No. 763,186. PATENTED JUNE 21, 1904.

S. J. JOHNSON.

OPERATING MECHANISM FOR DUMPING CARS.

APPLICATION FILED APR. 14, 1904.

NO MODEL. 2 SHEETS—SHEET 1

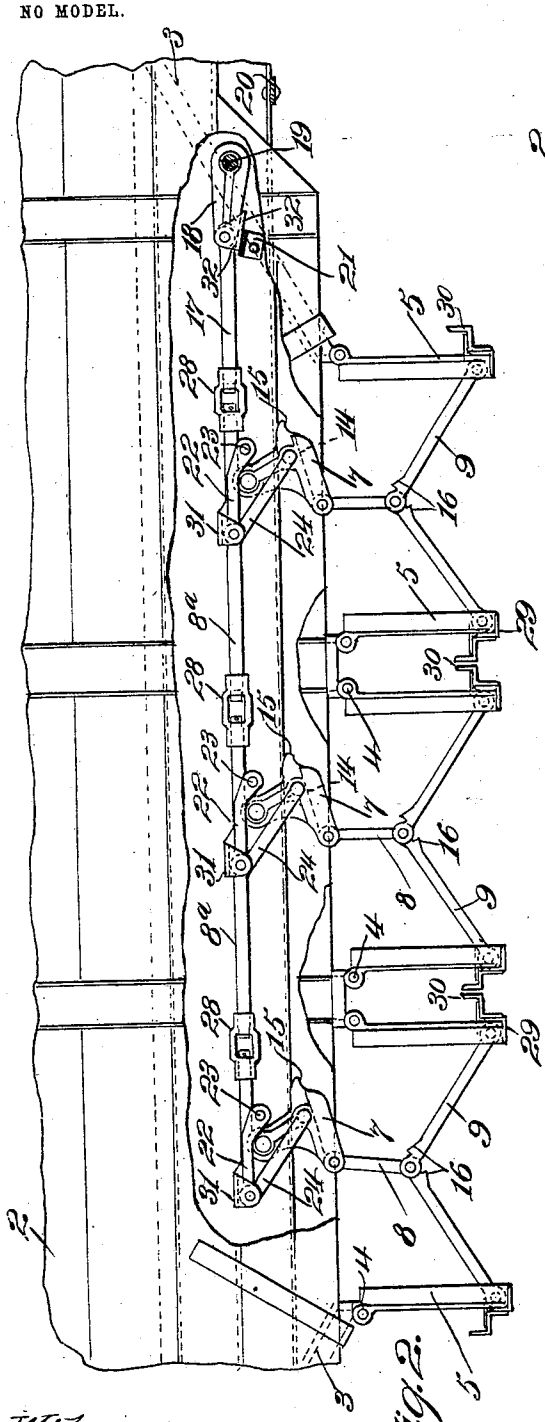


Fig. 2.

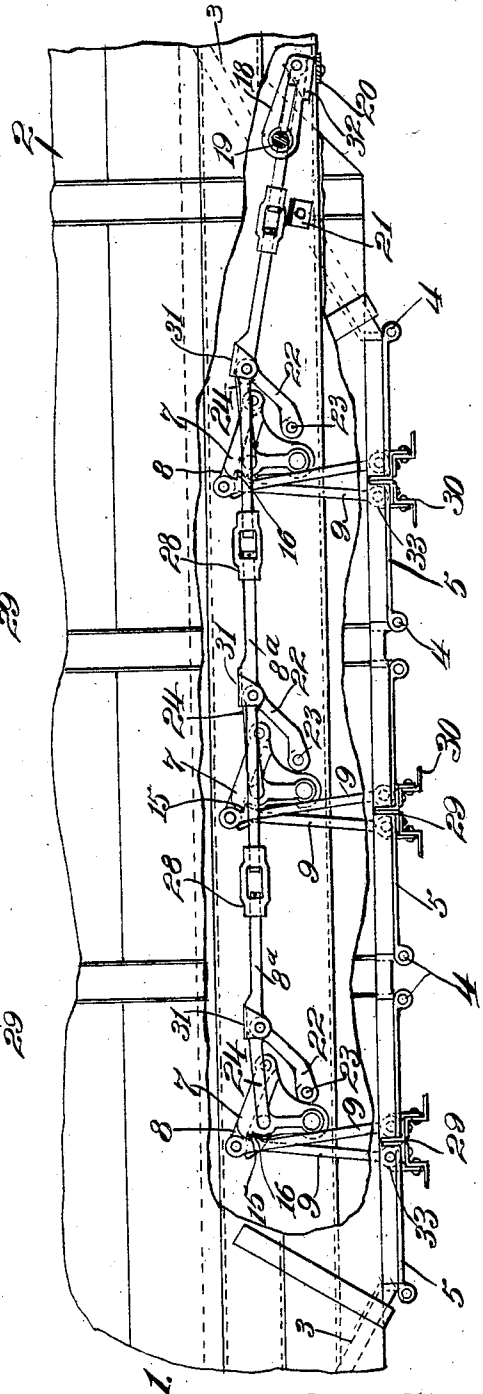


Fig. 1.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 5.

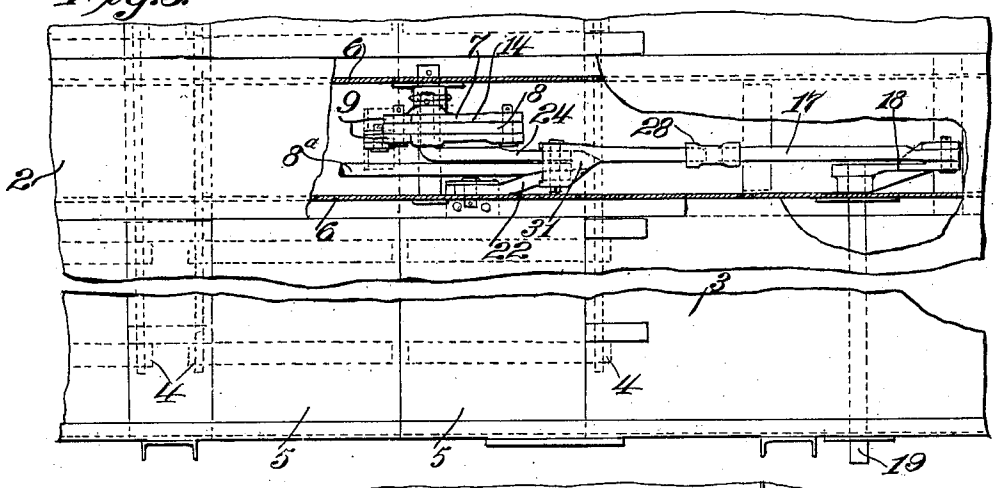
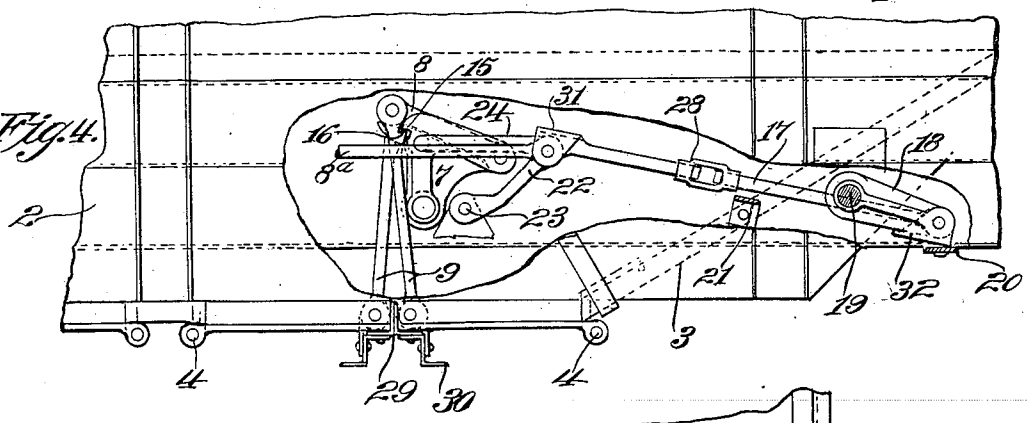


Fig. 4.



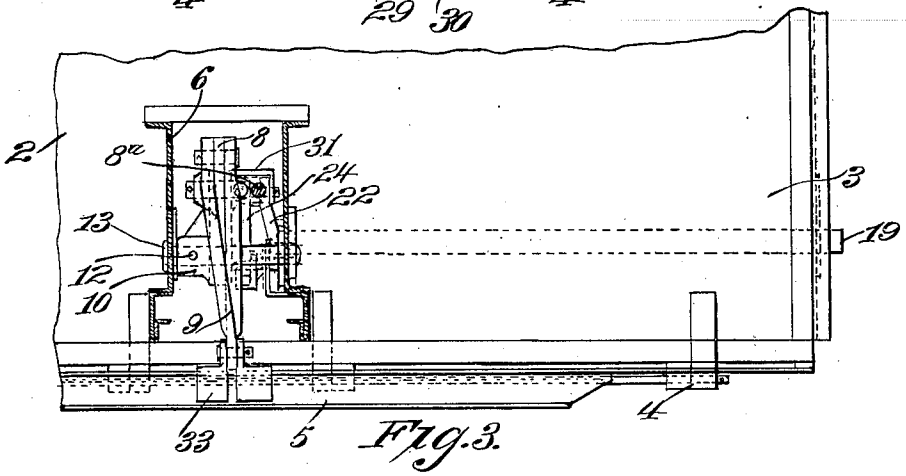


Fig. 3.

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No. 763,186. Patented June 21, 1904.

UNITED STATES PATENT OFFICE.

SINCLAIR J. JOHNSON, OF MONTCLAIR, NEW JERSEY.

OPERATING MECHANISM FOR DUMPING-CARS.

SPECIFICATION forming part of Letters Patent No. 763,186, dated June 21, 1904.

Original application filed February 1, 1904, Serial No. 191,458. Divided and this application filed April 14, 1904. Serial No. 203,073. (No model.)

To all whom it may concern:

Be it known that I, SINCLAIR J. JOHNSON, a citizen of the United States, residing in Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Operating Mechanism for Dumping-Cars, of which the following is a specification.

The present invention is designed, primarily, to provide such an operating mechanism for opening and closing the doors of dumping-cars as will lessen the cargo-space by a minimum amount and interfere to little or no extent with the loading or unloading of the car. Such result I accomplish by a system or organization of operating links and levers connected to the swinging edges of doors of the car and capable of forcibly swinging the latter from their closed to their open position, and vice versa, without assuming a position at any time which shall occupy a space unduly extending upward into the cargo-space of the car.

A further feature of the present improvements relates to means for actuating said links and levers from a position without the car such that the actuating mechanism for transmitting motion shall not interfere with the descent of the load. In the particular illustrated application of the present invention, moreover, I utilize rods as distinguished from one or more chains for transmitting motion from the operating-arm to the links and levers whose movements control the swinging of the doors.

A mechanism for operating the doors of a dumping-car and which is constructed in accordance with my present improvements is characterized by the fact that a comparatively small movement or travel of the aforesaid operating-rods suffices to swing the doors from their closed to their open position, and vice versa, while the relative positions assumed by the parts suffice for locking the doors both in their open and in their closed positions, the mechanism being so designed as to afford ample leverage for not only effecting the movement of the doors when the latter are in actual movement, but also for initiating their movement in either direction.

In its present form the invention pertains to means for manipulating a plurality of doors of dumping-cars simultaneously by operating mechanisms for each door suitably connected to each other and an operator connected to one of them to actuate all of them and all operative from a given mechanism—such, for instance, as is shown and described in my United States Letters Patent for operating mechanism for dumping-cars, No. 755,671, this application constituting a division thereof.

In the drawings accompanying the present specification, Figure 1 is a side elevation of a car, portions being broken away the better to show the parts beyond, the doors being indicated in their closed position and all of the operating parts in their corresponding relative positions. Fig. 2 is a similar view of the parts as indicated in Fig. 1, portions being broken away and the doors being in their open position and all of the operating parts in their corresponding relative positions. Fig. 3 illustrates, on an enlarged scale, a cross-sectional view of a portion of the operating mechanism. Fig. 4 illustrates, on the same scale, a side view thereof and showing one door; and Fig. 5 is a plan view of Fig. 4.

Similar characters of reference indicate like parts throughout the figures.

The particular type of dumping-car to which the present improvements are applied is one having openings in the bottom thereof adapted to be closed by doors, each of which may be connected with the door-operating mechanism by links, and all of said mechanisms for the different openings being connected by links one to another, so that all of the said door mechanisms will act simultaneously when one mechanism, being connected to an operator, (hereinafter to be described,) is manipulated. As shown, the mechanisms are so located that they are shielded and protected from the load. The operator for actuating the connected door-mechanisms may be so located that it may operate without interfering in any manner with the loading-space. The levers and links comprised in the operating mechanism are likewise so organized as to require a minimum vertical height for their play, as will be evident.

Referring in detail to the drawings, the car-

body is designated in Figs. 1 and 2 by 2, the same having a hopper-shaped bottom formed by slanting ends 3 3, at the lower end of each of which may be hinged by pivots 4 the half-leaves 5 of the doors. Center longitudinal sills of the car are designated by 6. Mounted to turn on axes, preferably between the longitudinal sills and above the meeting-line of the closed doors, are angle-levers 7, to which are pivoted the links 8 and 24. The suspension-links 8 are jointed at their free ends to the contiguous ends of pairs of links 9 9, each of which at their lower ends is pivotally jointed to corresponding leaves 5 of the doors by lugs 33 at suitable points. The mounting of these levers between the sills may comprise a hub 10 on the side of each lever, through the bore of which hub a pin extends. These pins are long enough to reach across from sill to sill and through openings cut therein and may be fastened, as by a cross-pin 12, to the hubs of the levers. The hubs, in conjunction with the heads 13 of the pins, prevent the lateral displacement of the levers during the turning thereof. A considerable vertical movement of the joint between the links 9 9 and the suspension-links 8 is necessary to shift the doors from their position as indicated in Fig. 2 to their position as indicated in Fig. 1—that is, from their open to their closed position. In order to effect a total amount of such movement with angle-levers of comparatively small maximum radial dimensions, I so organize the links 9 9, the suspension-links 8, and the levers 7 that during the latter portion of the upward movement of the doors from the position in Fig. 2 to the position in Fig. 1 the suspension-links 8 will come to rest upon the angle-levers 7 some time before the joints between such links and the links 9 9 reach the highest point of their path of travel. During the angular movement of the angle-levers thereafter and while the closing movement of the doors is taking place the continued turning of the angle-levers will swing the suspension-links 8 bodily around the center of the angle-levers 7 and the aforesaid joints upward. During the reverse turning of the angle-levers this motion is of course reversed. The suspension-links remain folded in contact with the angle-levers so long as the doors remain closed, and the levers may be provided with concave or hollowed-out portions 14 to receive and constitute a seat for the joints between the links, while to minimize the tendency of the weight of the doors and the load thereupon to swing the doors downward the center line of effort exerted by the links 9 9 upon the angle-levers 7 when the doors are closed preferably passes comparatively close to the pivotal axes of the angle-levers. When the doors are closed, a lug or projection 15 upon each angle-lever is adapted to coöperate with lugs or projections 16 16 upon the links 9 9. The active faces of these lugs are so related to each other that when the doors are substantially closed the lugs 16 16 will lie contiguous to if not quite in contact with the lugs 15 upon the angle-levers. The coöperating lugs thus constitute locks for locking the doors against any further upward movement when closed, and when the angle-levers are turned an initiating movement of the links 9 9 results.

I provide each angle-lever 7 with radius-bars 22, which are pivoted at one of their ends to the links 24, and each of their outer extremities are also pivotally mounted upon the car at 23 and eccentric to the pivot-pins of the angle-levers.

I provide in this invention means for connecting each of the pivot-points between the links 8 and 22, which means in the present instance preferably comprises connecting members or rods 8^a, each being provided with means for adjusting their lengths so that all of the door mechanisms can be adjusted to operate from and to the same positive positions. In this way the manipulation of any mechanism will cause all of the connected mechanisms to operate. For the purpose of operating all of these connected mechanisms I provide a rock-arm 18, which is rotatably mounted on a shaft 19 and which in this instance is illustrated as suitably situated beyond the mechanisms and which is suitably coupled to one element of one of the connecting mechanisms by a rod 17, which in the present instance may be connected to the pivot-points between the links 8 and 22 of one of the mechanisms. The means for transmitting motion from the rock-arm to the operating mechanisms preferably comprises a longitudinal bar, which serves in this instance to turn the angle-levers in both a forward and backward direction, corresponding to the closing and opening, respectively, of the doors. This operating-bar is indicated by 17, and it extends longitudinally of the car in the instance shown through the space between the aforesaid longitudinal center sills 6 to a point such that it may be connected to a rock-arm 18, affixed to a rock-shaft 19, here shown extending transversely to and through the sill. This rock-shaft may be, as shown, located without the cargo-space of the car and for its convenient manipulation projects to a point somewhat beyond the side of the car. It is in this instance adapted to have applied to it a suitable operating crank or arm for turning it and swinging the rock-arm 18. In order to lock the doors in their closed position, the organization is preferably such as that indicated in Fig. 1, in which it will be seen that when the rock-arm or an appurtenance thereof is arrested by a stop 20 the center of effort exerted by the operating-rod passes somewhat to one side of the pivotal axis of the rock-shaft 19. When the rock-shaft is turned and the rock-arms swing to the position in which its said center line is substan-

tially a prolongation of its center line in the position in Fig. 1, (see Fig. 4,) its movement is arrested by a suitable stop 21.

As will be observed, the angle-levers rotate through a greater arc than the radius-bars or the operator-arms. This is due to the special construction and connection of the angle-levers 7, radius-bars 22, and links 8 and to the special proportions and positions of the pivotal axes. The organization is such that the angle-levers, radius-bars, and links 8 form what is termed in the above-recited patent a "jointed frame," which when revolved rotates about two fixed axes, which causes the greater rotation of the angle-lever over the radius-arm, and these jointed frames will effect the movement of the angle-levers through the arc necessary to position the doors either to full open or closed positions, and by connecting these jointed frames of the door-operating mechanisms any number of doors can be operated from an operator connected to any one of the mechanisms.

I do not confine myself to any particular details of construction of the various parts, although, if desired, the edge of each door may be strengthened by an angle-bar 29 and a Z-bar 30, while the joints at the ends of the operating-bar may be embraced by straps 31 32, integral with one of the connected parts.

While any arrangement of the mechanisms may be resorted to within the purview of the present invention it will in practice perhaps be most preferred that the door-operating mechanisms shall be extended along the longitudinal axis of the car and in such relation properly connected, preferably by adjustable connections. Furthermore, while the operator for these connected door-operating mechanisms may be connected to such mechanisms in any suitable manner and at any suitable or convenient point the same will probably in practice be hitched onto one of the said mechanisms, so that the operator may be located beyond the series of connected mechanisms—for instance, as shown in the drawings.

Having thus described this invention, I claim—

1. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of connected jointed frames connected to the doors, adjustable rods connecting the frames, and means suitably connected to said series for manipulating the latter and the doors.

2. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of connected jointed frames connected with said doors, rods connecting said frames, and an actuator for operating said frames.

3. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of door-operating mechanisms connected with said doors, adjustable rods connecting said door-operating mechanisms and single means for manipulating the combined mechanism and the doors.

4. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of connected door-operating mechanisms connected with said doors, adjustable rods for connecting the door-operating mechanism, and an actuator suitably connected to said series for manipulating the latter and the doors.

5. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of connected jointed frames connected to the doors, adjustable rods connecting the frames, and an operator suitably connected to said series for manipulating the latter and the doors.

6. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of connected jointed frames connected with said doors, rods connecting said frames, and an operator actuating the combined frames and the doors.

7. In a hopper-door-operating mechanism, the combination with a plurality of door-operating mechanisms, of doors connected therewith, adjustable rods between said several mechanisms, and means for operating the connected mechanisms.

8. In a hopper-door-operating mechanism, the combination with a plurality of door-operating mechanisms, of doors connected therewith, adjustable rods between the several mechanisms, and an operator for actuating the connected mechanisms.

9. In a hopper-door-operating mechanism, the combination with a plurality of doors, of a series of door-operating mechanisms connected therewith, adjustable rods for connecting all of the mechanisms and a single operator for manipulating the combined mechanisms and doors simultaneously.

10. In a hopper-door-operating mechanism, the combination with a series of fulcrumed angle-levers and doors having linked connections therewith, of a series of connected radius-bars fulcrumed eccentrically of the fulcrum-axes of the angle-levers, means for connecting said eccentrically-fulcrumed radius-bars, and a means for operating said connected eccentrically-fulcrumed radius-bars and for transmitting motion to said angle-levers.

11. In a hopper-door-operating mechanism, the combination with a series of fulcrumed angle-levers and doors having linked connections therewith, of a transmitting-link pivoted to each angle-lever, means pivoted eccentrically to each angle-lever, for causing the outer end of the transmitting-link to travel in a prescribed path, means for connecting the links, and an adjustable operator connected therewith.

12. In a hopper-door-operating mechanism, the combination with a series of fulcrumed angle-levers and doors having linked connections

therewith, of connected transmitting-links pivoted to the angle-levers, means for causing the outer end of said transmitting-links to travel in a prescribed curved path, rods for connecting said links and an adjustable operator for the connected mechanism.

13. In a hopper-door-operating mechanism, the combination with fulcrumed angle-levers and doors, of pairs of jointed links connecting each angle-lever with the doors, transmitting-links pivotally connected to said angle-levers, means for causing the outer ends of the transmitting-links to travel in a prescribed path, rods for connecting the system and an operator for the connected system.

14. In a hopper-door-operating mechanism, the combination with fulcrumed angle-levers and doors, of pairs of jointed links connecting said angle-levers with the doors, the links pivoted to the angle-levers being adapted to come into contact with said levers and be bodily swung thereby, transmitting-links pivoted to said angle-levers, radius-bars for causing the outer ends of the transmitting-links to travel in a prescribed path, rods for uniting the door-operating mechanisms together, and an operator for said mechanisms.

15. In a hopper-door-operating mechanism, the combination with fulcrumed angle-levers and doors for door-openings, of jointed links connecting said angle-levers with the doors, links pivoted to the angle-levers being adapted to come into contact with the angle-levers and be bodily swung thereby, transmitting-links pivoted to said angle-levers, radius-bars for causing the outer ends of the transmitting-link to travel in a prescribed path, connections for uniting each mechanism at the pivotal point of the radius-bar and transmitting-link, and an operator for the mechanism.

16. In a mechanism of the character described, the combination with doors, of rotatably-mounted members connected therewith, transmitting-links pivoted to said members, radius-bars for causing the outer end of said transmitting-links to travel in a prescribed path, adjustable rods for connecting all of the members, and an operator.

17. In a mechanism of the character described, the combination with doors, of rotatably-mounted members connected therewith, transmitting-links pivoted to said members, radius-bars for causing the outer end of said transmitting-links to travel in a prescribed path, rods for connecting all of the members, and an operator connected to any one member.

18. In a mechanism of the class described, the combination of doors, fulcrumed angle-levers connected therewith, transmitting-links pivoted to said levers, radius-bars for causing the outer ends of said transmitting-links to travel in a prescribed path, adjustable rods connected to one link of one lever to the link of another lever, and an operator connected to any one of the links.

19. In a mechanism of the character described, the combination with rotatably-mounted members and doors connected therewith, of links, one of whose ends is pivoted to said members, pivoted instrumentalities for compelling the outer ends of said links to travel in a prescribed path, the axes of said movable members and pivoted instrumentalities being eccentrically located, rods for connecting the members to form one train of door-operating mechanisms, and an operator connected to the train.

20. In a mechanism of the character described, the combination with rotatably-mounted members and doors connected therewith, of links, one of whose ends is pivoted to said members, pivoted instrumentalities for compelling the outer ends of said links to travel in a prescribed path, the axes of said movable members and pivoted instrumentalities being eccentrically located, adjustable rods for connecting the members to form one train of door-operating mechanisms, and an operator for the train.

21. In a hopper-door-operating mechanism, the combination with fulcrumed angle-levers and doors, of jointed links connecting said angle-levers to the doors, the links pivoted to the angle-levers being adapted to come into contact with the levers and be bodily swung thereby, transmitting-links pivoted to said angle-levers, and means for causing the outer ends of said transmitting-links to travel in a prescribed path, coöperating projections on the angle-levers and the jointed links pivoted thereto, means for operatively connecting all of the door-operating mechanisms, and an operating-bar extending longitudinally of the car and a crank connected at its end to a rock-shaft.

22. In a mechanism of the class described, the combination of pairs of hinged doors, links pivoted to the doors, suspension-links to whose ends said first-mentioned links are pivoted, angle-levers to which said suspension-links are pivoted, and upon which the suspension-links are adapted to be folded and contact, and by which they may be then bodily swung, jointed frames comprising transmitting-links pivoted to said angle-levers and radius-bars pivoted to fixed points, adjustable rods for connecting the jointed frames, and coöperating projections on said angle-levers and said jointed links, and an operator connected to one of the jointed frames.

23. In a mechanism of the character described, the combination with fulcrumed angle-levers and doors having link connections with said levers, of transmitting-links pivoted to said angle-levers, means for causing the outer ends of said transmitting-links to travel in prescribed paths approaching and receding

from the axes of the fulcrum-levers, rods for connecting all of the links, an operator for actuating said transmitting-links consisting of a rock-shaft, a rock-arm extending therefrom, and an operating-rod connecting said operator and links, and a stop for limiting the movement of said rock-shaft, said operator, rock-shaft, rock-arm and stop constituting means for locking the doors closed.

24. In a mechanism of the character described, the combination with fulcrumed levers and pairs of doors, of links connected to said doors, suspension-links to which the first-mentioned links are jointed and which are pivotally connected to said levers and adapted to be bodily swung by said levers as the doors approach their closed position, radius-arms mounted on said car, transmitting-links connecting the outer ends of said radius-arms with said fulcrumed levers, adjustable means for uniting all of the links at a point where they are pivoted to the radius-arms, an operator consisting of a longitudinally-extending bar connected to one of the transmitting-links; a rock-shaft, and a crank-arm, and a stop constituting means for locking the doors when closed.

25. In a hopper-door-operating mechanism, the combination with doors, of angle-levers for operating the doors, adjustable rods between the angle-levers and the doors, an operator for the angle-levers, and means to cause the angle-levers to describe a greater arc than the operator.

26. In a hopper-door-operating mechanism, the combination with a series of doors, of connected angle-levers for operating said series, connections between angle-levers and doors, an operator for the connected angle-levers, and rods to cause the angle-levers to describe a greater arc than the operator.

27. In a hopper-door-operating mechanism, the combination with doors, of door-operating mechanisms, the mechanisms comprising sets of angle-levers, links and radius-bars, rods between said sets to form a train, an operator for said train, said radius-bars through the transmitting-links compelling the angle-levers to rotate farther than the operator.

28. In hopper-door-operating mechanism, the combination with doors of a plurality of door-operating mechanisms, the mechanisms comprising angle-levers, links and radius-bars, rods between said mechanisms to form a train, an operator for said train, said radius-bars through the transmitting-links compelling the mechanisms to rotate farther than the operator.

29. In a hopper-door-operating mechanism, the combination with doors, of a plurality of door-operating mechanisms comprising angle-levers, door-connecting links, transmitting-links and means for causing the outer end of the transmitting-links to prescribe a curved path, rods between said mechanisms, an operator for the connected mechanism, said means through the transmitting-links compelling the angle-levers to rotate farther than the operator.

30. In a car-hopper-door-operating mechanism, the combination with doors, of a train of door-operating mechanisms, said mechanisms comprising angle-levers pivoted to the car-body, door-connecting links, transmitting-links pivoted to said angle-levers, radius-bars pivoted to the car-body and eccentrically to the pivotal axes of the angle-levers, the other end of which is pivoted to the outer end of the transmitting-links, adjustable links connecting said mechanism, an operator consisting of a crank-shaft and bar connected to the train, the operating mechanism being such that the angle-levers travel farther than the operator.

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 13th day of April, 1904.

SINCLAIR J. JOHNSON.

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