J. M. ROHLFING.

CAR DOOR OPERATING MECHANISM.

APPLICATION FILED MAY 27, 1914.

1,184,024.

Patented May 23, 1916.

4 SHEETS—SHEET 1.

Fig. 1.

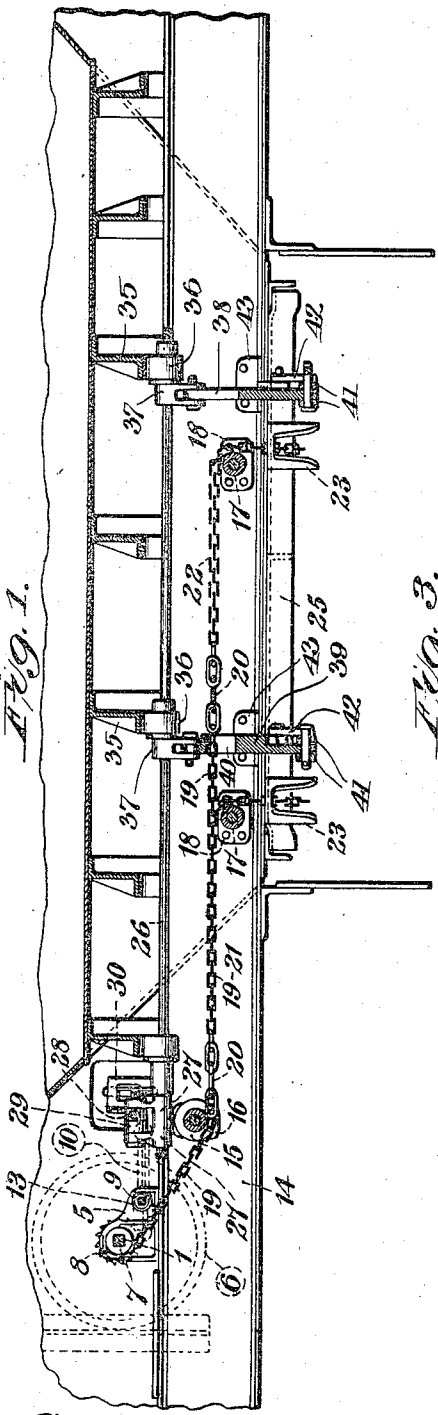
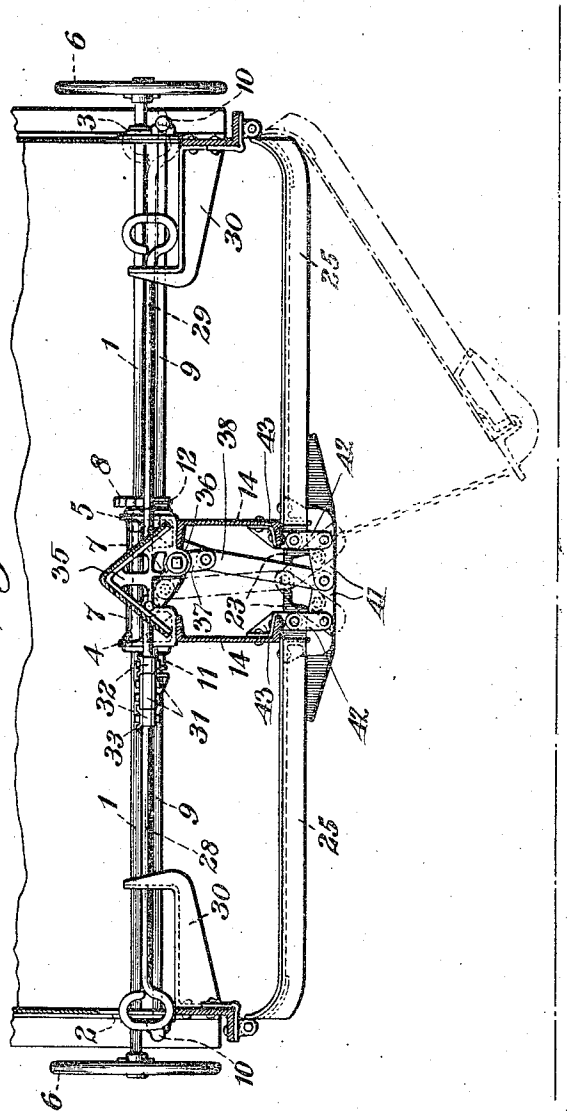


Fig. 3.



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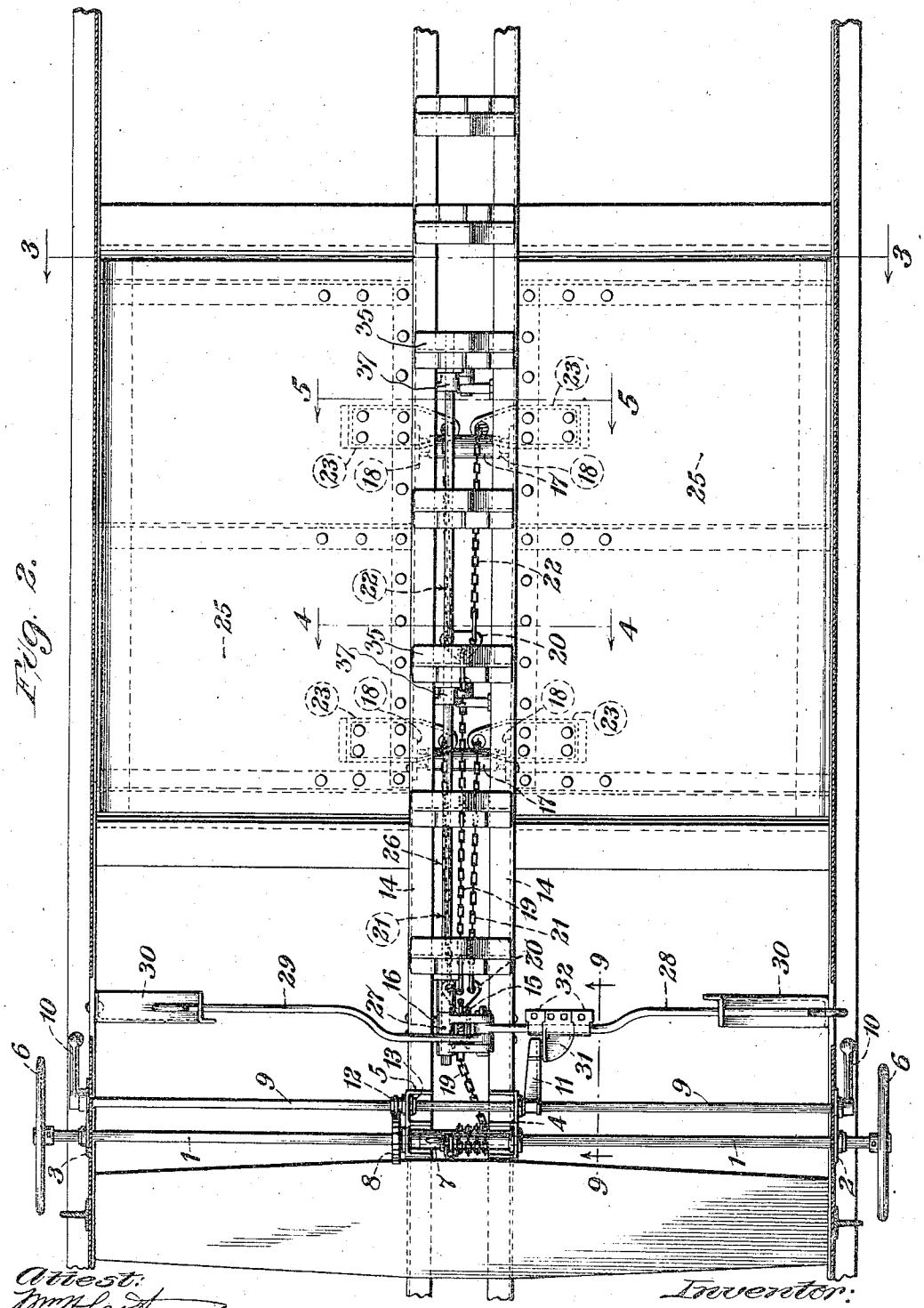


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 4.

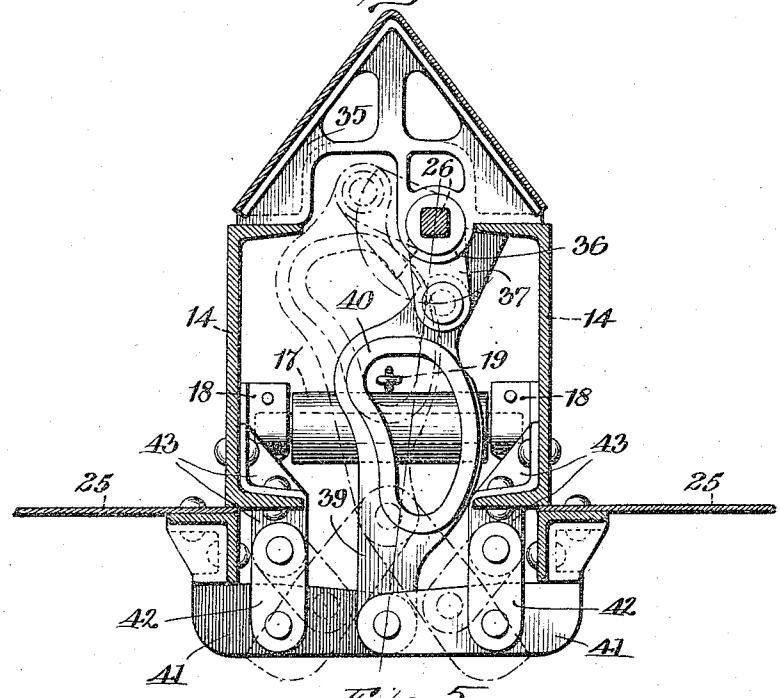


Fig. 5.

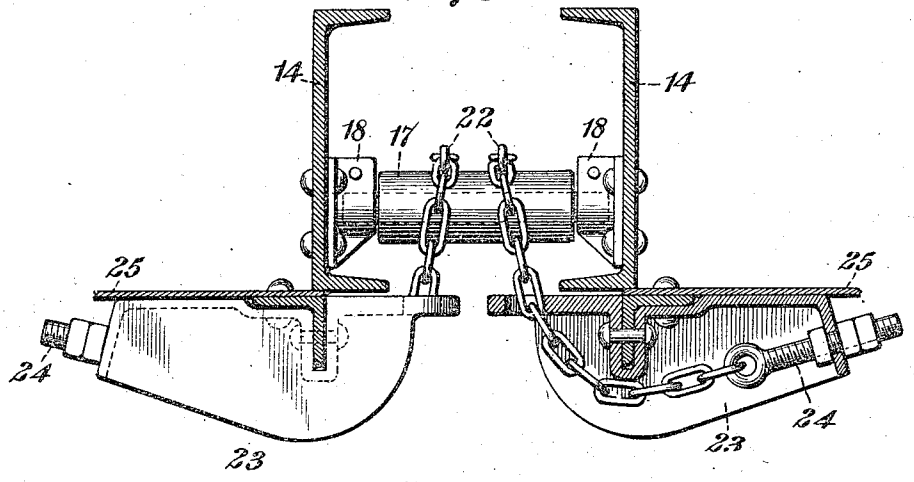
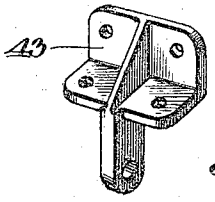


Fig. 8.



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4 SHEETS—SHEET 4.

Fig. 11.

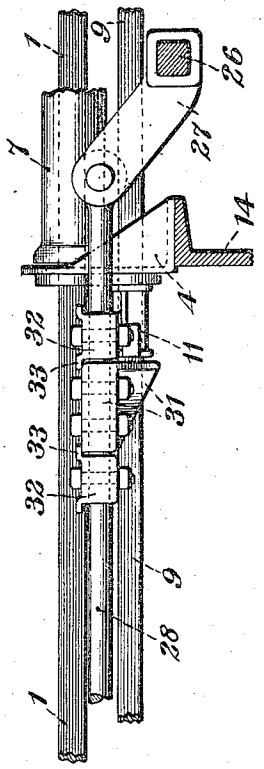


Fig. 7.

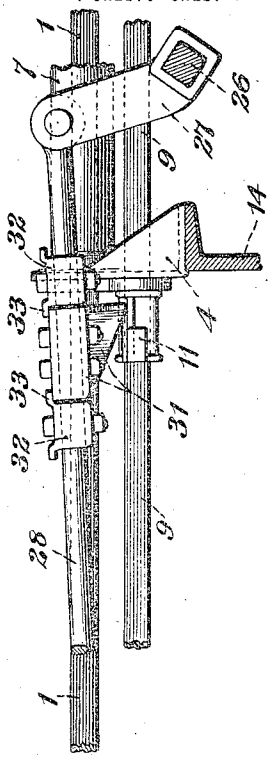


Fig. 9.

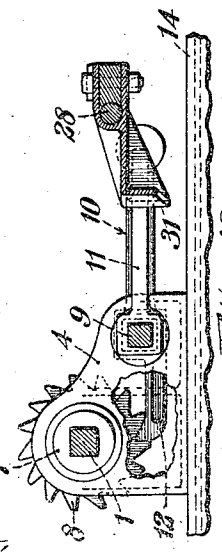


Fig. 10.

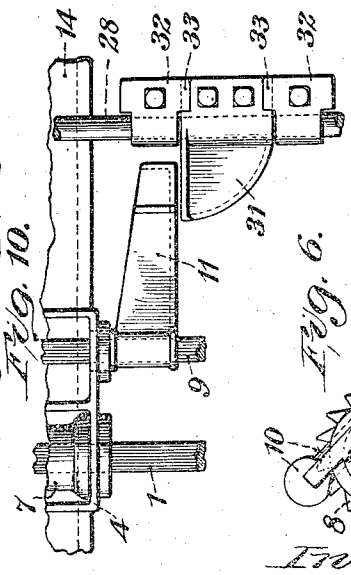
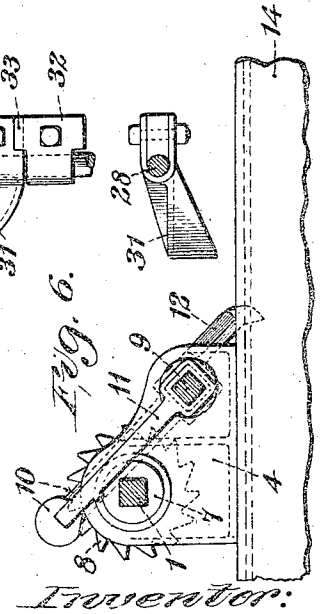


Fig. 6.



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UNITED STATES PATENT OFFICE.

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CAR-DOOR-OPERATING MECHANISM.

1,184,024. Specification of Letters Patent. Patented May 23, 1916.

Application filed May 27, 1914. Serial No. 841,380.

To all whom it may concern:

Be it known that I, JOHN M. ROHLFING, residing at St. Louis, Missouri, and being a citizen of the United States, have invented certain new and useful Improvements in Car-Door-Operating Mechanism, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a central longitudinal sectional view of a hopper portion of a dumping car. Fig. 2 is a horizontal section of the same portion of the car, taken on a plane somewhat above the center sills. Fig. 3 is a transverse sectional view of the said car portion to the right of the door operating mechanism, and looking toward the left, being taken on line 3—3 of Fig. 2. Fig. 4 is a vertical transverse sectional view through the transverse central portion of the car, being taken on line 4—4 of Fig. 2, the arrows denoting the direction of vision. Fig. 5 is a similar transverse section, but taken on line 5—5, of Fig. 2. Fig. 6 is a detail view in side elevation, showing the ratchet pawl and locking arm in a disengaging position, rendering it possible to release and drop the doors. Fig. 7 is a detail transverse view, showing the swinging locking clip raised by and riding over the locking arm during the door closing operation. Fig. 8 is a perspective view of a bracket for sustaining a door locking lever. Fig. 9 is a detail sectional view taken on line 9—9, of Fig. 2, and looking in the direction of the arrows, a portion of the bearing being broken away for the sake of clearness. Fig. 10 is a detail plan view of most of the parts shown in Fig. 9; and Fig. 11 is a view similar to Fig. 7, but showing the locking arm opposed to the locking clip to prevent release of the doors.

Many forms of car door operating mechanisms employ chains which are wound upon shafts, drums or their equivalents, to raise the door from an open to a closed position. Often the arrangement is such that, as the doors are lowered to a lading-discharging position, the winding chains have severe stresses imposed upon them, and either they must be made commensurately strong, or their lives will be shortened. They may even give way during the transit of the car and a considerable loss of the lading may follow.

In the car door operating mechanism comprising the present invention, it is contemplated to employ the door-raising chains only for bringing the doors to a closed position after the discharge of the load. Consequently, one of the advantages obtained is the permissibility of the use of relatively light chains, as any stress imposed upon them will be negligible. Not only the chains, but also the ratchet wheel, the pawl and the bearings are immune from heavy stresses and may be of light construction, with a resultant inexpensiveness.

Much expenditure of time and money is frequently made to secure a fine adjustment of a chain winding, with a view to avoiding a vexatious and imperfect closure of the doors, but in the present arrangement no refinement is necessary as the winding mechanism is adapted to coöperate with a door-supporting device well designed to insure the proper action of the doors. As the chains are located between the center sills, they occupy a highly protected position far above the rails and beneath some type of car flooring. Owing to the dropping doors pulling out the chains during the releasing period, there is no necessity for handling revolving wheels, and entire safety is thus insured. To the low cost of initial construction is added that economy resulting from a conservation in wear and tear, due to the lack of appreciable stresses on the parts, and their ease of operation, which also improves their effectiveness.

Referring to the drawings, 1 indicates a chain spool shaft, which passes through the bearings 2 and 3 secured to the side walls, and bearings 4 and 5 positioned upon and affixed to the center sills, of a car. Hand wheels 6 are secured to opposite ends of shaft 1 to permit it to be revolved to effect a winding up of the chains, as hereinafter more fully set forth. Mounted on the shaft 1, is a chain spool 7, located between bearings 4 and 5, and ratchet wheel 8 outside of bearing 5. The cylindrical hub of the said

ratchet wheel passes through and is directly and revolubly mounted in bearing 5, and one end of spool 7 is mounted in like manner in bearing 4, both said hub and said spool-end serving as bushings for shaft 1. As spool shaft 1 is preferably of rectangular cross-section, and passes through similar shaped axial holes in said ratchet wheel and spool, a rotary movement of hand wheel 6 causes a like motion of said ratchet wheel 8 and spool 7. The spool shaft 1, however, is not necessarily restricted to the section described, and the hand and ratchet wheels and the chain spool may be attached by keys, pins, or any convenient means.

Parallel to spool shaft 1, but shown as occupying a lower position, is a coöperating shaft 9, also, by preference, having a rectangular cross-section. On each of its ends, outside of the car side walls, is secured an operating handle 10, weighted at its outer end. Coöperating shaft 9 also receives its support from bearings 2, 3, 4 and 5, though, like spool shaft 1 it does not directly contact therewith. A locking arm 11 and a ratchet pawl 12, having hubs, axially perforated and so as to conform to the section of coöperating shaft 9, are mounted on said shaft, the pawl 12 being alined with and adapted to engage ratchet wheel 8 on shaft 1 and the locking arm 11 being located outside of the center sill-supported bearing 4. The hub of locking arm 11 is cylindrical and is revolubly supported in said bearing 4, and a bushing 13, surrounding coöperating shaft 9, turns in bearing 5 and supports the said shaft at this point.

The center sill construction of the car comprises a pair of spaced apart longitudinal members, here conveniently shown as channels 14, having their top and bottom flanges inturned. Below the top flanges, and inwardly from shaft 9, is a sheave wheel 15, centrally disposed between the center sills 14, and supported by suitable bearings 16 attached to the inner faces of the sills. Progressively spaced from sheave wheel 15, and at substantially uniform distances, are rolls 17, also located between the center sills 14, but occupying a lower position than sheave 15. Rolls 17 are comparatively long, being shown as nearly equal in length to the distance between the center sills 14, to the inner faces of which bearings 18 for said rolls are secured. Securely attached at one end to a proper point on chain spool 7, is a two-part chain 19, hereinafter referred to as the central chain. The two central chain parts are connected by a small perforated triangular-shaped connecting plate 20, and to the free end of the chain another plate 20^a is secured. To outwardly projecting corners of the chain connection plate 20, intermediate the length of the central chain 19, are attached forward side chains 21, one on each side of said central chain 19. Rear side chains 22 are attached to corresponding corners of a second connection plate 20^a at the rear free end of central chain 19, and extend to and over the rear roll 17, the forward side chains 21 extending rearwardly from their plate 20 and extending to and over the forward roll 17. Each end of each side chain 21 and each side chain 22, after extending over its respective roll 17, passes through an aperture in a door casting 23, secured to one of the doors 25, and is attached to an adjustable eyebolt 24 carried by said casting. The chains run underneath sheave wheel 15, which keeps central chain 19 running centrally, and over rolls 17. The latter permit side play of side chains 21 and 22 when they are under the influence of the action of the doors. The doors 25 are shown as being connected by hinges to supporting members at the car sides, which members may be side sills. The doors extend inwardly toward the center sills 14, and their inner edges are adapted to bear thereagainst when the doors are closed. When the latter open, they are adapted to discharge lading below the center sills, as indicated in dot and dash lines in Fig. 3.

The invention also comprehends a means for preventing an accidental release of the car doors, which means are governed by the coöperating shaft 9, through locking arm 11 secured thereto. The release of the doors may be obtained through any suitable mechanism that is controlled by an operating shaft, and such a shaft is shown at 26 extending longitudinally of the car, and is positioned to one side of the longitudinal vertical central plane of the center sill construction and between the spaced center sills 14.

The door supporting and releasing mechanism shown in the drawings furnishes a good example of an appropriate mechanism to be controlled by shaft 26. It is a part of the present invention in that it is a means for pressing the doors to their tightly closed position and retaining them there until shaft 26 causes a release. Said door supporting and releasing mechanism comprises a plurality of door locking devices having rockable parts and shaft 26, which extends longitudinally of the car between the center sills and consequently between the doors. The door locking devices are best shown in Figs. 1, 3 and 4, and each includes a casting 35, mounted on the upper flanges of the center sills 14, and is provided with a bearing 36. A rockable crank arm 37 is mounted in said bearing, and pivotally connected therewith and depending therefrom is a link. In Fig. 3, the link is of ordinary form and is designated as 38. In Fig. 4, a link 39 containing loop 40 therein, is substituted for link 38, and link 39 is included

in those door locking devices which are so located that the door lifting chains are required to extend through them. Loop 40 in link 39 permits such chain passage in any of its positions, as indicated in Fig. 4. The lower ends of links 38 and 39 are pivotally connected to locking dogs 41, rockably mounted on the lower ends of swing links 42, which in turn are pivoted to supporting casting 43 resting on the bottom flanges of center sills 14, and extending therebelow.

Shaft 26 is mounted in bearings supported from the center sills, and is operably associated and connected with the door supporting and releasing mechanisms or locking devices, and at its forward end passes above sheave wheel 15 and terminates shortly behind, and somewhat below coöperating shaft 9. On this end of the longitudinally extending shaft 26 is mounted a bifurcated crank arm 27, having a pair of outstanding arms. These arms are connected at their outer ends by pins which also pass through the inner ends of operating rods 28 and 29. The latter extend transversely of the car in opposite directions toward the car sides, which are perforated to allow the outer looped ends of said rods to partly pass therethrough, and the perforations are large enough to enable a trainman's arm to pass freely through them in manipulating said rods 28 and 29.

To the inner faces of the car walls, just below the perforations are secured inwardly extending brackets 30. It has been found convenient to form them as pressings of angular cross section with inner upstanding projections, through each of which passes one of the operating rods 28 or 29, the looped end of which is outside said projection. The upstanding projections of brackets 30, therefore, constitute stops, limiting the inward thrust of said operating rods.

Revolubly mounted on operating rod 28 is a locking clip 31, located in intimate relation with locking arm 11 carried by cooperating shaft 9. Retaining clips 32 are securely clamped to operating rod 28, one on each side of locking clip 31, and each has projections 33, which overlap said locking clip to normally hold it in a position opposing locking arm 11, when shaft 9 is acting to prevent the unwinding of the chains. Figures 9, 10 and 11 best disclose this condition of the relationship. And under this condition, the looped end of rod 29, by reason of its proximity to the upstanding projection of its bracket 30, prevents material movement in one direction of either rod 28 or 29. On the other hand, locking arm 11 prevents the movement of these rods in the other direction, by obstructing locking clip 31. Consequently, there can be no unintentional release of the doors

When a release of the doors is desired, one of the operating shaft handles 10, whichever it is most convenient to use, is thrown to the position shown in Fig. 6. Locking arm 11 is simultaneously thrown out of the path of locking clip 31, and pawl 12 is disengaged from ratchet wheel 8. Either operating rod 28 is then pushed in, or operating rod 29 is pulled out, thus effecting the release of the doors 25 by the consequent turning of crank arm 27, which rocks shaft 26. The latter extending through hubs of the crank arms 37 of the locking devices in operative relation thereto, rocks said crank arms to raise links 38 and 39, which then rock the locking dogs 41, and cause the links 42 supporting them to swing inwardly. Locking dogs 41 are thus withdrawn from under doors 25, which drop by gravity to a lading-discharging position. As the doors drop they pull the chains with them, rapidly revolving the spool 7, shaft 1, ratchet wheel 8 and hand wheels 6. After the discharge, coöperating shaft handles 10 are returned to their former positions, whereupon pawl 12 again engages ratchet wheel 8, preventing retroaction of shaft 1 as it is being turned by hand wheels 6 to rewind the chain upon spool 7, during the door lifting process.

Returning operating rods 28 and 29 to their initial positions securely locks the doors in closed position by rocking shaft 26 in a reverse direction, which reverses the action of the parts of the door locking devices and causes locking dogs 41 to extend under doors 25 to press them to their tightly closed positions. Though locking arm 11 is again in its obstructing location before the operating rods 28 and 29 are restored to their original places, the beveled lower face of locking clip 31 enables the latter to ride over locking arm 11, during which action the locking clip swings upwardly about operating rod 28, as clearly shown in Fig. 7. At the completion of its passage over locking arm 11, locking clip 31 swings by gravity back into its locking arm-opposing position, being prevented from too great a downward movement by projections 33 of retaining clips 32. The car is then ready to receive a new load, which, when transported to its destination, may be discharged as just described.

The simplicity of the mechanism, its relative cheapness, its light but adequately strong construction, together with the insurance it gives against loss of lading and of safety in operating it, all contribute to make it a valuable addition to the car building art.

What I claim is:

1. In a car door operating mechanism, door-raising means located between and movable longitudinally of car center sills

and comprising a plural-part central chain coupled together by a connection plate and carrying at a free end another connection plate, both plates extending laterally of said central chain, a plurality of side chains attached to the lateral extensions of each connection plate, anti-friction supporting and guiding means for said side chains, an anti-friction directing device for said central chain, and apparatus for chain winding.

2. In a car door operating mechanism, an interconnected system of flexible door-raising means operable longitudinally of car center sills, doors adapted to close against said sills, reinforcements for certain edge portions of said doors, attachment devices on said doors for said raising means, each comprising a recessed casting embracing one of said door reinforcements, said castings having apertures for the passage of part of said door-raising means, and apparatus adapted for operating said door-raising means.

3. In a car door operating mechanism, an inter-connected system of flexible door-raising means operable longitudinally of center sills of a car having side walls, and apparatus for operating the same, said means comprising a spool shaft disposed transversely of the car and extending through said side walls and being supported intermediate its ends, means for rotating said shaft, a spool extending transversely of said sills, and a ratchet wheel, both mounted on said shaft, a coöperating shaft, weighted operating handles therefor, and a pawl on said coöperating shaft adapted to co-act with said ratchet wheel.

4. In a car door operating mechanism, a system of flexible door-raising means operable longitudinally of center sills of a car having side walls, winding apparatus including a ratchet wheel for said door-raising means, and coöperating means for said apparatus comprising a shaft extending beyond both said side walls, a pawl rigidly mounted thereon and adapted to engage said ratchet wheel, and operating gravity handles secured to said shaft outside said side walls adapted to maintain said pawl in or out of engagement with said ratchet wheel.

5. In a car door operating mechanism, a system of flexible door-raising means operable longitudinally of center sills of a car, winding apparatus operable from sides of the car, and a shaft extending transversely of the car having connected therewith cooperating means adapted at will to prevent or permit retroaction of said winding apparatus in combination with operating mechanism adapted to control door supporting and releasing devices.

6. In a car door operating mechanism, flexible door-raising means operable longitudinally of center sills of a car, winding apparatus therefor, and coöperating means for said apparatus including a shaft, in combination with a shaft for operating door-supporting and releasing means, a bifurcated lever fixed to said shaft, oppositely extending operating rods pivotally connected with said lever, brackets supporting said rods and attached to car side walls perforated above said brackets, and interlocking means secured to one of said rods and to the shaft for said coöperating means.

7. In a car door operating mechanism, flexible door-raising means operable longitudinally of a car through its central portion, winding apparatus therefor, and coöperating retroaction prevention and permission means including a shaft, in combination with operating and interlocking mechanism for door supporting and releasing means, comprising an operating shaft having a crank arm, oppositely extending operating rods pivoted thereto, supports for said rods, movable locking means definitely positioned on one of said rods, and a locking arm fixed to said shaft, normally opposing said locking means but movable away therefrom, said locking means being capable of riding over said arm to return to its normal position.

8. In a center dumping car, doors hinged at the sides of said car and opening downwardly and outwardly, door-raising means located between and movable longitudinally of center sills and comprising a central chain, a plurality of side chains attached to the central chain and to said doors, anti-friction supporting and guiding means for said side chains, an anti-friction directing device for said central chain, and apparatus for chain winding.

9. In a car door operating mechanism, an interconnected system of flexible door-raising means operable longitudinally of car center sills, center dumping doors adapted to close against said sills, locking means for said doors supported by said center sills, means for operating said locking means, and apparatus adapted for operating said door-raising means.

10. In a car, a door operating means comprising an inter-connected system of chains operable between and longitudinally of car center sills and connected with doors, apparatus for winding said chains, supporting and guiding devices for said chains, each comprising a roll of greater length than the lateral extent of movement of said chains, and bearings for said roll each secured to one of the said sills.

11. In combination in a car, side supports, doors connected therewith and extending toward the center line of the car, a car door operating mechanism comprising door-raising means located between and movable longitudinally of center sills and comprising central chain, a plurality of side chains con-

nected with the central chains and with said doors, anti-friction supporting and guiding means for said side chains, an anti-friction directing device for said central chain, and apparatus for chain winding.

12. In a car, center dumping doors, door operating means comprising an interconnected system of flexible door-raising means operable between and longitudinally of car center sills connected with said doors, and supporting and guiding devices for said flexible door-raising means, each comprising a roll of greater length than the lateral extent of movement of said door-raising means, and bearings for said roll each secured to one of the said sills.

13. In a car, a pair of center dumping doors, an interconnected system of chains movable longitudinally of the center sills of a car having side walls, said chains being connected with said doors and apparatus for operating the same, said means comprising a spool shaft disposed transversely of the car and being supported intermediate its ends, means for rotating said shaft; a spool extending transversely of said sills and a ratchet wheel, both mounted on said shaft; a coöperating shaft, operating handles therefor and a pawl on said coöperating shaft adapted to co-act with said ratchet wheel.

14. In a dumping car, a car door operating means comprising an interconnected system of flexible door raising means movable longitudinally of the car, connection plates in said system, doors connected with said door-raising means and rockable latches extending transversely of the car adapted to underlie said doors to hold them in locked position.

15. In a dumping car, a door operating means comprising an interconnected system of flexible door lifting means movable longitudinally of the car, a shaft extending longitudinally of the car, door latches extending transversely of the car and means operatively connecting the shaft and said latches.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

JOHN M. ROHLFING.

Witnesses:

JAMES J. COOPER,

ROBERT J. SCHEIBLI, Jr.

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