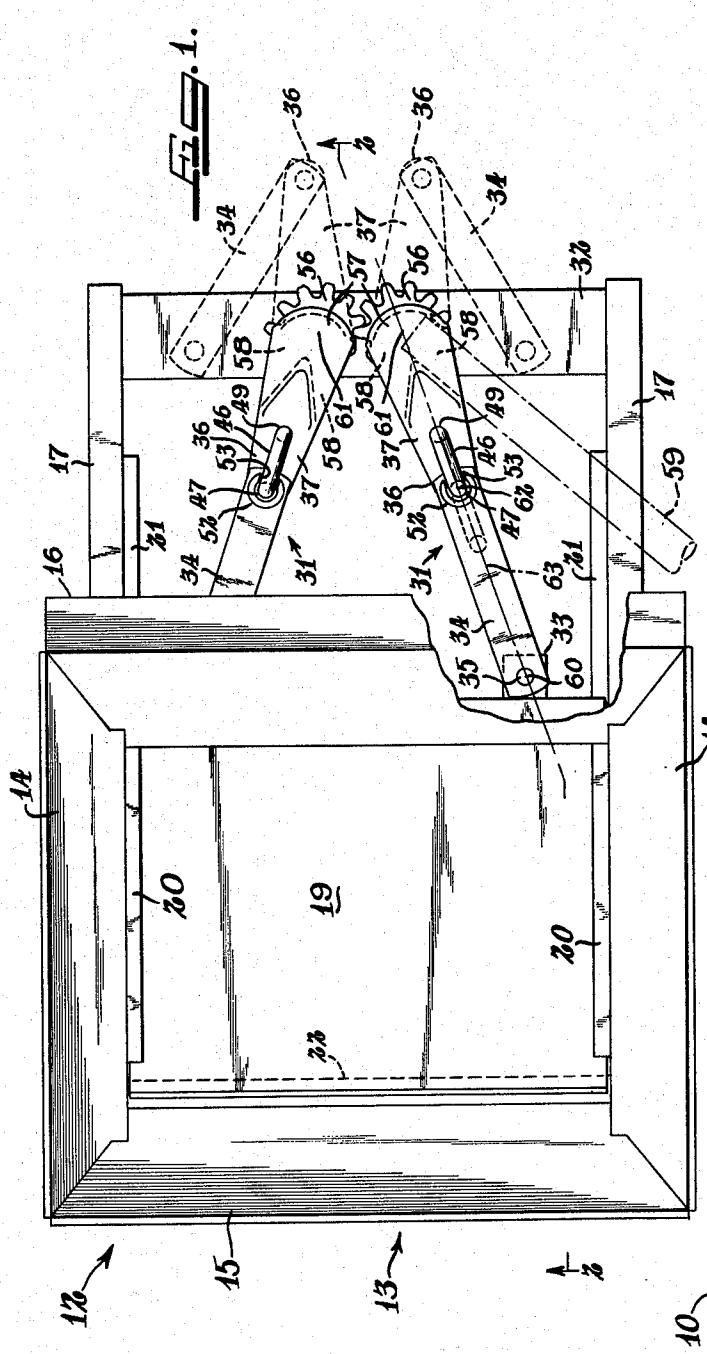
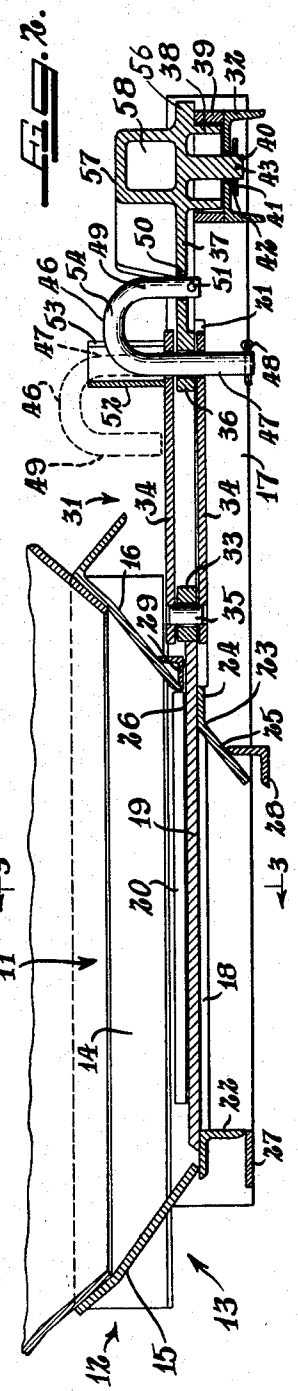
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DISCHARGE OUTLET ASSEMBLY FOR HOPPER CAR

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DISCHARGE OUTLET ASSEMBLY FOR HOPPER CAR

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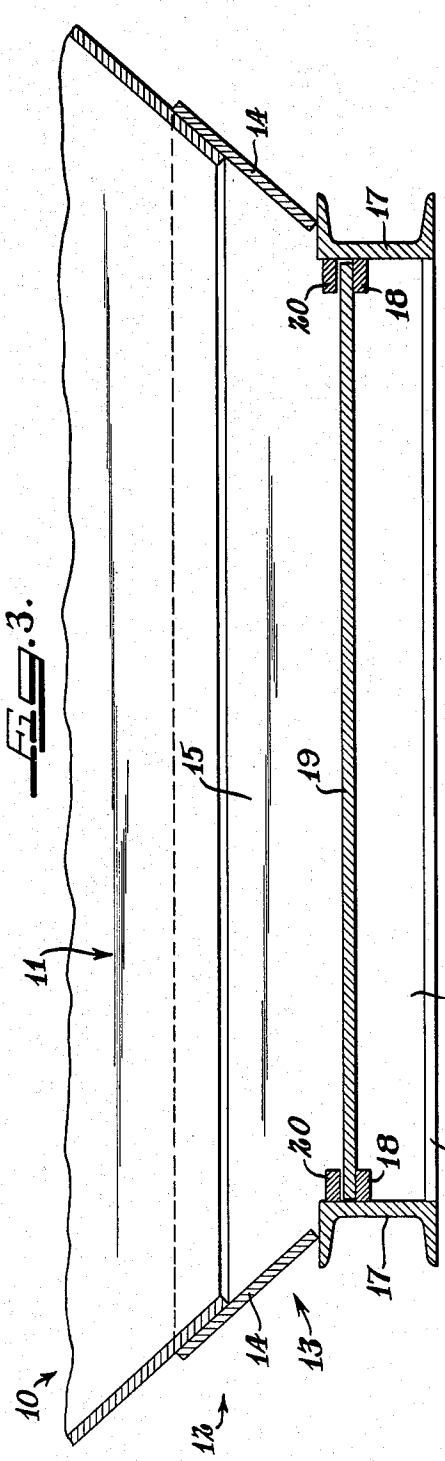


FIG. 3.

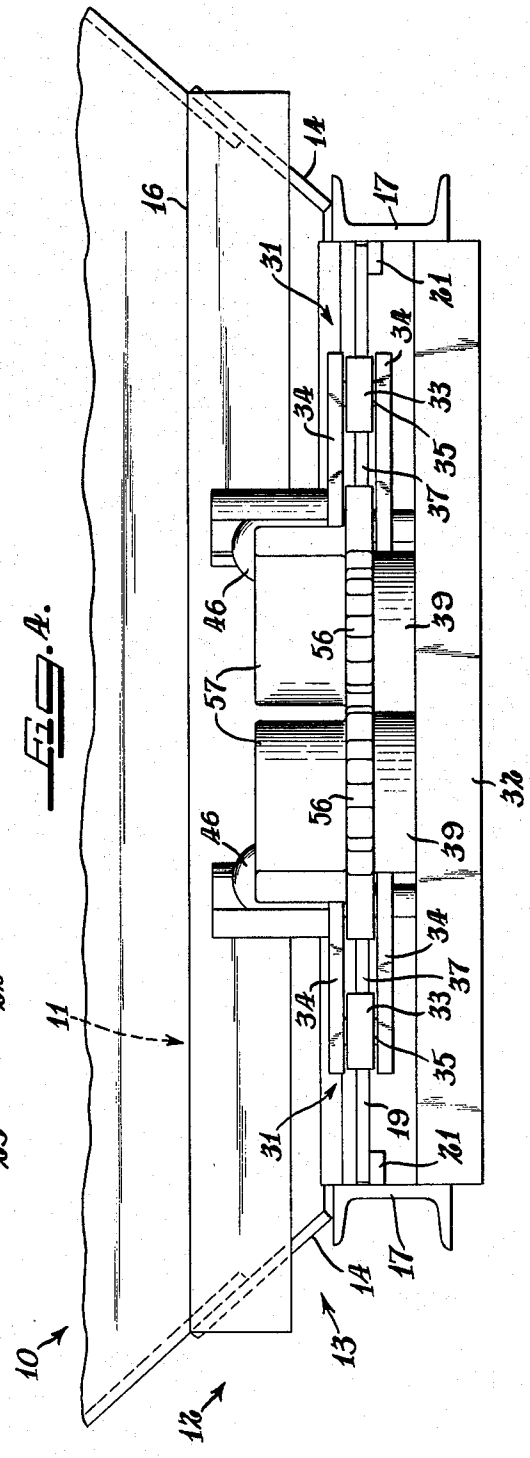


FIG. 4.

United States Patent Office 3,183,852 Patented May 18, 1965

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DISCHARGE OUTLET ASSEMBLY FOR HOPPER CAR

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Filed Aug. 21, 1963, Ser. No. 303,641
9 Claims. (Cl. 105—282)

This invention relates to an improved hopper discharge outlet for covered hopper cars which have sliding gate openings at the bottom.

A primary object of this invention is, among others, to provide improved rotatable crank arm and connecting linkage mechanism for moving a sliding gate.

Another object of this invention is to provide an improved door and linkage means which permits the use of a minimum number of parts.

Still another object of this invention is to provide a door actuating linkage means which allows full use of the mechanical advantage of the linkage for pulling the gate open by positioning the linkage such that rotation thereof causes a force to be transmitted to the door in the plane of its movement, for example in a horizontal plane, in contradistinction to conventional constructions in which the linkage arrangement rotates in a plane normal to the plane of movement of the door, thus tending to lift the gate off its ways while opening and causing excessive frictional contact between the top of the gate and the associated closure surfaces. This lifting tendency causes the conventional gate to become inoperative when commodities, such as cement and other of like nature which tend to compact, are handled. This is due to the fact that the mechanism tends to lift the gate against the compacted commodity while it is being drawn open. When the present invention is employed, the gate can be used with cement and other like commodities since the operating linkage tends to move the gate only in its direction of opening and does not tend to lift it against the lading, such as a compacted material. The conventional linkage operated gate requires a guide lug for the purpose of limiting the lifting movement above referred to. The conventional rack and pinion operated gate also requires this construction. The reason for this is that both mechanisms tend to exert upward forces against the gate tending to lift it off the ways and sealing surfaces and to move it against the lading which, when it comprises a compacted material, makes it difficult to slide the gate to the open position. This lifting tendency in conventional constructions has been one of the greatest difficulties to be overcome. The present invention accomplishes this by not applying any lifting action to the gate and thus obviating the necessity for a guide lug.

A still further object of this invention is to provide an improved locking means for slide gates operated by a linkage.

A still further object of this invention is to provide a hopper outlet construction that is relatively simple and economical to manufacture and which can be readily installed and operated.

In the drawings:

FIG. 1 is a top plan view of a discharge outlet assembly embodying the present invention.

FIG. 2 is a vertical sectional view taken generally along the line 2—2 of FIG. 1 and showing how the discharge outlet assembly of the present invention is applied to a four sided center discharge hopper of a railway car.

FIG. 3 is a vertical sectional view taken generally along the line 3—3 of FIG. 2.

FIG. 4 is a view, in end elevation, of the construction shown in FIG. 2, the view being taken looking from right to left.

Referring now to the drawings, it will be observed that the reference character 10 designates, generally, a center discharge hopper for a railway car which defines a four sided discharge opening 11. It will be understood that the present invention can be applied to a railway car having hoppers located on opposite sides of its center sill.

Surrounding the discharge opening 11 provided by the center discharge hopper 10 is a discharge outlet assembly that is indicated, generally at 12. The discharge outlet assembly 12 includes a rectangular frame, indicated generally at 13, which overlies the outer lower margins of the walls of the center discharge hopper 10 and is suitably secured thereto as by welding. In order to show the invention more clearly in the drawings the various welds are omitted.

The rectangular frame 13 includes inclined side plates 14—14 that are formed of steel plate. Also the rectangular frame 13 includes an end plate 15 at one end and an angle member 16 at the other end. Secured to and located below the lower margins of the inclined side plates 14—14 are channel members 17—17 which extend a substantial distance beyond the angle member 16. The channel members 17—17 are formed of rolled steel channel sections which can be readily welded to the inclined side plates 14—14 and to other parts of the construction.

Secured to and extending inwardly from the vertical webs of the channel members 17—17 are ways 18—18 on the upper sides of which a gate 19 in the form of a steel plate is slidable. Guide flanges 20—20 overlie the margins of the gate 19 and are secured to the inner sides of the webs of the channel members 17—17 for guiding the gate 19 along the ways 18—18 and preventing its upward movement in the absence of lading. Extensions 21—21 of the ways 18—18 are carried by the inner sides of the webs of the channel members 17—17 outwardly of the angle member 16 for supporting the gate 19 when it is moved to the open position.

At its forward or leading edge the gate 19 in closed position bears against a transverse angle 22 which is secured to the lower margin of the end plate 15 in the relationship shown in FIG. 2. Opposite the transverse angle 22 is a transverse plate 23 having a flat upper section 24 on which the gate 19 slides between closed and open position. The transverse plate 23 also includes an inclined lower section 25 for directing lading downwardly from the angle member 16. A slot 26 is provided between the lower margin of the angle member 16 and the upper side of the flat upper section 24 through which the gate 19 is slidable.

With a view to holding a discharge chute (not shown) a transverse plate 27 is secured to and extends along the depending flange of the transverse angle 22. The transverse plate 27 is secured at its ends to the inner sides of the webs of the channel members 17—17. A transverse angle 28 is secured to and extends underneath the inclined lower section 25 of the transverse plate 23 for receiving a lip of the discharge chute.

The lower margin of the angle member 16 immediately above the slot 26 is reinforced by a reinforcing angle 29.

With a view to sliding the gate 19 between the closed and open position operating linkages 31—31 are provided. Attention is directed to the fact that the operating linkages 31—31 are arranged and constructed to operate substantially in the plane of movement of the gate 19. Because of this arrangement, forces are applied to the gate 19 for moving it to the open or closed position only in the plane of movement. Thus there is no tendency for the gate 19 to cant or lift off of the ways 18—18. The operating linkages 31—31 are positioned between the

trailing or rear edge of the gate 19 which projects through the slot 26 and a transverse channel 32 which is secured at its ends to the inner sides of the webs of the channel members 17—17. As seen in FIG. 2 the transverse channel 32 opens downwardly and it has its web uppermost and horizontally positioned.

In order to provide for connecting the operating linkages 31—31 to the trailing or rear edge of the gate 19 it is provided with laterally extending lugs 33—33 to which pairs of links 34—34 are pivoted by pivot pins 35—35. The upper and lower ends of the pivot pins 35—35 are welded to the links 34—34 to provide an integral construction.

The other ends of the links 34—34 are pivoted to distal ends 36—36 of crank arms 37—37 which, as seen in FIG. 2, are provided with depending annular flanges, one being shown at 38, which telescope with tubular bearings 39—39 carried by the upper side of the web of the transverse channel 32. Each crank arm 37 has a depending central stud 40 that extends through an opening 41 in the web of the transverse channel 32 and also through a washer 42 which is held in place by a cotter pin 43.

The distal ends 36—36 of the crank arms 37—37 can be connected to the respective links 34—34 by pivot pins similar to the pivot pins 35—35. However, it is desirable that provision be made for disassembling the operating linkages 31—31 to permit removal of the gate 19. Accordingly, the pivotal connections between the crank arms 37—37 and the pairs of links 34—34 are provided by J-shaped locking members 46—46. As seen in FIG. 2 it will be noted that each J-shaped locking member 46 has a longer arm 47 that provides the pivotal connection between the respective crank arm 37 and links 34—34. The longer arm 47 extends a substantial distance below the lower link 34 and a cotter pin 48 extends therethrough to prevent withdrawal when the J-shaped locking member 46 is lifted to the unlocked position shown by broken lines in FIG. 2. The shorter arm 49 of the J-shaped locking member 46 in the locked position extends downwardly through an opening 50 in the respective crank arm 37. A transverse opening 51 is provided in the lower end of the shorter arm 49 to receive a sealing ribbon in accordance with conventional practice. The longer arm 47 of the J-shaped locking member 46 is movable endwise in a tube 52 that is carried by and fixed against rotation on the respective upper link 34 and it has a slot 53 through which the bight 54 of the J-shaped locking member 46 extends in the locking position. In order to unlock the J-shaped locking member 46, the sealing ribbon in the opening 51 is removed. Then the locking member 46 is moved upwardly until the bight 54 clears the upper end of the tube 52. Then it is rotated to the position shown by broken lines where it is held in the unlocked position.

If two J-shaped locking members 46 are employed, they are moved to the locked position and sealed in the manner described. Likewise they are unlocked and moved to the unlocked positions in order to permit operation of the gate 19 through the operating linkages 31—31. If desired, only a single J-shaped locking member 46 can be employed for one of the operating linkages 31. The pivotal connection between the crank arm 37 and the links 34—34 of the other operating linkage 31 can be provided by a pivot pin similar to the pivot pin 345 as above pointed out.

In order to effect conjoint movement of the operating linkages 31—31 gear sectors 56—56 are formed integrally with the crank arms 37—37 and their teeth are in meshing engagement as seen in FIG. 1. Thus, when one of the crank arms 37 is rotated, the other crank arm 37 is rotated in the opposite direction. To facilitate such rotation each of the crank arms 37 is provided with an operating handle 57 as an integral part. Each operating handle 57 has inclined operating bar receiving sockets 58—58 into one of which a removable operating bar 59, shown by broken lines in FIG. 1, is arranged to be inserted. The operating bar 59 is swingable in a plane above the plane of

movement of the gate 19 and above the plane of movement of the operating linkages 31—31. This makes it possible to transmit the entire operating force applied to the outer end of the operating bar 59 to the operating linkages 31—31 in contradistinction to other types of operating mechanisms in which the operating bar is inserted at an angle to the plane of rotation of the member that is arranged to be rotated by the operating bar. Since the operating bar 59 is arranged to extend in a horizontal plane, it is unnecessary to give consideration to any likelihood of interference with the depending sides of the center discharge hopper 10 or other parts of the car located above the plane of movement of the operating bar 59.

Attention is directed to the fact that the pivot axis through the pivot pin 35, FIG. 1, is indicated at 60. The pivot axis for the associated crank arm 37 is indicated at 61 which is the axis about which the gear sector 56 rotates in the bearing 39. The axis of the pivotal connection between each of the links 34—34 and its crank arm 37 is indicated at 62 which is the vertical axis of the longer arm 47 of the respective J-shaped locking member 46. It will be observed that these pivots 60, 61 and 62 are located along a straight line that is indicated by the dotted line 63. The arrangement is such that, when the gate 19 is in the fully closed position, the operating linkages 31—31 are locked with the respective pivots 60, 61 and 62 substantially in alignment or with the pivot 62 slightly past the center position along the line 63 so as to occupy an over center toggle locked position. This arrangement is advantageous in that the mechanical advantage is obtained resulting from a relatively great movement of the crank arms 37—37 which is accompanied by a relatively small movement of the gate 19 during the initial movement of the operating linkages 31—31 toward the open position or toward the final closed position. This facilitates breaking loose the gate 19 from the lading and from the ways 18—18 on which it is slidably mounted.

It will be understood that the insertion of the operating bar 59 in one of the sockets 58 makes it possible to rotate the operating linkages 31—31 and move the gate 19. For example, the operating linkages 31—31 can be operated in this manner by placing the operating bar 59 first in one of the sockets 58 and then in the other in order to move the gate 19 to the full open position where the corresponding positions of the operating linkages 31—31 are indicated by broken lines. In the opening and closing operation the force applied to the operating bar 59 reacts about one or the other of the axes or pivots 61. Since the operating bar 59 moves in a plane parallel to the plane of movement of the operating linkages 31—31 and the plane of movement of the gate 19, there is no component of force applied to the operating bar 59 that is not available to apply an opening or closing force to the gate 19 as is the case when other arrangements are employed where the operating bar 59 is inserted at an angle to the operating pivot, such as the pivot 61.

Attention is directed to the fact that the teeth of the gear sectors 56—56 are opened and have vertical faces. Any material that may settle on these faces tends to fall off or to be driven off on meshing of the teeth. Thus, there is a self-cleaning action for the teeth of the gear sectors 56—56.

What is claimed as new is:

1. A discharge outlet assembly comprising:

(*a*) an enclosure defining a discharge opening,

(*b*) a slidable gate for said opening movable from closed position through one side of said enclosure to open position beyond said one side,

(C) ways supported on opposite sides of said enclosure and extending toward each other on which said gate is slidable in a horizontal plane,

(*d*) support means mounted on and extending laterally from said enclosure in the direction of opening movement of said gate,

(*e*) a pair of crank arms mounted on said support

means to rotate about parallel vertical axes normal to said plane,

(*f*) link means individual to each crank arm pivotally connected at one end to the distal end thereof and pivotally connected at the other end to said gate, and

(*g*) means operatively interconnecting said crank arms and causing conjoint rotation thereof for moving said gate along said ways between closed and open position.

2. A discharge outlet assembly comprising:

(*a*) an enclosure defining a discharge opening,

(*b*) a slidable gate for said opening movable from closed position through one side of said enclosure to open position beyond said one side,

(*c*) ways supported on opposite sides of said enclosure and extending toward each other on which said gate is slidable in a plane,

(*d*) support means mounted on and extending laterally from said enclosure in the direction of opening movement of said gate,

(*e*) a pair of crank arms mounted on said support means to rotate about parallel axes normal to said plane,

(*f*) link means individual to each crank arm pivotally connected at one end to the distal end thereof and pivotally connected at the other end to said gate, and

(*g*) meshing gear sectors on said crank arms operatively interconnecting them and rotatable therewith about the respective axes of rotation to cause conjoint rotation thereof for moving said gate along said ways between closed and open position.

3. The invention, as set forth in claim 2, wherein the crank arms and gear sectors are substantially identical in construction.

4. A discharge outlet assembly comprising:

(*a*) an enclosure defining a discharge opening,

(*b*) a slidable gate for said opening movable from closed position through one side of said enclosure to open position beyond said one side,

(*c*) ways supported on opposite sides of said enclosure and extending toward each other on which said gate is slidable in a plane,

(*d*) support means mounted on and extending laterally from said enclosure in the direction of opening movement of said gate,

(*e*) a pair of crank arms mounted on said support means to rotate about parallel axes normal to said plane,

(*f*) link means individual to each crank arm pivotally connected at one end to the distal end thereof and pivotally connected at the other end to said gate, and

(*g*) means operatively interconnecting said crank arms and causing conjoint rotation thereof for moving said gate along said ways between closed and open position,

(*h*) said crank arms and link means being rotatable generally in the plane of movement of said gate and the force for moving said gate being confined to said plane.

5. The invention, as set forth in claim 4, wherein each link means comprises a pair of links with the distal end of the respective crank arm therebetween at one end and a lug extending from the gate therebetween at the other end.

6. The invention, as set forth in claim 4, wherein at least one of said crank arms is provided with an operating bar receiving handle having at least one operating bar receiving socket for an operating bar movable generally in a plane parallel to the plane of movement of the gate and about the axis of rotation of the respective crank arm.

7. A discharge outlet assembly comprising:

(*a*) an enclosure defining a discharge opening,

(*b*) a slidable gate for said opening movable from closed position through one side of said enclosure to open position beyond said one side,

(*c*) ways supported on opposite sides of said enclosure and extending toward each other on which said gate is slidable in a plane,

(*d*) support means mounted on and extending laterally from said enclosure in the direction of opening movement of said gate,

(*e*) a pair of crank arms mounted on said support means to rotate about parallel axes normal to said plane,

(*f*) link means individual to each crank arm pivotally connected at one end to the distal end thereof and pivotally connected at the other end to said gate,

(*g*) means operatively interconnecting said crank arms and causing conjoint rotation thereof for moving said gate along said ways between closed and open position, and

(*h*) locking means operatively interconnecting at least one of said crank arms and the link means individual thereto and preventing relative movement therebetween when said gate is in closed position.

8. The invention, as set forth in claim 7, wherein the locking means comprises an inverted J-shaped member the longer arm of which constitutes the pivotal connection between the crank arm and its link means and is slidable endwise while the shorter arm in locked position engages said crank arm.

9. The invention, as set forth in claim 8, wherein a slotted sleeve is carried by the link means in which the longer arm is endwise slidable and through the slot of which the bight of the J-shaped member extends in the locking position.

References Cited by the Examiner

UNITED STATES PATENTS

3,082,705	3/63	Dorey	105—282
3,082,706	3/63	Dorey	105—282
3,097,612	7/63	Dorey	105—282

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