

A. E. OSTRANDER.
DOOR OPERATING DEVICE.
APPLICATION FILED MAY 18, 1911.

1,041,864.

Patented Oct. 22, 1912.

3 SHEETS—SHEET 1.

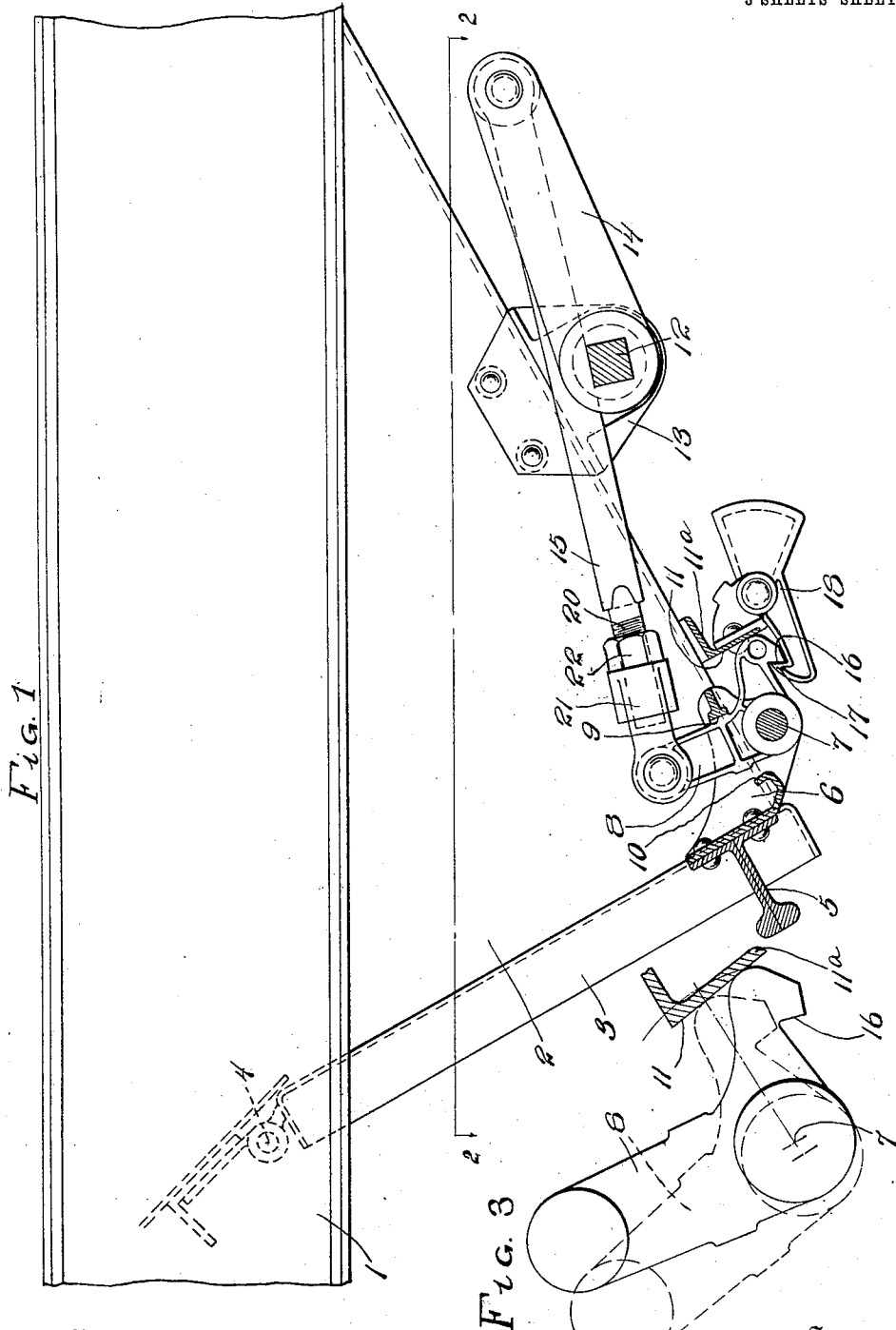


Fig. 1

Fig. 3

Witnesses:
H. H. Martin
L. E. Ostrander

Inventor
Allen E. Ostrander
By his Attorney J. H. Gibbs

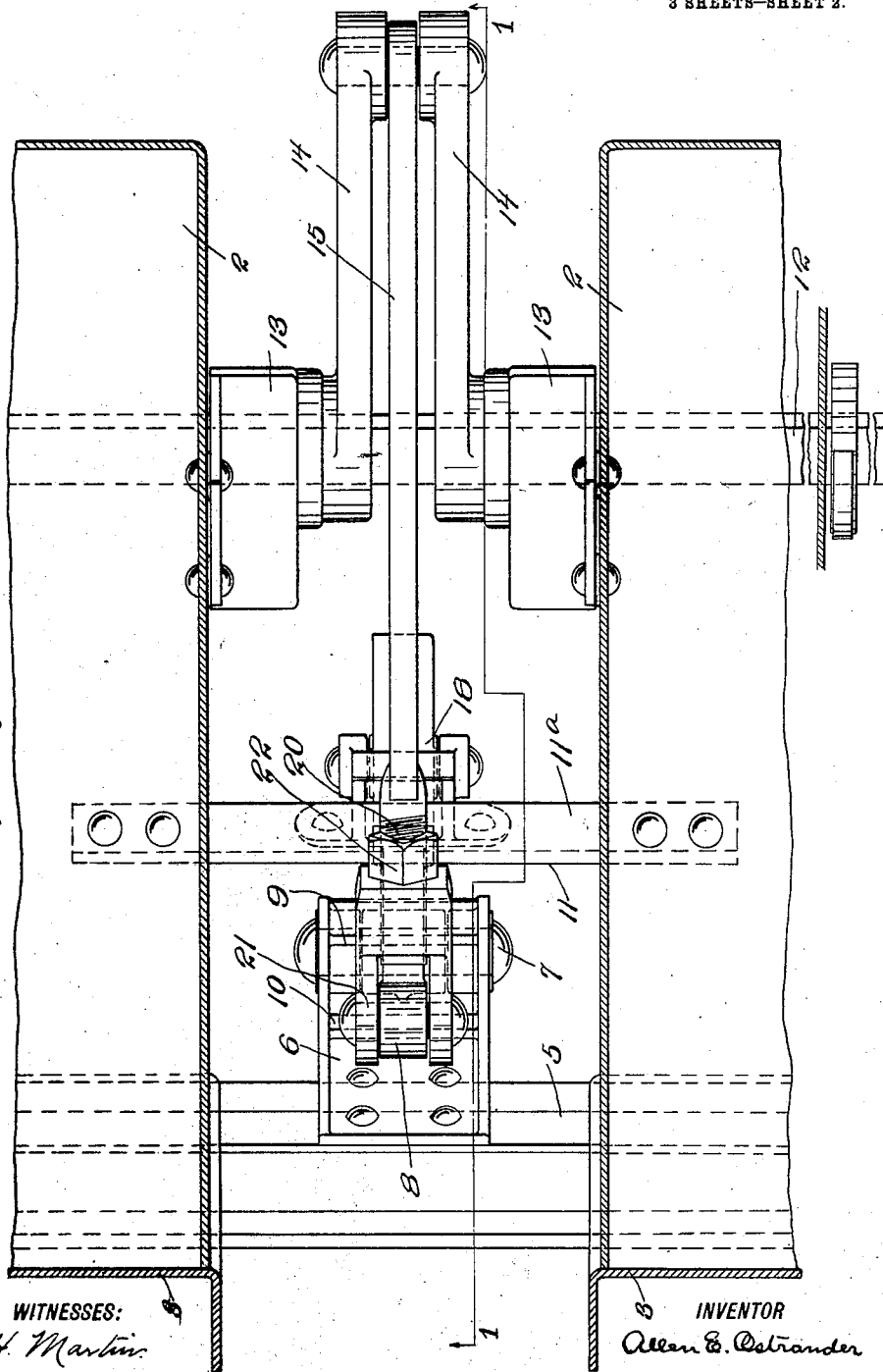
A. E. OSTRANDER.
DOOR OPERATING DEVICE.
APPLICATION FILED MAY 18, 1911.

1,041,864.

Patented Oct. 22, 1912.

3 SHEETS—SHEET 2.

Fig. 2.



WITNESSES:

H. H. Martin

L. Sanford Hand

INVENTOR

Allen E. Ostrander

BY J. H. Gibbs

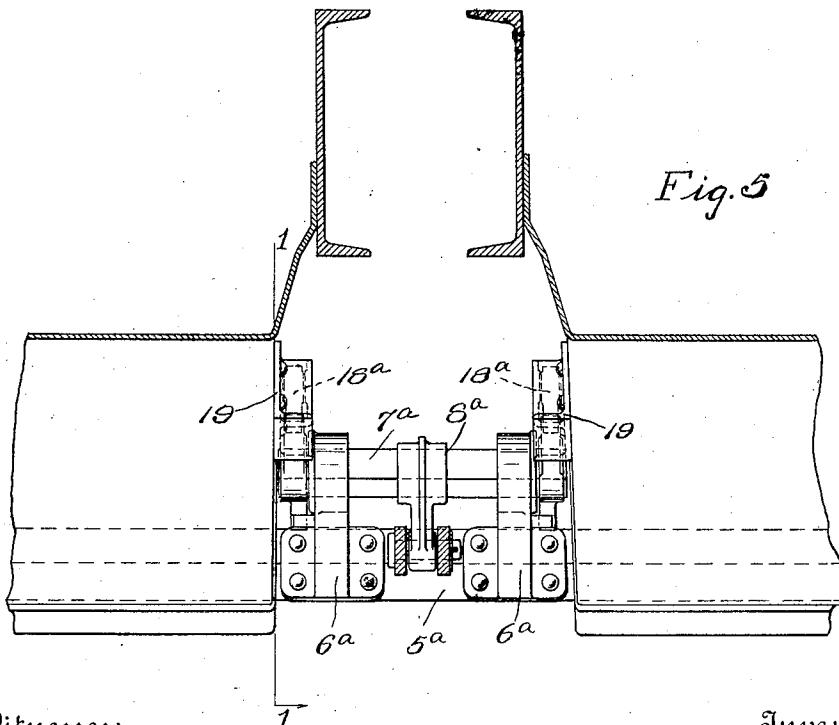
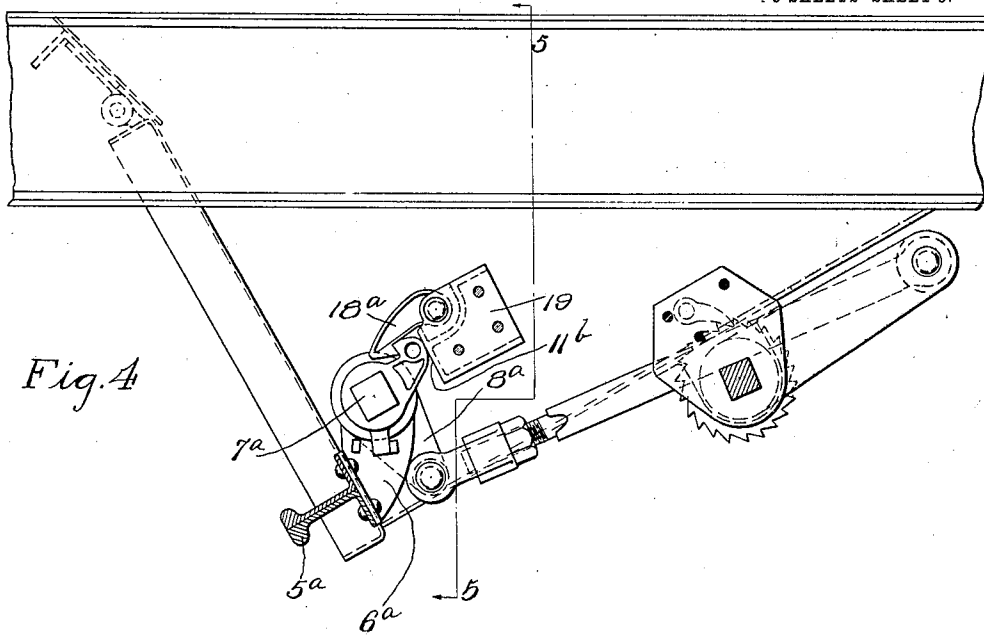
ATTORNEY

A. E. OSTRANDER.
DOOR OPERATING DEVICE.
APPLICATION FILED MAY 18, 1911.

1,041,864.

Patented Oct. 22, 1912.

3 SHEETS-SHEET 3.



Witnesses:
K. H. Martin
L. Sanford Handley

Inventor
Allen E. Ostrander
By his Attorney J. H. Gibbs

UNITED STATES PATENT OFFICE.

ALLEN E. OSTRANDER, OF RIDGEWOOD, NEW JERSEY.

DOOR-OPERATING DEVICE.

1,041,864.

Specification of Letters Patent.

Patented Oct. 22, 1912.

Application filed May 18, 1911. Serial No. 628,048.

To all whom it may concern:

Be it known that I, ALLEN E. OSTRANDER, residing at Ridgewood, Bergen county, New Jersey, and being a citizen of the United States, have invented certain new and useful Improvements in Door-Operating Devices, 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 longitudinal sectional view through a portion of a hopper bottom car showing the invention applied, the particular invention of this application being illustrated in connection with a crank arm and link diagrammatically illustrated and the section being taken on a line 1—1 of Fig. 2. Fig. 2 is a horizontal sectional view of the parts shown in Fig. 1, the section being taken on line 2—2 of Fig. 1, and showing the door operating mechanism in top plan. Fig. 3 is a diagrammatic detail view illustrating the manner in which the mechanism operates for starting the opening movement of the doors. Fig. 4 is a view similar to Fig. 1, illustrating a modified conception of the invention, and Fig. 5 is a vertical transverse sectional view taken on the plane of line 5—5, of Fig. 4.

It is well known that, in cold weather the doors of hopper bottom cars become frozen, often so solidly that it is necessary to use a sledge, for breaking the ice, before the doors can be opened. The inevitable result is that the doors soon become so badly battered and twisted that it is impossible to force them into fully closed position.

The object of this invention is to provide, in a door operating device, means for materially increasing the power of the operating shaft for opening the doors so that the operator may readily break the ice-seal by the usual operation of rotating the operating shaft.

To this end it consists in suitable cam-like mechanism adapted for imparting to the door a powerful initial opening movement

upon the first turning of the operating shaft.

A further object is to provide a lock for the door independent of the operating shaft.

Referring to the drawings forming part of this specification;—the numeral 1, indicates the center sill or sills, upon the opposite longitudinal sides of which are disposed the hoppers 2—2. I have illustrated only one pair of doors, but it will be understood that the mechanism may be duplicated upon the similarly arranged doors at the opposite side of the transverse median line of the car, all of which is common in this class of cars.

The doors 3, are hinged at their upper edge, as at 4, in the frame work of the car the lower edges of the door are connected together by the usual yoke-bar 5, which bridges the space between the two doors and affords means for attaching the door operating device. Fixed to one face of the bar 5, intermediate the doors is a bracket casting 6 in which is rockably mounted, as at 7, a bell crank lever 8. Suitable stops, as 9 and 10, formed in the casting 6, serve to limit the movement of the bell crank in either direction. The bell crank comprises a relatively long arm, and a short arm. The longer arm projects upwardly approximately parallel to the plane of the door. The shorter arm projects at an angle to the long arm, and away from the door, and when the door is closed is designed to have the outer surface of its free end engage a co-acting surface 11, of a rigid member 11*, extending across the space between the two hoppers.

The operating shaft 12 is rotatably mounted in suitable brackets 13—13, fixed to the opposite hoppers 2, and extends to the outer sides of the car. Fixed to the shaft intermediate the hoppers is a crank arm 14 at the outer end of which is pivotally connected one end of a link 15. The opposite end of said link is pivotally connected to the upper end of the long arm of the bell crank 8 for operating said bell crank. The particular design of the crank arm 14 and link 15 are unimportant to the present invention which may be applied in conjunction with many of the well known door operating means in common use though, for convenience for illustration I have shown, diagrammatically, the device of Ames Patent 806,763 of Dec. 12, 1905, as one device with which my invention may be used.

As best seen in Fig. 3, when the door is closed, the engagement of the end of the short arm of the bell crank with the surface 11 is such that the point of contact is somewhat below the plane of a line drawn from the center of the pivot 7, of the bell crank, at right angle to the surface 11. Thus the rocking movement of the bell crank will cause the end of the short arm to move, as on a cam, upward along the surface 11 and force the pivot 7 away from said surface with a force materially greater than that applied to rock the bell crank.

In order to provide a lock for the doors when closed the end of the short arm of the bell crank is formed with a hook or shoulder 16, adapted to engage an oppositely disposed shoulder 17 formed upon a counter-weighted gravity latch 18. The latch 18 is pivotally supported upon the rigid member 11^a.

The operation of the device is simple, and as follows:—Considering the door to be open; rotation of the operating shaft and crank arm in a clockwise direction; Fig. 1 maintains the long arm of the bell crank 8 against the stop 9, and moves the door into closed position without relative movement of the bell crank, the gravity latch giving way to the head of the short arm of the bell crank, and latching securely behind the shoulder 16 of said head. When unlocking the door; the first movement of the operating shaft and crank arm, in a counter-clockwise direction, will force the upper end of the long arm of the bell crank 8 toward the plane of the doors, rocking said bell crank about its pivot, from the position shown by full lines in Fig. 3 to the position shown in dotted lines in said figure, until the long arm of the bell crank contacts with the stop 10, or until any ice seal, which may exist between the doors and their respective hoppers, is broken. This movement disengages the head of the short arm of the bell crank from the gravity latch 18 so that the door is free to move into open position by continued rotation of the operating shaft.

In the modifications, Figs. 4 and 5, the bell crank mechanism is shown relatively reversed so that the long arm as 8^a of said bell crank depends. This disposal of parts renders possible the use of a gravity latch without the counter weight which is a necessary part of said latch in the construction just described. In the modified structure the long arm of the bell crank is positioned approximately midway the length of a short shaft 7^a extending between the walls of the hoppers and rotatably mounted in spaced brackets 6^a—6^a, fixed to the yoke-bar 5^a. The short arm of the bell crank is duplicated and fixed to opposite ends of the shaft 7^a. The gravity latch as 18^a is likewise duplicated, one for each of the short arms.

The short arms of the bell crank are disposed adjacent the walls of the opposite hoppers, and the gravity latches 18^a are pivotally mounted in suitable brackets 19 fixed to said hoppers. Each of the brackets 19 is formed with a surface 11^b adapted to be engaged by the end of the short arm similarly as is the surface 11 of the member 11^a. This arrangement provides a positive and comparatively independent lock for each of the doors.

The length of the connecting link 15 is made adjustable to compensate for variations of construction, wear, etc., as follows: The end adjacent the bell crank 8 is threaded as at 20, and fitted into a threaded aperture formed in the hollow of a U-shaped member 21, between the opposite ends of which the upper end of the long arm of the bell crank is pivoted. A lock nut 22 is fitted to the threaded portion of the link 15 and abuts the member 21.

Wherever the term "tension type" is employed in the claims hereto appended, it is intended that such term shall distinguish that form of door operating device wherein the door is pulled to its closed position in contradistinction to that form wherein the door is designed to be pushed to its seat.

Having thus described the invention what I claim as new and desire to secure by Letters Patent is:—

1. In a car door operating device of the tension type, the combination comprising a door, an operating shaft, a bell crank between said operating shaft and said door for transmitting the movement of said shaft to said door and adapted to increase the power of said operating shaft for opening said door.
2. In a car door operating device of the tension type, the combination comprising a door, an operating shaft, a bell crank between said operating shaft and said door for transmitting the movement of said shaft to said door.
3. In a car door operating device, the combination comprising lifting means, a door, and interposed lever adapted to automatically push open said door while one end of said lifting means is rising to a higher plane.
4. In a car door operating device of the tension type, the combination comprising lifting means, a door and an interposed bell crank adapted to automatically push open said door while one end of said lifting means is rising to a higher plane.
5. In a car door operating device of the tension type, the combination comprising a door closing and locking means including a bell crank supported above the lower edge of the door adapted to partly open said door.
6. In a car door operating device of the

tension type, comprising an operating shaft, a crank arm, a connecting link, a door, a rockable member connected with said door adapted to initially open the same and a fixed abutment therefor.

7. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, and a door opening bell crank intermediate said link and door.

8. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door toward which said link extends, and a crank arm supported on and rockable in juxtaposition to the door-end of said link adapted to force said door to an open position.

9. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a stop in juxtaposition to said door, and a bell crank lever adapted to cooperate therewith to open said door.

10. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, locking means for said door operable from said link, and a stop cooperating with said locking means for opening said door.

11. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a stop in proximity to said door when in closed position, and rockable means operable by said link adapted to cooperate with said stop to release and partly open said door.

12. In a hopper door operating device, the combination comprising an operating shaft, a link operable therefrom, a door, an independently mounted movable member, and rockable means operable by said link adapted to engage said member to lock and release said door.

13. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, an independently mounted rigid member, and a rockable bell crank connecting said door and link adapted to cooperate with said rigid member to force open the door.

14. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, an independently mounted movable member, and a rockable member on said door adapted to engage said movable member.

15. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a bell crank rockably mounted upon said door and adapted to be rocked by said link, a pair of stops for limiting the movement of said bell crank, and means engaged by said bell crank while moving between said stops adapted for forcing the door open.

16. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a bell crank rockably mounted upon said door and adapted to be rocked by said link, a stop for limiting the movement of said bell crank in one direction, and means engaged by said bell crank while moving away from said stop adapted for forcing the door open.

17. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a bell crank rockably mounted upon said door and adapted to be rocked by said link, a stop for limiting the movement of said bell crank in one direction, means for engaging said bell crank adapted for locking said door while said bell crank is in engagement with said stop, and means engaged by said bell crank when said bell crank is out of engagement with said stop for forcing the door open.

18. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a bell crank rockably mounted upon said door and adapted to be rocked by said link, said bell crank comprising a plurality of arms, and a plurality of rigid members adapted to be engaged by some of said arms for forcing the door open.

19. In a hopper door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a bell crank rockably mounted upon said door and adapted to be rocked by said link, said bell crank comprising a plurality of arms, one of said arms being connected to said link, and rigid members adapted to be engaged by other arms for forcing the door open.

20. In a car door operating device, means for operating a door comprising a crank shaft, crank arm, a rockable cam, and means carried by the car adapted to be engaged by the cam to force the door toward open position.

21. A car door operating device comprising a cam abutment, a crank shaft, crank arm and a cam member adapted to engage said abutment to force the door toward open position.

22. In a car door operating device, a fixed abutment, and a rockable bell crank member adapted to engage said abutment to force the door toward open position.

23. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, and rockable means, intermediate said link and door, adapted to automatically lock said door.

24. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, and

means in juxtaposition to the door, adapted to automatically lock said door.

25. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, lifting means, and interposed means adapted to control a lock for said door.

26. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, and a bell crank locking member interposed between said link and the door.

27. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, a bell crank locking member connected therein, and a socket member adapted to receive part of said bell crank to lock said door in closed position.

28. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, and a rockable locking member interposed between said link and door.

29. In a car door operating and supporting device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, a rockable locking member connected with said door, and means for rocking said locking member.

30. In a car door operating and supporting device of the tension type, the combination comprising a door closing means, and a rockable locking member connected with said door and movable therewith.

31. In a car door operating device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, and a rockable member connected with said door and movable with the door, said member being adapted to release said door.

32. In a car door operating device of the tension type, the combination comprising an operating shaft, a crank arm, a connecting link, a door, and means movable with said door extending laterally beyond said door adapted to lock the same in closed position.

33. In a hopper door operating device, the combination comprising an operating shaft, a crank, a link operable thereby, a door, and door unlocking bell crank intermediate said link and door.

34. In a hopper door operating device, the combination comprising an operating shaft, a crank, a link, operable thereby, a door, and means movable with the door and rockable on said door adapted to lock the same in closed position.

35. In a hopper door operating device, the combination comprising an operating shaft, a crank, a link operable thereby, a door, a bell crank on said door, and interlocking means adapted to cooperate therewith.

36. In a hopper door operating device, the combination comprising an operating shaft and crank, a link, operable thereby, a door, a bell crank on said door operable from said link, and a stop cooperating with said bell crank.

37. In a hopper door operating device, the combination comprising an operating shaft, a crank arm, a link operable thereby, a door, and locking bell crank carried on said door and operable by said link.

38. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a lever rockably mounted upon and movable with said door adapted to be rocked by said link, and means for adjusting the length of said link.

39. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a lever shiftably mounted upon said door adapted to be shifted by said link, and means for adjusting the length of said link.

40. In a door operating device, the combination comprising an operating shaft, a link operable thereby, a door, a locking lever mounted upon said door adapted to be operated by said link, and means for adjusting the length of said link.

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

ALLEN E. OSTRANDER.

Witnesses:

FREDERICK H. GIBBS,
EDWARD H. FISHER.