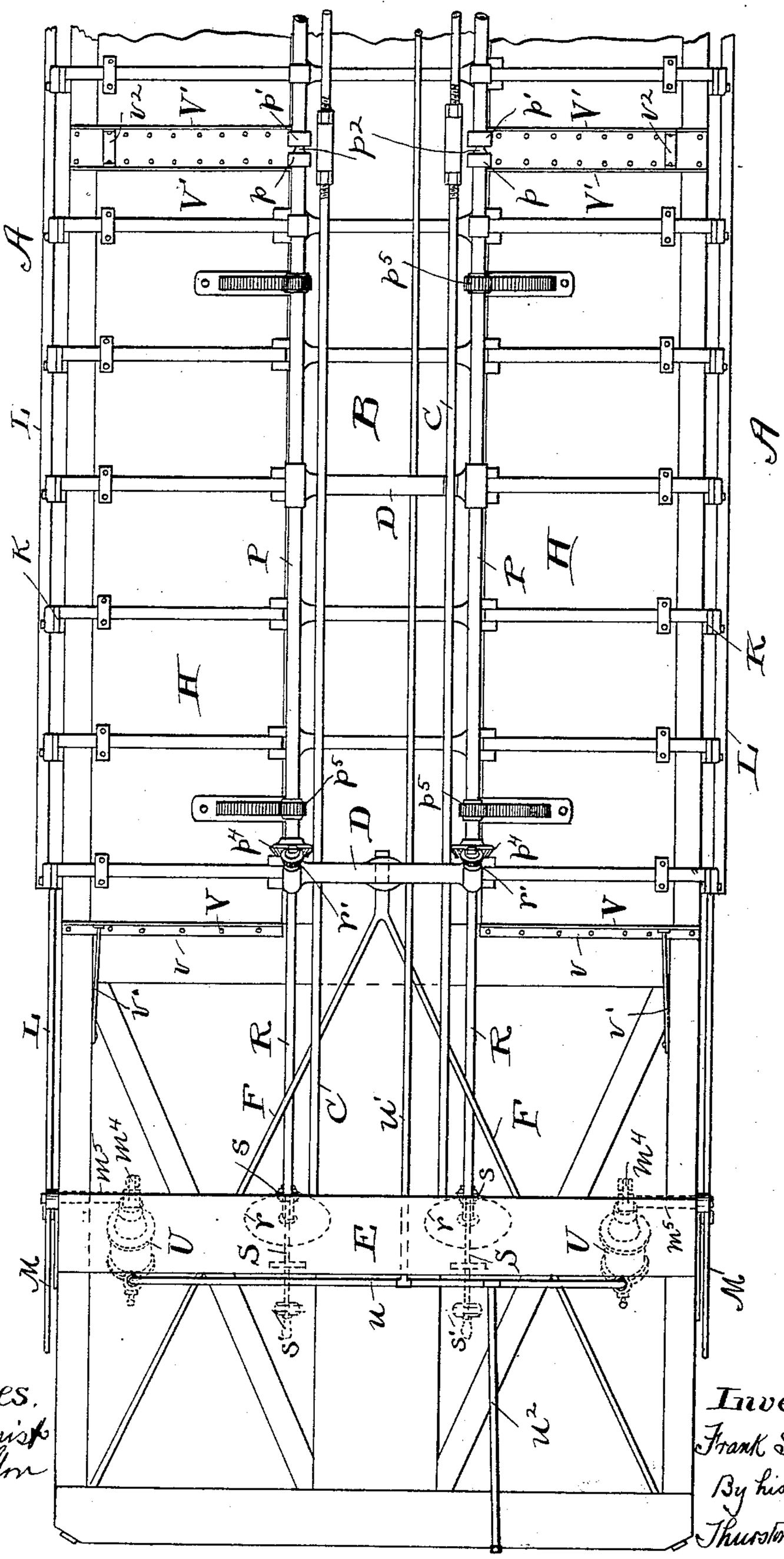
No. 632,650. Patented Sept. 5, 1899.

F. S. INGOLDSBY.

DUMP CAR.

(Application filed Jan. 4, 1899.)

(No Model.) 3 Sheets—Sheet 1.



Witnesses.
E. B. Gilchrist
P. E. Knowlton

Inventor:
Frank S. Ingoldsby,
By his attorneys,
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(No Model.) 3 Sheets—Sheet 2.

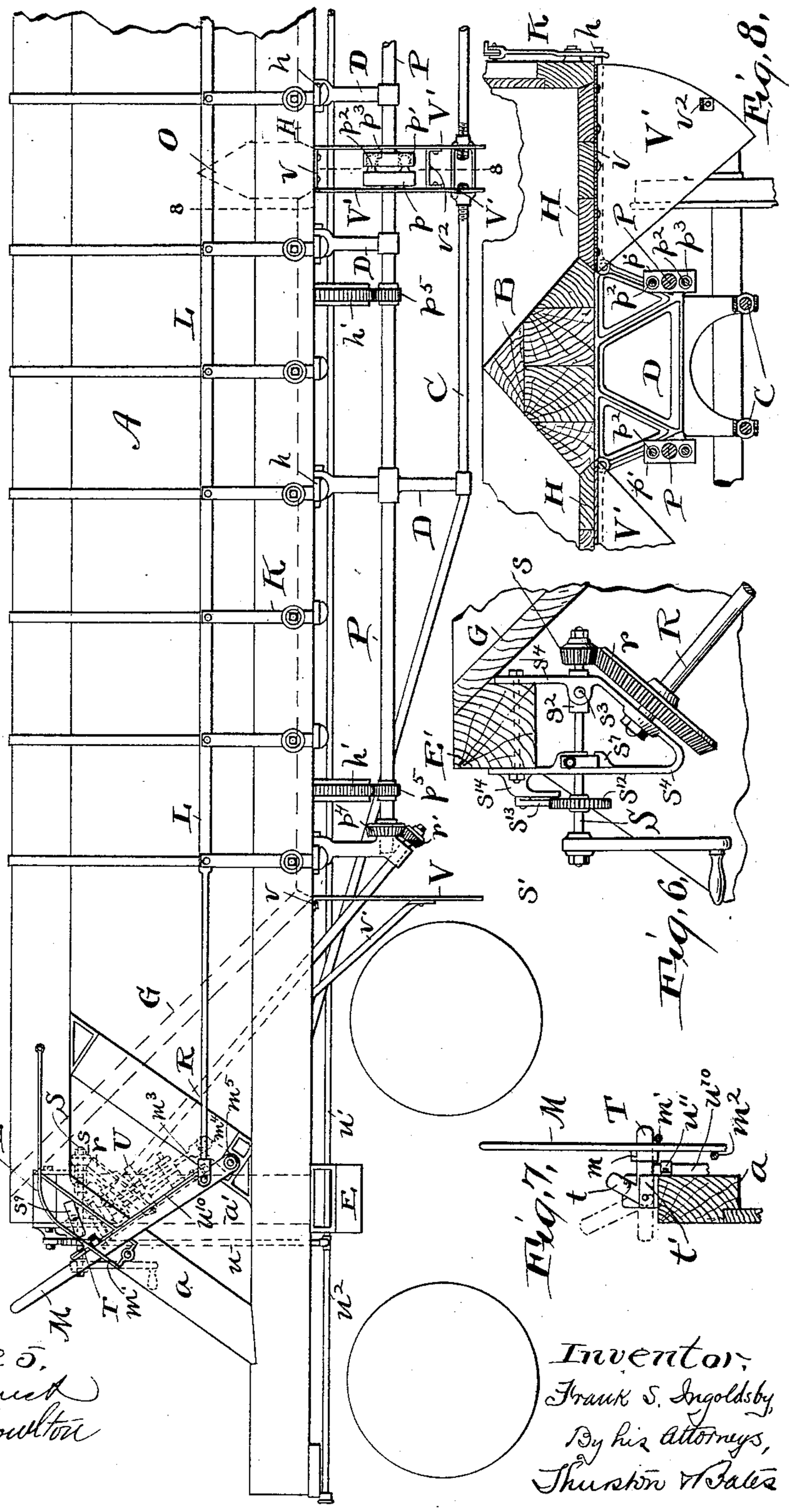

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Fig. 3.

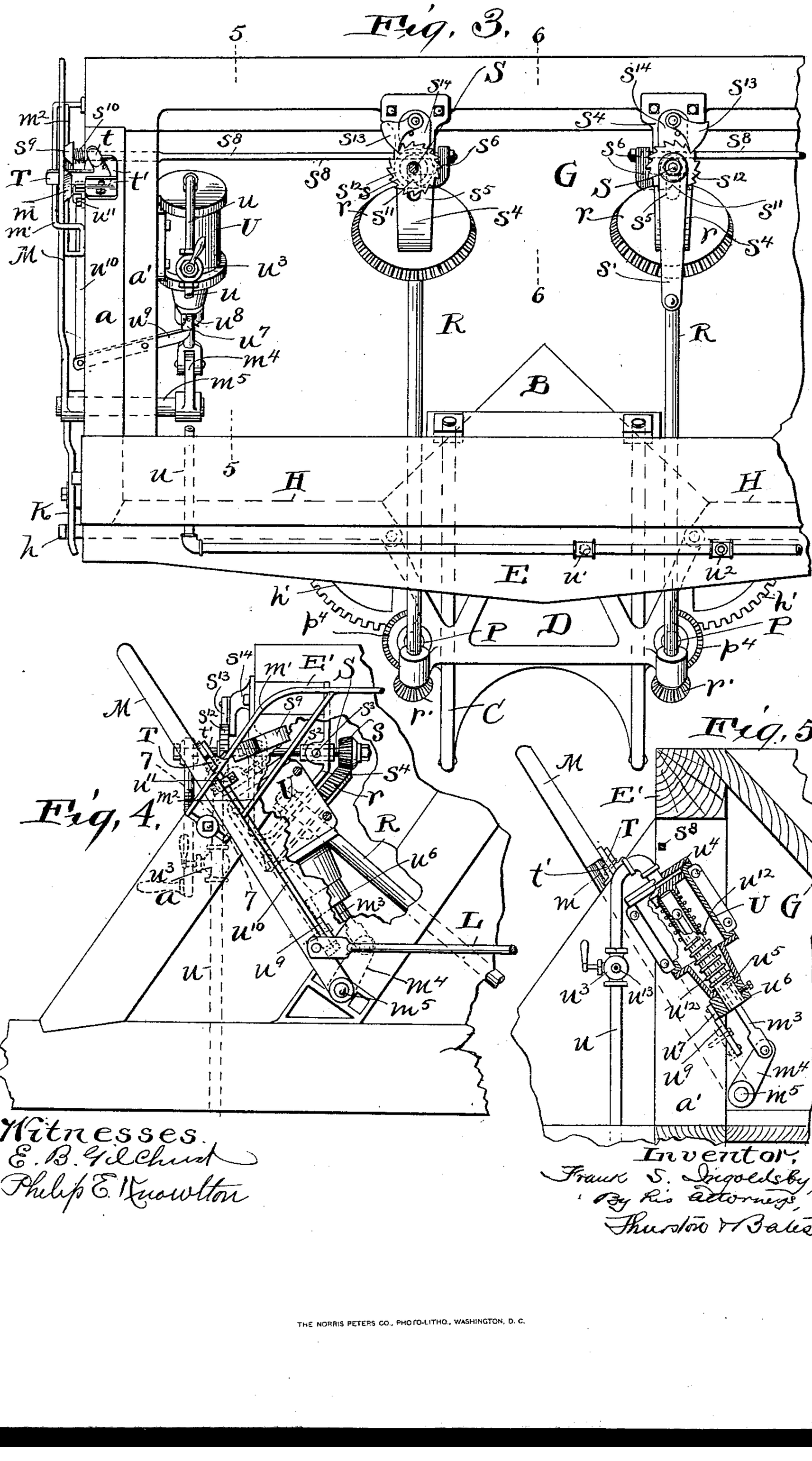

Fig. 4.

Fig. 5.

Witnesses.
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UNITED STATES PATENT OFFICE.

FRANK S. INGOLDSBY, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE INGOLDSBY AUTOMATIC CAR COMPANY, OF SAME PLACE.

DUMP-CAR.

SPECIFICATION forming part of Letters Patent No. 632,650, dated September 5, 1899.

Application filed January 4, 1899. Serial No. 701,106. (No model.)

To all whom it may concern:

Be it known that I, FRANK S. INGOLDSBY, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Dump-Cars, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My invention relates to dump-cars of the general class shown in Patent No. 613,279, granted to me November 1, 1898. The present invention is concerned with means whereby such dump-car may be operated by compressed air, means whereby the door-raising gear is automatically thrown out of action, thus eliminating all danger to operator or to gear, means for preventing the material passing off the ends of the trap-doors when lowered to discharge at the side of the track, and means adapting the invention for long and heavy cars without rendering it inconvenient to operate and without the sagging of the car binding the operating-shafts.

The object of the invention is to provide these features in a form which shall be simple in construction and efficient in service; and the invention may be best summarized as consisting in the combinations of parts to this end, as hereinafter explained and as enumerated in the claims.

The drawings clearly disclose my invention.

Figure 1 is a bottom plan of a little more than half of my improved dump-car, and Fig. 2 is a side elevation of such portion. These figures are on the same scale, which is about one-half the scale of the remaining figures. Fig. 3 is an end view of the car. Fig. 4 is a side elevation of that portion of the car shown at the left of Fig. 2, a portion of the side of the car being broken away to show the mechanism beyond. Figs. 5 and 6 are vertical sections on the lines 5 5 and 6 6 of Fig. 3, looking to the left of that figure in each case. Fig. 7 is a section on line 7 7 of Fig. 4, looking diagonally upward perpendicular to the section-line. Fig. 8 is a vertical section on the line 8 8 of Fig. 2, looking toward the right of that figure.

The same letters of reference designate the same part in each figure.

Referring to the parts by letters, A A represent the sides of the car, and B a central longitudinal beam which is trussed on its under side by the tie-rods C, extending under suitable struts D, secured on the under side of the beam. These tie-rods terminate at each end above a cross-beam E. Diagonal rods F extend from the corners of the car to a suitable point on the central beam B.

At each end of the car is an inclined floor G, and at the base of this floor and between the longitudinal beam and the sides of the car are trap-doors H, pivoted at the central beam. Hooked tongues *h* project outwardly from these trap-doors and are adapted to be engaged by corresponding hooks K, which are pivoted to the side of the car and have their upper ends connected to a link L, which is adapted to be shifted by a lever M. The edges of the trap-doors and the corresponding face of the central beam and side of the car may be beveled and the interlocking hooks K and *h* beveled. When these hooks are drawn tightly into engagement, the trap-door snugly closes the bottom of the car.

On the under side of the trap-doors are segmental racks h', which mesh with pinions p^5 on longitudinal shafts P. At their forward ends these shafts have pinions p^4, meshing with pinions r' on diagonal shafts R, which are adapted to be revolved by plain or ratchet windlass cranks or hand-wheels to raise the trap-doors.

One half of the car on one side of a longitudinal vertical plane is a duplicate of the other longitudinal half.

The construction I have so far described is shown in my prior patent referred to. In the present invention, however, the car is made much longer than the one shown in that patent and four trap-doors are provided, the two on the same side of the longitudinal beam being separated by a transverse beam O, the upper side of which is beveled to prevent material lodging on it. With the long cars shown herein the sag, when the car is loaded, amounts to perhaps two inches, and this would be liable to bind the operating-shafts P and prevent their operation. I therefore form a flexible joint in these shafts at their middles. This flexible joint is made by separating the shaft P at its middle and securing

to the meeting ends the coöperating heads p and p', of which the head p carries a pair of ball-headed studs p^2, diametrically opposite each other, and the head p' has a pair of corresponding recesses p^3, into which the studs extend. Thus the two members must rotate together, while the sag of the car does not cause the shaft to bind in its bearings, but simply moves the upper ends of the heads closer together than the lower, the ball-heads on the studs p^2 keeping the connection tight and the shaft making a slight angle at the middle of the car. This feature constitutes one part of my present invention.

In a long car, as shown, considerable power is required to raise the trap-doors, and I therefore gear down the mechanism for raising the doors, and thus operating the crank or hand-wheel (the term "crank" being hereinafter used as including either) raises the doors for each turn only such amount as can be easily done by one man. This additional gearing between the crank and doors increases the necessity of disengaging the crank from the doors, so that when they drop the former shall not be rotated, as its momentum when the trap-doors stop would be liable to strip the intermediate gears, and its revolution would be dangerous to the operator. The arrangement I have shown for accomplishing this result is a part of the present invention and will now be described.

A gear r on the diagonal shaft R referred to meshes with a pinion s on a shaft S, the other end of which carries the crank s', the left-hand crank being omitted in Fig. 3 for clearness. This shaft S is journaled in a sleeve s^2, which has trunnions s^3 projecting into bearings in a U-shaped bracket s^4, secured to an upper cross-beam E' of the car. The shaft S extends through a slot s^5 in the front side of this bracket, whereby the shaft is allowed to swing in a vertical plane about the trunnion s^3, the pinion s being in or out of mesh with the gear r. The pinion may be held in mesh, however, by the pawl s^6, which rides on a lug s^7 on the bracket and is secured to a rod s^8, which extends through the side of the car and at its outer end carries a head s^9, there being a spring s^{10} surrounding this rod between the car and the head. The spring s^{10} operates normally to hold the pawl across the slot s^5. The shaft lies normally at the bottom of this slot, with the pinion s out of mesh with the gear r. If the crank is bodily raised from its normal position, the shaft S bears against the inclined face s^{11} on the pawl s^6 and forces it aside against the action of the spring s^{10} until the shaft clears the pawl, when the latter springs under it, holding it elevated. This is the position shown in the drawings. Whenever the head s^9 is forced inward, however, the shaft S drops by gravity and the pinion s passes out of engagement with the gear r. A ratchet-wheel s^{12} is rigidly secured to the shaft S, and a pawl s^{13}, pivoted to a lug s^{14}, projecting from the bracket, engages with this ratchet when the shaft is in its elevated position, and thus prevents the shaft unwinding as the doors are being raised. The lever M, which operates the hooks K, is guided between the rods m' m^2, carried on the side of the car. On its inner side this lever has a beveled lug m, which is adapted to engage with the head s^9 on the rod, this head being beveled in the direction of the movement of the lever past it. When it is desired to release the trap-doors, the lever M is thrown forward (to the right in Figs. 2 and 4) and the doors drop by gravity. When they are to be elevated, the crank s' is raised, and the shaft S passes pawl s^6, which springs back underneath it, thus holding the pinion s in mesh with the gear r. Thereafter the rotation of the crank raises the doors. When the doors have been raised, the lever M is drawn back to the position shown. In this movement, after the hooks K have engaged the hooks h, the lug m on the lever engages the head s^9 and forces the latter inward, withdrawing the pawl s^6 from the shaft S and allowing the latter to drop by gravity and disengage the pinion s from the gear r. Thus the crank and its pinion are normally out of engagement. Whenever the doors have to be raised, the crank is brought into engagement, and the final movement of the lever, latching the raised doors, releases the crank. In order to retain the lever M in its normal position, I provide a lock-bar T, pivoted to a suitable bracket t', carried by the end diagonal post a of the side of the car. This lock-bar stands normally in front of the lever M, as shown, and prevents its movement; but it may be thrown back out of engagement into the position shown in dotted lines in Fig. 7. When thus thrown back, the weighted end t of the lock-bar holds it out of action until replaced by hand.

Another feature of my invention is the provision of means for dumping the car by compressed air. This means I will now describe.

A cylinder U is suitably secured to the side of the car beneath the inclined end of the floor. This cylinder has its upper end connected by a branch pipe u with mains u' u^2, extending longitudinally of the car. In action these mains form a continuous pipe beneath the train from the compressed-air reservoir and operating-valve on the locomotive. A valve u^3 is provided on the pipe u for individually controlling the cylinder U. Within the cylinder U is a piston-head u^4, having extending from it the tubular piston-rod u^5. This piston-rod u^5 extends outside the cylinder, where there is secured to it the collar u^6, which carries a pawl u^7. A spring u^8, acting on this pawl, tends to keep it in the normal position shown in Fig. 2, where it is adapted to engage with the end of lever u^9, which is pivoted to an upright post a' of the car. The other end of this lever u^9 is connected to the lower end of a link u^{10}, which is guided near its upper end directly beneath the lock-bar

T by a stirrup u^{11}, secured to the diagonal post a. If now compressed air enters the cylinder through the pipe u, the piston is shoved forward and the pawl u^7 depresses the lever u^9 and the link u^{10} raises the lock-bar T out of the path of the lever M until the lock-bar falls by gravity into its inactive position. Extending loosely into the tubular piston-rod u^5 is the rod m^3, having a ball-head on its upper end and connecting at its lower to the rocker-arm m^4, which is secured to the rock-shaft m^5, to the outer end of which the lever M is secured. After the piston has moved far enough to throw back the lock-bar T, as just described, the piston engages the rod m^3, and thereafter the continued movement of the piston under the influence of the compressed air shoves the rod m^3 downward, and thereby shoves the lever M forward, releasing the hooks K and h and allowing the doors to fall. In this continued movement of the piston the pawl u^7 passes off the end of the lever u^9 and moves idly below it. When the air-pressure is released, a spring u^{12} within the cylinder returns the piston and its tubular rod and attached parts to their normal position, the pawl u^7 clicking over the end of the lever u^9. The operating-lever M may then be returned when desired. The valve u^3 when it closes the pipe u connects the upper end of the cylinder with the atmosphere through the opening u^{13}, whereby the air in the cylinder is freed and the operation of the car is independent of the cylinder. Each cylinder being connected by a branch with the main air-pipe, it will be seen that the cars may be dumped by air in that pipe in any desired selection. For example, if the valves u^3 on one side of the train are open and closed on the other side one side will be dumped, or the valves might be open simply on occasional cars, when these only would be dumped.

In order to prevent the material from passing off the end of the trap-doors when they are lowered, I provide suitable shields V and V′, depending from the bottom of the car opposite the ends of the trap-doors. These shields are sector-shaped, flaring from the pivot-line of the trap-doors, and are secured to the bottom of the car by flanges v at their upper ends. The shields are braced in suitable manner by the brace v', secured to the shield V and the bottom of the car, and the brace v^2, connecting together the two intermediate shields V′. When the door is let down to discharge the load at the side of the track, these shields form the sides of a chute or trough, and none of the material can be dropped onto the track. The combination of such shields with trap-doors the outer ends of which swing downward is a part of my present invention.

In the operation of the car the trap-doors are normally held closed by the interlocking hooks h and K. The car is then filled and drawn to a point where it is desired to dump the car. If it is to be dumped by compressed air, the valves u^3 are opened, as desired, and the engineer from the locomotive may dump at the same time all the cars which are to be dumped. Thereafter the operator on the car raises the hand-wheel s' to bring its pinion into engagement with the gear r and rotates the hand-wheel until the trap-doors are elevated. He then draws back the lever M, (the air-pressure having been relieved after the cars have been dumped or the valve u^3 having freed the cylinder,) and thus latches the doors and releases the crank, and the throwing back of the lock-bar T locks the lever M. The valve u^3 being turned to close the pipe the future dumping of cars on the train does not affect this car or the side thereof which has been dumped. If the car is to be dumped without compressed air, the lock-bar T is simply thrown back and the lever M moved forward by hand. Thus the provision for dumping by air in no way interferes with the hand dumping, and vice versa.

Having described my invention, I claim—

1. In a dump-car, in combination, a trap-door, a lever, a connecting mechanism whereby the lever may release the trap-door, a lock preventing the operation of the lever, an air-cylinder, a connecting mechanism between the same and the lock and between the same and the lever, said cylinder adapted to first release the lock and then move the lever, substantially as described.

2. The combination in a dump-car, of a trap-door, a hand-lever, connecting mechanism between the hand-lever and the door whereby the hand-lever may release the door, an air-cylinder, a connection between the cylinder and the trap-door whereby the air-cylinder may release the trap-door, a lock preventing such releasing operation, and means whereby the air-cylinder throws off such lock, substantially as described.

3. The combination of a trap-door, means for closing the same, means for latching it when closed, a lever for operating said last-mentioned means, a connection between said lever and the closing means whereby the lever in its movement disengages said closing means, substantially as described.

4. In a dump-car, in combination, a trap-door, a crank, connecting mechanism between the crank and trap-door whereby the rotation of the crank may raise the trap-door, means for locking said trap-door in its closed position, and mechanism operated by said means and adapted to interrupt the connection between the crank and the door, substantially as described.

5. The combination in a dump-car, of a trap-door having tongues projecting from it, hooks on the side of the car adapted to engage therewith, a lever adapted to operate said hooks, a rock-shaft to which said lever is secured, an air-cylinder, a piston therein, and a suitable connection between the piston and the rock-shaft whereby the piston may rock the shaft, substantially as described.

6. The combination in a dump-car, a trap-door having tongues projecting from it, hooks on the side of the car adapted to engage therewith, a lever adapted to operate said hooks, mechanism for raising said trap-door, means, operated by said lever in its movement after it has caused the hooks to engage the tongues, for disengaging the raising connection, substantially as described.

7. In a dump-car, in combination, a trap-door, tongues extending therefrom, hooks secured to the side of the car and adapted to engage with said tongues, an operating-lever, connection between the same and said hooks, a rod adapted to be shifted by said lever as it moves into position to cause the hooks to engage the tongues, a crank, mechanism between the same and the trap-door whereby the rotation of the crank may raise the door, and means operated by said rod for disengaging such connection, substantially as described.

8. The combination, in a dump-car, of a hinged trap-door, a shaft, a suitable mechanism between the same and the trap-door whereby the rotation of the shaft elevates the door, said shaft having a gear r, a pinion adapted to mesh with said gear r, means for latching said trap-door in its elevated position, and means whereby the operation of said latching means releases the pinion from the gear r, substantially as described.

9. In a dump-car, in combination, a trap-door, a shaft R adapted to elevate the same, a gear r on said shaft R, a shaft S, a pinion s on said shaft, means for rotating said shaft S, a pawl for holding said shaft in position where its pinion engages the gear r, means for latching said trap-door when elevated, and means whereby the operation of said last-mentioned means may release said pawl, substantially as described.

10. The combination with a shaft R, a trap-door, connecting mechanism between said shaft and trap-door whereby the rotation of the shaft may raise the door, a shaft S, a pivoted sleeve s^2 in which said shaft bears, a pinion s on said shaft, means for rotating said shaft, a pawl adapted to hold it in such position that the pinion s engages the gear r, and means for withdrawing said pawl to release the shaft, substantially as described.

11. The combination, in a dump-car, of a rock-shaft, a hand-lever secured thereto, a rock-arm secured to said shaft, an air-cylinder, a rod operated thereby and connected with said rock-arm, a dumping-door and a connection between said rock-shaft and door whereby the actuation of the shaft may release the door, substantially as described.

12. The combination of an air-cylinder, a piston, a double piston-rod, one of which may have a movement before the movement of the other begins, a trap-door, a lever, a connection between the lever and the door whereby the lever may release the door, a lock for said lever, a connection between the piston-rod which is first operated and the lock, and between the other piston-rod and the lever, substantially as described.

13. In combination, a cylinder, a piston therein, a tubular rod extending from said piston to the outside of the cylinder, a rod within said tubular rod but normally out of engagement with the piston-head, a trap-door, mechanism for releasing the same, a connection between the inner piston-rod and the releasing mechanism, a lock preventing the operation of such releasing mechanism, and a connection between the outer piston-rod and lock, substantially as described.

14. In a dump-car, in combination, a trap-door, a lever M for releasing the same, a lock-bar T adapted to prevent its operation, a link w^{10} adapted to throw aside the said lock-bar, a lever w^9 connected with said link, a cylinder U, means operated by said cylinder for operating the lever w^9 and for operating the releasing mechanism, substantially as described.

15. In a dump-car, in combination, a trap-door, a lever M for releasing the same, a lock-bar T adapted to prevent the operation of the lever, a lever w^9 adapted in its operation to throw aside said lock-bar, a cylinder U, a piston-head within the same, a tubular piston extending out of the cylinder, said tubular piston being adapted in its advancement to move said lever w^9, a rod m^3 within the tubular rod adapted to be acted upon by the advancing piston later than the tubular rod, and a connection between said rod m^3 and the releasing mechanism, substantially as described.

16. In a dump-car, in combination, a central beam, a trap-door pivoted at said beam and adapted to swing downward on its outer edge at the side of the car, a shield extending transversely to the car opposite the end of said trap-door, and adapted to form a chute or trough therewith when the same is discharging outside of the rail on which the car stands, substantially as described.

17. In a dump-car, in combination, a central beam B, a trap-door H pivoted along the edge of the central beam and swinging with its outer edge downward parallel with the track, a sector-shaped shield depending from the bottom of the car at the end of the trap-door, and flaring from the central beam outward and adapted to form an end wall for the trap-door preventing material passing off of it onto the rail when the trap-door is lowered to discharge material outside of the rail, substantially as described.

18. In a dump-car, the combination of a dumping-door, a flexible shaft and connecting mechanism between the shaft and door, whereby the shaft is operative notwithstanding a deflection of the car, substantially as described.

19. The combination of a dump-car and a flexible shaft for operating it, the flexion being given said shaft by a flexible joint com-

posed of two heads one of which carries a stud projecting into a recess in the other, substantially as described.

20. In a dump-car, in combination, two shafts placed end to end, heads p p' on the meeting ends of said shafts, one of said heads having extending from it a pair of studs p^2 having ball-shaped ends, and the other of said heads having a pair of recesses which receive said studs, and mechanism for operating the dump-car connected with such flexible shaft, whereby the sagging of the car does not bind the shaft, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

FRANK S. INGOLDSBY.

Witnesses:
FRANK E. SEBASTIAN,
GUSTAV F. DECKER.