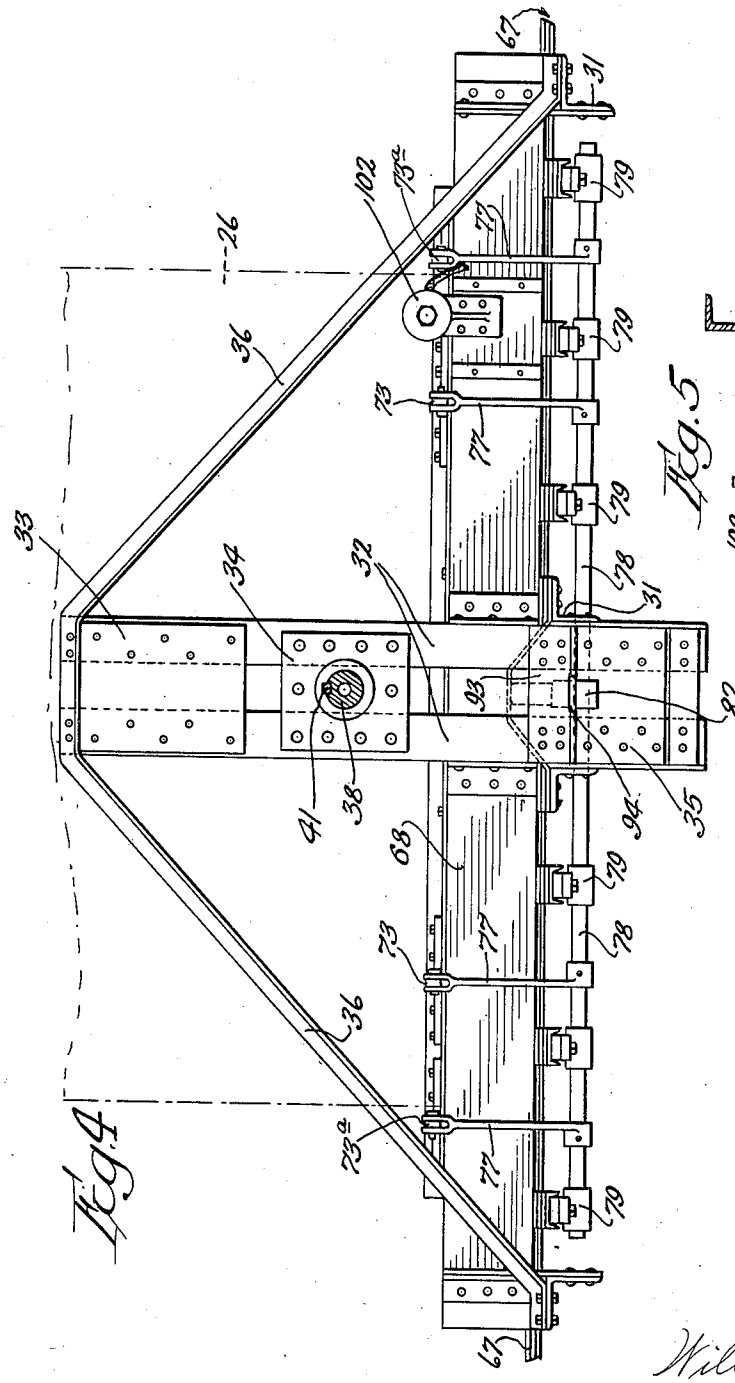

Fig. 4

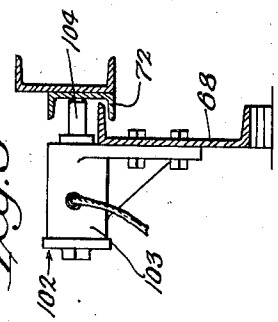

Fig. 5

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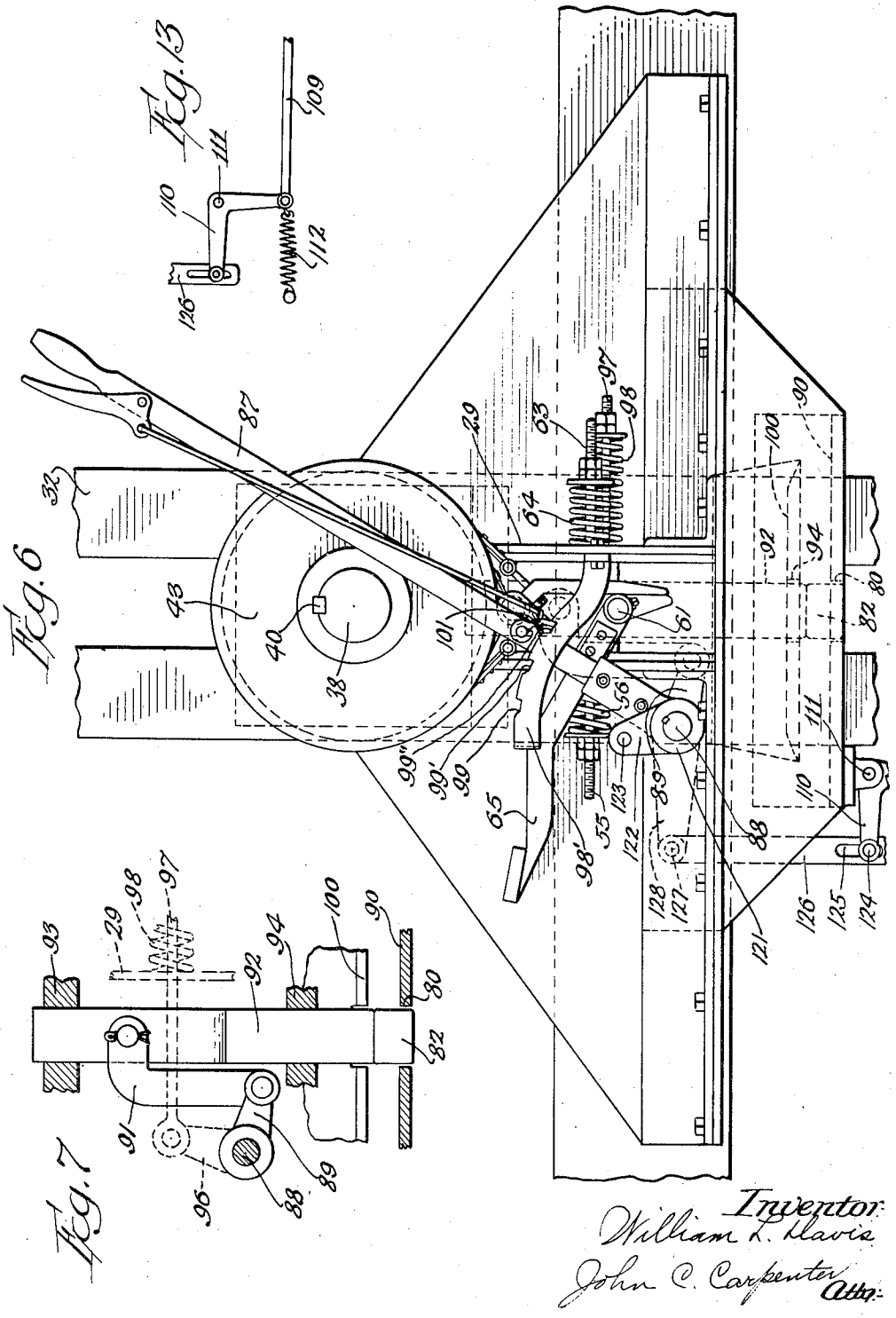

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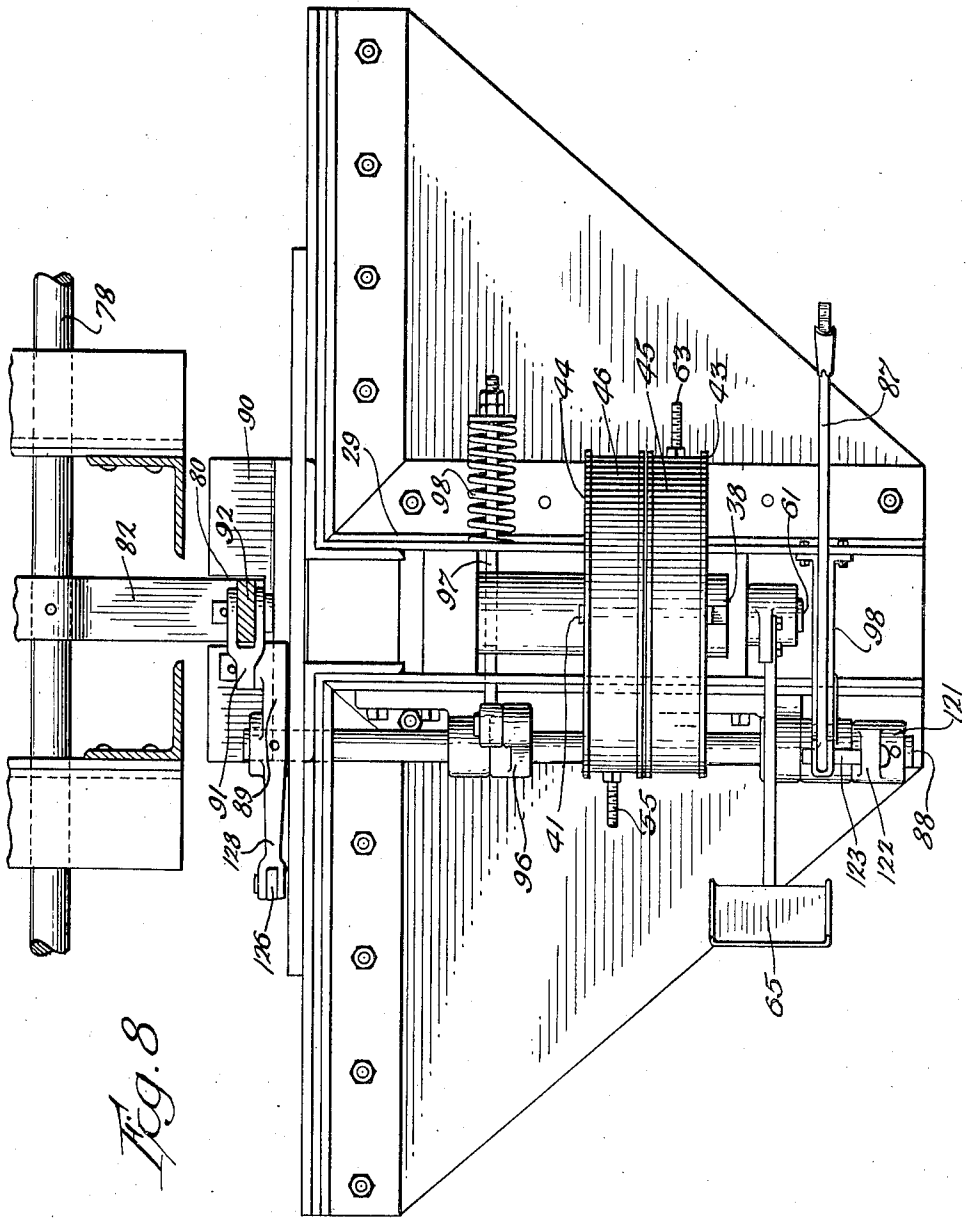

Fig. 8

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Fig. 10

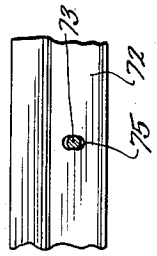

Fig. 9

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Fig. 11

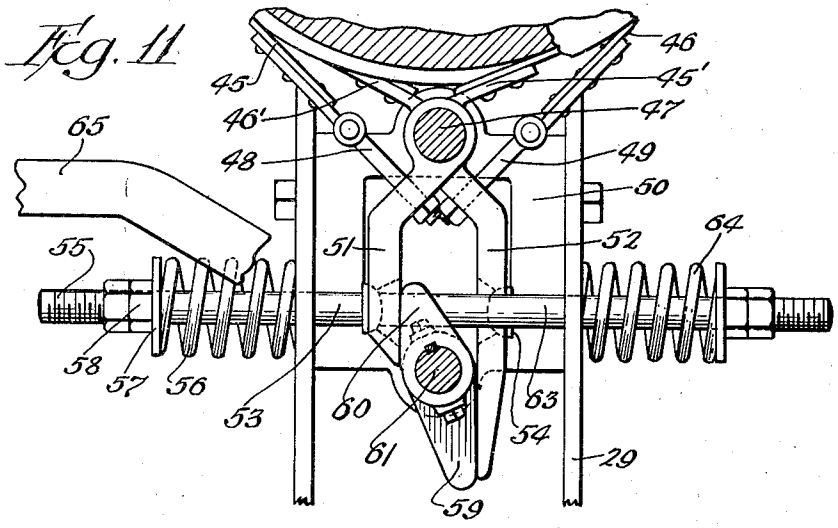
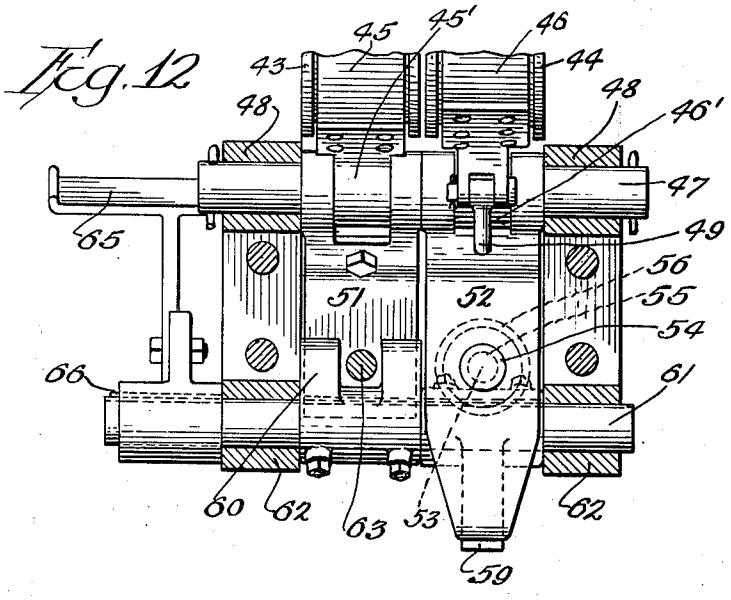


Fig. 12



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Patented Sept. 11, 1934

1,973,163

UNITED STATES PATENT OFFICE

1,973,163

TIPPLE

William L. Davis, Decatur, Ill., assignor to A. E. Staley Manufacturing Company, Decatur, Ill., a corporation of Delaware

Application September 27, 1930, Serial No. 484,802

5 Claims. (Cl. 214—52)

This invention relates to apparatus for the unloading or dumping of cars, and while it will hereinafter be described as embodied in an apparatus particularly designed for the dumping of cars carrying a finely divided or pulverant material, such as starch which has been dried in a kiln, it will readily be understood that the entire invention and its several features are capable of other valuable embodiments and uses.

Prior to my invention it has been known to load finely divided material, such as starch, in moist condition into cars having cellular bodies. The cars so loaded have been run through kiln tunnels in which a warmed drying medium is caused to circulate through and around the cells to accomplish drying. After being removed from the kiln tunnels, the cars loaded with the dried pulverant material have been run upon the platform of a tipple or dumper, where they have been locked in place and the platform with its loaded car revolved by power to an inverted position to accomplish discharge.

An important object of the invention is the provision of a dumping apparatus for a car which will move from a car receiving to a dumping position and back again thereafter to normal position without the use of power, and through inverting and return movements induced and accomplished by the shifting of the center of gravity of the entire mass as a result of the discharge of the contents. A car for drying starch and the like comprises a relatively light body built up of screens carried in a framework, and a chassis of relatively heavier and sturdier construction. My invention has for an important object the provision of a tipple or dumping apparatus which will engage and suspend the car from the relatively stronger chassis during the entire discharging operation.

Another important object of the invention is the provision for vibration of the car to insure complete discharge of the contents. The invention contemplates in this regard, mechanism and devices which act upon the chassis or running gear of the car as contradistinguished from the body to accomplish the vibration, the body being preferably left free for vibratory movement.

Another important object of the invention is the provision of a car dumping apparatus which will effectively and in minimum time discharge pulverant material having tendency to adhere to the cells of the body, and this with a minimum of labor.

Another important object of the invention is the provision of a dumping apparatus having these and other advantages, which will be of simple construction, and devoid of parts likely to require frequent repair, replacement, or readjustment.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Figure 1 is a side elevation of a dumping apparatus embodying my present invention, the pit receiving hoppers and adjacent floor parts being shown in section;

Fig. 2 is a top plan view thereof;

Fig. 3 is an end elevation of the same;

Fig. 4 is an enlarged side elevation of the inverting platform and associated parts;

Fig. 5 is a detailed side elevation of one of the vibrators;

Fig. 6 is an end elevation of the controls for the interlocking devices and the brakes;

Fig. 7 is an enlarged detail of a portion of the control arranged behind the plane of the structure shown in Fig. 6;

Fig. 8 is a top plan view of the control mechanism, parts being shown in section;

Fig. 9 is an end view thereof

Fig. 10 is a fragmentary detail showing engagement of one of the locking mechanisms with the car;

Fig. 11 is an enlarged fragmentary, vertical section showing a portion of the brake control;

Fig. 12 is an enlarged fragmentary, horizontal section of the same; and

Fig. 13 is a fragmentary side elevation of the portion of control.

Referring first more particularly to Fig. 1, reference character 21 indicates a pit in which hoppers 22 are located for the reception of the discharged material. These hoppers empty into an air disposal system 23, discharge of the material from the hoppers into this system being controlled by valve mechanisms 24. The dumping mechanism to be presently described in detail and embodying the present invention is located above the pit, and receives loaded cars from rails 27, which lead from the drying kilns. After dumping, each car generally indicated at 26, is moved off the dumping apparatus onto tracks 25, which lead to or may lead to transfer tracks or cars (not shown) which return them back to receive a new charge of material to be dried. The details of the parts just described are not thought necessary to an understanding of the present in-

vention and description of them is accordingly not undertaken.

Car 26, as shown on the drawings, is one particularly adapted for use in the drying of starch, which consists generally of a chassis 1 of heavy structural steel construction, and a superstructure or body 2 of relatively light and frail material. The chassis is supported upon axles 3 and wheels 4 which engage the rails 27. The body is, of course, relatively much larger than the chassis and is or may be constructed merely of horizontal and vertical frame members 5 and 6, braced by diagonal bars 7, with foraminous side walls 8.

The dumping apparatus comprises generally side supports 28 and 29, from which is suspended a car receiving platform, generally indicated at 31. A fabricated truss structure is arranged to extend up from each side of the platform (as may be seen in Fig. 4). Each of these truss structures comprises, in the present instance, two centrally arranged vertical members 32 connected together by cross plates 33, 34 and 35, and comprises also angularly arranged end braces 36. Each truss structure is suitably connected with the platform in any usual or preferred manner.

The platform itself is likewise built up of relatively heavy and well balanced structural iron. The side truss structures and the platform constitute a single rigid and sturdy construction. The central plates 34 are provided with oppositely extending bosses 39 through which are mounted fixed shafts constituting the bearing trunnions 38, these shafts or trunnions being held against independent rotation by keys 41. The trunnions or shafts 38 are arranged for rotation through bearings 42 at the tops of the side supports 28 and 29.

One of the trunnions 38, i. e. the trunnion at the left viewing Figs. 8 and 9, is provided with two brake drums 43 and 44, each of which is embraced by a brake band 45—46, the brake drums being connected to the trunnions by a key 40. A shaft 47 is arranged beneath the brake drums and is mounted through bearing plates 50 forming parts of the side support 29. This shaft is directly beneath and is arranged parallel to the axis of the trunnion 38. The brake bands 45—46 are secured to this shaft by anchoring members 45′ and 46′ and extend from this shaft oppositely around the drums. The other ends of the bands are provided with rods or bolts 48 and 49 respectively, which are arranged through arms 51 and 52 pivoted upon the shaft 47, these arms being bifurcated where they engage the shaft to permit arrangement of the anchoring members 45′ and 46′ between the separated end portions of the arms, as may be seen in Fig. 12.

The arms 51 and 52 extend downwardly and their lower ends are separated to receive brake release cams 59 and 60 mounted upon a rock shaft 61 arranged beneath the shaft 47 in bearing members 50 of the side support 29.

A rod 53, having an enlarged head 54, is arranged to extend through the arm 52 and through the more remote side of the side support 29. The outer end of the rod 53 is threaded at 55 and is embraced by a spring 56 which presses against the presented face of the side support 29 and against a washer 57 held on the rod by nuts 58 engaging said threaded portion 55. The spring 56 pulls the brake band 46 into braking position and against the release cam 59 already described.

A similar rod 63 is similarly arranged through the arm 51 and is provided with a spring 64 similarly mounted upon its end beyond the side support 29. The rod 63 normally urges the brake band 45 into braking engagement with its drum and against the release cam 60, already described.

A brake releasing pedal 65 is secured at 66 upon a rock shaft 61 and is adapted, when depressed, to release both brakes at the same time. Rocking of the rock shaft separates the arms 51 and 52, compressing the springs 56 and 64 to release the brakes. The two band brakes just described are oppositely acting and control or stop the movement of the car carrying platform in its two directions.

The platform normally assumes approximately the position shown on the drawings, i. e. car receiving position, since it will be noted that the center of gravity of the platform in this position is much below the axis of rotation, i. e. the axis of the trunnions 38. The construction and arrangement of the parts is such that the center of gravity of the combined mass of the platform and of an empty car is below this axis. When, however, a loaded car is placed upon the platform, the load in the car shifts the center of gravity of the combined mass to a location above the axis of the trunnion 38, and the tendency is for the platform with this car to rotate to an inverted position without the employment of power or manual impulse.

Two rails 67 are arranged upon the platform for registration with the rails 25 and 27 already described, and side channels 68 (Fig. 9) are mounted upon the platform with their flanges extending inwardly toward its longitudinal center. An angle iron 69 is arranged upon the upper horizontal flange of each channel iron 68 and with the associated channel flange 71 forms a support for the car when the platform is inverted. Reference character 70 indicates a main side channel member of the car chassis. A car supporting channel 72 is secured along each chassis channel member 70 in position to receive the channel flange 71 and the angle member 69 between its flanges.

Means, which will now be described, are provided to lock the car to the platform, when, and only when, it has arrived at the desired predetermined position upon the platform. The primary locking elements of this means consist of four pins 73 (Fig. 9) arranged through bearings 74 carried in the angle irons 69 and located one near each end of each side of the car position. These pins are adapted to enter into four appropriately arranged vertically elongated openings 75 in the channels 72 and 70 when these openings are presented for their reception. Each pin 73 is connected by a pin and slot connection 76 to the upper end of an arm 77 which is fixed upon a rock shaft 78 extending longitudinally of and carried beneath the platform in bearings 79. A shaft 78 is arranged at each side of the platform, and two arms with their associated pins extend up from each shaft.

A lever having two arms 81 and 82 is fixed upon each shaft 78 beneath the axis of the trunnion. The arms 81 of the two levers meet at the center of the platform where they are connected by pin and slot connections 83 to a yoke 84, above which is mounted a spring 85 arranged in a spring barrel 86, so that the spring normally presses down upon the arms 81 of the levers to thrust the pins 73 into interlocking relation with the car.

A control, to be presently described, normally maintains the pins 73 in retracted position. When the pins are in this position the outer arms

82 of the two levers are arranged in slots 80 provided in angle irons 90 secured in the pit in appropriate position. Since the axis of rotation is located at the centers of the trunnions 38, disposal of the arms 82 of the levers in the slots 80 locks the platform against rotary movement.

The control for holding the pins 73 in retracted position and the lever arms 82 in the slots 80 comprises a hand lever 87 mounted upon a rock shaft 88 arranged in the base of the side support 29 (Figs. 6, 7 and 9). The shaft 88 extends in toward the platform, and an arm 89 is fixed upon this shaft at its inner end. This arm is connected by a bent link 91 to a vertically reciprocating lock bar 92 slidably mounted in brackets 93 and 94 fixed to the presented face of the side support 29.

An angle iron 100 is fixed to the platform just above the lever arms 82 at the control side of the apparatus, and this angle iron is provided with a slot through which the bar 92 is moved downwardly to withdraw the pins 73 from car holding position. The bar 92 is normally arranged in this slot to depress the arms 82 into the slots 80 locking the platform in car receiving position.

An arm 96 is fixed upon the shaft 88 and is connected with a rod 97 which is arranged through the opposite side of the side support 29 and embraced by a spring 98 to cause the lever 87, the shaft 88, the link 91, and the bar or plate 92 to move down into pin releasing position and into position to lock the platform against movement.

The lever 87 is loosely mounted upon the shaft 88 and upon this shaft there is also provided a collar 121 fixed to the shaft and having an outwardly extending arm 122 which is provided with a pin 123 at its outer end arranged in the path of travel of hand lever 87. A quadrant 98' is arranged alongside the lever 87 and this quadrant is provided with three notches indicated by reference characters 99—99'—99''.

The lever 87 has four positions, the first of which is at the limit of the movement toward the right (viewing Fig. 6) and when a notch engaging pin 101 carried by the lever is to the right of all of the notches. Thus arranged the bar 92 is in its lowermost position with the arms 82 pressed well down through the slots 80 of the angle irons 90 and the pins 73 out of locking engagement with the car. As the car approaches central position it is intended that the lever 87 shall be moved to engage its pin 101 with the notch 99'' i. e. the lever is moved to the second position. Thus arranged the bar 92 has been lifted sufficiently to permit the pins 73 to bear against the channels 72 of the car and to snap into the slots 75 when the car arrives at the center of the platform.

At this stage in the operation the arms 82 earlier mentioned are still arranged in the slots 80. The car is thus locked upon the platform and the platform is locked in the support. The lever 87 is then moved to engage its pin in the notch 99' of the quadrant and in this movement the bar 92 is raised sufficiently to permit the spring 85 to lift the arms 82 out of the notches so that the platform is unlocked.

Means, however, are provided for preventing dumping movement of the platform until the lever 87 has been given further movement to permit engagement of the pin 101 in the slot 99. This means comprises one or more vertically arranged upwardly extending arms 105 (Fig. 1) fixed upon a shaft 106 rotatably supported upon a cross frame member 107 in the pit. The arms 105 when in normal position are arranged just beneath the platform at the incoming side. An arm 108 is also fixed upon this shaft at the control side of the apparatus and a link 109, connected with the upper end of the arm 108, extends beneath the control into engagement with one arm of a bell crank lever 110 suitably pivoted at 111. A spring 112 pulls or tends to pull the arm or arms 105 into the upright normal position shown in Fig. 1, and into suitable engagement with a fixed stop 105'.

The other arm of the bell crank lever 110 has a pin 124 arranged in a slot 125 in the lower end of a union link 126 which extends down from a pivotal connection 127 with an arm 128 on shaft 88, the parts being so arranged that the link 126 is arranged close against the side wall of the pit out of the path of travel of the angle iron 90 and lever arm 82.

When the lever 87 is moved into engagement with the notch 99, i. e., into its farthest position toward the left (viewing Fig. 6) the arm 128 is moved downwardly sufficiently to cause the pin 124 to be engaged by the upper end of the slot and the bell crank lever swing to move the rod 109 to push the arms 105 out of platform supporting position. The slot in the link 126 is of sufficient length to permit the earlier described movements of the lever 87 without effect upon the position of the arms 105, these being held beneath the platform by the spring 112.

When a car is to be dumped the bar 92 is moved up by the control to arrange its lower end above the angle iron 100, whereupon as other parts are released by the control the platform with its loaded car swings to an inverted position where it is held by the brake during dumping. After dumping release of the brake causes the platform to return with the empty car by gravity back to normal position. The angle iron 100, which is fixed to move with the platform, is a straight member having its ends beveled, as may be seen in dotted lines in Fig. 6. As the platform with its car returns to normal position the angle iron 100 acts as a cam to insure that the bar 92 is maintained in an elevated release position unitl the platform has arrived at or substantially at its central car receiving position.

In inverting, the platform swings in a clockwise direction (viewing Fig. 1) through the slightly overbalancing effect of two vibrators 102 which are mounted in the platform beneath and near the righthand end of the car and in position to engage the presented portions of the car chassis to vibrate the car. As shown in Fig. 5, each vibrator comprises a cylinder 103 adapted to actuate a pin or plunger 104 to engage the channels 72 and shake them with sufficient violence to cause all or substantially all of the material in the inverted car to be discharged. As the car reaches inverted or dumping position the brakes are tightened by release of the foot lever, and the vibrators operated. The car is returned to normal position by gravity and by merely releasing the brakes. The overbalancing effect of the vibrators insures that return to normal car receiving position is in counter-clockwise direction.

Before releasing the brakes by operation of the foot lever, the operator moves lever 87 to position #3. The platform in returning passes slightly its horizontal position swinging the supports 105 to the right (viewing Fig. 1) against the action

of the spring 112. As soon as the platform passes these stops or supports they snap back into supporting position under the platform. Under the control of the operator using the lever the platform is then permitted to settle gently upon supports 105. Lever 87 is then moved to position #1 where the platform is locked and the car released. In the return movement, if the operator releases lever 87 to position #1 or #2 before the car has reached its level position coming from either direction, the bar 92 rides upon the angle iron 100 until it may snap down to lock the lever arms 82 in their slots 80. The lever 87 need not follow the movement of bar 92 by reason of collar 121, arm 122, and pin 123 already described. This construction is provided as a safety precaution and prevents sharp oscillation of lever 87 which might be dangerous to the operator as well as to cause unnecessarily severe shocks upon the locking mechanism.

Means are provided to prevent manipulation of the control as a car is moving onto or off of the platform. A supplemental arm 77 is provided upon each end of each shaft 78 and at each side at each end of the platform. A pin 73ª, similar to the pin 73 and similarly mounted, is arranged at the upper end of each arm 77. Each of these pins, however, unlike the pins 73 is provided with a car engaging end too large to enter into a presented opening 75 in the chassis channels. If effort is made to operate the controls to lock a car in place before the previously emptied car has entirely cleared the platform, the lefthand pins 73ª (viewing Fig. 4) will engage the channel of the lifting car and prevent movement of the pins 73 into locking position and release of the arms 72 until the channels of the departing car have moved beyond the pins 73ª. Likewise if effort is made to operate the control while a car is moving onto or is projecting over the platform, the pins 73ª at the right (Fig. 4) will engage the forward ends of the chassis channels and operation of the control is prevented.

The pins 73ª also give wider latitude of control to the operator. As soon as a car is well started onto the platform the lever 87 may be moved into the notch 99'' so that the adjacent pins 73ª bear against the forward end of the chassis channels. Because of the large size of the ends of these pins they cannot enter the openings 75 as they are presented so that the car moves on until the pins 73 are in position to snap into these openings, i. e. until it arrives at the center of the platform.

I have provided means for inverting the tipple by hand, and in the absence of a loaded car should repair or other condition render inversion desirable. A worm wheel 113 is loosely mounted on the idle trunnion 38 and this worm wheel carries one part 114 of a jaw clutch. The other part 115 is splined on the end on the trunnion. The worm wheel is adapted to be rotated to rotate the platform by worm 116, in turn adapted for rotation by a crank 117.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. An apparatus for dumping cars loaded with dried and other materials, comprising in combination, fixed side supports, a platform for receiving a loaded car and pivoted in said supports to swing from a receiving to an inverted dumping position, locking devices carried by said platform for locking the car to said platform during dumping, and a manual control for said locking devices arranged in fixed location with respect to a said side support.

2. An apparatus for dumping cars loaded with dried and other materials, comprising in combination, fixed side supports, a platform for receiving a loaded car and pivoted in said supports to swing from a receiving to an inverted dumping position, locking devices carried by said platform for locking the car to said platform during dumping, and a manual control for said locking devices arranged in fixed location with respect to a said side support, said control engaging and controlling said locking devices only when said platform is in normal car receiving position.

3. The combination of a car for drying starch and the like, having a rigid chassis, axles and wheels supporting said chassis, and a relatively frail body for containing the material to be dried, a dumping platform pivoted to move from a normal to an inverted position, means carried by said platform for interlocking with the chassis to support the car in an inverted position, and a vibrator mounted on said platform and having a part for engaging the chassis to shake the material from the body when in an inverted position.

4. In a device of the type described, a support, a car-receiving platform rotatably mounted on said support and normally held against rotation when in horizontal position, a car, an actuating mechanism having a plurality of distinct controlled movements, means responsive to movement of said actuating mechanism for locking said car to said platform, and means responsive to further movement of said actuating mechanism for releasing said platform.

5. In a device of the type described, a support, a rotatable car-receiving platform mounted on said support, a dump car on said platform, said car being provided with longitudinally extending rails along its outer sides and said rails having openings therein, and reciprocal locking members operable to engage said rails through the openings therein to lock said car.

WILLIAM L. DAVIS.