No. 769,752. PATENTED SEPT. 13, 1904.

T. LAWSON.

DUMPING MECHANISM.

APPLICATION FILED JUNE 6, 1903. RENEWED APR. 9, 1904.

NO MODEL. 4 SHEETS—SHEET 1.

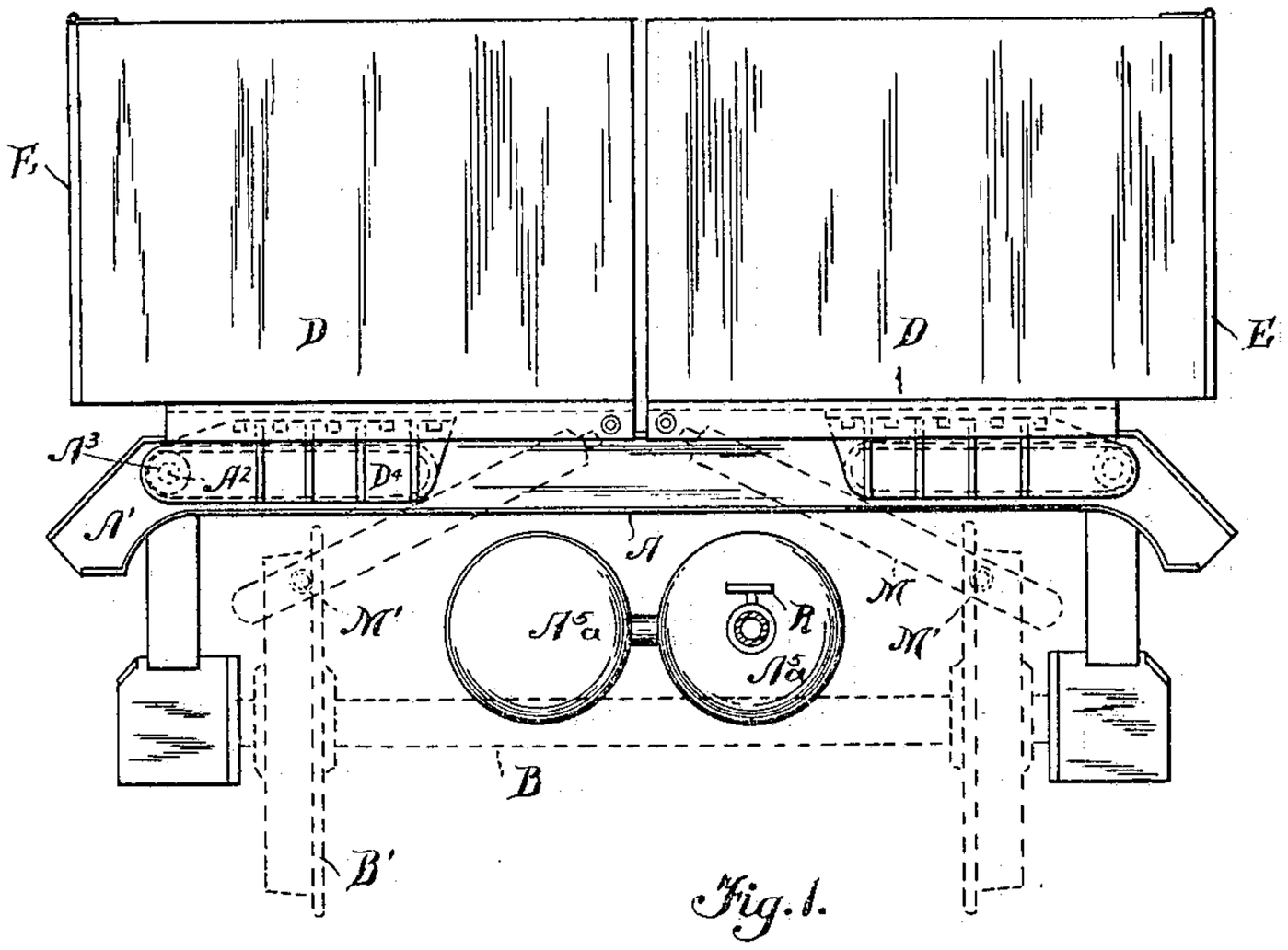

Fig. 1.

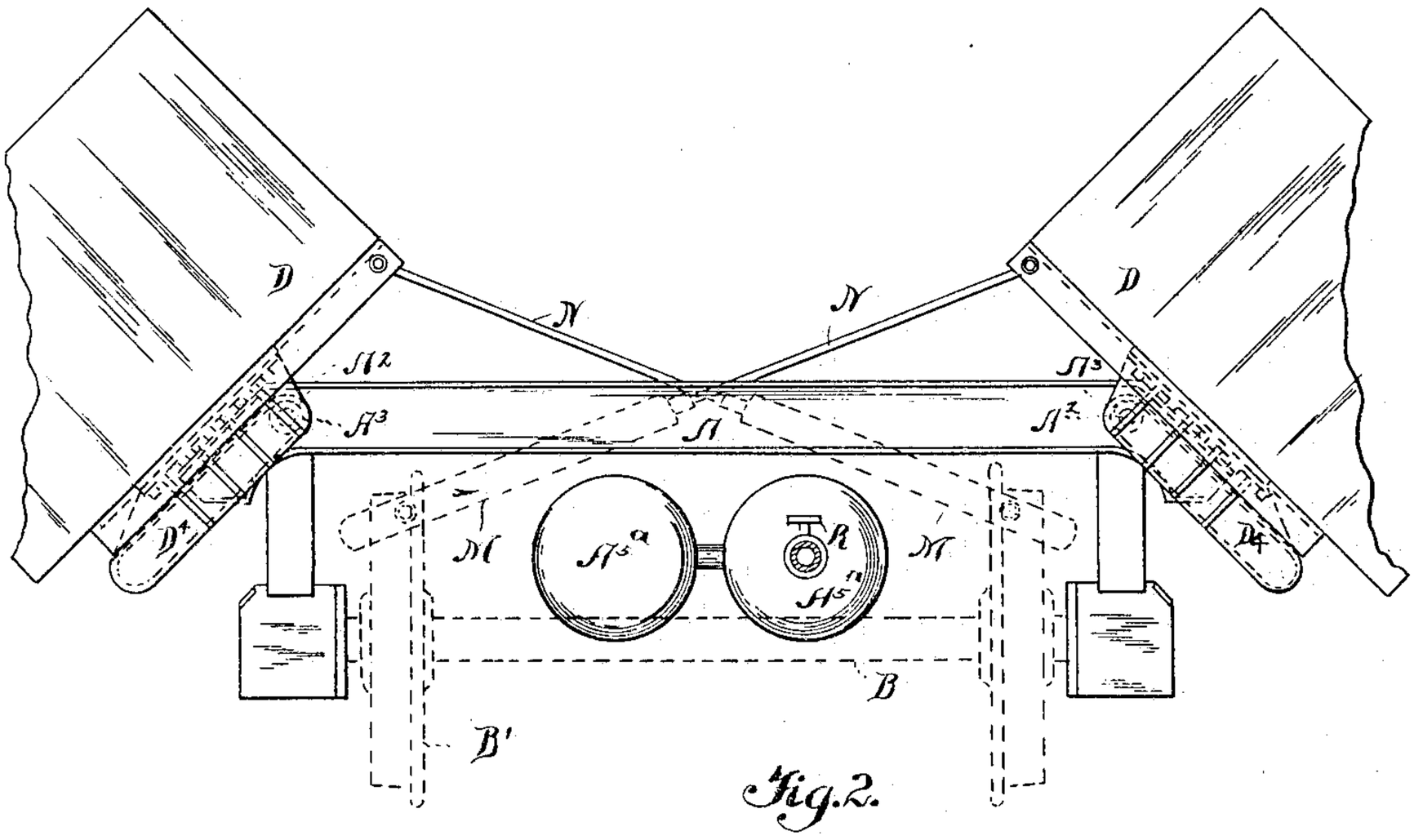

Fig. 2.

WITNESSES:

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 9.

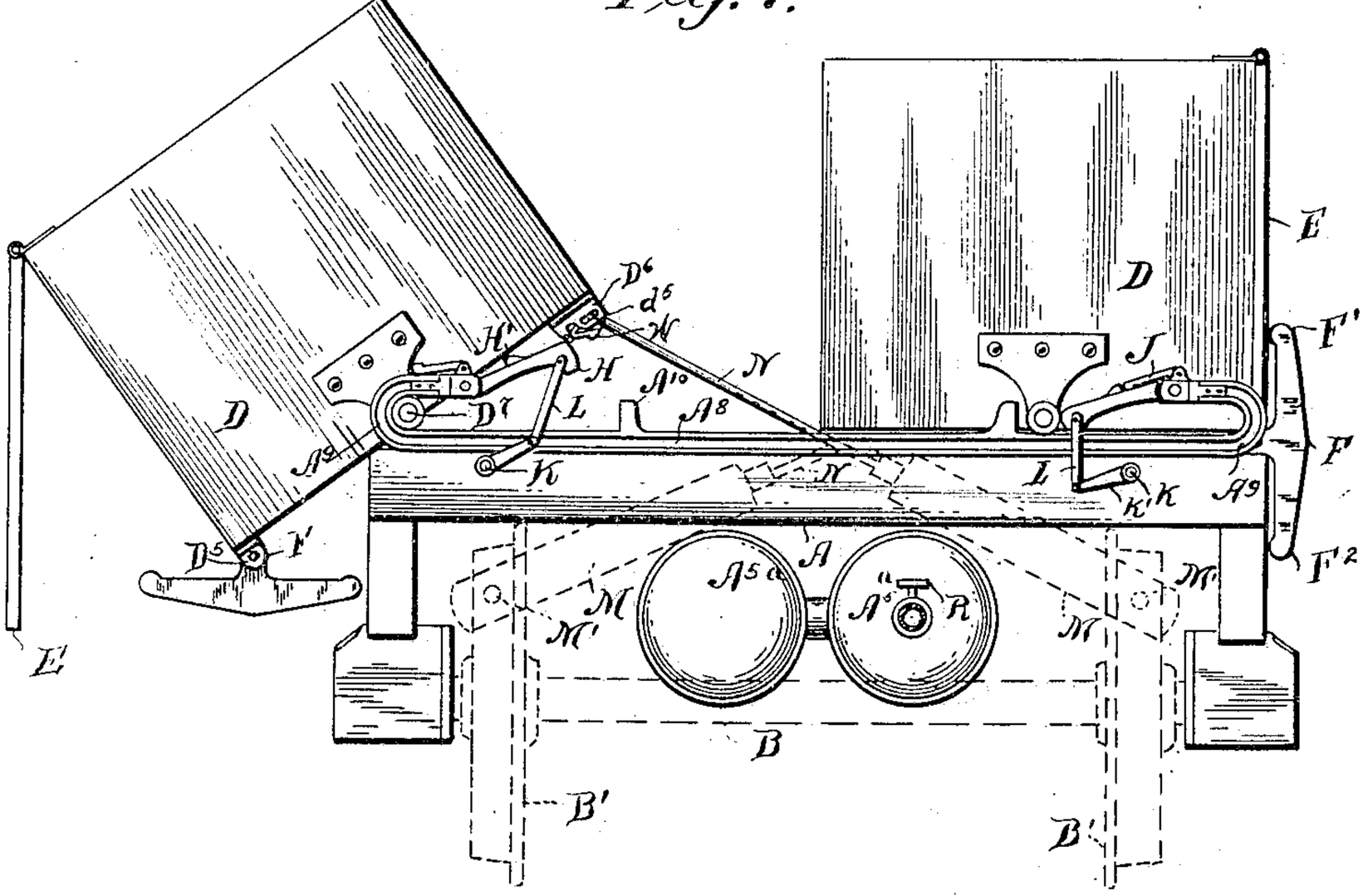

Fig. 3.

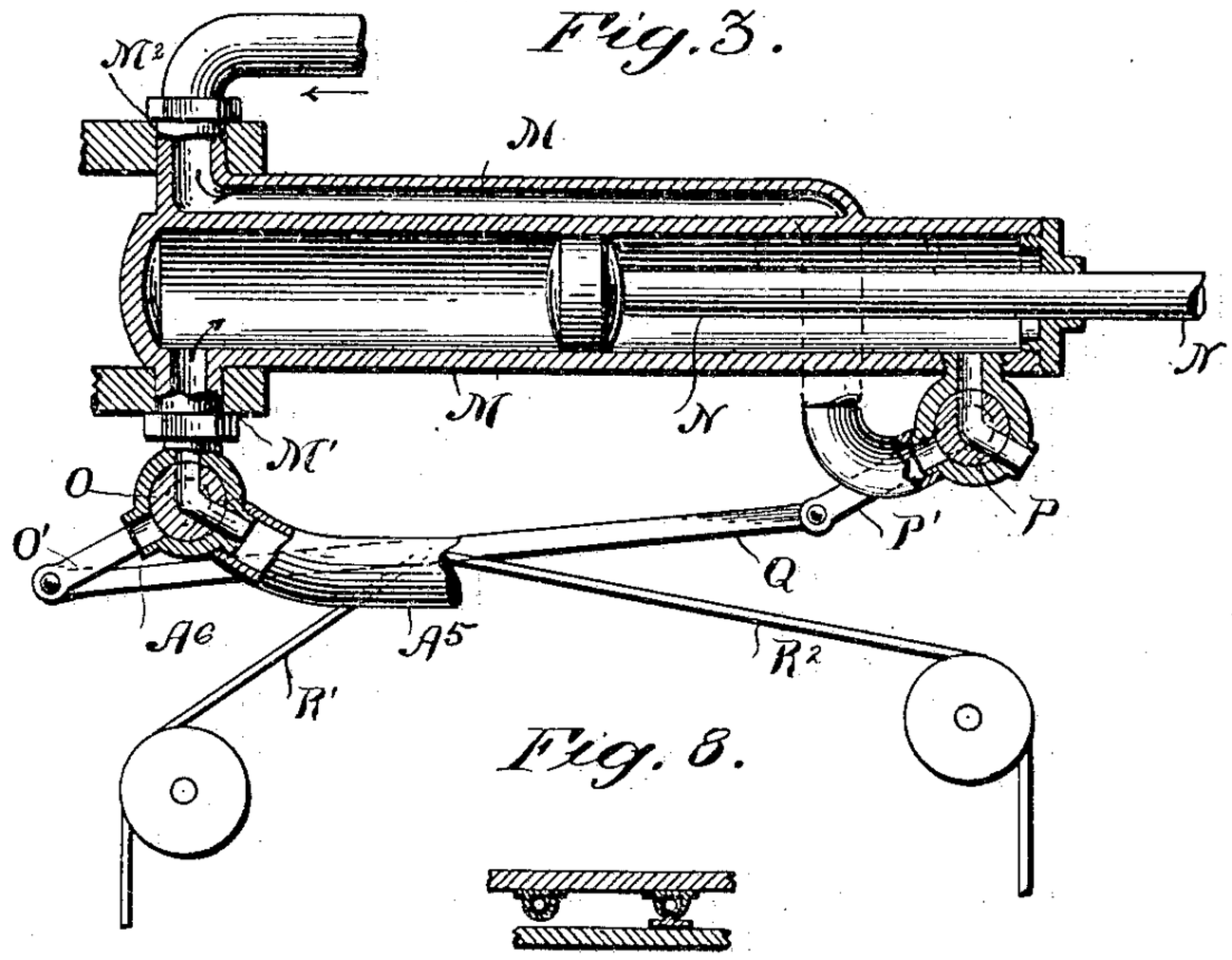

Fig. 8.

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 4.

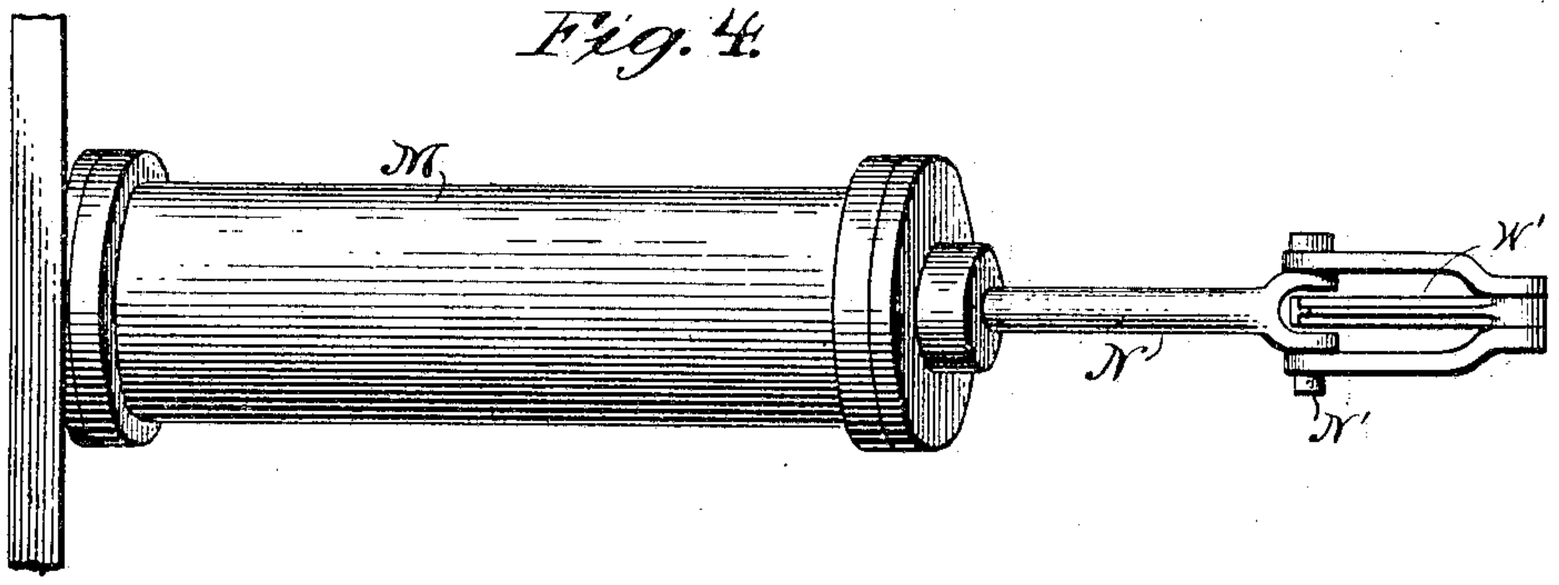
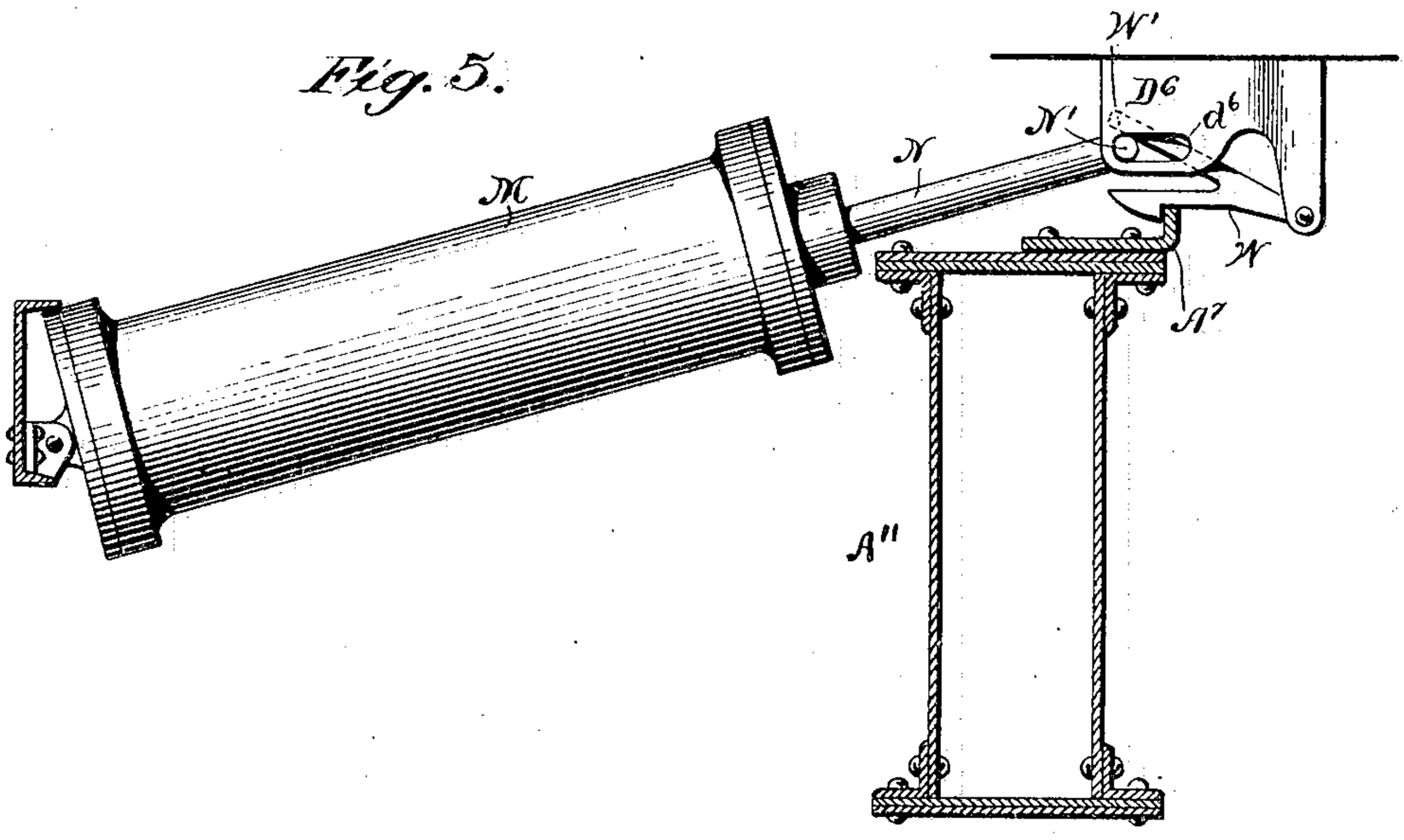


Fig. 5.



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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 6.

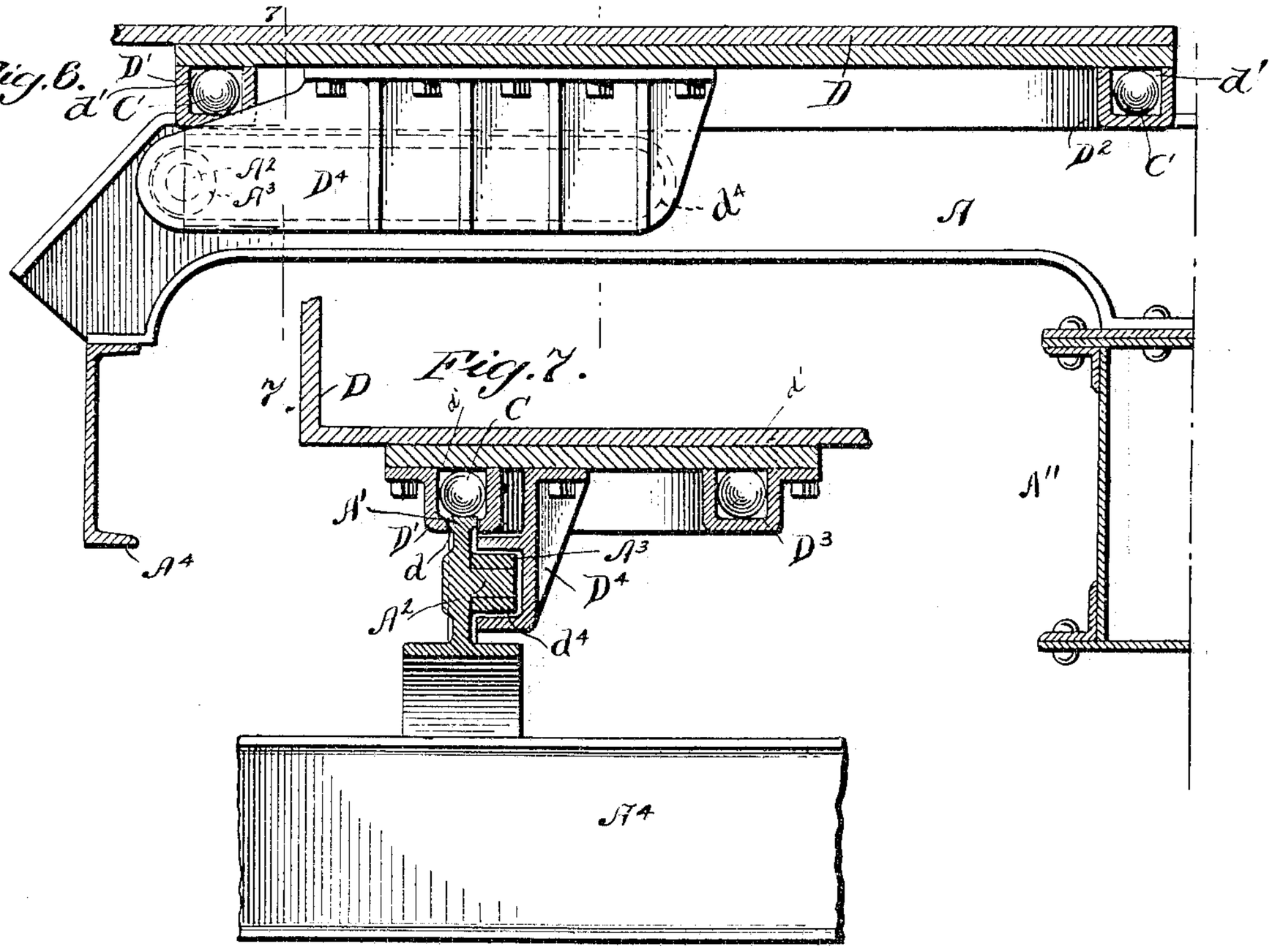


Fig. 7.

Fig. 10.

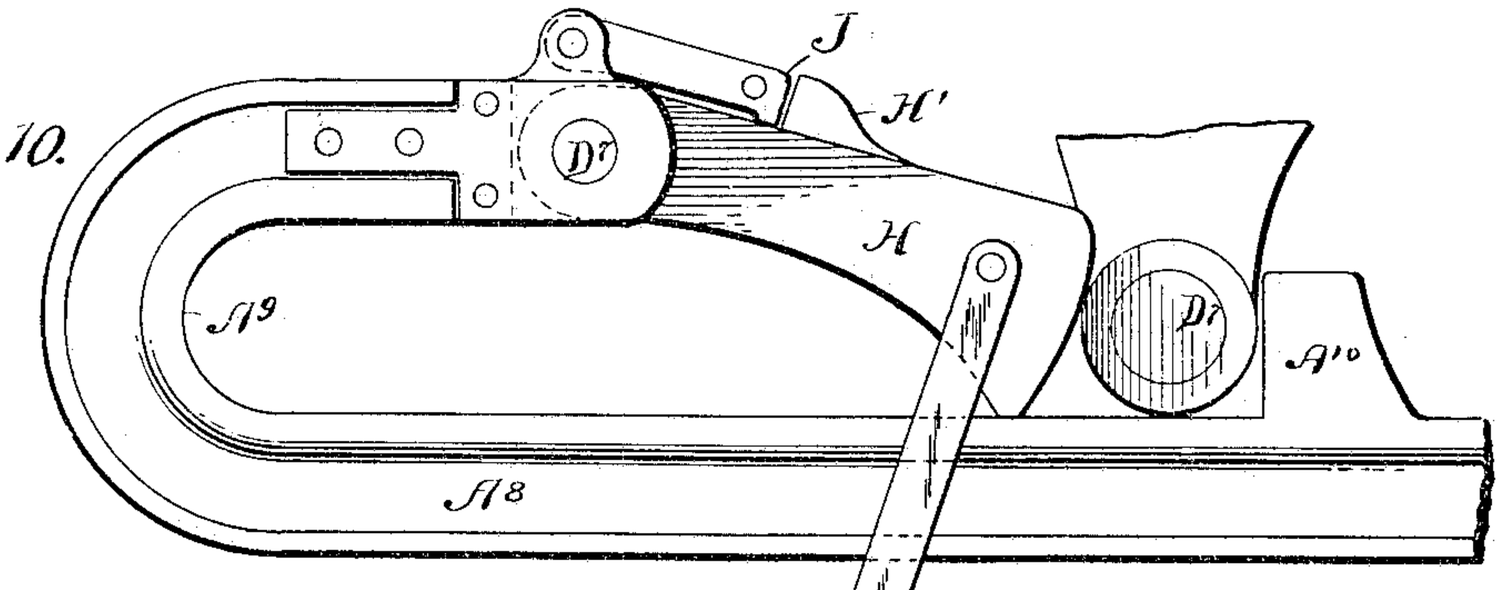
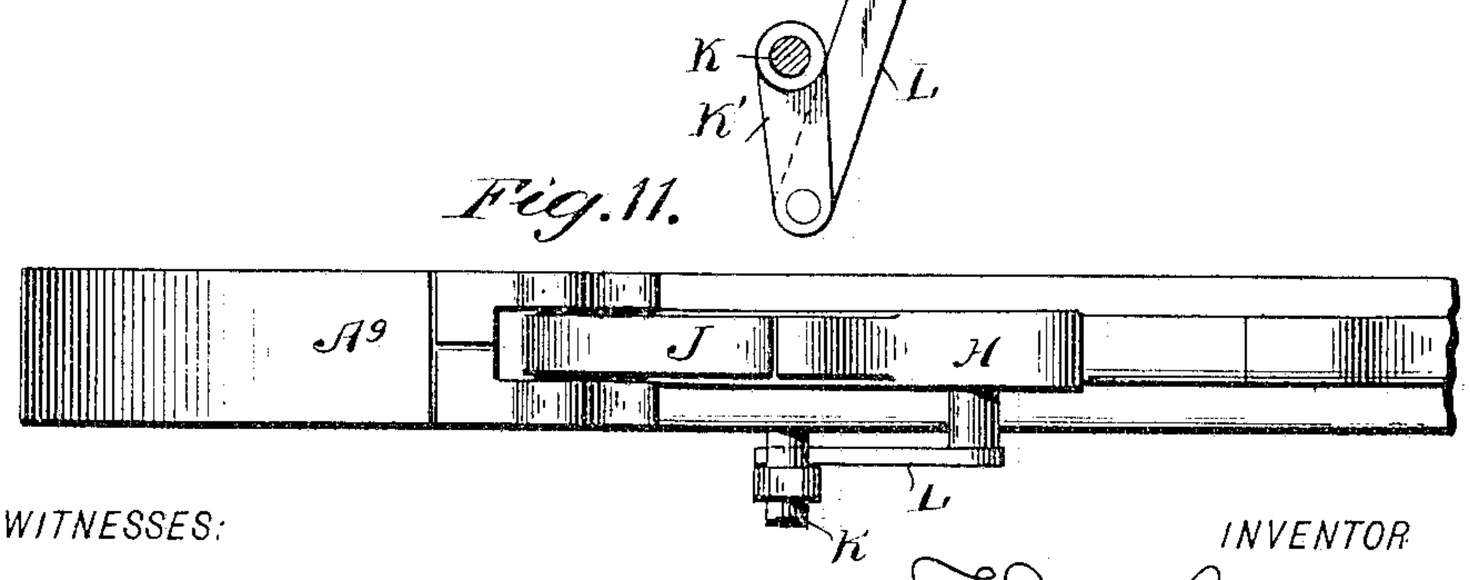


Fig. 11.



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No. 769,752. Patented September 13, 1904.

UNITED STATES PATENT OFFICE.

THOMAS LAWSON, OF NEW YORK, N. Y., ASSIGNOR TO LAWSON BOAT AND CAR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

DUMPING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 769,752, dated September 13, 1904.

Application filed June 6, 1903. Renewed April 9, 1904. Serial No. 202,444. (No model.)

To all whom it may concern:

Be it known that I, THOMAS LAWSON, engineer, a citizen of the United States, residing in the borough of Manhattan, in the city and State of New York, have invented a certain new and useful Improvement in Dumping Mechanism; and I do hereby declare that the following is a full, clear, and exact description of the same.

The improvement applies to all classes of dumping vehicles and vessels which dump at the sides. I will describe it as applied to a railroad-car. I provide for delivering the material under such conditions that it is carried outward clear of the track.

The improved cars may be of various lengths and with any required number of wheels. I will describe a dumping-car with four wheels.

The material to be transported and dumped, which I will for brevity term "earth," is held in two movable bins or carriers of dimensions suitable for occupying each the breadth from the center line to one of the sides of the car. I provide for moving these outward and for tilting each carrier suddenly after it has been moved into its extreme outboard position. I equip the under side of each carrier with a "way" near each end carrying a series of balls serving as antifriction devices and provide the car with transverse rails allowing the balls to run thereon during their respective courses. In the act of dumping the load the carrier is supported on journals. In each way the balls form two parallel lines extending transversely of the carrier, with the ends joined to constitute a continuous series. Nearly half of the balls in each series lie in a straight line, following each other on the corresponding rail, and carry the load. The narrow aperture which receives the rail from below must extend not only along the straight portion of the series of balls on the loaded side, but also in a straight line quite through the housing at each end of the latter. It is important that the ways be relieved a little at each end of the loaded portion, so as to carry the balls unloaded in the act of moving into and out of line. I have devised a construction whereby the cross-girders of the car perform the several functions of rails on which the balls of the ways shall run, braces for stiffly supporting the longitudinal sills, supports for pivots on which the carriers tilt in the act of dumping, and means for holding the carriers in proper connection with the car-body in case defects of the track or other causes, as derailment, shall tend to separate them. I have devised means for automatically locking the carriers when they are drawn inward to be loaded and for automatically liberating them when they are to be thrust outward and dumped. I employ long and relatively slender inclined oscillating cylinders containing pistons operated by compressed air, with facilities for effecting the required lateral movements and the tilting of each carrier and for controlling and gently arresting each movement. I have devised additional means for holding the carriers in their inward positions. One consists of strong ordinary pawls with special provisions for easily lifting by hand. Another provides for locking such pawls additional to their gravity. After the car has been hauled to the place for dumping and the special additional locking means have been disengaged at leisure by hand I lift the main pawls simultaneously from either end of the car. I provide for applying the force togglewise in thus lifting the main pawls.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is an end elevation showing the whole in condition for receiving and transporting the load. Fig. 2 is a corresponding elevation showing the act of dumping. As shown, the carriers are both being dumped. Fig. 3 is a nearly horizontal section in the plane of the axis of one of the cylinders with the cocks and passages and the operating mechanism. Fig. 4 is a plan view of one of the oscillating cylinders and the fastening parts on the carrier, omitting the provisions for admitting and discharging the air and show-

ing the cylinders as otherwise pivoted. Fig. 5 is an elevation of the same viewed longitudinally of the car with a vertical section of portions of the framework. Fig. 6 is on a slightly larger scale. It is a vertical transverse section of a portion of the car and also of the adjacent carrier near one end of the latter. Fig. 7 is a vertical section on the line indicated by 7 7 in Fig. 6. Fig. 8 is an end elevation of a portion viewed longitudinally of the car. The remaining figures show a form of the parts which may be preferable in some cases. Fig. 9 is an end elevation of the car. It shows the double-locking provisions for holding the carrier in its extreme inboard position for receiving and transporting the load. It also shows on the left side the condition when the carrier has been moved outward to dump. Fig. 10 is a side view of a portion, on a larger scale, showing a modification. Fig. 11 is a corresponding view.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

The figures show the novel parts with so much of the ordinary parts as is necessary to indicate their relation thereto.

Referring to Figs. 1 to 8, inclusive, A is the body of the car, B the axles, and B′ the bearing-wheels, all of any ordinary or suitable type. D D are two equal carriers capable of being moved outward and inward bodily and arranged to also tilt when at the extreme outboard position. Each extends lengthwise of the car and is supported on two cross-rails A′, serving as frames in the car-body A. Balls C are carried in ways D′ D′, extending transversely in the bottom of each carrier, each being a continuous circuit having curved ends D^2 and return portions D^3. The portion D′ of each way, in which the balls are effective, has a longitudinal aperture *d* extending its whole length on the lower side, into which the rail A′ is received, the balls being so large as to be supported when the carrier inclines in the act of being dumped. I hollow or raise the upper surface of the interior of each way D′, which constitutes the upper bearing for the series of balls C, so as to relieve the balls from load while they are being moved into and out of their straight line of travel. Such relief elevation considerably exaggerated is indicated by *d′* in Figs. 6 and 7. In a cross-frame A′ of the car-body are fixed near each end strong horizontal pivots A^2, preferably made integral with the cross-frame. On these pivots, in the properly-placed cross-frames, the carriers, respectively, are supported when they have been sufficiently moved outward and are allowed to tilt to dump. These must be of such strength as will allow them to support the entire weight of the carrier and its load and allow the mass to be turned thereon in the act of dumping. Each pivot A^2 is inclosed by a ring or small wheel A^3, interiorly lubricated. Under each carrier D, near each end, is rigidly bolted a casting D^4, which performs important functions. Each has a capacious elongated recess d^4 in one side which incloses one of the pivots A^2 and its ring A^3 and is of such length as only allows the required amount of traverse of the carrier outward and inward. The inner end of the recess d^4 forms a hollow semicylindrical bearing adapted to rock on the pivot A^2 through the intervention of the lubricated ring A^3 and support the great load in the act of dumping. The ring turns with the carrier and serves as an antifriction-bearing. The outer side of each carrier is provided with a door E, hinged at the upper edge and opening outward. F is one of a series of T-shaped devices which I term "door-fasteners." Each is knuckled by its shank to the side of the proper carrier at D^5. When the carrier is drawn inward, the lower arms F^2 of the several door-fasteners abut against adjacent points on the side of the car-body and cause the upper arms F′ to press each against the outer face of the swinging door E above. In this condition of the parts the carrier may be loaded with earth and transported to any distance, the door being reliably held under any ordinary or extraordinary amount of irregularities and jolting motions. The moving of the knuckle D^5 outward with the carrier in the act of dumping deprives each door-fastener of the support it had previously received through its lower arm, and the fastener turns by gravity into the horizontal position as the door is released and swings open. My experiments indicate that this door-fastener will in practice detain the door just about enough for the best effect, which is until the rapidly-moving carrier has nearly or quite completed its outward movements and has commenced to incline in dumping. So soon as the door has swung outward and the load has been dumped the carrier is again restored to its horizontal position and the door promptly swung into place, and in completing the inward movement the fastener again contacts with the side of the car-body and holds the door strongly closed, as before. I attach importance to the driving of each carrier outward with rapidity and decision to insure that the outward movement of the carrier with its load, the liberation of the door, and the tilting of the carrier to dump in the extreme outward position shall promptly succeed each other without any chance of failure. I apply a strong and active force by compressed air under each carrier near each end to effect the movements of each outward and inward and attain this by relatively long and slender oscillating cylinders with pistons. I work the compressed air expansively and effect a cushioning of the air to aid in arresting the motion in either direction gently. M is one of the inclined oscillating cylinders mounted under one end of a carrier. It will

be understood that there is a corresponding cylinder and connections to serve under the other end of each carrier, so that a long car requires at least four. Each turns on hollow trunnions $M' M^2$ in the opposite side of the car-body, equipped with proper stuffing-boxes. N is the piston-rod. The passage through the trunnion M′ connects with the interior of the cylinder at the adjacent end. O is a three-way cock which in one position—that shown in Fig. 3—connects this trunnion with a pipe A^5, which is kept supplied with compressed air, and in another position allows the compressed air previously in that end—the trunnioned outer end—of the cylinder to escape through the pipe A^6 into the atmosphere. The other trunnion, M^2, is longer and connects through a passage *m*, which extends longitudinally of the cylinder and opens into the latter at the inner end. This, through a three-way cock P, allows the pressure of the compressed air to be thrown at will on the opposite face of the piston, so as to forcibly draw the connected carrier inward. The levers of the cocks O and P are connected by a rod Q and the levers O′ and P′, so that the attendant by moving the rod Q will operate both cocks. $R' R^2$ are cords leading from the mid-length of Q over the pulleys to the hand of the operator. (Not shown.) In the mid-position of the cocks the compressed air will be excluded entirely from each end. This is the ordinary condition of rest. When the rod Q is moved to one side—the left, as shown in Fig. 3—the cock O admits the air through the trunnion M′ and rapidly forces the piston out to effect the dumping movement. The end of the piston-rod N carries a transverse pin N′, which is received in short horizontal slots d^6 in the housing D^6, one on each side of the piston-rod. The pin N′ can traverse the length of those slots without moving the carrier. On the under face of each carrier near each end is provided a hook-pawl W, arranged to engage an offset formed by an arm A^7, carried on the car-body. This hook-pawl is subject to gravity to depress it and to the cross-pin N′ on the adjacent piston-rod N to elevate it at the periods when it is required to let go. It is provided with an inclined arm W′, which lies over the pin N′ and receives the lifting action.

When ready to dump, the operator opens the valve R to admit the air to strongly drive out the piston. The mechanism lifts each hook-pawl W automatically at the commencement of the outward movement and releases it automatically at the end of the inward movement of the carrier. At the commencement of an outward movement the operator lets on the air, and the cross-pin N′ moves outward in the slots D^6 and acting under the arm W′ lifts the hook-pawl W. The carrier is now free, and as the strong force of the piston is applied through a pin N′ in the farthest end of each slot the carrier starts vigorously on its important outward journey. At the proper stage in the movement the vigilant attendant operates the valve R to close the exhaust. Now, the air being shut off, the pin N′ urges with lessened force by the expansion of the air and soon ceases to urge forward the heavy carrier moving onward by momentum. Next, the air in advance being cushioned, the pin N′ shifts idly to the inner ends of the slots and commences to serve as a means of gently arresting the movement without injurious concussion. After either carrier has been thus moved outward and tilted and has dumped its load or a little earlier, as shall be determined by practice, the operator shifts the controlling-valves O and P to proper extents and lets the air act so as to apply the force in the reverse direction. This restores the carrier to its upright position and moves it bodily inward again along its nearly frictionless ball-bearing path. On this return motion, which will usually be commenced immediately, the steps succeed in the reverse order, first a vigorous pull by the compressed air with the pin N′ in the inner end of its slots d^6, then a period of indifference, and, finally, a transfer of each pin N′ again to the outer end of its slots d^6 to arrest the inward movement of the unloaded, but still heavy carrier. Finally, the cushioning-air is released, and at or near the termination of the inward movement of the carrier each pin N′ moves to the inner ends of its slots d^6 and releases the hook-pawl D, so that the latter at the end of the inward movement of the carrier drops again into reliable engagement with the arm A^7, and all is ready for another filling and dumping.

There have been previous efforts to utilize compressed air in operating the mechanism for dumping cars. Mine is superior to any known to me in acting directly to not only dump the carriers, but also to move them bodily outward and inward. My invention also allows either side to be dumped separately. I store quantities of compressed air in strong and capacious vessels A^{5a} on each car which may be utilized to induce a succession of several dumping motions and return motions, so that any car can serve for a long period without recharging with air.

It will be noted that in operating the valve R in the inward movements of the massive carrier after the dumping operation the cushioning or other action of the air to arrest the movement must be released near the end of the motion and enough air let on, urging the pin N inward again near the end of the inward movement to allow the hook-pawl W to drop.

There is a marked advantage in the toggle effect due to the angular relations of the arms K′ and the links L in making it easy for men at one end or both ends of the car to partially rotate the shaft K and lift the dogs H in preparing to dump.

Each transverse frame A′ is of such depth as to contribute greatly to the strength and stiffness. I join it rigidly to the longitudinal side sills A^4 and also to the central sill A^{11}, so that it serves as a girder, a rail, and a support for the pivot A^2. Mounting the pivots on the car having the bearings therefor on the carriers and providing such bearings in the form of long recesses d^4, which are only a little deeper than the diameter of the ring A^3 which each is to receive, affords a strong construction, and by caging the ring and its inclosed pivot A^2 guards against any displacement in jolting over faults in the track and may even keep the parts properly together in case of derailment and overturning of the car. I have the pivoted bearings for the tilting motion under the carrier and make the exterior and the interior of each carrier free from any offsets or protuberances. Railroad-iron or other straight and heavy material may lie fairly in a carrier. All the space on the car-body beyond the ends of the carriers may be fully utilized.

I use the term "railroad-car" in this connection to include wagons to run on common roads and vehicles generally.

Modifications may be made without departing from the principle or sacrificing the advantages.

The invention is intended, mainly, for land-carriages, but may with the parts made larger be applicable for scows.

I can provide a separate engine and boiler on one of the cars to operate the pump for compressing air instead of utilizing the power of the locomotive.

Two pairs of cylinders, one near each end of the car, are essential if the car and the carriers are long, but when short one pair of cylinders located at the mid-length of the car may serve well.

In the form of the invention shown in Figs. 9 and 10 the pivots on which the carrier turns in being dumped are fixed on the carrier instead of the car. It allows the pivot to be higher and may in some cases be preferred. I will describe it very fully. From a carefully-determined point in the end of each carrier extends a journal D^7, carrying a lubricated ring. Stout transverse bars A^8 are carried on the body, extending a little beyond the sides and terminating in upwardly-turned hooks A^9. The carrier moves outward and inward on ball-bearing ways, as in the form first described. At the extreme outboard position the journals D^7 are arrested in these hooks A^9, and in the act of being dumped the load is tilted, as in the other form. I so proportion the weight and so arrange the impelling force that it is certain to tilt when moved out actively and arrested by the hook-bearings. H represents dogs, one at each end, turning each on a pivot on the hook A^9. When a carrier is drawn inward after each dumping action, each journal D^7, with its loose inclosing ring, passes under the proper dog H and elevates it. When the carrier has moved to its extreme inward position, bringing the ring which surrounds each journal against the corresponding fixed chock A^{10}, the dog H sinks again into effective position and holds the journal, and consequently the carrier, against moving outward until the operator again elevates the dog. J is a short and light pawl which I will refer to as the "safety-pawl," pivoted also on the hook A^9 and arranged to engage with an offset H′ on the dog H. This may be thrown over out of use. This safety-pawl can insure against the dog being lifted at the wrong time by any chance. When this locking-pawl is in position for use, it must be lifted by hand or otherwise and thrown over out of use before the air is let on to effect the dumping. In many situations, carrying material short distances over smooth roads at moderate speed, this safety-pawl may be kept all the time out of use. K is a shaft extending longitudinally of the car-body A and provided with means at the ends (not shown) for partially turning it. Arms K′ of this shaft connect by links L with the several dogs H. One or more operators at either end of the car may by turning the shaft K lift both dogs simultaneously. The lateral pressure exerted by the journal D^7 or the lubricated ring which surrounds it against the end of the dog H may sometimes be so great as to offer considerable resistance to the lifting of the pawl. I provide for this by making the arms K′ extend downward when the dog is depressed, so that they are nearly parallel with the link, which causes them to act togglewise in effecting the first part of the lifting movement of the pawl. After the pawl has been started by the aid of this toggle action it is easy by following it up promptly to effect the remainder of the lifting in the obvious manner.

With any form of the apparatus and of the fastening and liberating means I consider it a portion of the invention if only one carrier should be used. In such case the carrier can be made somewhat wider; but in other respects the mechanism may be the same as one-half of this shown.

Two of these continuous series of ball-bearings, one near each end, are necessary. A third at the mid-length can be used, if preferred, when the car is long. Such may be identical in every respect with one of those shown. I can also have one or more intermediate supporting-ways and one or more intermediate cross-frames A′, serving also as rails; but I esteem two sufficient for all ordinary conditions. The balls may be varied in size, making corresponding changes in the housings.

I do not in this patent claim the pawls or dogs H, with their links L and operating-arms K′, serving togglewise to lift, nor the

safety-pawl J, shown in connection therewith, such being made the subject of an application for a separate patent.

I claim as my invention—

1. In a dumping-car having longitundinal sills A^4, the combination therewith of a carrier D adapted for lateral bodily and also tilting movements, and ways D′ in the base thereof, each having narrow longitudinal openings *d*, inclosed balls C, the cross-girders A′ having their upper edges straight and narrow and received with easy fit in such ways arranged to perform the double function of cross-girders for stiffening the structure and rails for carrying the load, with provisions by the hollows *d*′ for relieving the balls from load at each end of the loaded portion of the traverse, all substantially as herein specified.

2. In a dumping-car body having cross-girders A′ and longitudinal sills A^4, provisions for firmly attaching and bracing the parts and having the upper edges of the cross-girders straight and narrow, matching easily in a narrow opening *d* in the lower side of corresponding ways D′ D^2 D^3 in the base of a carrier D, in combination with such carrier and ways and provisions by the hollows *d*′ for relieving the balls from load at each end of the loaded line, and with balls C free to roll therein, all substantially as herein specified.

3. In a dumping-car having a carrier with provisions for moving it laterally and tilting to dump, a door E opening outward on the outer face of the carrier, in combination with provisions for holding such door reliably closed by a positively-arranged fastener, and for automatically liberating it by the act of moving the carrier outward and again automatically fastening it by the act of moving the carrier inward, all substantially as herein specified.

4. In a dumping-car having a carrier with provisions for moving it laterally and tilting it to dump, a door E hinged to the carrier at its upper edge and opening outward on the outer face of the carrier and a knuckle D^5 on the same face at a lower level, in combination with each other and with a T-shaped fastener F hinged by its shank to such knuckle, and conditioned to confine and liberate the door at the proper periods by the inward and outward movements of the carrier, all substantially as herein specified.

5. In a dumping-car having a carrier with provisions for moving it laterally and tilting to dump, provisions by the ways D′ and balls C for supporting the carrier in the traversing movements, cylinders and pistons with connections for moving each piston rapidly by an elastic fluid, and provisions by pivots on the one part received in bearings in the other part at the end of the outboard motion for supporting the carrier in the dumping movements, all adapted to serve substantially as herein specified.

6. In a dumping-car having a carrier with provisions for moving it laterally and tilting it to dump, the ways D′ and balls C for supporting the carrier in the traversing motions and pivots A^2 on the one part and elongated recesses d^4 extended transversely in the other part, performing the triple function of supporting the carrier in the traversing movements, supporting the same in the dumping movements, and preventing the separation of the carrier from the car-body under any conditions, all substantially as herein specified.

7. In a dumping-car having a carrier with provisions for moving it laterally, a pawl W pivoted on one part arranged to engage automatically with an offset A^7 on the other part and to be engaged and disengaged automatically in combination with a storage-reservoir A^{5a} for compressed air, a cylinder and piston and controlling-valves admitting and releasing such air for applying force to effect and arrest the movements, all substantially as herein specified.

8. In a dumping-car having a carrier with provisions for allowing it to move laterally, and a rod N giving alternate thrusting and pulling forces through a cross-pin N′, a slotted connection D^6 d^6 with such pin affording liberty for the pin N′ to move idly therein to a limited extent, in combination with a pawl W pivoted to one part adapted to take hold automatically of the other part and to let go thereof by the idle movement of the pin in such slots, all arranged for joint operation substantially as herein specified.

9. In a dumping-car, the plane bottomed carrier B supported on two or more antifriction-ways, in combination with an oscillating cylinder M and a piston therein having its rod N connected to the plane bottom of such carrier, and provisions for operating such piston by compressed air, all substantially as herein specified.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

THOMAS LAWSON.

Witnesses:

THOMAS DREW STETSON.

M. F. BOYLE.