

No. 755,671.

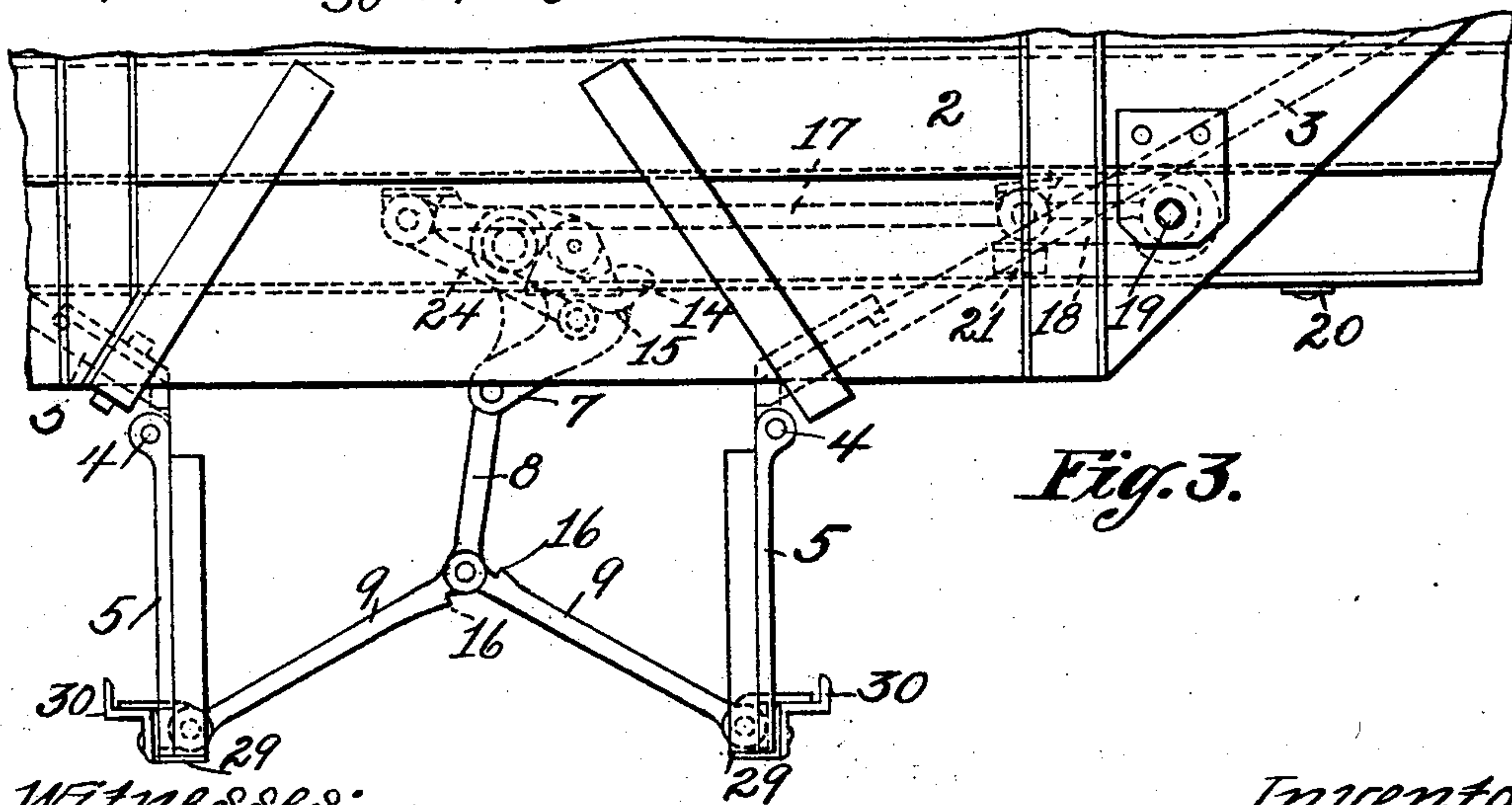
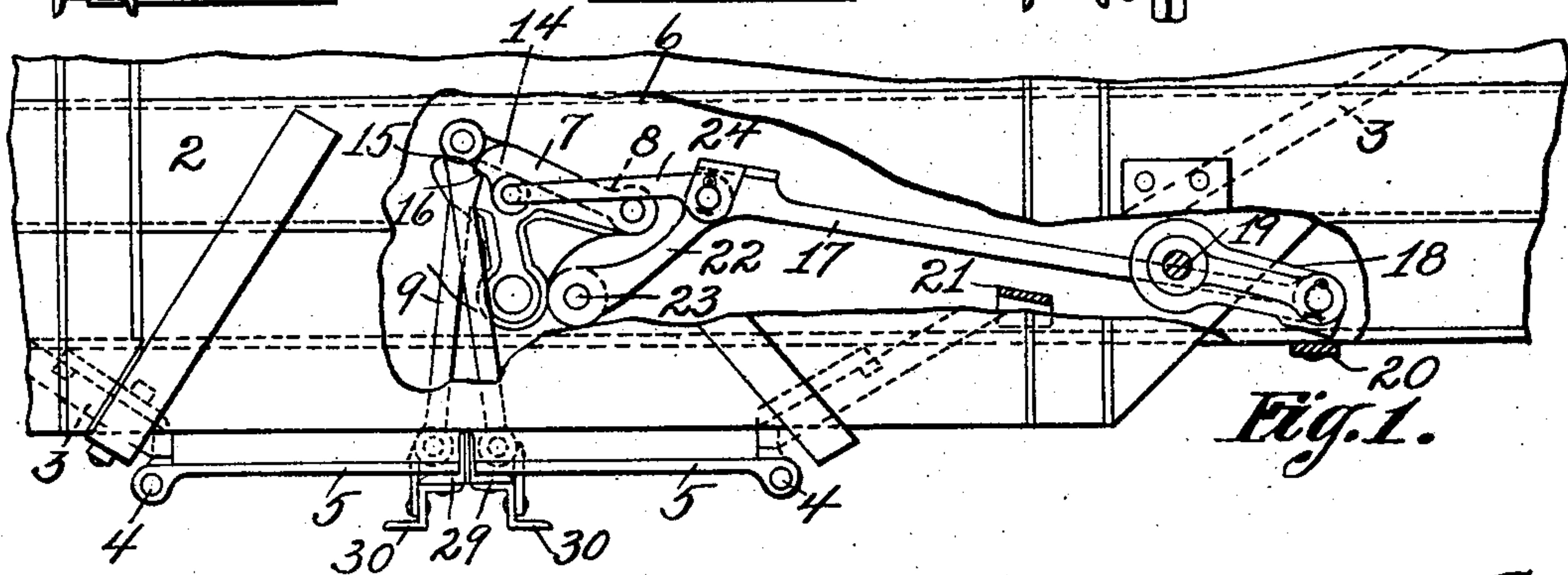
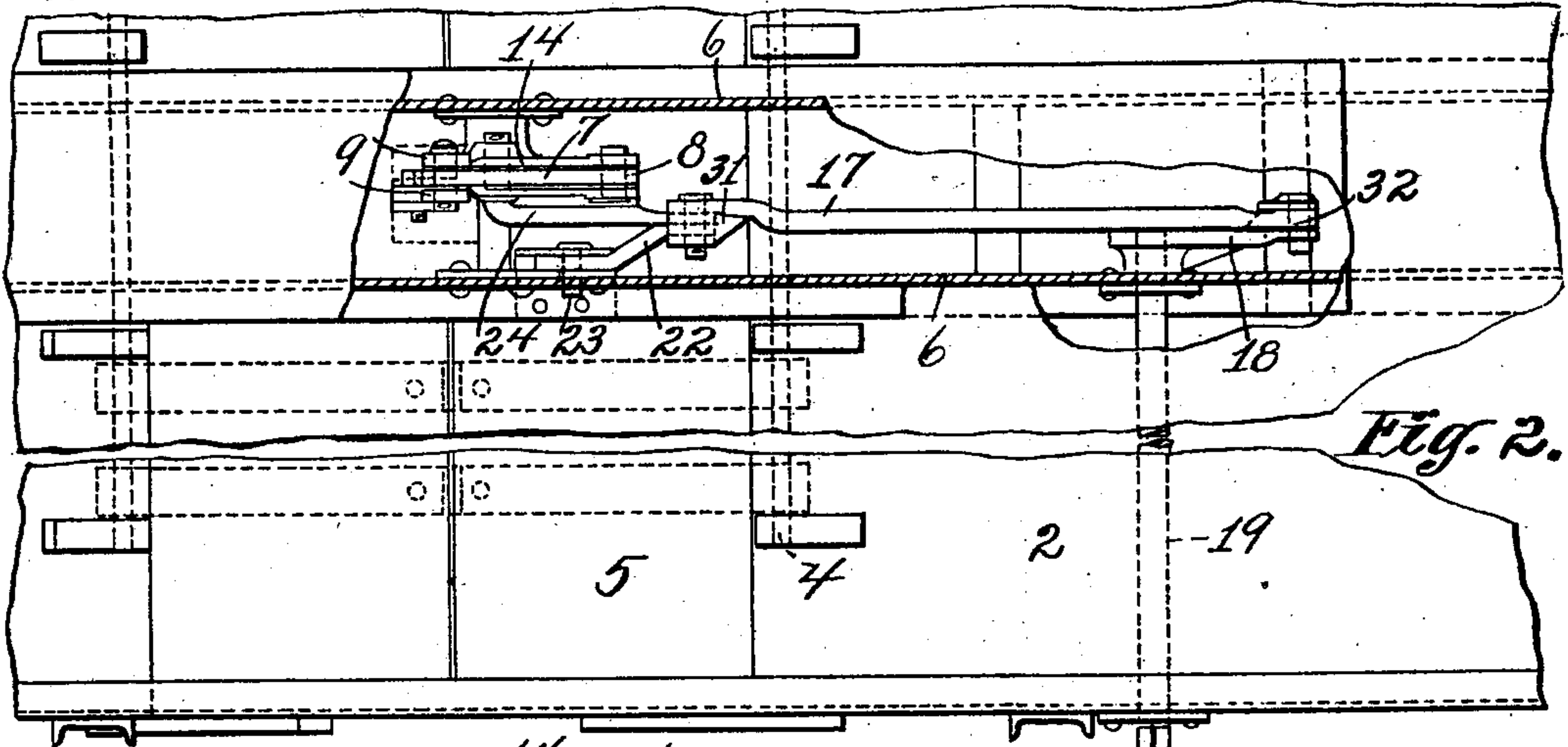
PATENTED MAR. 29, 1904.

S. J. JOHNSON.
OPERATING MECHANISM FOR DUMPING CARS.

APPLICATION FILED FEB. 1, 1904.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses:

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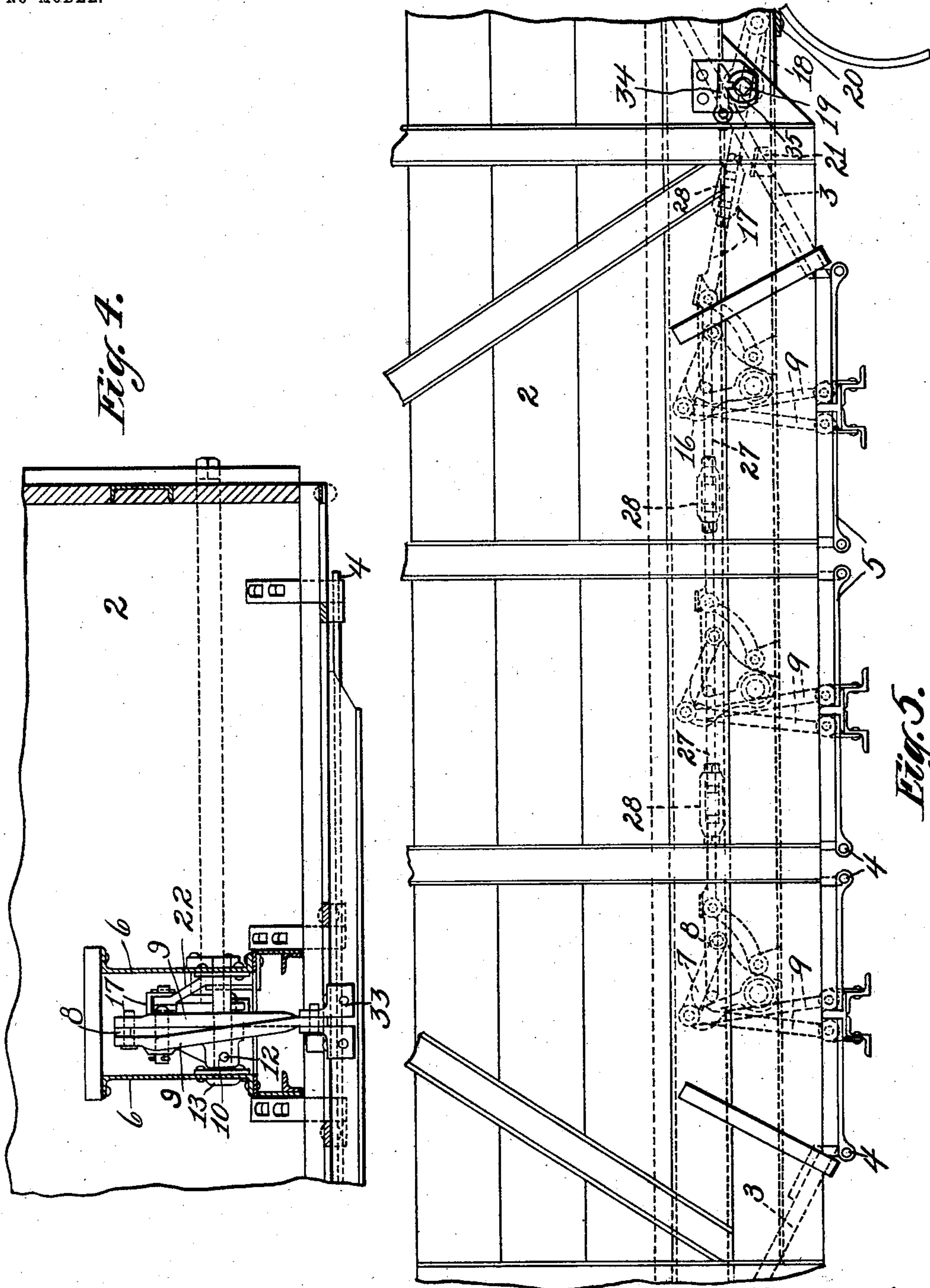
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

SINCLAIR J. JOHNSON, OF MONTCLAIR, NEW JERSEY.

OPERATING MECHANISM FOR DUMPING-CARS.

SPECIFICATION forming part of Letters Patent No. 755,671, dated March 29, 1904.

Application filed February 1, 1904. Serial No. 191,458. (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 the door or 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 a rod as distinguished from one or more chains for transmitting motion from the operating-crank to the links and levers whose movements control the swinging of the doors.

A mechanism for operating the doors (one or more) of a dumping-car and which is constructed in accordance with my present improvement is characterized by the fact that a comparatively small movement or travel of the aforesaid operating-rod suffices to swing the doors from their closed to their open position, and vice versa, while the relative positions assumed by the parts suffices 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 the drawings accompanying the present specification, Figure 1 is a side elevation of a car, portions being broken away the better to show parts beyond, the doors being indicated in their closed position and the operating parts in their corresponding relative position. Fig. 2 is a plan view of the parts as indicated in Fig. 1, portions being broken away. Fig. 3 is a view similar to Fig. 1, but illustrates the doors as open, with the operating mechanism in the position assumed when the doors are fully open. Fig. 4 is a cross-sectional view of a car representing an elevation of the operating mechanism. Fig. 5 is a view upon a somewhat smaller scale than the other figures, illustrating the application of the present invention to a car having a plurality of sets of dumping-doors and indicating means embodying the present invention for operating all of the doors in unison.

Similar characters of reference designate corresponding parts in all figures.

The particular type of dumping-car to which the present improvements are applied is one having a hopper-bottom closed by a pair of doors consisting of two oppositely-swinging leaves, to each of which is pivoted an operating-link connected at their adjacent ends by a suspension-link, this latter connecting with the operating mechanism in a manner that will presently be described. Such being the means used in the present instance for swinging the doors and a central location of the suspension-rod being adopted, the mechanism for actuating the latter is likewise preferably located centrally—that is, substantially midway between the opposite sides of the car, and here shown as being between the longitudinal center sills of the latter. These sills constitute a shield for protecting the mechanism and preventing the load from interfering therewith, it being here remarked that the operating-rod for actuating the links and levers comprised in such mechanism is extended longitudinally of the car and between said longitudinal sills thereof to a point adjacent to one end or the other of the car, where it may be operated

from the exterior of the car without interfering in any manner whatsoever with the loading-space. In order, moreover, that the height of such longitudinal sills—that is, the portion
 5 of the loading-space occupied thereby—may be reduced to a minimum, the levers and links comprised in the operating mechanism are of such relation and organization as to require a minimum vertical height for their play, as will
 10 be evident from the description hereinafter given.

Referring in detail to the drawings, the car-body is designated in Figs. 1, 2, 3, and 4 by 2, the same having a hopper-shaped bottom
 15 formed by slanting ends 3 3, at the lower end of each of which is hinged by a pivot 4 the half-leaf 5 of the door. The center longitudinal sills aforesaid of the car are designated by 6. Mounted to turn on an axis, preferably
 20 between the longitudinal sills and above the meeting-line of the closed doors, is an angle-lever 7, to which are pivoted the links 8 and 24. The suspension-link 8 is jointed at its free end to the contiguous ends of a pair of
 25 links 9 9, each of which at its lower end is pivotally jointed to the corresponding leaf 5 of the doors by lugs 33 at a point substantially midway thereacross. The mounting of this lever between the sills may comprise a hub 10 on the
 30 side of the lever, through the bore of which hub a pin extends. This pin is long enough to reach across from sill to sill and through openings cut therein, it being fastened, as by a cross-pin 12, to the hub of the lever. The hub, in
 35 conjunction with the head 13 of the pin, prevents the lateral displacement of the lever during the turning thereof. A considerable vertical movement of the joint between the links 9 9 and the suspension-link 8 is necessary to
 40 shift the two parts of the door from their position as indicated in Fig. 3 to their position as indicated in Fig. 1—that is, from a substantially vertical position of the door parts to a substantially horizontal position thereof. In order to
 45 effect a total amount of such movement with an angle-lever of comparatively small maximum radial dimension, I so organize the links 9 9, the suspension-link 8, and the lever 7 that during the latter portion of the upward move-
 50 ment of the doors from the position in Fig. 3 to the position in Fig. 1 the suspension-link 8 will come to rest upon the angle-lever 7 some time before the joint between such link and the links 9 9 reaches the highest point of its
 55 path of travel. During the angular movement of the angle-lever thereafter and while the closing movement of the doors is taking place the continued turning of the angle-lever will swing the suspension-link 8 bodily around
 60 the center of the angle-lever 7 and the aforesaid joint upward. During the reverse turning of the angle-lever this motion is of course reversed. The suspension-link 8 remains folded in contact with the angle-lever as long
 65 as the doors remain closed, and the lever may

be provided with a concave or hollowed-out portion 14 to receive and constitute a seat for the joint between the links, while to minimize the tendency of the weight of the doors and the load thereupon to swing the doors down-
 70 ward the center line of effort exerted by the links 9 9 upon the angle-lever 7 when the doors are closed preferably passes comparatively close to the pivotal axis of the angle-lever. When the doors are closed, a lug or projec-
 75 tion 15 upon the angle-lever is adapted to cooperate 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
 80 will lie contiguous to, if not quite in contact with, the lug 15 upon the angle-lever. The cooperating lugs thus constitute a lock for locking the doors against any further upward
 85 movement when closed, and when the angle-lever is turned an initiating movement of the links 9 9 results.

It has already been stated that the means for actuating the operating mechanism comprises a longitudinal bar, this bar serving in
 90 this instance to turn the angle-lever 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
 95 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
 100 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
 105 to it a suitable operating-crank 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
 110 the rock-arm or an appurtenance thereof is arrested by a stop 20 the center line 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
 115 the rock-arms swung to the position in which its said center line is substantially a prolongation of its center line in the position in Fig. 1, (see Fig. 2,) its movement is arrested by a
 120 suitable stop 21.

In order that the movement of the rock-arm 18 through substantially one hundred and eighty degrees shall effect the movement of the angle-lever 7 through the extended arc
 125 necessary for the full opening and closing of the doors, (which in this instance is an arc of considerably greater angular measure than that through which the rock-arm 15 swings,) I employ in this instance as a transmitting
 130 means a jointed frame or lever, to which the

operating-arm is connected, this frame having two axes of oscillation, one upon the angle-lever and one fixed relatively to the car.

The proportions, positions of the pivotal axes, and organization is such that this jointed frame will effect the movement of the angle-lever through the arc necessary to position the doors as aforesaid. In the specific construction of such frame illustrated the same comprises a radius-bar 22, pivotally mounted upon a pin 23, extending from one of the longitudinal sills, and to the outer or swinging end of which radius-bar the operating-rod 17 is pivoted. Between such joint and a proper point on the angle-lever 7 (to which latter it is pivotally connected) is a link 24, which under the control of the radius-bar 22 serves to transmit the push and pull of the operating-bar to the angle-lever. The position on the radius-bar at the opposite extremes of its movement is indicated in the two views Figs. 1 and 2, respectively, while the path traveled by the transmitting-link 24 during the movement of the radius-bar from one extreme position to the other is apparent by comparing the relative positions of such transmitting-link in Figs. 1 and 3. The joint between the operating-rod, transmitting-link, and radius-bar is thus compelled to travel in a circular arc which is eccentric to the axis about which the angle-lever turns, and this eccentricity, in connection with the other construction described, effects the necessary and proper movement.

It will be observed that the radius-bar in neither of its extreme positions prevents the movement of the operating-bar, but that when it is in either such position the operating-bar can operate at an advantageous leverage to turn the radius-bar. It will be further apparent that as the operating-bar is drawn backward to shift the doors from the position indicated in Fig. 3 to that indicated in Fig. 1 the transmitting-link approaches more nearly a vertical position and more nearly tangential to the arc described by the point of its connection with the angle-lever. In other words, as the doors approach their closed position the transmitting-link operates with increased advantage or leverage to turn the angle-lever.

Obviously the same system of operation may be applied to the opening and closing of any number of doors controlling, for instance, the discharge from a number of hoppers at the bottom of the car, since all that is necessary is the connection of the joint between the radius-bar and transmitting-link of one mechanism with the corresponding joint of another operating mechanism. Such an application is indicated in Fig. 5, in which parts corresponding to those already described with reference to the preceding figures are given like characters of reference. Suffice it here to say with reference to Fig. 5 that between the aforesaid joints of adjacent pairs of operating mechanisms there extends a transmitting-bar 27,

(which may have a turnbuckle 28 for purposes of adjustment,) pivoted at opposite ends to the aforesaid joints. A pawl 34 and a ratchet 35 may be used as a safety-lock. (See, for instance, Fig. 5.)

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.

Having described my invention, I claim—

1. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door having a linked connection with said lever, of a lever fulcrumed eccentrically of the fulcrum-axis of the angle-lever and means for operating said eccentrically-fulcrumed lever and for transmitting motion to said angle-lever.

2. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door having a linked connection with said lever, of a transmitting-link pivoted to said angle-lever, means pivoted eccentrically to the angle-lever, for causing the outer end of said transmitting-link to travel in a prescribed path and an operating-bar for the link.

3. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door having a linked connection with said lever, of a transmitting-link pivoted to said angle-lever, means for causing the outer end of said transmitting-link to travel in a prescribed curved path, and an operating-bar for the link.

4. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, a transmitting-link pivoted to said angle-lever, means for causing the outer end of said transmitting-link to travel in a prescribed path, and an operating-bar for the link.

5. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, means for causing the outer end of said transmitting-link to travel in a prescribed path, and an operating-bar for the link.

6. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, a radius-bar for causing the outer end of said trans-

mitting-link to travel in a prescribed path, and an operating-bar for the link.

7. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, and means for causing the outer end of said transmitting-link to travel in a prescribed path, and cooperating projections on the angle-lever and the links pivoted thereto.

8. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, and means for causing the outer end of said transmitting-link to travel in a prescribed path, and an operating-bar extending longitudinally of the car and crank-connected at its end to a rock-shaft.

9. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to fold onto and come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, and a radius-bar for causing the outer end of said transmitting-link to travel in a prescribed path, and an operating-bar extending longitudinally of the car and crank-connected at its end to a rock-shaft.

10. In a hopper-door-operating mechanism, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, and means for causing the outer end of said transmitting-link to travel in a prescribed path, and cooperating projections on the angle-lever and the lever pivoted thereto, and an operating-bar extending longitudinally of the car and crank-connected at its end to a rock-shaft.

11. In a mechanism of the class described, the combination of a pair of hinged doors, links pivoted to the swinging edges of each, a suspension-link to whose end said first-mentioned links are pivoted, an angle-lever to which said suspension-link is pivoted and which is adapted to contact and by which it may be bodily swung, a jointed frame comprising a transmitting-link pivoted to said angle-lever and a radius-bar pivoted to a fixed

point and an operating-bar extending between sills of the car.

12. In a mechanism of the class described, the combination of a pair of hinged doors, links pivoted to the swinging edges of each, a suspension-link to whose end said first-mentioned links are pivoted, an angle-lever to which said suspension-link is pivoted and upon which the suspension-link is adapted to be folded and contact, and by which it may then be bodily swung, a jointed frame comprising a transmitting-link pivoted to said angle-lever and a radius-bar pivoted to a fixed point and an operating-bar extending between the center sills of the car, and cooperating projections on said angle-lever and said suspension-link.

13. In a mechanism of the character described, the combination with a fulcrumed angle-lever and a door having a linked connection with said lever, of a transmitting-link pivoted to said angle-lever, means for causing the outer end of said transmitting-link to travel in a prescribed path approaching and receding from the axis of said fulcrum-lever, an operating-rod for actuating said transmitting-link, a rock-shaft, a rock-arm extending therefrom and to which said operating-rod is secured, and a stop for limiting the movement of said rock-shaft, said operating-rod, rock-shaft, rock-arm and stop constituting means for locking the door closed.

14. In a mechanism of the character described, the combination with a fulcrumed lever and a pair of doors, of links connected to said doors, a suspension-link to which the first-mentioned links are jointed and which is pivotally connected to said lever and adapted to be bodily swung by said lever as the doors approach their closed position, a radius-arm mounted on said car, a transmitting-link connecting the outer end of said radius-arm with said fulcrumed lever, a longitudinally-extending operating-bar for swinging said transmitting-link, a rock-shaft, a rock-arm and stop constituting means for locking the door closed.

15. In a mechanism of the character described, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the link pivoted to the angle-lever being adapted to come into contact with the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, a radius-bar to which the outer end of said transmitting-link is pivoted, and an operating-bar for actuating the transmitting-link and which operating-bar is longitudinally movable in the plane of movement of the radius-bar and the transmitting-link.

16. In a mechanism of the character described, the combination with a fulcrumed angle-lever and a door, of a pair of jointed links connecting said angle-lever with the swinging edge of the door, the end of the link pivoted

to the angle-lever being adapted to come into contact with and rest upon a seat on the lever and be bodily swung thereby, a transmitting-link pivoted to said angle-lever, a radius-bar to which the outer end of said transmitting-link is pivoted, and an operating-bar for actuating the transmitting-link and which operating-bar is longitudinally movable in the plane of movement of the radius-bar and the transmitting-link.

17. In a mechanism of the character described, the combination with a door, a rotatably-mounted member connected therewith, a transmitting-link pivoted to said member, a radius-bar for causing the outer end of said transmitting-link to travel in a prescribed path, and an operating-bar for the link.

18. In a mechanism of the character described, the combination of a door, a fulcrumed angle-lever connected therewith, a transmitting-link pivoted to said lever, a radius-bar for causing the outer end of said transmitting-link to travel in a prescribed path, and an operating-bar for the link.

19. In a mechanism of the character described, the combination with a rotatable member and a door connected therewith, of a link one of whose ends is pivoted to said member, pivoted means for compelling the outer end

of said link to travel in a prescribed path, the axis of said pivoted means being eccentric to the axis of said rotatable member, and an operating-bar for the link.

20. In a mechanism of the character described, the combination with an angle-lever, and a door connected therewith, of a link one of whose ends is pivoted to said member, pivoted means for compelling the outer end of said link to travel in a prescribed path, the axis of said pivoted means being eccentric to the axis of the angle-lever, and an operating-bar for the link.

21. In a mechanism of the character described, the combination with a rotatable member and a door connected therewith, of a link one of whose ends is pivoted to said member, pivoted instrumentalities for compelling the outer end of said link to travel in a prescribed path, the axis of said movable members being eccentrically located, and an operating-bar for the link.

Signed at Nos. 9 to 15 Murray street, New York, N. Y., this 28th day of January, 1904.

SINCLAIR J. JOHNSON.

Witnesses:

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PIERSON L. WELLS.