

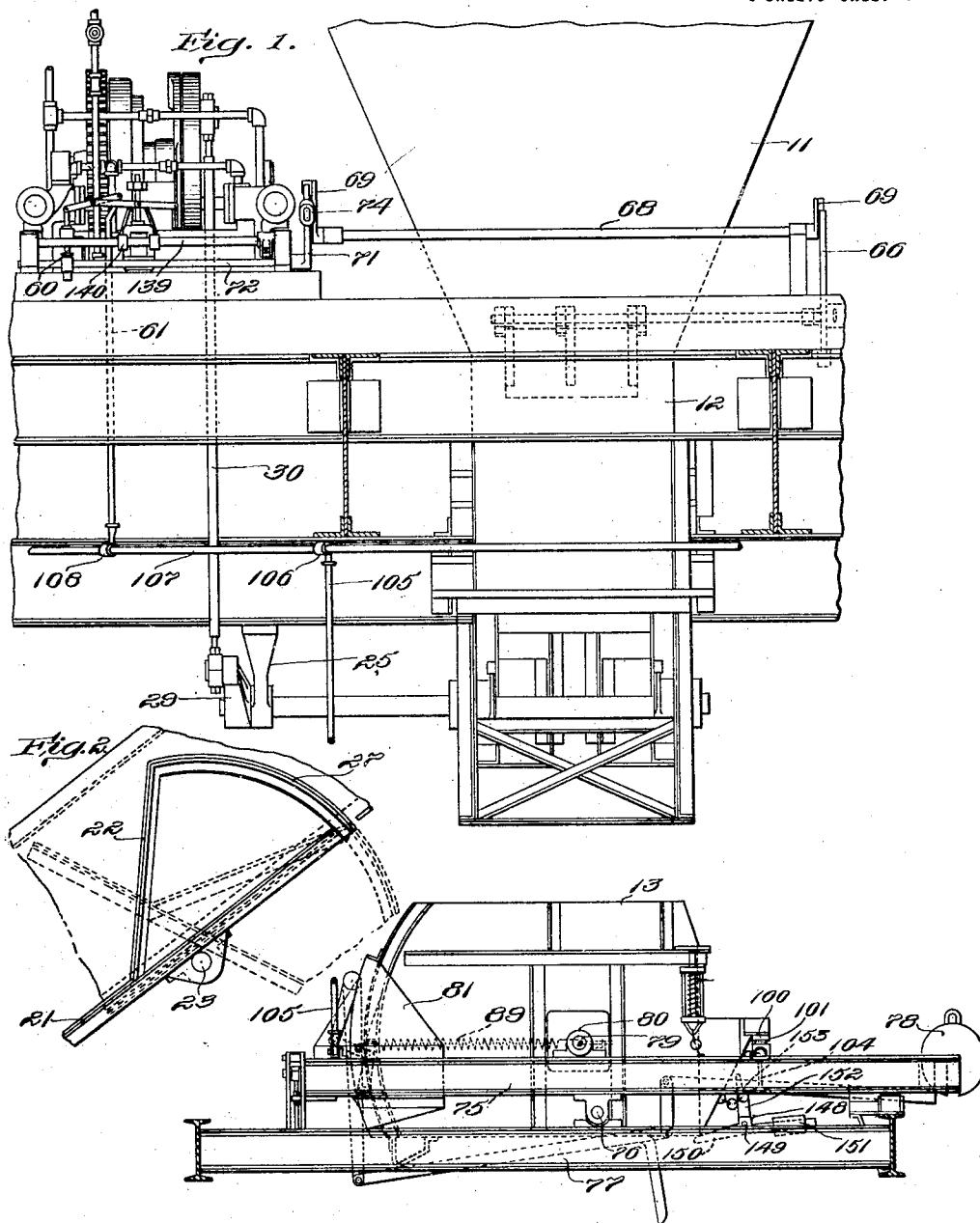
A. E. NORRIS.
LOADING APPARATUS.

APPLICATION FILED MAY 27, 1912.

Patented Mar. 12, 1918.

6 SHEETS—SHEET 1.

1,258,700.



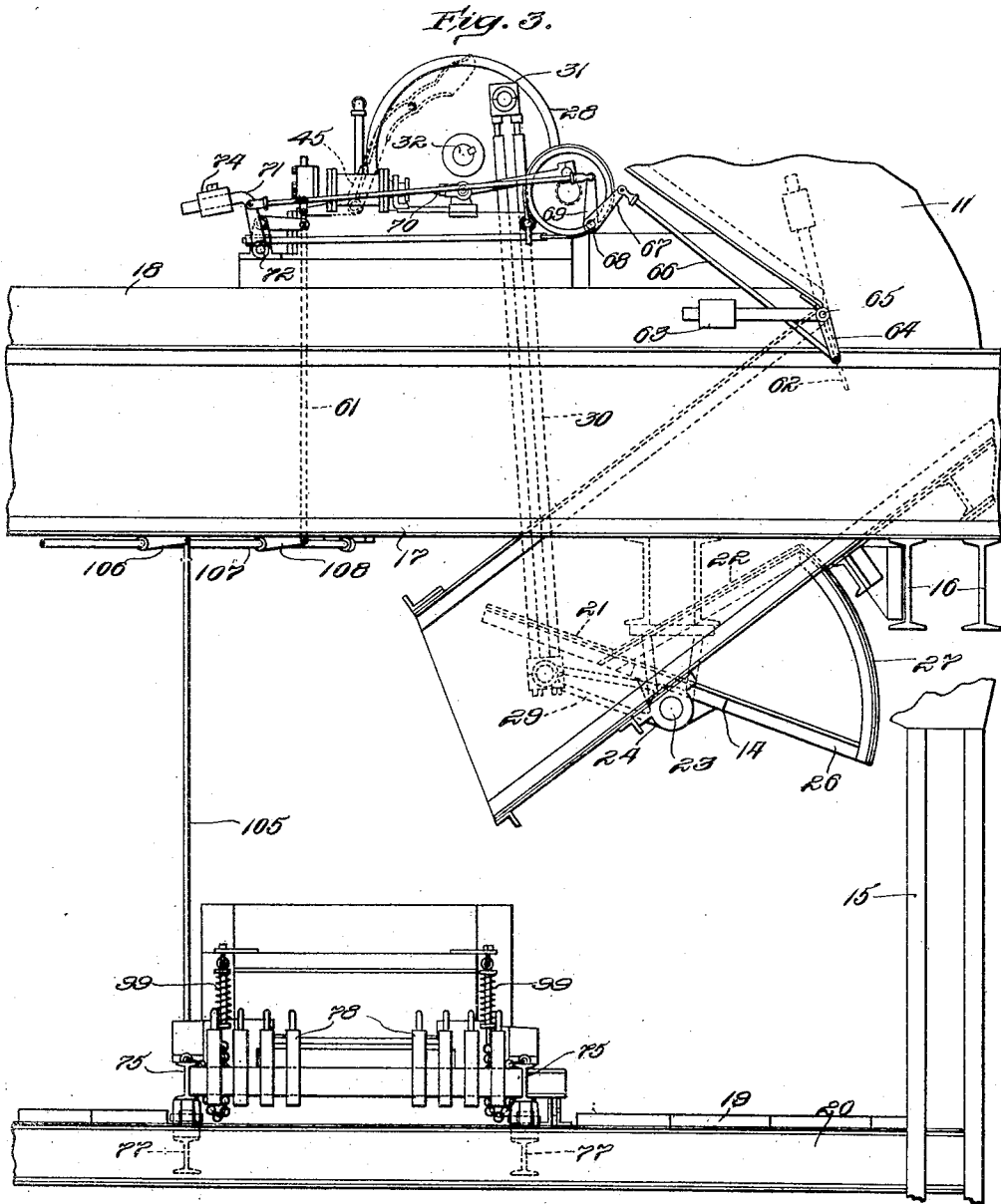
Witnesses:
Horace A. Groseman
Carl L. Glorale.

Inventor:
Almon E. Norris.
By Emory Booth, James H. Varney
Attys.

A. E. NORRIS.
LOADING APPARATUS.
APPLICATION FILED MAY 27, 1912.

1,258,700.

Patented Mar. 12, 1918.
6 SHEETS—SHEET 2.

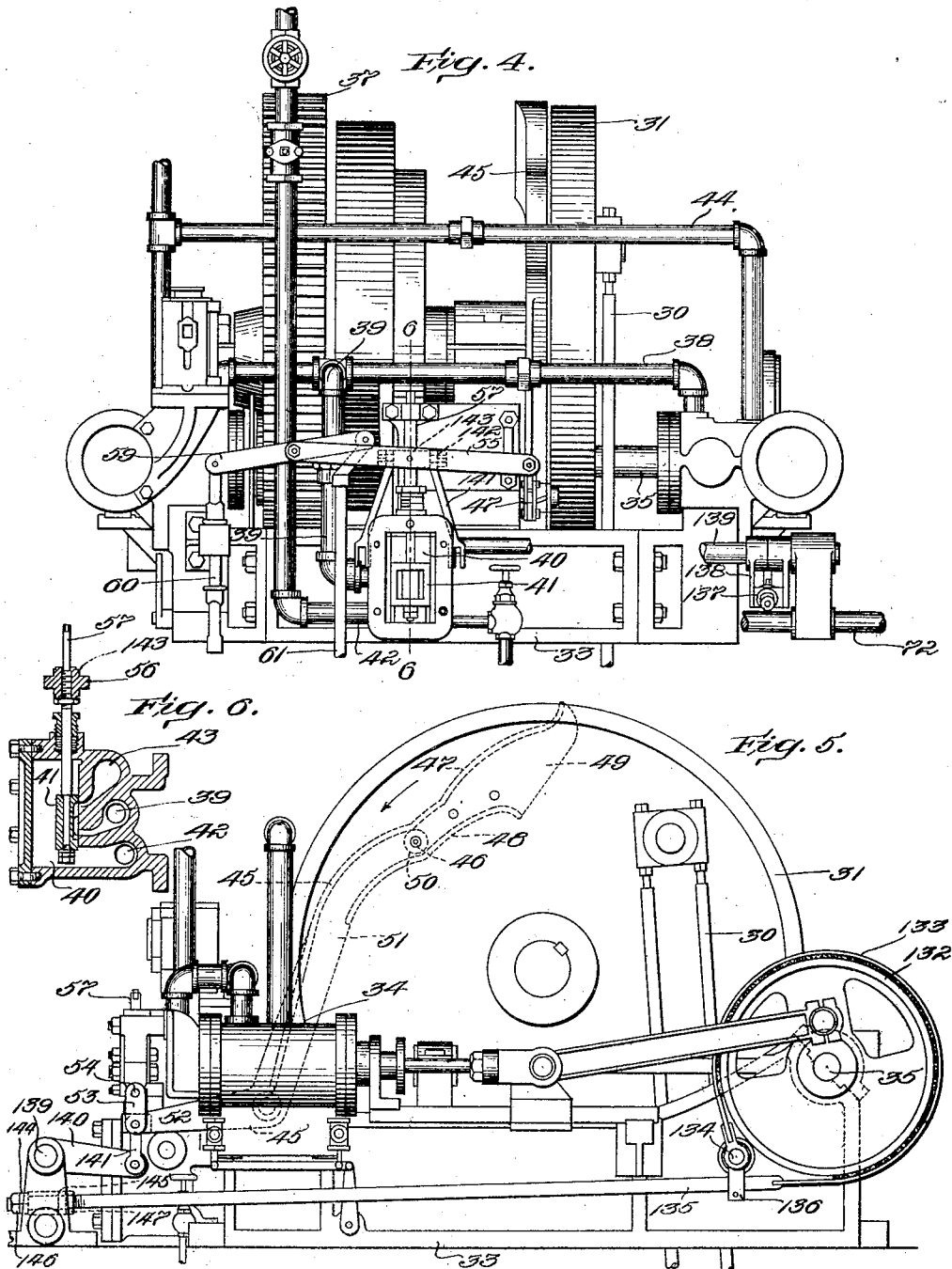


Witnesses:
Hrace A. Crossman
Earl L. Choate

Inventor:
Almon E. Norris,
by Emory Booth, James H. Varney
Attys.

1,258,700.

Patented Mar. 12, 1918.
6 SHEETS—SHEET 3.



Witnesses:

Hervace A. Crossman
Carl L. Choate.

Inventor:

Almon E. Norris.
by Emory Booth James Harvey
Attys

1,258,700.

Fig. 7.

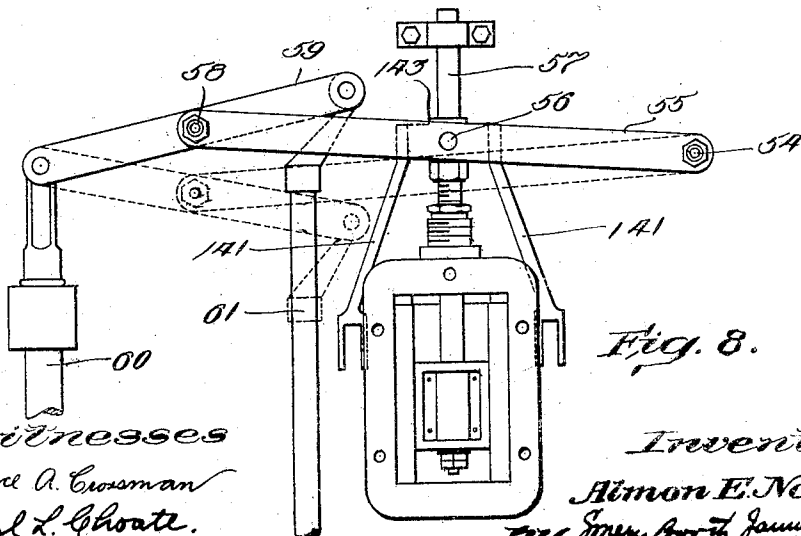
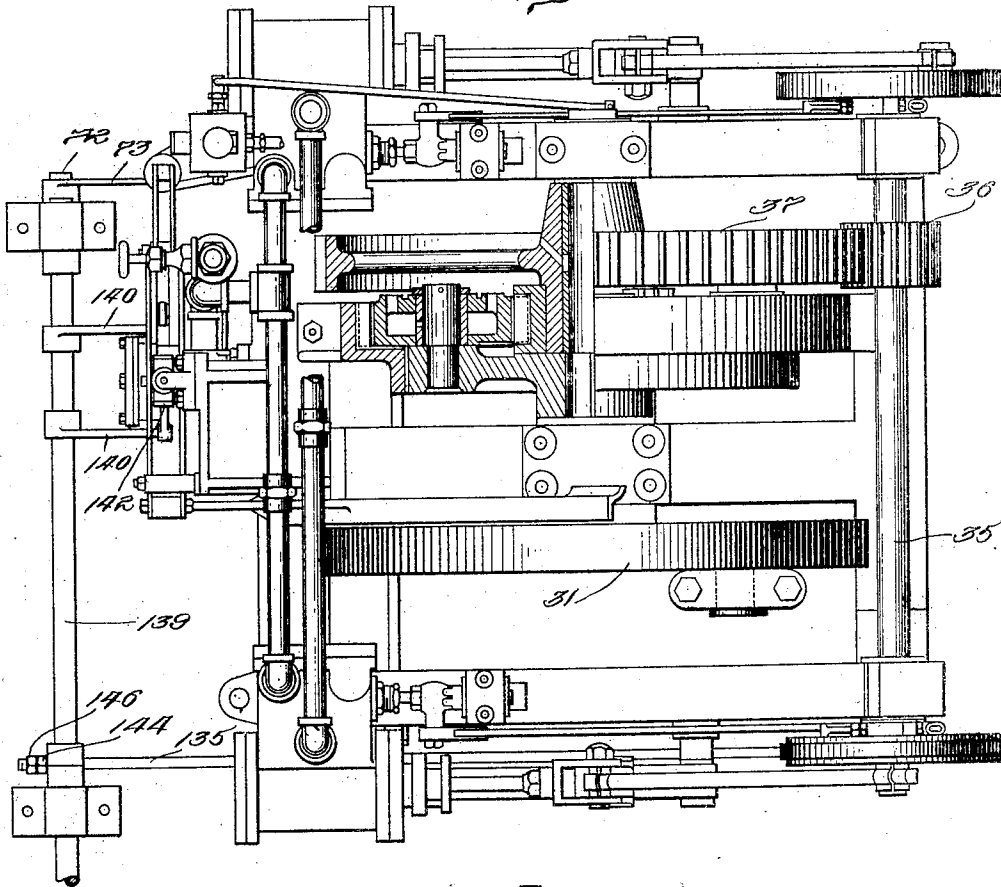


Fig. 8.

Witnesses
Horace A. Crossman
Carl L. Choate.

Inventor
Almon E. Norris.
By Henry North, James H. Harvey
Attys.

1,258,700.

A. E. NORRIS.
LOADING APPARATUS.
APPLICATION FILED MAY 27, 1912.

Patented Mar. 12, 1918.

6 SHEETS—SHEET 5.

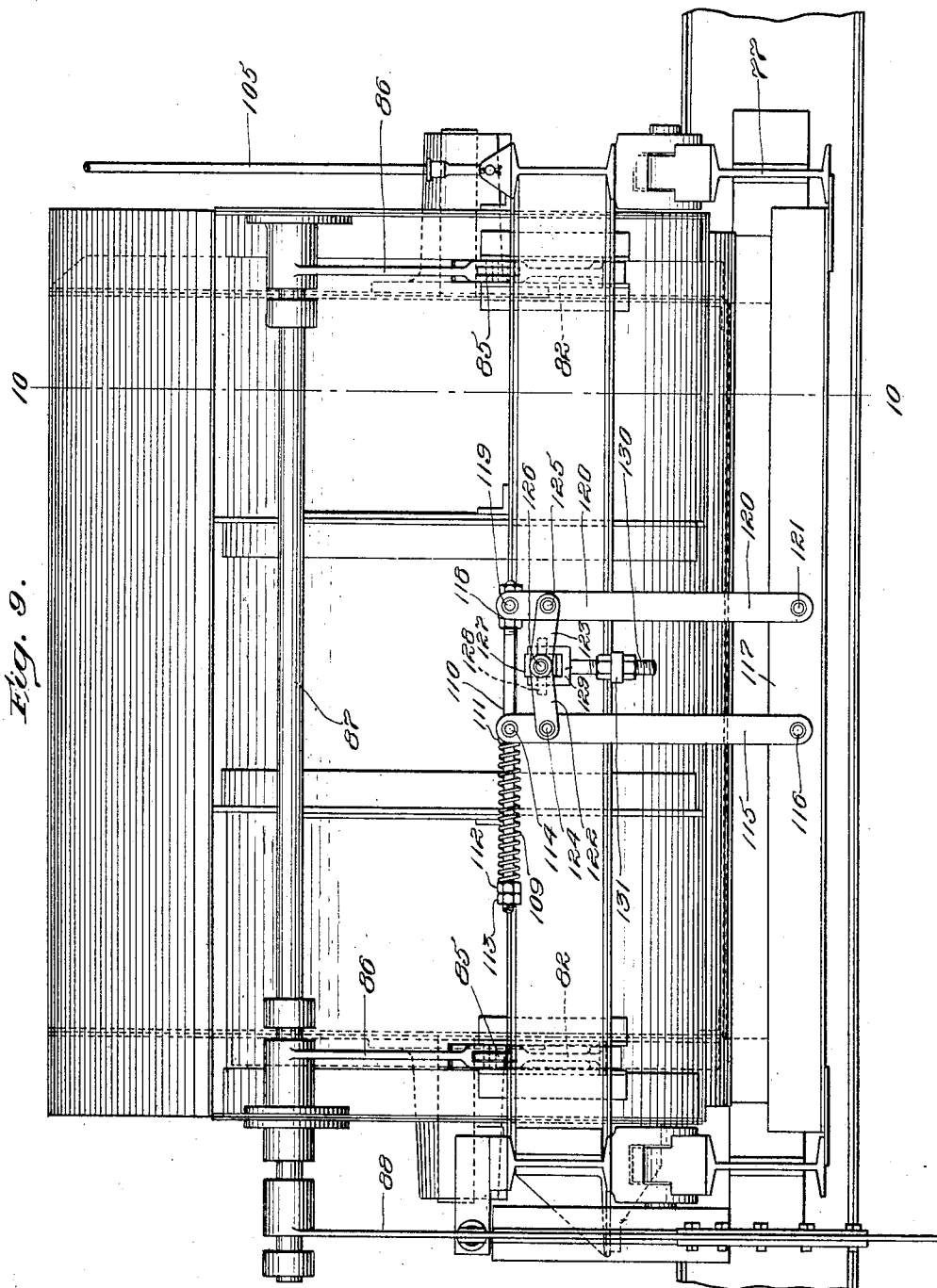


Fig. 9.

Witnesses:
Horace A. Crossman
Carl L. Choate.

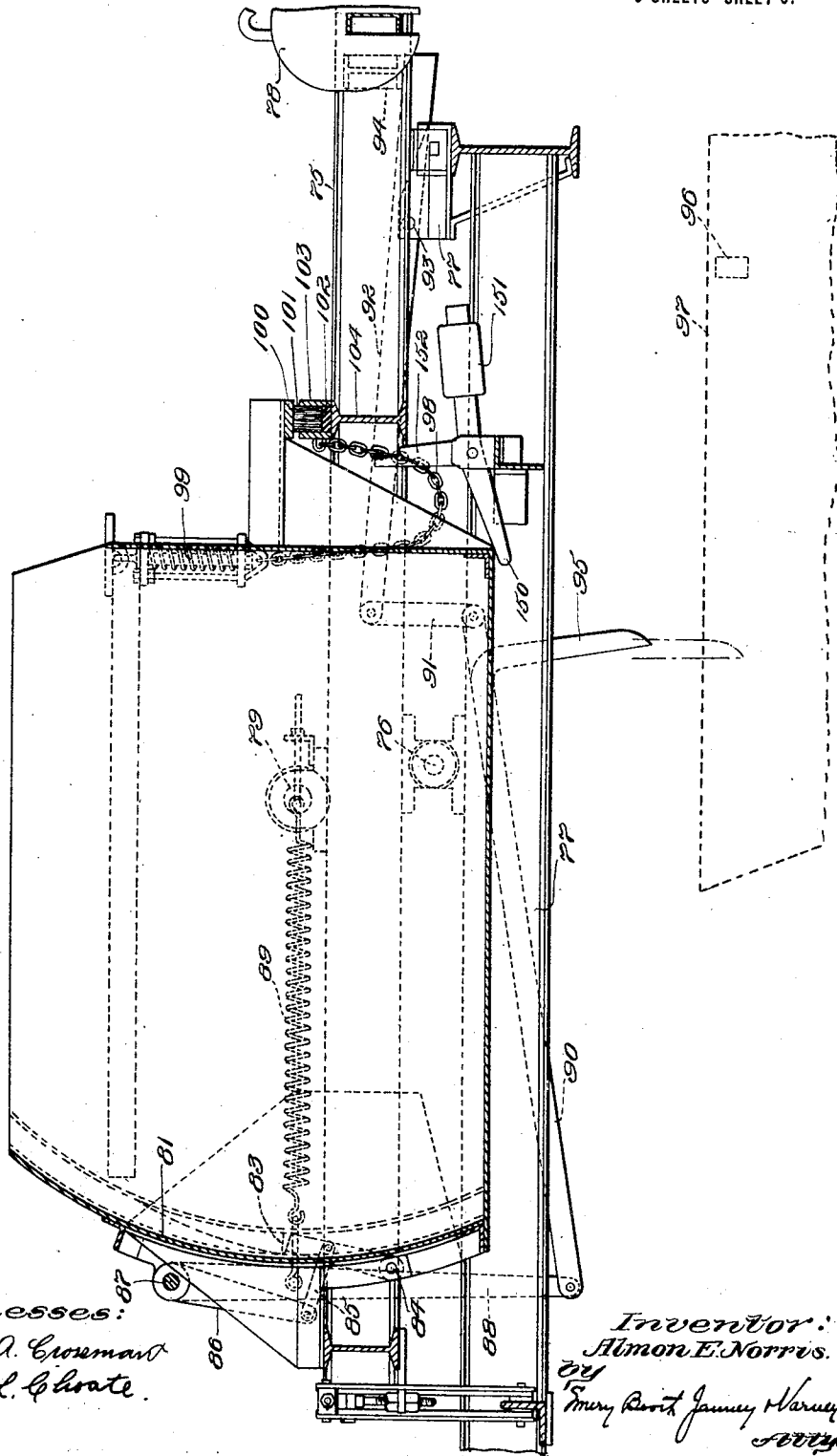
Inventor:
Almon E. Norris.
by Emory Booth, James Harvey
Attys.

1,258,700.

A. E. NORRIS.
LOADING APPARATUS.
APPLICATION FILED MAY 27, 1912.

Patented Mar. 12, 1918.
6 SHEETS—SHEET 6.

Fig. 10.



Witnesses:
Horace A. Crockett
Carl L. Crockett.

Inventor:
Almon E. Norris.
By
Emory Root James Harvey
Attorneys

UNITED STATES PATENT OFFICE.

ALMON E. NORRIS, OF CAMBRIDGE, MASSACHUSETTS.

LOADING APPARATUS.

1,258,700.

Specification of Letters Patent.

Patented Mar. 12, 1918.

Application filed May 27, 1912. Serial No. 700,089.

To all whom it may concern:

Be it known that I, ALMON E. NORRIS, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Loading Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My invention relates to loading apparatus, being more particularly concerned with apparatus for automatically loading material on moving cars or other conveyances, and will be best understood by reference to the following specification, when taken in connection with the accompanying illustration of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims:—

In the drawings:—

Figure 1 is a front elevation partly in section, showing a feed-controlling mechanism embodying my invention;

Fig. 2 is a detail showing the feeding-gate in the position of discharge;

Fig. 3 is a transverse vertical view of Fig. 1, partly in section and partly in elevation;

Fig. 4 is a front elevation on an enlarged scale of the engine for a feeding-gate, shown in Figs. 1 and 2;

Fig. 5 is a side elevation of the same;

Fig. 6 is a detail sectional view on an enlarged scale on line 6—6 of Fig. 4;

Fig. 7 is a plan view partly in section of the engine shown in Figs. 4 and 5;

Fig. 8 is a diagram showing the position of the valve and valve-controlling links in a different position from that shown in Fig. 3;

Fig. 9 is a detail elevation on an enlarged scale of the dumping receptacle and tilting and weighing frame, as viewed from the left-hand side of Fig. 1; and

Fig. 10 is a sectional view partly in elevation on line 10—10 of Fig. 9, looking toward the left.

Referring to the drawings, and to the specific embodiment of my invention which I have there disclosed for illustrative purposes, I have there shown a loading apparatus similar in many respects to the apparatus disclosed in United States Letters Patent No. 961,732, issued to me June 14, 1910. It will be convenient to describe

herein the construction and operation of much of the apparatus of the aforesaid patent, in order that a proper understanding of my present invention and its application to the patented apparatus may be had.

Referring to the drawings, there is disclosed a loading apparatus which herein is specifically intended for automatically loading measured quantities of material such as coal or the like into the cars or other moving conveyances, which are caused to move past one or more loading installations, each comprising a hopper 11, having a chute 12 leading therefrom to a properly located dumping receptacle 13, adapted to receive measured quantities of material from the chute under the control of a moving feeding device 14 (Fig. 3), the latter controlling the delivery of material from the chute to the dumper. The dumping device is so arranged that the movement of a car, or like conveyance to a materials-receiving position beneath the same acts automatically to discharge the material therein into the car, the dumper in turn receiving one or more, and usually two or three, discharges from the moving feeding-device in the chute to complete its load between the passage of successive cars.

Referring more particularly to the constructional details of the described system, the loading apparatus hereinafter described is supported upon any suitable frame work, herein shown as comprising suitable columns, such as 15 (Fig. 3), the latter bearing girders 16 and beams 17, supporting an upper platform 18, on which is supported the hopper 11. A lower platform 19 is sustained by suitable girders 20 secured to the columns 15.

While the feeding-device may be otherwise constructed and located, in the present instance it is arranged near the bottom of the chute and consists of an oscillating measuring-gate, or feeder, comprising transverse walls 21 and 22, extending completely across the chute, but arranged as shown in Figs. 2 and 3 at an obtuse angle to each other. These are carried by the framework secured to a gate-shaft 23, the latter adapted to oscillate in bearings 24 depending from the underside of the chute, and also (Fig. 1) in a bracket 25, depending from the framework. The feeding-gate 14 has also rearwardly extending frame members 26, (Figs. 119

2 and 3,) to which is secured at one end the curved wall 27, also extending completely across the chute, the opposite end of said wall being joined to the end of the gate-measuring wall 22. The gate 14, in its feeding movement, is caused to oscillate from a materials-receiving position in which all delivery from the chute is cut off, to a discharging position (represented in full lines in Fig. 2), wherein the measured discharge of the gate is delivered into the dumper.

In Fig. 3, the gate is represented as having reached a position just short of its full receiving position, the measuring wall 21, however, shutting off all delivery from the chute. In the subsequently attained full receiving position, (which is represented by dotted lines in Fig. 2), the pocket formed between the measuring walls 21 and 22 is completely filled with material gravitating from the hopper. The gate being then moved to the other extreme (shown in full lines in Fig. 2), the material contained in the pocket between the walls 21 and 22 is completely discharged, the curved wall 27, during discharge, cutting off further movement of material in the chute as the gate moves toward its discharging position. As the gate oscillates back and forth in the chute, therefore, it receives successive measured charges of material, and delivers them to the underlying dumper.

For the complete automatic control of the apparatus, it is desirable to control the oscillating movement of the gate so that while continuing so long as the normal operation of the apparatus continues, such movement can be automatically interrupted when the normal operation of the apparatus is interrupted, as by the exhaustion of the supply in the hopper, or the failure of the dumping receptacle to discharge its material for any reason, such as the absence of a suitable receiving car or conveyance beneath the same. For such control, I have provided a driving motor, herein a steam engine, for oscillating the gate and controlling means for stopping not only the gate, but also the engine itself, under certain predetermined conditions.

Referring more particularly to Figs. 1 and 3, the gate engine designated generally by the numeral 28 is shown as mounted upon the platform 18, and connected to oscillate the gate by means of a crank 29 attached to the gate-shaft 23 and a connecting rod 30, the latter eccentrically connected to a crank disk 31 on a main driving shaft 32. The engine may be of any suitable type of construction, and employing any desired form of motive power, but herein I have shown a steam engine mounted (Figs. 4 and 5) upon a suitable framework 33 and having twin cylinders 34, both acting to turn an engine crank-shaft 35. In order to

reduce the speed and impart a relatively slow oscillating movement to the gate, speed reduction gearing is provided between the engine crank-shaft 35 and the main driving shaft 32. This may be of any suitable construction, but herein there is provided upon the crank-shaft a spur gear 36, meshing with a large spur gear 37, the latter being connected by suitable gearing with the large crank disk 31 in such a manner as to cause the latter to be driven at a relatively low speed. It will not be necessary to further describe this reduction gearing herein since the same is not essential to a proper understanding of my present invention.

The cylinders and their steam chests are connected (Figs. 4, 5 and 7,) by a steam pipe 38, which has a depending supply branch 39 leading to a chamber 40 of a throttle valve 41 of any usual or suitable construction, the latter when elevated acting to connect said supply pipe 39 with a steam pipe 42, (Fig. 4), and starting or continuing the operation of the engine. In the operation of the apparatus of the aforesaid patent, it was found that the steam trapped in the chest and cylinder of the engine was occasionally sufficient to cause the engine to overrun enough to carry the engine driven disk with the pin carried thereby beyond the controlling lever and make an entire surplus revolution, thus spilling the coal and making the operation of the loader unsatisfactory. In the present apparatus, when the valve is depressed (as shown in Figs. 4 and 6), it acts to shut off the supply of steam to the supply pipe 39 and the cylinders, and stop the operation of the engine, and also acts to place the engine cylinders in communication with an exhaust port 43, thus preventing the steam which would otherwise be trapped in the chests and cylinders from causing the engine to overtravel, which would often be the case were it not for this provision. This exhaust port and its connection with the cylinders constitutes one of the important features of my present invention. Exhaust pipes 44 are employed to carry off the exhaust from the engine.

Having described the mechanism for driving or rotating the crank disk 31 and the feeding-gate 14, the mechanism for automatically starting and stopping the gate will now be described. In stopping the gate, it is desirable to stop it at some predetermined position, and this usually is some position approximating the full receiving position of the gate, so that when subsequently started, it will be in a position suitable for immediately commencing the delivery of material without loss of time. In order that the engine may be stopped at such a predetermined position, I have provided a device insuring the movement of the gate to such a position and its stoppage thereat

under certain conditions which will be more fully referred to. For this purpose, there is pivoted to a bracket on the engine frame 33 a bell-crank lever 45, weighted at its outer or upper end, and oscillating in a plane adjacent and parallel to the face of the crank disk 31, so as to coact with a pin 46 fixed at a definite position thereon.

Referring more in detail to the present embodiment, the longer arm of the lever (Figs. 4 and 5) is shown more or less undulating in shape, and is provided (Fig. 5) with a back flange 47 extending its entire length, and with a shorter front flange 48 extending a portion only of its length. This arm of the lever widens at its outer end, and the flanges follow the contour of the widened portion, so that a mouth 49 is presented to receive the pin 46 in the face of the crank disk. The pin is provided with a roll 50, which after entering the mouth 49 bears on an inner side of the flange 47 moving the long arm of the lever upward and rocking the shorter arm downwardly. In Fig. 5, the pin is shown in a position lifting the longer arm of the lever up to a maximum degree. The continued rotation of the disk from the position shown in Fig. 5 in the direction of the arrow, will cause the roll 50 to draw the lever downward and leave the path defined by the flange 47 at an exit 51, the lever being allowed thereby to remain down to its normal position, thus raising the other arm 52 of the bell crank. Thus the lever 45 will be periodically moved at predetermined intervals by the intermittent engagement of the roll 50 therewith, this acting to move the valve as hereinafter described. Connections lead from the short arm 52 of the bell crank lever to the throttle valve 41, as follows:—the arm 52 has connected thereto a pair of short links 53, the latter pivoted at 54 to the outer end of a pair of main controlling links 55, the links 55 having jointed connection at 56 to an upright valve stem 57, which latter is connected to the throttle valve 41, and is mounted for a sliding movement, as the links 55 are moved up or down. The opposite end of the links 55 may also be moved up or down and for this purpose are joined at 58 to the mid-portion of a second pair of links 59, to which latter, at one end, is connected a link-actuating rod 60, and at the other end a link-actuating rod 61.

The described mechanism for controlling the valve constitutes a floating linkage, and requires for the closure of the valve and the stoppage of the engine the depression not only of the end 54 of the link 55 due to the approach of the feeding gate to its initial position, but also the coincident depression of the opposite end 58 of the link due to the depression either of the actuating rod 60, or the actuating rod 61, or both. In the spe-

cific construction illustrated, the extent of movement of the arm 52 of the bell-crank lever as it rises and falls, due to the successive rotations of the crank disk, is about the same as the extent of the movement of the actuating rod 60, or the actuating rod 61. Since the rods 60 and 61, however, act through the link 59, the depression of either one individually produces only one-half the movement of the valve produced by the arm 52 of the bell-crank lever.

Starting with both actuating rods 60 and 61 elevated, and the arm 52 also elevated, the links lie as represented in full lines in Fig. 8, and the construction of the valve is such that the movement of the links 55 due to the depression of either or both the rods 60 and 61, is insufficient to close the valve, but with the depression of either or both of the rods 60 and 61, coincident with the depression of the end 54, due to the movement of the bell-crank lever, the valve will move to a closed position and cut off the supply of pressure fluid to the engine. There is, therefore, provided a joint control over the gate and the gate engine, responsive not only to the position of the gate, but to other conditions, which herein represent some departure from the normal and continuous operation of the apparatus.

Various conditions may be selected to exercise control over the gate engine. Herein I have provided detector means in the hopper responsive to the presence or absence of material to be fed, such that when the hopper supply falls below the amount necessary again to refill the dumper, one of the link-actuating rods 60 or 61 is automatically depressed, so that when the gate again approaches its initial position, the engine will be stopped, unless meanwhile the hopper has again been refilled. This may be constructed in various ways, but herein I have provided approximately at the juncture of the hopper and the chute, or wherever else convenient, a detector plate 62, which tends to move toward the interior of the chute, by means of a weight 63 and a movable bell crank lever 64, the latter secured to a shaft 65, by which the plate is carried. When the material fills the chute, it presses the plate against the top wall thereof (as represented by dotted lines in Fig. 3), but when the material becomes exhausted from the hopper, or the upper part of the chute, the plate being no longer pressed up by the material allows the weight to drop down (see full lines Fig. 3), and acting through suitable connections to depress the actuating rod 60. To cause this actuation, the weighted bell crank lever 64 is connected through a rod 66 with a lever 67 on a rock-shaft 68, the latter extending (Fig. 1) beyond the hopper, where it is connected to a lever 69. The latter in turn is connected to a link 70, 130

joined to a weighted lever 71, the latter secured to a rock-shaft 72 mounted at the rear of the engine frame. The rock-shaft 72 in turn is secured to a lever arm 73 (Fig. 7), the latter joined to the lower end of the link-actuating rod 60. Through these connections, the position of the detecting plate 62, that is whether depending or pressed against the upper wall of the chute, determines the position of the actuating rod 60. So long as the plate is pressed against the top of the chute indicating an ample supply of material, the actuating rod remains lifted. When, as represented in the drawings, the plate drops down, due to the exhaustion of material, the actuating rod is dropped down and the valve stem 57 is dropped, so that when the roll 50 on the crank disk next engages the bell crank lever, the closure of the valve will be effected. Means for varying the sensitiveness of the plate may be employed, such for example as a weight 74 adjustably supported on the lever 71.

During the operation of the apparatus, the underlying dumping receptacle, when filled with a predetermined quantity of material, is allowed to tip, and when subsequently actuated by the approach of a car beneath the same to a receiving position is caused to discharge its material thereinto, and immediately restore itself to its initial position. In the preferred operation of the apparatus, the movements are preferably so timed that the cars move continuously along beneath the receptacles, each car taking a portion of its load from each dumping receptacle, and sufficient time elapsing between the advent of successive cars to permit the dumping receptacle to be filled by one or more oscillations of the feeding-gate, as may be required to discharge therein the predetermined quantity. If, however, the discharge of the dumping receptacle is delayed for any reason, as for example by delay in bringing up the next car, or if its restoration to its initial position is retarded, it becomes desirable meanwhile to stop the action of the feeding-gate. In the present instance, therefore, I have so constructed the dumping receptacle that by connection therefrom to the link-actuating rod 61 at the engine until the filled dumping receptacle is discharged and restored to its receiving position, no more material can be fed from the feeding-gate, although the latter, before stoppage, will continue its movement approximately to its full receiving position, ready to renew the feed as soon as the dumper has been discharged and restored to its initial position. With this end in view, the dumping receptacle (Figs. 1 and 3) comprehends an oscillating dumper supporting or weighing frame 75, which is centrally trunioned at 76 to frame members 77, the latter sustained by the lower platform 19.

One end of the oscillating frame supports the dumper 13, while the other end is counter-balanced by one or more weights 78, adjustably arranged upon the frame so as to permit the tipping movement thereof under a predetermined load on the dumper. The dumper 13 is also itself mounted for tipping or discharging movement on the frame 75, being provided for that purpose on each side thereof and properly positioned with reference to its center of gravity, with trunions 79 supported in bearings 80 located on the upper side of the oscillating frame 75. The dumper may be of any suitable shape or size, consisting of a bin-like inclosure having imperforate sides, back and bottom, but an open top to receive the material from the chute. The front or mouth of the dumper is closed by a hood 81 separate from the dumper and fixedly secured to the frame 75. This hood incloses the mouth of the dumper and retains the loading material therein when the dumper is in its normal position. When the dumper receives a predeterminate quantity of material from the chute through one or more discharges of the feeding-gate, the oscillating frame 75, together with the dumper 13 and the hood 81 tip downward about the trunions 76, lifting the counterweight without change of position relatively to each other.

For the subsequent release of the dumper 13 to discharge its material, there is pivoted (Figs. 1, 9 and 10) on the oscillating frame 75 a pair of latches 82, engaging abutments 83 at each side of the front or mouth of the dumper and supporting the same in position with its mouth closed by the hood 81. The latches are mounted on pivots 84 on the frame 75, and connected by links 85 to arms 86, the latter secured to a rock-shaft 87, suitably supported upon the frame 75. The shaft 87 projects at one end (Fig. 9) beyond the oscillating frame, and is provided with a depending arm 88, to which one end of a suitable spring 89 is secured, the other end of the spring being secured to a suitable fixed point on the frame 75. The lower end of the arm 88 extends between a pair of parallel strips, or bars, 90, constituting a link, which is swingingly supported at one end by said arm, and at its other end by a link 91. The latter is pivotally supported at its upper end on one end of a lever 92, pivoted at 93 on the fixed frame 77, and projecting at its other end beneath a stop 94 carried by the tilting frame 75. By this means, the link 90 is normally supported in the position shown in Fig. 10. In order to permit the latches 82 to be tripped automatically, the link 90 is provided with a depending bar 95 rigidly attached thereto, which bar is adapted to be engaged by a suitably located lug or projection 96 carried by a passing car 97. The movement of the

car to a position where it can suitably receive the material from the dumper causes the lug 96 to strike the bar 95, swing the link 90 forward on the supporting link 91 and supporting arm 88, and cause the latter to act through the shaft 87, arms 86 and links 85, to withdraw the latches 82 from their supporting engagement with the abutments 83. This permits the dumper to tip, and its open mouth, being thereby depressed below the closing hood 81, delivers its contents to the car below. The dumper is so counterbalanced that it has a tendency to restore itself to its normal position as soon as the contents are discharged, and for limiting the pivotal or discharge movement thereof, chains 98 are provided, each having a spring 99 for relieving the jerk or strain interposed between it and the point of attachment to the dumper. Immediately upon its restoration, the latches 82 snap in under the abutments 83, and retain the dumper in its normal position until it is tripped by the next car. In the operation of the apparatus of the aforesaid patent, it was found that the shock caused by the impact of the loading pan on its stops on its return to its initial position was so great as to pulverize the wooden stops, and eventually cause breakage of some of the parts. In the present apparatus, as a means to receive the impact of the dumper and cushion the latter upon its restoration to its load-receiving position, the dumper carries at its rear end a pair of abutments 100 adapted to engage a pair of impact-receiving members 101 having suitable cushioning means, herein rubber cushions 102, located beneath the impact-receiving members. Preferably the impact-receiving members consist of blocks of wood, so placed that the end grain of the wood is presented to receive the impact. Preferably the impact-receiving members and their cushioning devices are mounted in sockets 103 supported upon a transverse member 104 of the tilting frame 75.

Referring now to the connections for controlling the feeding-gate and the gate operating engine, through the condition or movements of the dumper, the frame 75 is connected to the link-actuating rod 61 at the engine, by means of a vertical rod 105 pivotally attached at the hood end of the frame 75, and connected at its upper end (Fig. 3) to a lever arm 106, the latter connected through a rock shaft 107 with a second arm 108, which arm is directly connected to the link-actuating rod 61.

When the oscillating frame 75 is in its normal position represented in Fig. 1, the actuating rod 61 is held lifted, as in the position shown in Fig. 8. When, however, the dumper receives its intended load and the oscillating frame is thereby caused to tilt, the vertical rod 105 is drawn down and

this in turn, through the described connections, draws down the actuating link 61 to the position represented in dotted lines in Fig. 8. This has no effect upon the operation of the engine, until the gate-connecting rod 30 approaches the dead point represented in Fig. 3, whereupon, if the oscillating frame still remains tilted, the bell-crank lever 45 will be moved to depress the valve link 55 still farther, and close the throttle valve. It will be seen that the links 55 and 59, with their attached connections form a floating linkage mechanism for controlling the engine through the valve 41, the fulcruming points of both links being movable. This permits the engine to be controlled in response to the interruptions in the normal operation of the loading apparatus as described, the arrangement herein being such that if either or both ends of the link 59 are lowered, due to the exhausting of material in the hopper or the failure of the dumper to discharge and return to its normal position, the subsequent depression of the arm 52 of the bell-crank lever 45 will stop the engine.

While the roll 50 on the crank disk 31 might be located at different angular positions on the disk and thereby stop the gate at any desired predetermined position, preferably it is located as shown and in such a position that it will stop the engine with the connecting rod 30 just short of the dead point, or short of its highest elevation. It therefore still leaves, after subsequent starting, a slight movement before the delivery of materials to the dumper can commence. This avoids the possibility of delivering the materials to the dumper before the latter has been restored to its normal position and locked by the latches 82, which restoration may require a slightly longer time interval than the more rapid restoration of the oscillating frame 75, upon which depends the starting of the engine.

In the operation of the apparatus of the aforesaid patent, it was possible for the loader to fill from the hopper in such a way that the tilting frame would gradually descend to its lower tilting position, in which the engine was shut off, thus sometimes permitting the engine to travel too far and make an entire oscillation of the loading pan before it would stop. One of the important features of my present invention relates to a means to cause the tilting weighing frame 75 to tilt to its lowest position fully, if loaded sufficiently to tilt at all, thus preventing the frame from gradually descending to its lower position, in which the engine is shut off, and thus preventing the engine from traveling too far and making another reciprocation of the feeding-device before it stops. With this end in view, I have provided detent means normally tending to hold

the tilting frame in its elevated position, herein comprising a spring 109 (Fig. 9), and suitable means actuated by the depression of the frame 75 for utilizing said spring to urge the frame toward its lowermost position. To this end, the spring 109 may encircle a rod 110, bearing at one end against suitable movable abutments 111 on said rod, and on its other end against a suitable stationary abutment herein a nut 112 threaded onto the terminal portion of the rod and having a lock-nut 113. The movable abutment 111 consists of a sliding block pivoted at 114 to the upper end of a pair of levers 115, the latter being pivoted at 116 to a cross-member 117 of the stationary frame 77. The rod 110 carries a fixed block 118 pivoted at 119 to a pair of levers 120, the latter being pivoted at 121 to the cross-member 117. The levers 115 and 120 are connected to each other by a toggle composed of a pair of links 122 and a pair of links 123, the former being pivoted at 124 to the lever 115 and the latter being pivoted at 125 to the lever 120. The pairs of links 122 and 123 are pivoted at 126 to a block 127, the latter being pivoted on transverse pivots 128 in a jaw 129, having a screw-threaded shank 130 secured to an arm 131, the latter being rigidly secured to the tilting frame 75. This construction provides for the vertical adjustment of the center pivot 126 of the toggle. The axis of the center pivot of the toggle just described is normally located in line with, or slightly above, the axes of the pivots 124 and 125, and preferably above the latter. As a consequence, the pressure of the spring 109 is exerted through the rod 110 and levers 115 and 120 to draw the ends of the toggle toward each other, thus tending to raise the center pin of the toggle and accordingly urge the tilting frame toward its elevated position. When once the weight of the material in the dumper is sufficient to depress the toggle slightly to a point beyond a central position, the pressure of the spring 109 is utilized to act through the connections just described, to quickly force the tilting frame 75 to its lowermost position, thus shutting off the engine.

In order to insure stoppage of the engine, when the tilting frame 75 descends to its lowermost position, when the supply of pressure fluid thereto is cut off from the valve 41, as hereinbefore described, I provide suitable means for bringing the engine crank-shaft 35 to a state of rest, preferably by providing the engine crank with a brake-drum 132, having a suitable cooperating member, herein a brake-band 133. The latter may be actuated by suitable means connected with the same operating mechanism which controls the throttle valve 41. Herein the brake-band 133 has one end secured to a fixed stud 134, and its other end secured

to an actuating rod 135 mounted to slide in a suitable guide 136 carried by said stud. This actuating rod may be secured at its forward end to a block 137, pivoted to an arm or a pair of arms 138, the latter being secured to a shaft 139, herein located directly above the shaft 72. Secured to the shaft 139 are two levers 140 connected by links 141 to pivots 142 on a cross-head 143 on the valve stem 57, whereby the downward motion of the valve stem to shut off the supply of pressure fluid to the engine is also made effective to act through the connections just described to apply the brake on the brake-drum of the engine crank shaft. Suitable means may be provided for effecting an adjustment of the brake band, the rod 135 for this purpose being provided with nuts 144 and 145, and check nuts 146 and 147 on opposite sides of the pivot block 137 (see Figs. 4 and 5). The described mechanism for positively insuring the stoppage of the engine when the pressure fluid is cut off by the valve forms one of the important features of my present invention. As a means for preventing the tilting frame 75 from returning to its initial position until the dumper 13 has returned to its initial position, there may be provided a pair of bell crank levers 148 pivoted at 149 on the stationary frame 77, and having arms 150 held in engagement with the under side of the dumper by counterweights 151. These bell crank levers are provided with arms 152 having suitable provision for serving as stops for the tilting frame 75, herein being provided at their upper terminal portions with shoulders 153, which are adapted to pass beneath the cross-member 104 of the tilting frame when the bell crank levers are released during the dumping action of the dumper, thus effectually preventing the tilting frame from returning to its initial position until the shoulders have been withdrawn from beneath the cross member by the engagement of the dumper with the arms 150.

Briefly the operation of the apparatus is as follows:—The supply in the hopper 11 is replenished from time to time by any usual or suitable loading apparatus, not shown. Assuming that the engine is started to turn the gate and deliver material from the chute into the dumper, the detector plate 62 will then be pressed up against the top wall of the chute, showing the full condition of the hopper, and the left-hand link actuating rod 60 will be elevated as represented in Fig. 8. The dumper and oscillating frame being also in the normal position shown in Fig. 1, the right link actuating rod 61 will also be elevated as represented in Fig. 8, and with steam admitted to the supply pipe 39, the engine will start the gate in motion. At the beginning of the oscillation

tion of the gate, the roll 50 on the crank-disk soon leaves the exit 51 on the bell crank lever 45, and the latter drops lifting the end 54 of the valve actuating link 55 and insuring the maintenance of the engine operation until the crank disk 31 has turned again to the position shown in Figs. 3 and 5. Meanwhile, the valve is held open irrespective of the link-actuating rods 60 and 61. The engine having started up, the gate swings down until the connecting rod 30 is beyond the dead point, when the gate delivers its measured charge of material to the dumper 13, and then lifts again. While the dumper 13 may act to discharge on a single oscillation only of the feeding-gate, normally the dumper is arranged to be filled from two or three oscillations of the gate. When filled, the oscillating dumper frame 75 tilts down and carries with it the link-actuating rod 61, thus acting to stop the engine. The obstruction 96 of the next car then engages the bar 95, and releases the dumper latches 82, thus allowing the dumper to tilt and discharge its contents into the car. With the contents discharged, the dumper 13 is restored to its normal position by the tilting frame 75, the latter swinging back to a horizontal position under the influence of the counterweights 72, thus lifting the vertical rod 105 and the link-actuating rod 61, and starting the engine. Should this happen before the gate finishes its full oscillation, the gate movement will be continued to deliver a second discharge to the dumper. If the restoration of the dumper, however, is delayed for any reason, so that when the gate returns to its stopping position, the dumper is still tipped, and hence the link-actuating rod 61 still depressed, the movement of the bell crank lever 45 will act to stop the engine. If at any time, the plate 62 in the hopper drops, showing the exhaustion of material, the engine and gate will be stopped at the completion of the next rotation of the crank-disk. In order to prevent the tripping of the dumper 13 when empty, the relative positions of the link 91 and link 90 and depending arm 88 are maintained as shown in Fig. 10, by the engagement of the lever 92 with the stop 94 on the tilting weighing frame 75, since the depending arm 95 is held thereby out of the path of the obstruction on the passing car. It will be understood however, that when the dumper is loaded and the tilting frame is depressed, the lever 92 will be released by the stop 94, and hence the depending bar 95 will be allowed to descend into the position indicated in dotted lines in Fig. 10 in position to be engaged by the lug of the passing car.

While I have herein shown and described one form of my invention for illustrative purposes, and have disclosed and discussed in detail the construction and arrangement

incidental to one specific application thereof, it is to be understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to its specific embodiment herein shown, but that extensive deviations from the illustrated form or embodiment of the invention may be made without departing from the principles thereof.

Having thus described one embodiment of my invention, what I claim and desire by Letters Patent to secure is:

1. In an apparatus of the class described, the combination of a tilting weighing frame, a dumping receptacle carried thereby, means for normally holding said receptacle in non-dumping position, means under the control of said frame for supplying material to said receptacle, and detent means normally tending to hold said tilting frame in its elevated position.

2. In an apparatus of the class described, the combination of a tilting weighing frame, a dumping receptacle carried thereby, means for normally holding said receptacle in non-dumping position, means under the control of said frame for supplying material to said receptacle, and detent means under the control of said frame normally tending to hold the same in its elevated position.

3. In an apparatus of the class described, the combination of a tilting weighing frame, a dumping receptacle carried thereby, means for normally holding said receptacle in non-dumping position, means under the control of said frame for supplying material to said receptacle, and yielding detent means under the control of said frame normally tending to hold the same in its elevated position.

4. In an apparatus of the class described, the combination of a tilting weighing frame, a dumping receptacle carried thereby, means for normally holding said receptacle in non-dumping position, means under the control of said frame for supplying material to said receptacle, yielding means normally tending to hold said frame in its elevated position, and means actuated by depression of said frame for utilizing said yielding means to urge said frame toward its lowermost position.

5. In an apparatus of the class described, the combination of a tilting weighing frame, a dumping receptacle carried thereby, means for normally holding said receptacle in non-dumping position, means under the control of said frame for controlling the supply of material to said receptacle, yielding means normally tending to hold said frame in its elevated position, and means actuated by an increase of the load to a predetermined weight for utilizing said yielding means to depress said frame.

6. In an apparatus of the class described, the combination of a tilting weighing frame,

means under the control of said frame for controlling the supply of material thereto, yielding means normally tending to hold said frame in its elevated position, lever means normally acting on one side of a center to cause said yielding means to exert an upward thrust upon said frame, and means automatically to actuate said lever means to cause a reversal of the direction of the thrust of said yielding means on said frame.

7. In an apparatus of the class described, the combination of a tilting weighing frame, means under the control of said frame for controlling the supply of material thereto, yielding means normally exerting an upward thrust on said frame, and automatic means to cause a reversal of the direction of the thrust of said yielding means on said frame.

8. In an apparatus of the class described, the combination of a tilting weighing frame, means under the control of said frame for controlling the supply of material thereto, constantly acting yielding means, means for normally utilizing said yielding means to exert an upward thrust on said tilting frame, and means actuated by an increase of the load for utilizing said yielding means to exert a downward thrust on said tilting frame.

9. In an apparatus of the class described, the combination of a tilting weighing frame, means under the control of said frame for controlling the supply of material thereto, constantly acting yielding means, a toggle for normally utilizing said yielding means to exert an upward thrust on said tilting frame, and means actuated by an increase of the load for reversing the center of said toggle thereby to utilize said yielding means to exert a downward thrust on said tilting frame.

10. In an apparatus of the class described, the combination of a tilting weighing frame, means under the control of said frame for controlling the supply of material thereto, a toggle, yielding means constantly tending to draw the ends of said toggle toward each other, and means connecting the center of said toggle to said tilting frame.

11. In an apparatus of the class described, the combination of a tilting weighing frame, means under the control of said frame for controlling the supply of material thereto, a toggle, a pair of levers pivotally connected to the ends of said toggle, yielding means constantly tending to urge the ends of the toggle toward each other, and means connecting the center of said toggle to said tilting frame.

12. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, of delivery means for delivering material to said receptacle, motive means for actuating said delivery means, means automatically to

cut off the power supply to said motive means, and means for bringing said motive means to a state of rest.

13. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, of delivery means for delivering material to said receptacle, a power-driven shaft for actuating said delivery means, means automatically to cut off the power supply from said power-driven shaft, and means for bringing said shaft to a state of rest.

14. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, of delivery means for delivering material to said receptacle, a tilting weighing frame supporting said receptacle, motive means for actuating said delivery means, means actuated by said tilting frame for cutting off the power supply to said motive means, and means for bringing said motive means to a state of rest.

15. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, of delivery means for delivering material to said receptacle, a tilting weighing frame supporting said receptacle, a power-driven shaft for actuating said delivery means, means automatically to cut off the supply of motive power from said power-driven shaft, and brake means for said shaft under the control of said frame.

16. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, of delivery means for delivering material to said receptacle, a tilting weighing frame supporting said receptacle, a power-driven shaft for actuating said delivery means, means automatically to cut off the supply of motive power from said power-driven shaft, a brake-drum secured to said shaft, frictional braking means cooperating with said brake-drum, and connecting means between said braking means and said tilting frame.

17. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, of delivery means including an oscillatory measuring gate for delivering material to said receptacle, pressure-fluid actuated means including a crank and connecting rod connecting said crank to said gate for controlling the operation of said gate, a valve for controlling the supply of pressure-fluid to said pressure-fluid actuated means, and means to move said valve into position to cut off the supply of pressure-fluid to said pressure-fluid actuated means and connect the latter with the exhaust.

18. In an automatic loading apparatus, the combination with a receptacle for receiving material from a supply thereof, delivery

means for delivering material to said receptacle, a power driven shaft for actuating said delivery means, means automatically to cut off the power supply from said power driven shaft, and simultaneously operating means for bringing said shaft to a state of rest, coincident with the cutting off of the power supply.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALMON E. NORRIS.

Witnesses:

EVERETT S. EMERY,
F. IRENE CHANDLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."