C. A. LINDSTRÖM.

CAR DOOR OPERATING MECHANISM.

APPLICATION FILED NOV. 20, 1907.

939,425

Patented Nov. 9, 1909.

4 SHEETS—SHEET 1.

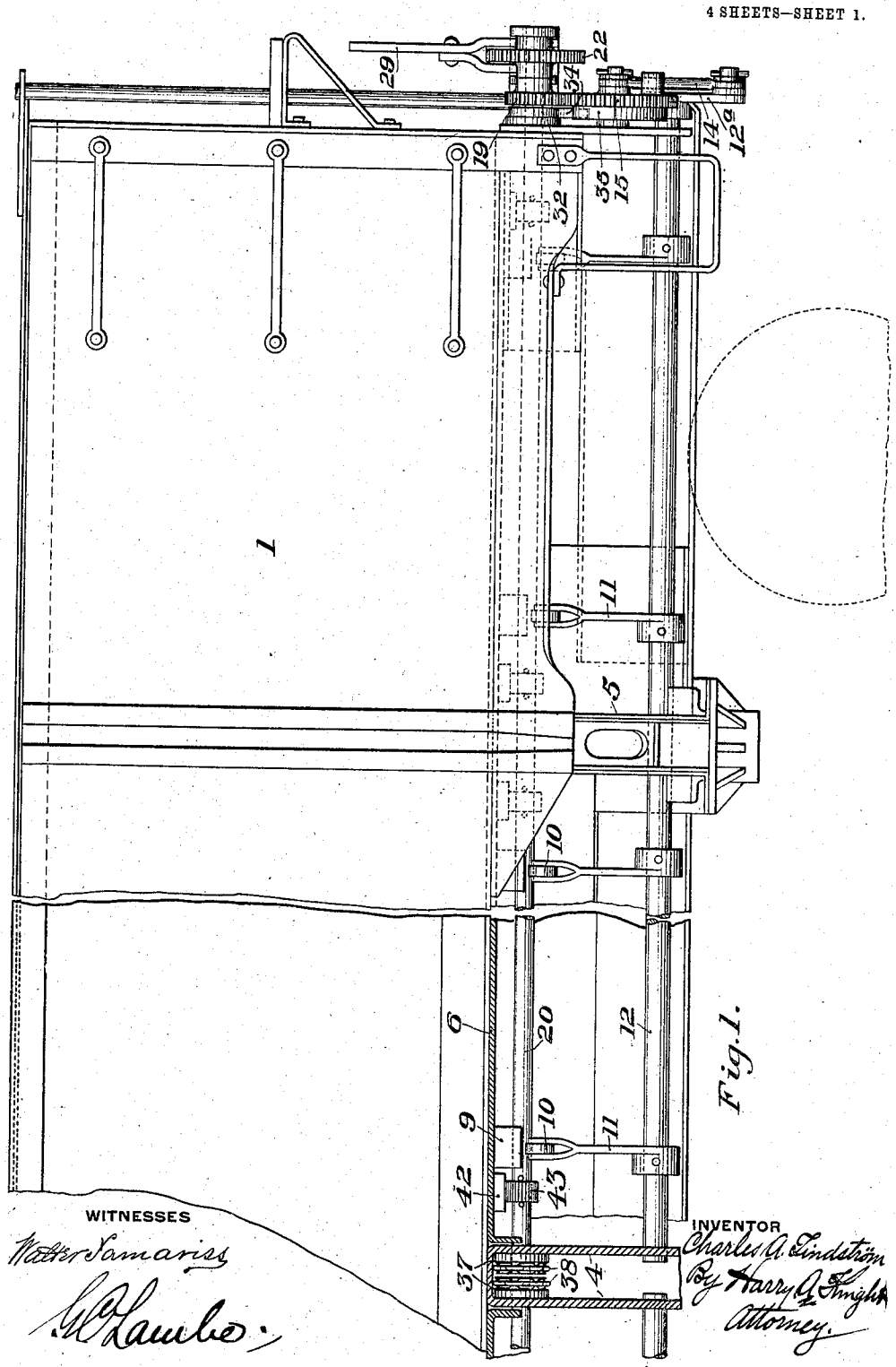

Fig. 1.

WITNESSES

Walter Samaris

G. C. Lambie.

INVENTOR

Charles A. Lindström

By Harry G. Knight

Attorney.

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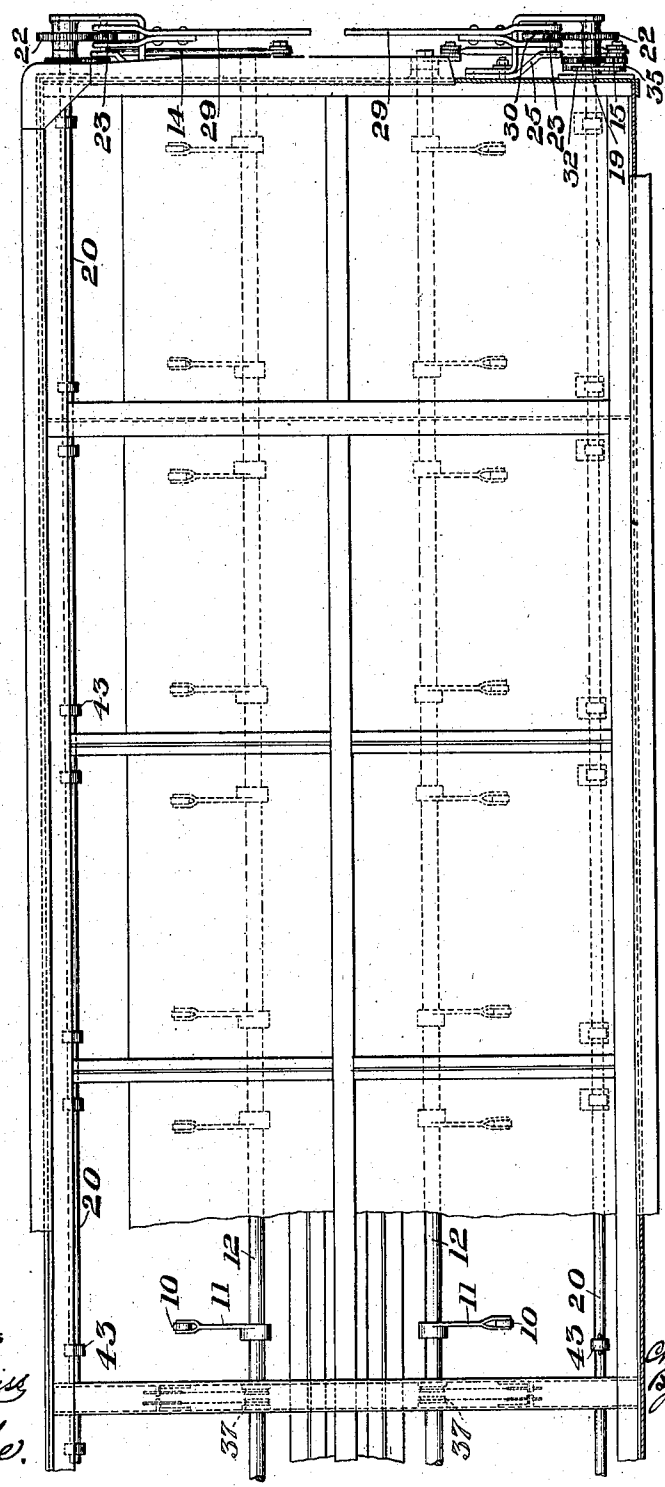

Fig. 2.

WITNESSES

Walter J. Amarine

G. C. Lambe.

INVENTOR

Charles A. Lindström

By Harry G. Knight

Attorney

C. A. LINDSTRÖM.

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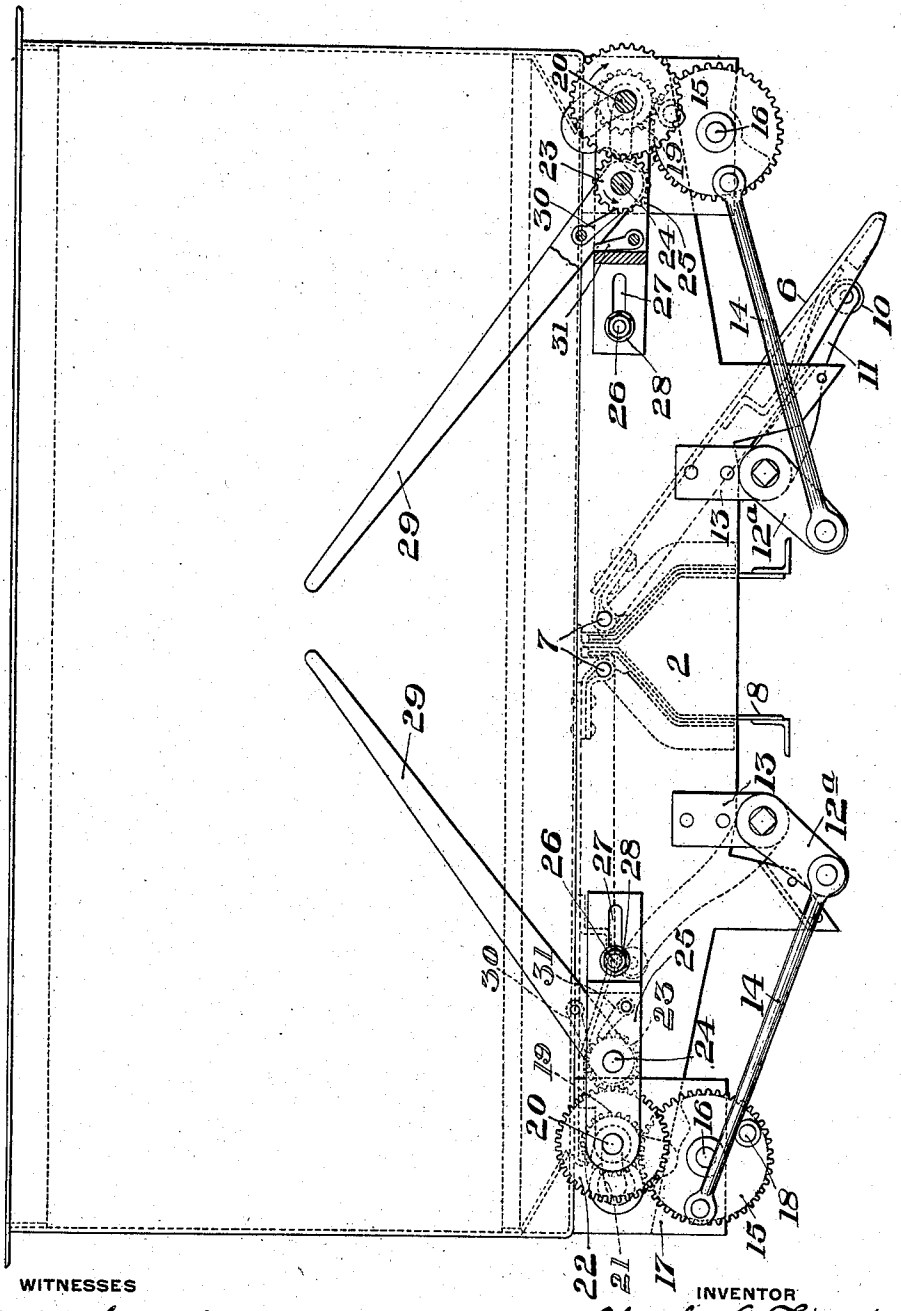
4 SHEETS—SHEET 3.

Fig. 3.



WITNESSES

Walter Samaris

G. Blaube.

INVENTOR

Charles A. Lindström

By Harry A. Knight

Attorney

C. A. LINDSTRÖM.

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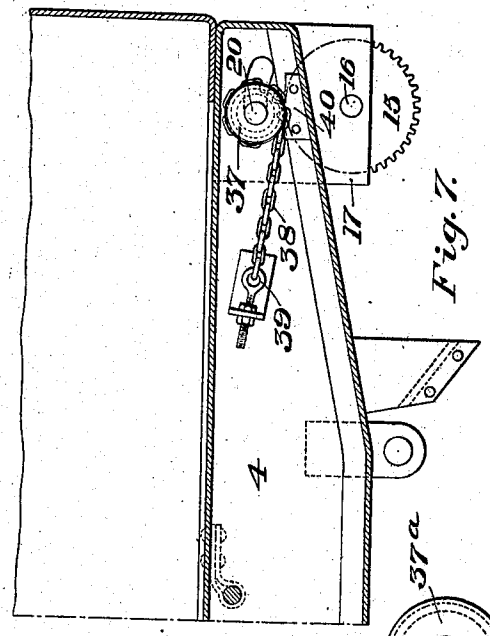

Fig. 7.

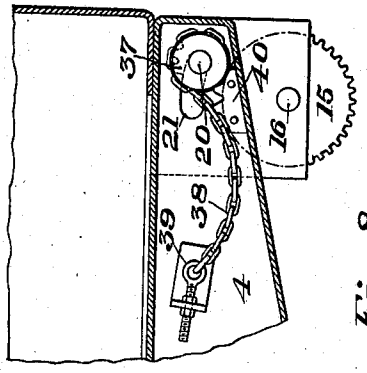

Fig. 8.

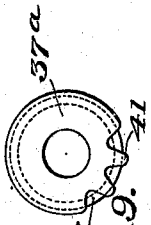

Fig. 9.

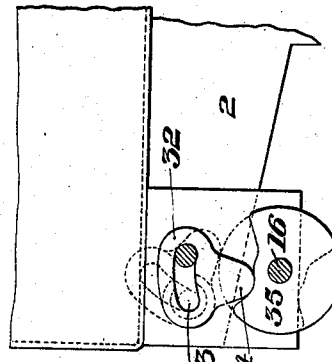

Fig. 6.

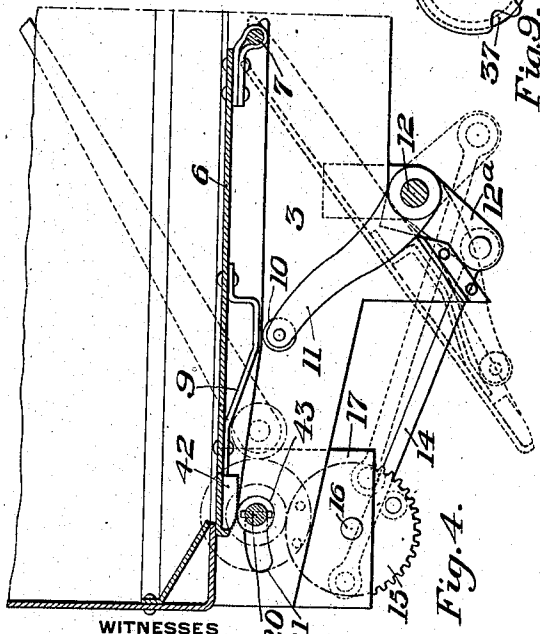

Fig. 4.

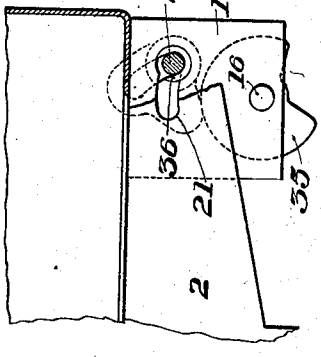

Fig. 5.

WITNESSES

Walter Samaris

G. Lambe.

INVENTOR

Charles A. Lindström

By Harry G. Knight

Attorney

UNITED STATES PATENT OFFICE.

CHARLES A. LINDSTRÖM, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR TO PRESSED STEEL CAR COMPANY, OF PITTSBURG, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

CAR-DOOR-OPERATING MECHANISM.

939,425. Specification of Letters Patent. **Patented Nov. 9, 1909.**

Application filed November 20, 1907. Serial No. 402,989.

To all whom it may concern:

Be it known that I, CHARLES A. LINDSTRÖM, a citizen of the United States, and resident of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Car-Door-Operating Mechanism, of which the following is a full, clear, and accurate description.

The object of the present invention is to provide an improvement in the class of door operating mechanism for gondola cars having flush drop doors and of a particular kind as illustrated in Patent No. 791,348 issued May 30, 1905, issued to myself and John F. Streib. In this patent chains are used for lifting the doors in position and it has been noticed that with some classes of lading the chains when the doors are down will obstruct the free flow of the lading from the car to the ground.

This present improvement therefore has the object of doing away with the chains and at the same time retain the other good features of the earlier patent, namely, a shaft which will move from a position outside of the doors when they are open to a position underneath the doors when they are closed, to make it absolutely impossible that the doors should become accidentally opened. To obtain this result I make use of two shafts for each set of doors, instead of one. One of these shafts which is located toward the center of the car and near the hinge portions of the doors, is provided with one or more arms to each door, and the one object of this mechanism is to lift the doors from an open to a closed position and when there is no load resting upon the doors and the weight to be lifted is therefore only the weight of the doors themselves. The second shaft, which is located outside of the doors when the doors are open, is utilized principally as a safety or locking device and is rolled or moved beneath the ends of the doors after they have been raised to their closed positions. The moving of this shaft beneath the ends of the door raises the doors upwardly slightly, thus relieving the first operating shaft with its arms from all loads that may rest upon the doors when they are closed.

In mechanisms of this kind, if applied to railroad cars which are necessarily exposed to more or less rough usage, it is not only necessary that the various parts be made stronger, but also that the operation of the various parts be safe and be as nearly automatic as possible, so that the less intelligent class of labor employed in the operation of cars of this kind may perform the required functions without having to specially study the mechanism with which the cars may be equipped, and therefore while the operations of the two shafts and mechanism described above are different and have different functions, they are so connected that movement of one will operate the other. To accomplish this, and on account of the fact that the work performed by each shaft is of different character, it is necessary to introduce a dead movement of one shaft, or in other words, a certain amount of movement of one shaft must be made before the other shaft becomes operative, after which the other shaft with its attachments is moved until the functions required are performed.

Levers have been heretofore used for raising and supporting the doors in closed position but have been found objectionable by reason of the impossibility heretofore of obtaining a lever mechanism, sufficiently strong to withstand the weight of all loads which may rest upon the doors when they are closed without making the mechanism so heavy as to require great exertion in operating the mechanism.

With the mechanism hereinafter described wherein the support of the doors in closed position is taken from the raising mechanism and placed upon a supporting shaft or device, it is possible to make the raising mechanism much lighter as the doors are raised only after the car has been emptied and hence the mechanism may be much more easily operated.

With the mechanism herein described also a means is provided for causing the automatic operation of the mechanism after the operator starts the same in movement so that the doors are dropped with great rapidity and with perfect safety to the operator. The manner in which these different motions and objects are attained is described hereafter and illustrated in the drawings.

Figure 1 is a side elevation of a car, partly in section, embodying the complete mechanism, portions of the car being broken away and portions being shown in dotted lines. Fig. 2 is a top plan view of the same. Fig.

3 is an end elevation of the same, showing particularly the operating devices with the doors on one side of the car open. Fig. 4 is a detail vertical section of a portion of the car looking from the interior toward one of the end sills, showing the relative positions of the parts when the doors are in closed position. Fig. 5 is a sectional detail view showing the shaft locking means at the operated end of the shaft, such means being partially shown in dotted lines. Fig. 6 is a detail elevation of the same, looking in the opposite direction, the door supporting shaft and the cam wheel stud being shown in section. Fig. 7 is a detail vertical section through an intermediate transom or cross-bearer looking in an opposite direction to that in Fig. 6, showing the means for controlling the movement of and locking the inner end of the supporting shaft, the parts being shown in their closed positions. Fig. 8 is a similar view, the parts being shown in their open door positions. Fig. 9 is a detail view of one of the shaft controlling devices.

Referring now in detail to the drawings: 1 represents the carbody of suitable type here shown as a gondola, 2 the end sill, 3 the intermediate transoms or cross-bearers, 4 a double transom or cross-bearer centrally located in the underframe, 5 the bolsters, and 6 the drop doors of suitable number here shown in four sets or series of four each and occupying the entire floor space of the car bottom (Fig. 1). Doors 6 are pivoted at 7 (dotted lines Fig. 3) to hinge lugs mounted on the center sill 8, the structure of which does not concern the present invention. On each of the doors 6 is mounted one or more bearing shoes or plates 9 (Fig. 1) having an inclined surface and adapted to be engaged by an antifriction roller 10, carried by a bifurcated door closing arm or lever 11 rigidly mounted on a shaft 12 (Fig. 3) suitably journaled in the car underframe, here shown as mounted on depending brackets or lugs 13 mounted on or forming a part of the end sills and several cross-bearers.

There may be any suitable number of arms or levers 11 for each of the several drop doors. In the drawings there is shown a pair of these arms or levers 11 (Fig. 2) for each of the drop doors. The drawings also show four of the shafts 12, one for each set of drop doors 6. Shaft 12 is operated by a crank or other suitable means 12^a which in turn is operated by a link 14 or other suitable means secured to a crank gear 15 mounted on a stud 16 seated in a depending lug or bracket 17 mounted on the car underframe or forming a part of the end sill, here shown as depending from the end sill.

18 is a stop mounted on gear 15 (Fig. 3) and adapted to limit the movement of link 14 and dog further movement of the gear 15 and link 14 after said link has passed beyond the center line of the axis of crank or gear 15 when the doors have reached a certain stage in their closing movement, so that the tendency of the doors to open under their dead weight when in raised positions, before the locking shaft 20 is shifted, is counteracted. Movement of the link 14 in an opposite direction, that is, during the opening movement of the doors, is limited in a manner hereinafter described.

Geared to gear 15 is a traveling pinion 19 rigidly mounted on a traveling shaft 20 which may extend the entire length of the car but which preferably extends only to a point about the center of the car, there being preferably four of these shafts, one for each set or series of drop doors, and said shafts being mounted in upwardly disposed slots 21 (Figs. 4 to 8), formed in the end sills, bolsters and transoms or cross-bearers of the underframe, the lower end of the slots being located near the outer ends of the bolsters, end sills, transoms or cross-bearers, so that as the shafts 20 are moved inwardly, they are forced upwardly. These slots 21 are concentric with the gear 15 (Fig. 3). Each of the shafts 20 has rigidly mounted thereon a gear 22 meshing with a pinion 23 loosely mounted on a pin 24 carried by a bifurcated traveling bracket 25. Bracket 25 is supported at one end by a stud 26 passing through a slot 27.

28 is a washer carried by the stud 26 and bearing against the surface of the bracket 25 and tending to decrease the vibratory tendency of the bracket 25. Slot 27 permits bracket 25 to move back and forth on stud 26.

29 is a lever bifurcated at its lower end and loosely mounted on pin 24 straddling ratchet wheel 23.

30 is a reversible pawl carried by lever 29 in engagement with the teeth of the ratchet 23.

31 is a dog mounted on bracket 25 and adapted to be thrown into engagement with the ratchet 23 to prevent back movement of the parts when the doors are being closed.

It will be seen from the right-hand side of Fig. 3, in which the drop doors are shown in their open positions, that the movement of the lever 29 from the side of the car toward the center imparts motion to the ratchet wheel 23 in the direction of the arrow, moving the gear 22 in the direction of its arrow and forcing the shaft 20 against the outer end of the slots 21, and holding it there and rotating the pinion 19 and gear 15 to open the doors until link 14 passes its dead center when the lading will complete the opening movement, ratchet 23 allowing the gears to run away from lever 29. To close the doors it is but necessary to reverse the pawl 30 and throw the dog 31 into engagement with the ratchet 23 and move the operating lever 29 from the center of the car toward the side,

whereupon an opposite movement of the ratchet 23, pinion 19, gear 22, gear 15 and link 14 occurs, elevating the doors to their closed positions. During the closing movement of the doors, as there is a tendency of the pinion 19 to travel over the teeth of the gear 15, it is necessary to lock the shaft 20 in its position at the outer ends of the slots 21. For this purpose a slotted locking plate 32 is provided having an arcuate or radial slot 33 identical in shape and length with the several slots in the end sills, bolsters and transoms or cross-bearers, and adapted to register with these latter in one position. Plate 32 is also provided with a cam surface 34 which coöperates with a cam 35 mounted on stud 16 and preferably formed integral with the gear 15, as by forming the gear and cam in a single casting. When the doors open cam 35 rotates with gear 15 and displaces plate 32 throwing slots 33 and 21 out of regulation and locking shaft 20 in position. Locking plate 32 is further provided with a hub 36 (Fig. 5) having an open bearing for shaft 20, the opening of which is adapted to register with the slot in the end sill in one position of the locking plate. It is of course obvious that the locking plate 32 may be positively connected to the gear 15 and operated by such connection rather than by cam 35, the sole object being to definitely fix the relation between the gear 15 and the locking plate 32, to prevent the traveling movement of the shaft 20 through slots 21 at a certain period in the rotation of the gear 15, that is until the doors have reached their uppermost positions or nearly so, at which time the cam 35 allows the locking plate 32 to move into a position bringing its slot 33 and the opening in the hub 36 in registration with the slots 21, (Fig. 6), whereupon further movement of the lever 29 by reason of the link 14 having reached the stop 18 on the gear 15, gear 15 will be dogged which will cause the pinion 19 to travel over the teeth of gear 15, thus carrying the shaft 20 inwardly toward the center of the car.

In order to effectively lock both ends of the shaft in its outer position throughout the closing movement of the doors and provide a positive feed of shaft 20 toward the center of the car, it is desirable also to have a controlling device at the opposite end of the shaft. Such a device is shown in Figs. 7, 8 and 9, and consists of a pulley 37 rigidly mounted on the end of the shaft 20 and shown in the drawings mounted between a pair of transoms or cross-bearers 4. Connected to the pulley 37 is a chain 38 secured at one end to the adjustable eye 39, suitably mounted on the transom or cross-bearer 4. A rack 40 is provided engaging a series of teeth 41 on the pulley 37 or on a disk 37^a, integral with or mounted to travel with pulley 37. These teeth 41 do not extend completely around the periphery of the said disk or pulley 37 but are sufficient only in number, as shown in dotted lines Fig. 8, to cause the shaft 20 and pulley 37 to travel the distance or length of the slots 21, the remainder of the periphery of the pulley 37 being plain or toothless and forming a smooth bearing surface against the forward end of rack 40 and the ends of slots 21, during the rotating non-traveling movement of the shaft.

The operation of the controlling device at the inner end of the shaft 20 is as follows:— Assuming the doors to be closed as shown at the left hand of Fig. 3, the pulley 37, toothed disk 37^a, and chain 38 are in the positions shown in Fig. 7, shaft 20 is first fed outwardly by pinion 19 and disk 37^a traveling over gear 15 and rack 40 respectively, by reason partly of the rack 40 being rigid and partly because overcoming the inertia of gear 15 offers greater resistance to pinion 19 than the traveling of said pinion 19 over the teeth of gear 15. As shaft 20 rotates as it travels, chain 38 unwinds from pulley 37 and rewinds thereon in an opposite direction. Of course during the automatic movement of the doors, such unwinding and rewinding takes place very rapidly, so that by the time the doors have reached their open positions the chain 38 will have rewound on pulley 37 and prevent further rotation of shaft 20, thus preventing the link from being drawn up by excess movement of gear 15 and hence preventing partial reclosing of the doors. In the closing movement chain 38 performs another function, that is, it starts the shaft on its travel inwardly. This happens after the chain has unwound from the position shown in Fig. 8 and rewound in the opposite direction, thus permitting about two revolutions of pulley 37 without inward movement of shaft 20 or sufficient to allow the doors to reach their closed positions before the shaft 20 travels. A detail view of pulley 37 and disk 37^a is shown in Fig. 9, wherein they are shown formed of a single casting.

Having shown how the shaft is moved toward the center of the car and returned, and how such movement is controlled, the effect of the said movement will now be described; On the under surface of each of the drop doors is located one or more bearing horns 42 shown in drawings, two in number, provided with a serrated or roughened surface, and on each of the door supporting shafts is located a corresponding number of loosely mounted devices or rollers 43, also having serrated or roughened surfaces adapted to engage the roughened surfaces of their respective bearing horns 42 (Fig. 4). The door raising arms or levers 11 and the shoes 9 are of sufficient length and depth respectively to, upon the complete upward movement of said arms or levers 11, raise the drop

doors 6 to positions in which the bearing horns 42 are approximately in the plane of the devices or rollers 43. When the doors have reached such positions through means already described, the shaft 20 begins its movement toward the center of the car, the devices or rollers 43 striking the bearing horns 42 and forcing the doors upwardly into complete closed positions, at the same time raising the shoes 9 from the antifriction rollers 10, so that it will be seen the entire weight of the doors and the load or lading carried thereby is thrown on the door supporting shaft 20 instead of on the raising arms or levers 11.

In the opening movement of the doors from the position shown on the left of Fig. 3, the lever 29 is grasped and moved toward the side of the car, causing the pinion to travel over the teeth of pinion 15 carrying the shaft and the devices or rollers 43 from beneath the bearing horns 42, whereupon the load or lading in the car carries the doors downwardly, the shoes 9 striking the antifriction rollers 10 on the levers 11 oscillating the shaft 12 and through the link 14, the gear 15 spinning around the gear 19 and through means of gear 22, the ratchet 24; ratchet 24 running away from the lever 29 by reason of its teeth passing under the dog 31 and the pulley 30, so that it will be seen that the mechanism herein shown and described is very quickly and safely operated, it being but necessary to impart an initiating movement to the ratchet 23, whereupon the lading immediately completes the opening movement of the doors without transmitting movement to lever 29.

At the same time that the gear 15 is spun around by the opening movement of the doors, caused by the lading after the shafts 20 have been moved from supporting positions, it will be seen the cam 25 strikes the cam 34 on the slotted locking plate 33 forcing the same into its locking position, so that the shaft is locked against inward traveling movement until the doors shall have been again returned to their closed or approximately closed positions.

The mechanism thus described is preferably quadrupled so that there is an operating device on each side of each end of the car, that is four operating levers each controlling one set of mechanism for a set of four doors.

Having thus described my invention, the following is what I claim therein and desire to secure by Letters Patent:—

1. In a car door mechanism, a door, means for closing said door, door supporting means geared to said door closing means to move into door supporting position when the door is closed and means for operating said mechanism.

2. In a car-door mechanism, a door and means for closing said door, in combination with means operatively connected to said door closing means for disengaging said door from said closing means and supporting said door in closed position, and means for operating said mechanism.

3. In a car-door operating mechanism, a drop door, means for raising said door to closed position and door supporting means operatively connected to said door raising means for further raising said door when moved into door supporting position to disengage said door from its raising means and carry the weight of the door off of its raising means.

4. In a car-door mechanism, a suitably mounted shaft, an arm or lever rigidly mounted on said shaft and adapted to close said door and a second shaft adapted to be moved into door supporting position and take the weight of said door from said arm or lever.

5. In a car-door mechanism, a door, a suitably mounted shaft, an arm or lever on said shaft adapted to close said door, a second shaft movable into door supporting position and adapted to take the weight of the door from said arm or lever, suitable operative connections between said shafts to insure their operation in proper sequence and means for operating said mechanism.

6. In a car-door mechanism, a door, a suitably mounted shaft, an arm or lever on said shaft for closing said door, a second shaft movable into door supporting position and adapted to relieve said arm or lever of the weight of said door, pawl and ratchet mechanism for operating said door supporting shaft and suitable connection between said pawl and ratchet mechanism and said arm or lever shaft.

7. In a car-door mechanism, a door, a suitably mounted shaft, an arm or lever mounted on said shaft for closing said door, a gear, a link connecting said gear and shaft, a door supporting shaft geared to said gear, movable into door supporting position and adapted to relieve said arm or lever of the weight of said door.

8. In a car-door mechanism, a door, means for closing said door, a door supporting means movable into door supporting position, and adapted to relieve said closing means of the weight of said door, suitable operative connection between said supporting and said closing means, means for locking the supporting means until the closing means is operated and means for operating the mechanism.

9. In a car-door mechanism, a door, means for closing said door and means geared thereto for supporting the door when in closed position, movable into supporting position only after the closing means has operated and means causing disengagement

of said door from its closing means when said supporting means is moved into supporting position.

10. In a car-door operating mechanism, a door, means for closing said door, means movable into position to support said door after the same has been closed, a gear geared to said supporting means and a link between said gear and said door closing means.

11. In a car-door mechanism, means for operating the mechanism, a door, means for closing said door, and means operated by said mechanism operating means adapted to first transmit movement to said door closing means and then move into position to support said door.

12. In a car-door mechanism, a door, means for closing said door, traveling means for operating said door closing means, door supporting means carried thereby, and means for locking said door closing means to cause said traveling means to shift and carry said door supporting means into door supporting position.

13. In a car-door mechanism, a door, means for closing said door, traveling means for operating said door closing means, door supporting means carried thereby, means for locking said door supporting means in non-supporting position while said door closing means is operating, and means for locking said door closing means to cause said traveling means to shift and carry said door supporting means into door supporting position.

14. In a car-door mechanism, a door and means for operating said door comprising a gear, in combination with traveling door supporting means, a cam mounted on said door supporting means and adapted to lock said door supporting means in non-supporting position, and a cam mounted to travel with said gear and adapted to operate said first mentioned cam.

15. In a car-door mechanism, a door and a toothed device for closing said door in combination with a toothed door supporting device adapted to operate and travel on said door closing device to door supporting position and means for stopping said door closing device at a certain stage of its operation to cause said door supporting device to travel to door supporting position.

16. In a car-door mechanism, a door and a gear for closing said door, in combination with a traveling door supporting shaft, a pinion mounted on said shaft in mesh with said gear and means for driving said pinion to drive said gear.

17. In a car-door mechanism, a door and a gear for closing said door, in combination with a traveling door supporting shaft, a pinion mounted on said shaft in mesh with said gear, means for driving said pinion to drive said gear and means for stopping said gear at a certain stage of its movement to cause said pinion to travel and carry said shaft into door supporting position.

18. In a car-door mechanism, a door and a gear for closing said door, in combination with a traveling door supporting shaft, a pinion mounted on said shaft in mesh with said gear, means for driving said pinion to drive said gear, means for stopping said gear at a certain stage of its movement to cause said pinion to travel across said gear and carry said shaft into door supporting position, a cam mounted to move with said gear, and a cam device operated by said cam for locking said shaft against traveling movement.

19. In a car door mechanism, a traveling door supporting shaft, means for operating said shaft and means operated by said shaft for locking said shaft against traveling movement during a certain period of its operation.

20. In a car door mechanism, a door, a traveling door supporting shaft for closing said door, and means locking said shaft against movement into door supporting position while the doors are being closed.

21. In a car door mechanism, a door, means for closing said door, a rotating shaft for supporting same in closed position and a cam device operated by said shaft locking said shaft in non-supporting position and guiding said shaft in passing into door supporting position.

22. In a car-door mechanism, a door, means for closing said door, a rotating shaft for supporting same in closed position and cam means operated by said shaft locking said shaft in non-supporting position.

23. In a car door mechanism, a door, means for closing said door, a rotating shaft for supporting said door in closed position, gears for causing a regular traveling movement of said shaft to carry the same beneath the door, and cam means operated by said shaft for locking said shaft against traveling movement until the door is closed.

24. In a car door mechanism, a door, a rotating traveling shaft movable to a door supporting position beneath said door, an open bearing for said shaft adapted to allow said shaft to pass therefrom to door supporting position, and means for operating said bearing to prevent the shaft from passing therefrom.

25. In a car door mechanism, a door, a shaft movable to a door supporting position, a slotted cam actuated plate having an open hub forming a guide and bearing for said shaft and actuated plate to move the opening in its hub to a position out of line of movement of said shaft to lock said shaft.

26. In a car mechanism, a door and a shaft movable into door supporting position in combination with a slotted plate forming a bearing and guide for said shaft and mov-

able to carry its slot out of line of travel with said shaft to lock the latter.

27. In a car mechanism, a door and a shaft movable into door supporting position, a slotted journaled plate having an open bearing and forming a guide for said shaft, a gear operated by said shaft, a cam carried by said gear and operating said slotted plate to turn the same and carry the slot and open bearing therein out of the line of movement of said shaft to lock the shaft.

28. In a car door mechanism, a door, a gear for operating said door, a stop on said gear, a link connecting said gear with said door and adapted to engage said stop, a rotating traveling shaft, a pinion carried by said shaft and meshing with said gear, and a suitably journaled slotted plate having an open bearing forming a guide and bearing for said shaft.

29. In a car door mechanism, a door, means for operating said door, a shaft, a toothed device on each end of said shaft, means for engaging said devices to cause said shaft to shift its position, and means for preventing said shaft from shifting its position until the door is closed.

30. In a car door mechanism, a door, means for operating said door, a shaft, and an intermittent traverse gear at each end of said shaft.

31. A car door mechanism comprising a door, a door operating gear having a limited movement, a rack, a rotatable and bodily movable door supporting shaft, a gear on said shaft in mesh with said door operating gear and a mutilated pinion or gear on said shaft in mesh with said rack.

32. A car door mechanism comprising a door, a door operating gear having a limited movement, a rack, a rotatable and bodily movable door supporting shaft, a gear on said shaft in mesh with said door operating gear, a mutilated pinion or gear on said shaft adapted to mesh with said rack and a cable winding on said shaft to cause said mutilated pinion or gear to mesh with said rack.

33. A car door mechanism comprising a door, a door operating gear having a limited movement, a rack, a rotatable and bodily movable door supporting shaft, a gear on said shaft in mesh with said door operating gear, a mutilated pinion or gear on said shaft adapted to mesh with said rack, a pulley on said shaft and a cable winding on said pulley to cause said mutilated pinion or gear to mesh with said rack.

34. In a car door mechanism, a door and a shaft, in combination with a mutilated pinion and a rack for shifting said shaft.

35. In a car door mechanism a door and a shaft in combination with a cable winding on said shaft in one direction to shift said shaft and winding on said shaft in an opposite direction to stop movement of said shaft.

36. In a car door mechanism, a door, a shaft, a pulley on said shaft and a cable winding on said pulley in either direction to shift the shaft in one direction and limit its movement in an opposite direction.

37. In a car door mechanism, a door, a shaft, a casting having a pulley and mutilated gear formed thereon, a rack adapted to engage said gear, and a cable winding on said pulley, in one direction to bring said gear into engagement with said rack to shift said shaft and winding on said pulley in an opposite direction to stop movement of said shaft.

38. In a car door mechanism, a drop door, an oscillating shaft, an arm on said shaft having a movable engagement with said door for raising same, a crank for operating said shaft and a link connection between said shaft and crank adapted to pass beyond the center line of the crank axis in closing the door.

39. In a car door mechanism, a drop door, means having a movable engagement with said door for raising the same, a bodily movable shaft for locking said door in raised position and a gear crank operated by said shaft for operating said door-raising means.

40. In a car door mechanism, a drop door, means having a movable engagement with said door for raising the same, a crank for operating said door-raising means, a connection between said crank and door-raising means having a limited movement beyond the center line of the crank axis and means for locking said door in raised position operable at the limit of said movement.

41. In a car door mechanism, a drop door, a door-raising arm having a movable engagement with said door, a bodily movable door-locking shaft and means for operating said arm and shaft.

42. A car provided with a hinged or pivotally mounted door, means for raising said door, a shaft arranged parallel to the front edge of the door and adapted to be moved underneath same to form a support therefor, and a device on the door constructed to receive said shaft and thus retain the door in its closed position; substantially as described.

43. A car provided with a hinged or pivotally mounted door, means for raising said door, a rotatable shaft arranged parallel to the front edge of the door, means for causing said shaft to shift bodily toward and away from the door when rotary movement is imparted thereto, and a device on the underneath side of said door constructed to receive said shaft when it moves underneath the door; substantially as described.

44. In a car door mechanism, a drop door,

a shaft for raising said door, a second shaft for supporting said door when in raised position and suitable connection between said shafts to operate one of said shafts from the other.

45. In a car door mechanism, a drop door, means for raising said door, a rotatable bodily movable shaft for supporting said door when in raised position and means causing said shaft to move into door supporting position after preliminary non-translating movement thereof.

46. In a car door mechanism, a discharge door, a rotatable bodily movable shaft for supporting said door in closed position, a slotted bearing for said shaft having a depressed portion at one end to receive and retain said shaft, means operated by said shaft for closing the door and means operable after door closing rotation of said shaft to force said shaft out of the depressed portion toward its door supporting position.

47. In a car door mechanism, a door, means for closing said door, door supporting means operatively connected to said door closing means to move into door supporting position when the door is closed and means for operating said mechanism.

48. In a car door mechanism, a door, and means for closing said door, in combination with means operatively connected to said door closing means for supporting said door in closed position, said door supporting mean movable into supporting position only after the closing means has operated and means causing disengagement of said door from its closing means when said supporting means is moved into supporting position.

49. In a door operating mechanism, a door, means for raising said door and means disconnecting said door from its raising means after the door raising operation.

CHARLES A. LINDSTRÖM.

Witnesses:
T. J. JONES,
G. C. LAMBE.