June 30, 1964 W. L. FLOEHR 3,139,042

HOPPER DOOR LOCKING MECHANISM

Filed Aug. 14, 1959 4 Sheets-Sheet 1

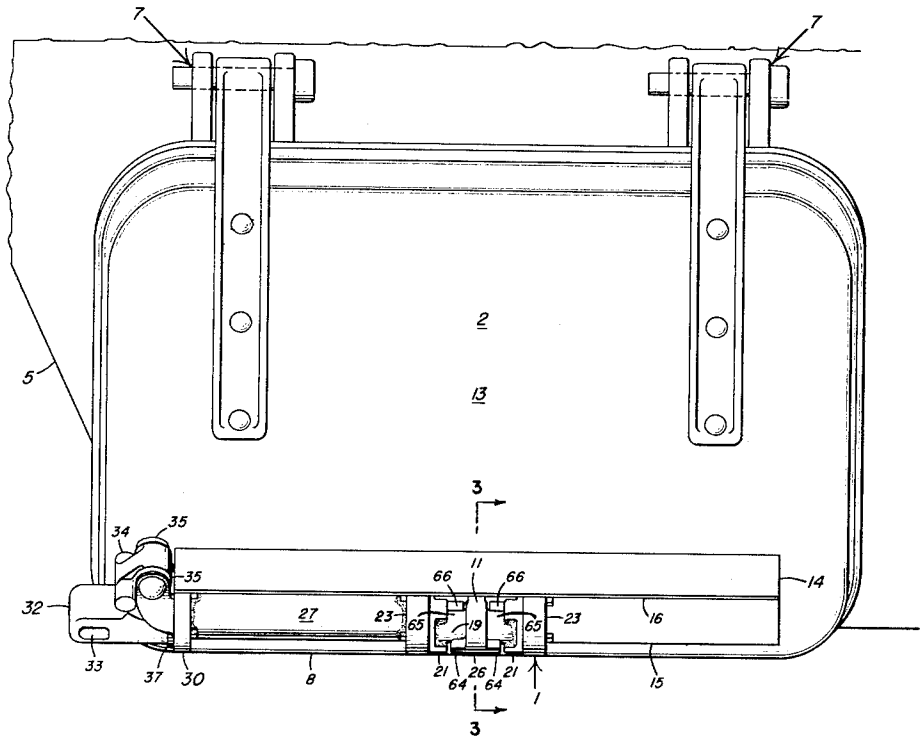


FIG. 1

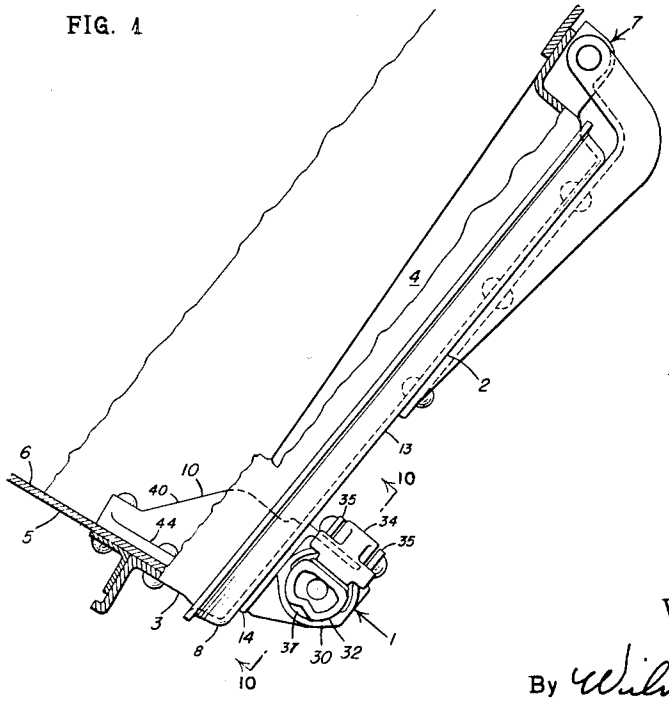


FIG. 2

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HOPPER DOOR LOCKING MECHANISM

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FIG. 3

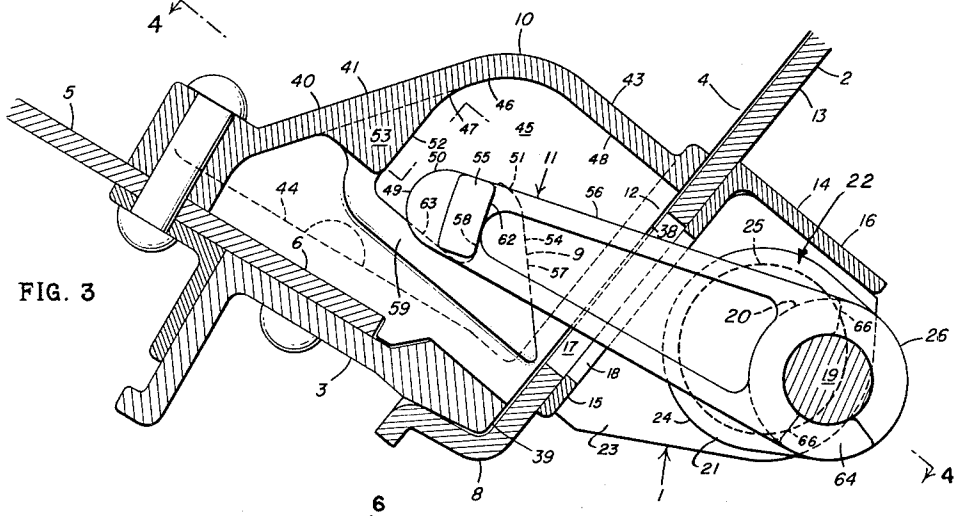


FIG. 4

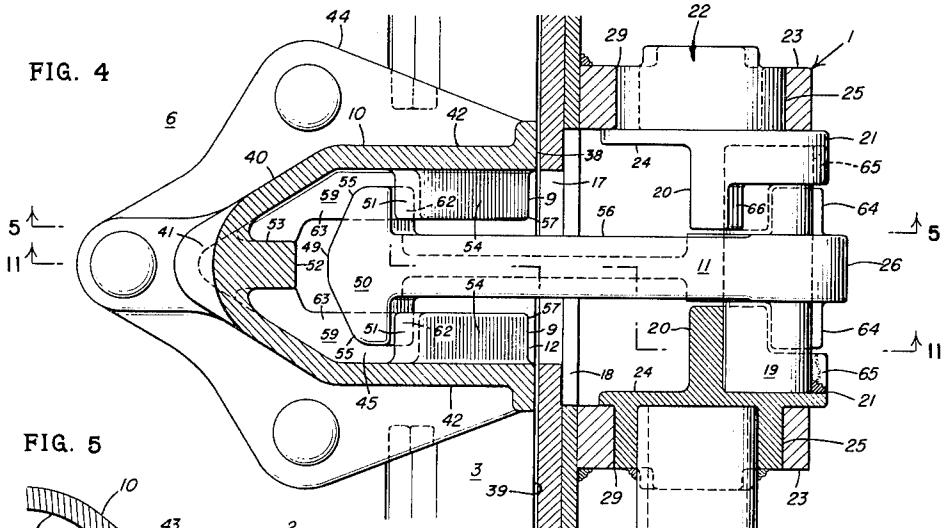
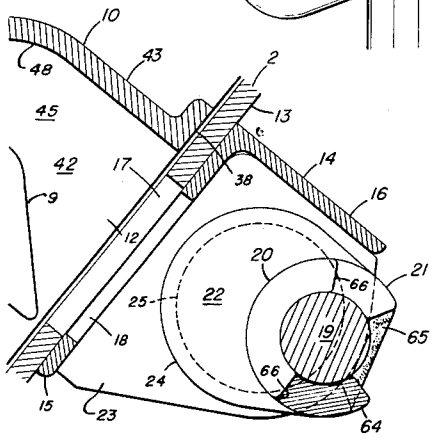


FIG. 5



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HOPPER DOOR LOCKING MECHANISM

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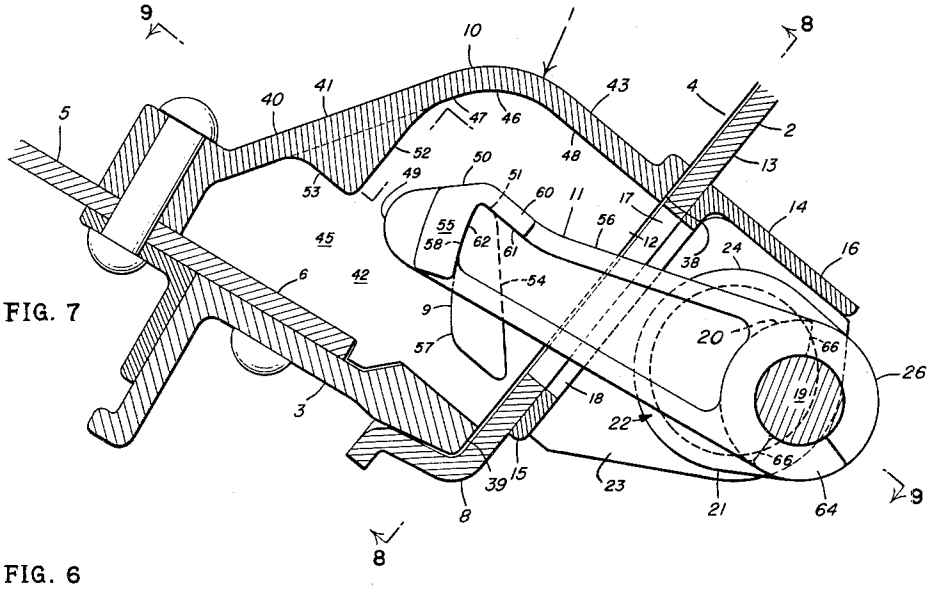


FIG. 7

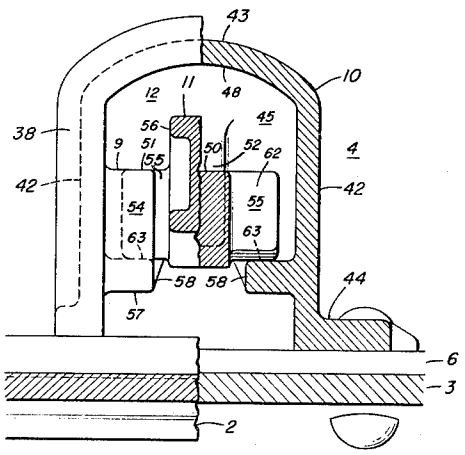


FIG. 6

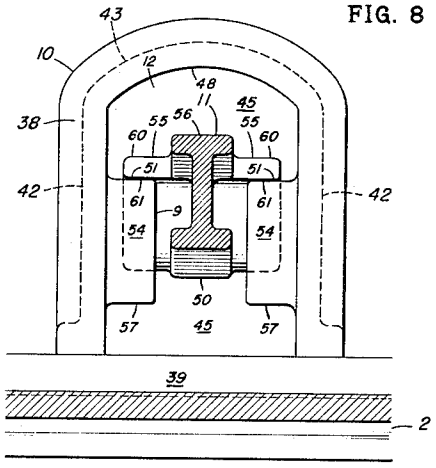


FIG. 8

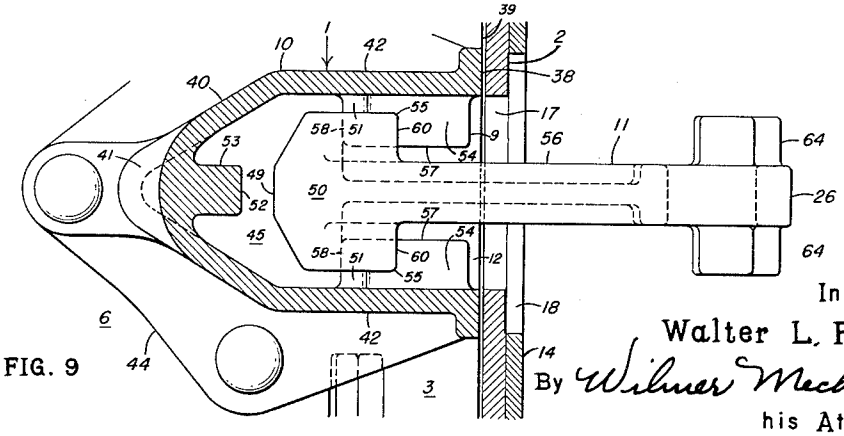


FIG. 9

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HOPPER DOOR LOCKING MECHANISM

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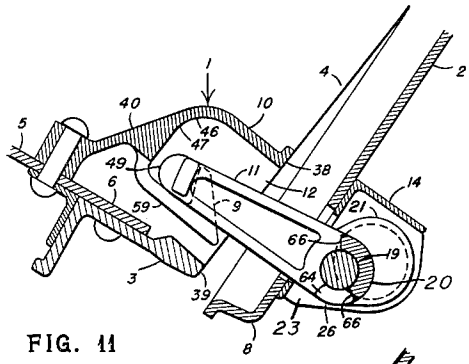


FIG. 11

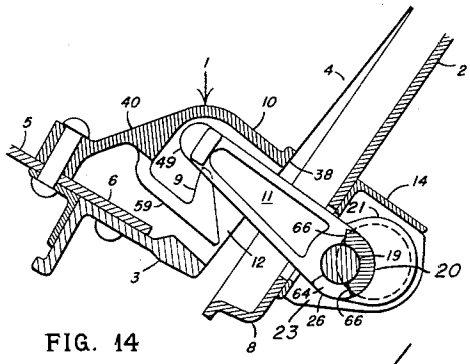


FIG. 14

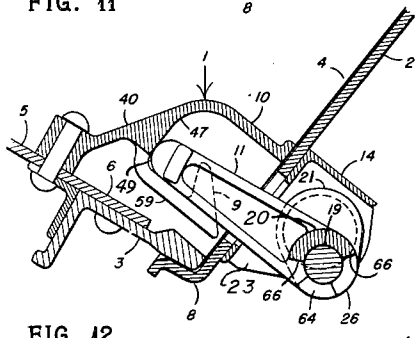


FIG. 12

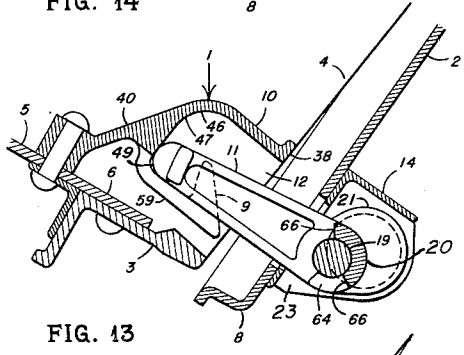


FIG. 13

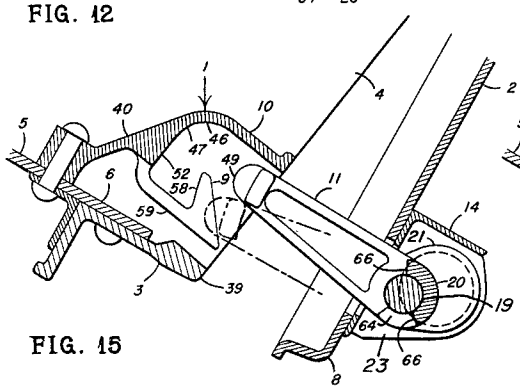


FIG. 15

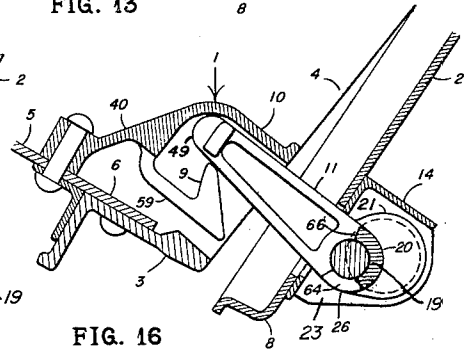


FIG. 16

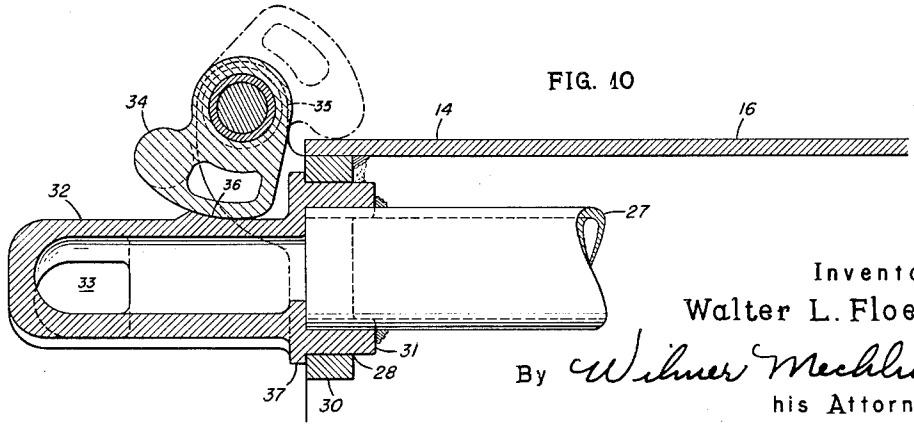


FIG. 10

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United States Patent Office 3,139,042 Patented June 30, 1964

3,139,042

HOPPER DOOR LOCKING MECHANISM

Walter L. Fioehr, Toledo, Ohio, assignor to Unitcast Corporation, Toledo, Ohio, a corporation of Ohio

Filed Aug. 14, 1959, Ser. No. 833,821
19 Claims. (Cl. 105—253)

This invention relates to door locking mechanisms for hopper doors of railway hopper cars.

It is customary to employ, in a locking mechanism of a hopper door, a pivoted latch, which, while drivable in some cases to shift a door from partly to fully closed position, is dependent on gravity to engage it with an associated catch as the door is swung closed. Any restraint imposed by rust, dirt or other foreign matter in its mounting on free pivoting of the latch at time of closure thus can prevent the locking mechanism from operating effectively. A further disadvantage of conventional mechanisms is that, even in those in which the latch is drivable, the effect of the drive in door opening is only to disengage the latch from the catch. Consequently, if the door at that time is frozen or otherwise stuck shut, resort must be had to hammering or other means for freeing the door before it can swing open.

An object of the present invention is to provide a locking mechanism for a hopper door, the latch and catch means of which are directed into engagement on closing.

Another object of the invention is to provide a locking mechanism for a hopper door which is capable of applying force to unseat a stuck door.

An additional object of the invention is to provide a door locking mechanism, the latch means of which is both directed into and out of engagement with its catch means and positively locked in door-locking position.

A further object of the invention is to provide a door unlocking mechanism of the character described which is operable from either or both sides of a hopper door.

Another object of the invention is to provide a door locking mechanism wherein shielding, by which the catch means and, in locking position, the latch means are protected from lading, on door closing effects engagement of the latch and catch means.

An additional object of the invention is to provide a door locking mechanism wherein the shielding protecting the catch means serves not only to direct the latch means into engagement with the catch means on door closing, but cooperates with the latch means to unseat a stuck door.

A further object of the invention is to provide a door locking mechanism, the latch and catch means of which are so arranged and constructed as to be self-cleaning in the course of operation of the mechanism.

Other objects and advantages of the invention will appear hereinafter in the detailed description, be particularly pointed out in the appended claims and be illustrated in the accompanying drawings, in which:

FIGURE 1 is a front elevational view of a hopper door incorporating a preferred embodiment of the door locking mechanism of the present invention;

FIGURE 2 is a side elevational view of the structure of FIGURE 1 with portions broken away and shown in section to more clearly illustrate certain of the details of construction;

FIGURE 3 is a fragmentary sectional view on an enlarged scale taken along the lines 3—3 of FIGURE 1;

FIGURE 4 is a sectional view taken along the lines 4—4 of FIGURE 3 with portions shown in full to more clearly illustrate certain of the details of construction;

FIGURE 5 is a fragmentary sectional view taken along the lines 5—5 of FIGURE 4;

FIGURE 6 is a sectional view taken along the lines 6—6 of FIGURE 4;

FIGURE 7 is a fragmentary sectional view on the scale of FIGURE 3 and taken on a section corresponding to that of that figure showing a modification of the mechanism of the preceding figures;

FIGURE 8 is a sectional view taken along the lines 8—8 of FIGURE 7;

FIGURE 9 is a fragmentary sectional view taken along the lines 9—9 of FIGURE 7, with portions broken away to more clearly illustrate certain of the details of construction;

FIGURE 10 is a fragmentary sectional view on the scale of FIGURE 3 taken along the lines 10—10 of FIGURE 2; and

FIGURES 11–16 are all figures taken on a section corresponding to that of lines 11—11 of FIGURE 4 and on a reduced scale showing the mechanism at various stages of its operation.

Referring now in detail to the drawings, in which like reference characters designate like parts, the door locking mechanism of the present invention is applicable generally to hopper doors of railway hopper cars and is particularly designed for individually locking such a door, although also applicable for locking in pairs aligned doors at opposite sides of the car.

Designated as 1, the door locking mechanism has been applied for purposes of illustration to a typical drop bottom hopper door 2 which is hinged, pivoted or hung at the top to a door frame 3 surrounding a discharge opening 4 in a hopper 5 of a conventional railway hopper car (not shown). Substantially rectangular in the illustrated embodiment and normal in closed position to the downwardly sloping bottom sheet or wall 6 of the hopper 5, the illustrated door 2 in that position conventionally slopes inwardly and downwardly from the hinges 7, so as to swing open at the bottom by gravity on release or unlocking of the locking mechanism 1.

Mounted so as to lock the bottom, free or distal end 8 of the door 2 to the frame 3, the locking mechanism 1 is comprised of a catch or keeper 9 preferably housed or contained in a housing or casing 10 and a pivoted latch or locking member 11 receivable or insertible in the housing through a confronting end opening 12 in the latter for engagement with the catch. While it is possible to mount or carry the housed catch 9 on either the door 2 or the hopper 5 and the latch 11 on the other of these members, it is preferred to mount the latch on the door and the catch on the hopper. To ensure that the locking mechanism 1 will not encroach upon the equipment limit lines imposed by the Association of American Railroads on car construction and illustrated in Hankins Patent No. 2,891,487, issued June 23, 1959, it also is preferred that the catch 9 be mounted within the hopper 5 with its housing 10 fixed, as by riveting, to the bottom sheet 6 of the hopper and adjacent portion of the frame 3 and that the latch 11 and associated operating structure, correspondingly, be mounted on or attached to the outer face 13 of the door 2 adjacent but above the latter's bottom or lower end 8 and in locked poistion be above the level of that end.

Preferably centered laterally on the door 2, the illustrated latch 11 conveniently is mounted thereon on a downwardly opening angle iron or bracket 14 extending substantially across the door's outer face 13 above and parallel to the lower end 8. Of the two legs of the angle iron 14, the lower 15 is against and fixed or secured to and made rigid with the door, as by welding, and the outstanding upper leg 16, because of its downslope in the closed position of the door, tends to protect the latch from the elements. The latch 11 extends through aligned slots 17 and 18, respectively, in the door 2 and lower leg 15 of the angle iron 14, and is

mounted for vertical rocking, pivoting or swinging on a horizontally directed pivot or latch pin 19.

While, according to this invention, it would be possible to drive the latch 11 into engagement with the catch 9, even though the former were simply pivotally or rotatably mounted, it is preferred that the mounting be capable of both pivoting and reciprocating the latch. To this end, the pivot pin 19, instead of being fixed or rotatable, is designed itself to revolve or swing in a limited arc eccentrically of a substantially horizontal axis fixed relative to and parallelling the bottom end 8 of the door 2 and impart reciprocable movement to the latch 11. The pivot pin 19 may be fixed to or form part of a crank pin or eccentric portion 20 of a single crank or eccentric 21, but, for greater stability as well as to enable the locking mechanism 1 to be operated from either or both sides of the door 2, preferably is fixed or secured, as by welding, to the crank pins of a pair of such cranks, which, together with the pivot pin, form a double crank 22. In the preferred construction, the cranks 21 are seated and journalled in a pair of concentrically apertured bearings or bushings 23 conforming in peripheral contour and fixed or secured, as by welding, to the legs 15 and 16 of the angle iron 14 at opposite sides of the vertical center line of the door 2. The cranks 21 preferably are duplicates, conveniently formed as castings, each with a pair of relatively offset or eccentric socketed cylindrical bosses, integral with and connected by a web 24, one serving as its journal or journal boss 25 and the other as its crank pin 20.

Carrying the preferred cylindrical hub 26 of the latch 11 intermediate its ends and with its ends concentrically socketed or received in and fixed or secured as by welding to the opposed crank pins or bosses 20 in the cranks 21, the pivot pin 19, on rotation of the cranks in the bearings 23, will swing eccentrically of the common axis of the journals or journal bosses 25 and in process impart reciprocable movement to the latch and shift the latter relative to the door 2 in a direction substantially normal to the outer face 13. In turn, one or each of the cranks 21 may be driven by a drive shaft 27 having its inner end socketed in and fixed or secured, as by welding, to the crank's journal boss 25 and extending at its opposite end through an aperture 28 axially aligned with the apertures 29 in the bearings 23 and formed in a bracket 30 fixed or secured, as by welding, to the adjoining end of the angle iron 14. Instead of being journalled directly in the bracket 30, the drive or operating shaft 27 conveniently is journalled therein through a flanged, axial collar or boss 31 socketing and fixed or secured, as by welding, to the outer end of the shaft and forming the inner end portion of a capstan 32, which, toward its outer end, has a radially extending opening or socket 33 for receiving an actuating lever or bar (not shown). Rotatable by the actuating bar, the drive shaft 27 normally is locked against rotation, suitable by a locking pawl or dog 34 pivoted to and between a pair of ears 35 integral with and upstanding from the bracket 30 above the capstan 32, the pawl in the locked position of the locking mechanism 1 aligning and being adapted to swing down or drop by gravity into engagement with a seat-forming notch, groove or flat 36 interrupting the periphery of the capstan outwardly of the peripheral flange 37 bounding the outer end of the collar 31.

As in certain prior hopper door locking mechanisms, such as that of the previously mentioned Hankins patent, the latch 11 is intended to engage the catch 9 on swinging of the door 2 toward closed position and, due to its eccentric mounting, enable the door thereafter to be driven, drawn or pulled shut or to fully closed position by rotation of the operating shaft 27 in a direction to shift the rocking axis of the latch outwardly or away from the catch. This purpose, served by so disposing the pivot pin 19 circumferentially of the operating shaft 27 that the pivoting axis of the latch will continue to be displaced away from the catch 9 to the point of full closure of the door 2, is the sole purpose of the eccentric mounting of the latches of prior mechanisms. However, in the mechanism of this invention, the eccentric mounting of the latch not only serves in closing to enable the door to be driven from a preliminary hold or partly closed to fully closed position, but, contrary to prior mechanisms, also serves in opening to enable the mechanism to unseat a door which has been frozen or otherwise sealed shut. The instant mechanism has the further advantage that the latch 11, on closing, is directed into engagement with the catch 9 and so avoids the common failing of prior mechanisms which depend entirely on gravity to engage their latches with their catches and thus are prone to non-engagement if the door is swung too fast toward closed position.

The responsibility for the above advantages of the present mechanism over prior mechanisms rests largely in the construction of the housing 10 and its coaction with the latch 11. Preferably centered laterally in the hopper opening 4 and seated at the bottom of that opening on the bottom sheet 6 in alignment with the latch 11, the housing 10 of either illustrated embodiment is open at the bottom as well as at the front but otherwise is closed to protect the mechanism from lading in the hopper 5 and for the same reason has its front end or face 38 flush or coplanar with the front edge 39 of the frame 3 so as to abut the door 2 when the latter is closed. Conversely, to minimize interference with the flow of lading during discharge of the hopper, the rear wall 40 of the housing 10 preferably is substantially V-shaped in a section parallel to the bottom sheet 6 and tapered or convergent rearwardly at the sides as well as inclined or sloped downwardly away from the front end 38 and toward the bottom sheet 6 so as to present a somewhat pointed or rounded-edged, forwardly flaring rear face 41 to the lading. Forwardly, the rear wall 40 of the housing 10 merges at the sides with transversely spaced, substantially parallel, upstanding or substantially vertically directed side walls 42 and at the top with a top wall 43, the latter extending substantially normal to the front end 38 and, with the side walls 42, bounding at top and sides the front opening or mouth 12. The housing 10 conveniently has as its base a peripheral flange 44 outstanding from its side and rear walls 42 and 40 for attachment, as by riveting, to the bottom sheet 6 and its several walls 40, 42 and 43, together with the included portions of the bottom sheet and the frame 3, define the forwardly opening cavity or pocket 45 housing or containing the catch 9 and adapted to receive the latch 11.

Aside from protecting the mechanism from lading, for which its above-described shape is well suited, the housing 10, as previously mentioned, is intended to ensure engagement of the latch 11 and catch 9 regardless of the speed at which the door 2 is swung closed and, in opening, to coact or cooperate with the latch in unseating the door in case the latter is frozen or otherwise sealed shut. The first of these objectives is accomplished by forming in the housing on its rear wall 40, above and rearwardly of the catch 9, a forwardly and downwardly facing, rearwardly and downwardly inclined or sloping, preferably substantially flat directing or deflecting surface or face 46 merging at the front, through a preferably arcuately concave guide surface 47, with the substantially straight underface 48 of the top wall 43. Disposed to be engaged, contacted or struck by the nose 49 of the latch 11 after the latch head 50 has entered the cavity 45 during swinging of the door 2 toward closed position and at impact inclining or sloping downwardly and rearwardly relative to the longitudinal center line of the latch, the directing surface 46 utilizes the inward swinging force on the door to impart downward force which drives the latch downwardly into a position in which it, in a direction parallel to the plane of the outer face 14 of the door, overlaps the upper extremity 51 of the catch 9 and thus is forced into engagement with the catch, regardless of the speed

with which the door is swung closed and without dependence upon the force of gravity.

Accomplishment of the second of the above objectives is made possible by providing, in the cavity 45, rearwardly of the catch 9 and below the directing surface 46, a stop, stop surface or bumper 52 facing forwardly toward and preferably paralleling the front face 38 of the housing 10 and conveniently formed on an abutment 53 integral with and instanding forwardly from the rear wall 40. Confronting and spaced rearwardly from the nose 49 of the latch 9 in the locked position of the mechanism 1, the stop 52 is disposed to be engaged by the nose, in case the door 2 is frozen or otherwise sealed shut, on operation of the drive shaft 27 in a direction to shift the hub 26 of the latch 11 toward the catch 9 and serve as a fixed reactance for enabling the rotative force on the drive shaft to apply an outward force on the door and break it loose from the frame 3.

The mechanisms of the two illustrated embodiments are identical in the foregoing respects but differ in some of the details of the latch 11 and catch 9. In both, the leading or front edge or face 54 of the catch is bevelled or sloped or inclined upwardly and rearwardly so as to engage and guide the latch head 50 correspondingly in case the latter has rocked, been jostled down or dropped to that level from its normal disengaged position above the catch in the interval between opening and closing of the door. In both, as well, the nose 49 of the latch 11 is rounded for better contact with the directing surface 46. Too, in each embodiment, the latch, for increased bearing, has, instead of one, a pair of latch, hook or catch-engaging elements 55 in the form of a pair of wings outstanding horizontally or laterally from its shank 56 and each engageable with one of a pair of catch or keeper elements 57 which together form the catch 9 and each of which is integral with and instanding from one of the side walls 42 of the housing 10.

The major respect in which the mechanisms of the embodiments differ is in the support of the head 50 of the latch 11 at proper height, both when latched to or engaging the catch 9 and when moving linearly therefrom toward the stop 52. In the first embodiment of FIGURES 3–6, this function is performed by a pair of transversely spaced parallel shelves or ledges 58 each instanding from one of the side walls 42 and each connected to the catch element 57 at that side and extending rearwardly therefrom substantially normal to the front face 38 of the housing 10 and at an acute angle to the element's rear or latch-element-engaging face 59. In the embodiment of FIGURES 7–9, on the contrary, the latch head 50 is supported at proper height on a pair of flanges 60 outstanding from opposite sides of the upper part of the shank 56 of the latch 11 rearwardly of the head 50 and having coplanar underfaces 61 disposed at an acute angle to and each merging with the upper extremity of the rear or catch-element-engaging face 62 of the latch element 55 at that side.

While the housings of both embodiments are somewhat self-cleaning by virtue of the downward inclination of the included portions of the bottom sheet 6 and frame 3 forming their floors, that of the second embodiment is better in this respect. In the first embodiment, some cinders or other foreign matter can collect on the latch-supporting upper faces 63 of the shelves 58. However, any such matter which even might temporarily stick to the underfaces 61 of the flanges 60 on the latch of the second embodiment will be rubbed therefrom by the supporting upper extremity or edge 51 of the catch as the flanges move thereon, either immediately prior to engagement of the latch and catch elements 55 and 57 during closing of the door 2 or, if the door is sealed shut, at the start of disengagement of these elements.

While the latch 11 must be rotatable relative to the pivot pin 19 to enable the eccentric movement impartable to the pin by the drive shaft 27 to be translated into the reciprocable movement of the latch responsible for pulling a door shut or freeing a stuck door, this relative rotation must be limited to that beyond its limits the latch will swing or rock with the pin if the drive shaft is to be instrumental in holding the latch in locked position and disengaging the latch from the catch 9. Lost motion or play suitable for the purpose in the driving connection between the latch 11 and the drive shaft 27 is readily provided by one or, here, a pair of segmental legs or ears 64, each projecting axially from one of the opposite sides of the hub 26 of the latch and contained or riding in a segmental slot 65 interrupting the crank boss 20 of the confronting or adjoining crank 21.

The extent of the lost motion between the drive shaft and the latch will, of course, depend upon the range of the eccentric movement of the pivot pin 19 relative to the drive shaft, the former being less than the latter by an angle sufficient to enable each lug to be laterally or radially engaged by one of the shoulders on the associated crank boss 20, bounding the opposite ends of its slot 65, toward either limit of the eccentric movement of the pin. The range of the eccentric movement of the pivot pin 19 between the locked and open or disengaged positions of the latch 11 to accommodate the desired movements of the latch relative to the catch 9 and the housing 10 being on the order of 150° in the illustrated embodiments, rather than a full 180°, the extent of the play or relative rotation between the latch and the pivot pin is correspondingly reduced to around 135°, this providing, by the engagement of either lug 64 with one or the other of the related shoulders 66, a positive force on the latch which, at the inner limit of the eccentric movement, holds the latch head 50 down in engagement with the catch and, toward the outer limit of that movement, lifts the head clear of the catch so that the latch can withdraw from the housing 10.

Since eccentric movement of the pivot pin 19 beyond the limits necessary for operating the locking mechanism 1 would serve no useful purpose, it is preferred to restrict the movement substantially to those limits. This, in the illustrated embodiments, is accomplished by employing the upper leg 16 of the angle iron 14 and the outer face 13 of the door 2 as the limit stops for the pivot pin, the leg being disposed to engage the crank bosses 20 if the latter are rotated slightly beyond their position with the latch 11 locked in which their axes and that of the drive shaft 27 are in line with the longitudinal center line of the latch. At the other limit of the eccentric movement of the pivot pin 19, the crank bosses 20 project through the slot 18 in the lower leg 15 of the angle iron 14 and abut or engage the outer face 13 of the door 2 at sides of the door slot 17, the latter for the purpose being only sufficiently wide to pass the shank 56 of the latch, while the leg slot 18 is of a width to enbrace or span the webs 24 of the double crank 22. A further limit, this time on vertical angling of the latch 11, is imposed by the vertical or upper and lower marginal limits of the slots 17 and 18. The depth of these slots is such as to accommodate the relative vertical angling or movement of the shank 56 of the latch in the operation of the locking mechanism, but limit such angling therebeyond so that the latch, when the door 2 is swung toward closed position, will always have its head 50 disposed to enter the mouth 12 of the housing 10 at a level between the latter's top wall 43 and the lower extremity of the leading edge 54 of the catch 9. Thus, engagement of the latch 11 with the catch 9 on closing is ensured at all times regardless of any accidental displacement of the latch in the interim.

The operation of the locking mechanism 1 is shown in FIGURES 3 and 11–16. In the fully closed or locked position of the door 2 shown in FIGURE 3, the latch 11 is fully engaged with the catch 9, being held in that position through its then positive connection to the drive shaft 27 and the locking of the latter against rotation by

the locking dog 34. When the door 2 is to be opened, the dog 34 is disengaged from the drive shaft 27 and the shaft is rotated by application of force to an actuating bar (not shown) seated in its capstan 32 in a direction to shift the hub 26 of the latch 11 toward the catch 9, clockwise in these figures. If the door is not then stuck, it will drop away from the frame 3, as the hub 26 shifts outwardly, to the preliminary hold position shown in FIGURE 11, the limit permissible while the latch and catch remain engaged. However, if the door initially is stuck, shifting of the hub 26 of the latch 11 toward the catch 9 will shift or move the head 50 of the latch inwardly away from the catch and into engagement with the confronting stop 52 in the housing 10, as shown in FIGURE 12. Once this engagement is established, the rotative force applied to the drive shaft will be translated into an outward force on the door, breaking the door from the frame 3, as shown in FIGURE 13, and enabling it to drop away to the position shown in FIGURE 11. Further rotation of the drive shaft 27 will lift the latch out of engagement with the catch, as shown in FIGURE 14, so that the door is free to swing open.

In closing, the door 2 simply is swung toward closed position, no preliminary manipulation of the locking mechanism being required because of the assurance by the limits on vertical angling imposed by the slots 17 and 18, that the head 50 of the latch will be in correct vertical alignment with the mouth 12 of the housing. Entering the housing through the mouth, in the position shown in FIGURE 15 or, if it has dropped in the interim, engaging the leading edge 54 of the catch 9, as shown in dot-and-dash line of that figure, the head 50 of the latch passes over the catch to the position shown in FIGURE 16 at which its nose 49 contacts the directing surface 46. The head is then driven downwardly by the directing surface under the inward swinging force applied to the door to the point at which it overlaps the catch 9 in a direction parallel to the plane of the outer face of the door and cannot but engage the catch, either partly or fully, the latter as shown in FIGURE 11, as the inward force is exhausted and the door swings outwardly to the limit permitted by the latch. In process, since the latch 11, on entering the housing 10, normally will be held in the release position shown in FIGURE 14 by engagement of one or each of its lugs 64 with the shoulder 66 at the corresponding end of the slot 65 in the related crank boss 20, the downward force imparted to the latch normally will also cause a corresponding downward swinging of the crank bosses to the position shown in FIGURE 11. With the latch 11 and catch 9 engaged, rotation of the drive shaft 27 in a direction to shift the hub 26 of the latch away from the catch will pull the door inwardly to the fully closed position shown in FIGURE 3 and lock it in that position by engagement of the locking dog 34 with the drive shaft.

From the above detailed description, it will be apparent that there has been provided an improved lock operating mechanism for hopper doors which not only possesses the capabilities of previous mechanisms, but, in addition, is capable, in opening, of releasing a stuck door and, in closing, of ensuring engagement of its latch and catch regardless of how fast the door is swung toward closed position. It should be understood that the described and disclosed embodiments are merely exemplary of the invention and that all modifications are intended to be included which do not depart from either the spirit of the invention or the scope of the appended claims.

Having described my invention, I claim:

1. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising catch means fixed to one of said members, latch means mounted for limited relative pivoting on said other member and engageable with said catch means, and means fixed to said one member and operable over the range of said relative pivoting of said latch means for directing said latch means into engagement with said catch means on swinging of said door member toward closed position.

2. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening toward the other of said members, catch means in said housing, latch means rockably mounted on said other member and engageable with said catch means, and means in said housing and engageable with said latch means on swinging of said door member towrd closed position for enabling a closing force on said door to drive said latch means toward said catch means.

3. Locking mechanism for a hinged door member closing a discharge opening in a hopper member comprising catch means fixed to one of said members, latch means mounted for limited relative pivoting on said other member and engageable with said catch means, means fixed to said one member and operable over the range of said relative pivoting of said latch means for directing said latch means into engagement with said catch means on swinging of said door member toward closed position, and drive means carried by said other member and connected to said latch means for disengaging said latch means from said catch means.

4. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising catch means fixed to one of said members, latch means mounted for limited relative pivoting on said other member and engageable with said catch means, means fixed to said one member and operable over the range of said relative pivoting of said latch means for directing said latch means into engagement with said catch means on swinging of said door member toward closed position, and drive means carried by said other member and having a lost-motion connection to said latch means for disengaging said latch and catch means.

5. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising catch means fixed to one of said members, eccentric means rotatably mounted on said other member, latch means mounted for limited relative rocking on an eccentric portion of said eccentric means, and means fixed to said one member and operable over the range of said relative rocking of said latch means for directing said latch means into engagement with said catch means on swinging of said door to closed position.

6. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising catch means fixed to one of said members, eccentric means rotatably mounted on said other member, latch means mounted for limited relative rocking on an eccentric portion of and reciprocable by said eccentric means, means fixed to said one member and engageable with said latch means over the range of said relative rocking of said latch means for directing said latch means into engagement with said catch means on swinging of said door member toward closed position, and stop means fixed to said one member and spaced from said catch means in a direction away from said other member, said latch means on rotation of said eccentric means with said door member sealed shut in a direction to shift said eccentric portion toward said catch means engaging and acting against said stop means to unseat said door member.

7. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening toward the other of said members, catch means in said housing, eccentric means rotatably mounted on said other member, latch means pivotally mounted on an eccentric portion of said eccentric means and engageable with said catch means, and stop means in said housing inwardly of said catch means, said latch means on rotation of said eccentric means with said door member sealed shut in a direction to shift said eccentric portion toward said catch means

engaging and acting against said stop means to unseat said door member.

8. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening toward the other of said members, catch means in said housing, eccentric means rotatably mounted on said other member, latch means pivotally mounted on an eccentric portion of said eccentric means and engageable with said catch means, stop means in said housing inwardly of said catch means, said latch means on rotation of said eccentric means with said door member sealed shut in a direction to shift said eccentric portion toward said catch means engaging and acting against said stop means to unseat said door member, and means in said housing and engageable with said latch means on swinging of said door member toward closed position for driving said latch means toward and into position to engage said catch means.

9. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening outwardly toward the other of said members, catch means in said housing, eccentric means rotatably mounted on said other member, latch means mounted for limited relative pivoting on an eccentric portion of said eccentric means and engageable with said catch means, stop means in said housing inwardly of said catch means, said latch means on rotation of said eccentric means with said door member sealed shut in a direction to shift said eccentric portion toward said catch means engagng and acting against said stop means to unseat said door member, and means in said housing and engageable with said latch means on swinging of said door member toward closed position for driving said latch means toward and into position to engage said catch means.

10. Locking mechanism for a hinged door closing a discharge opening in a hopper, comprising a housing in and fixed to a bottom sheet of said hopper and opening forwardly therefrom toward said door, catch means in said housing, eccentric means rotatably mounted on a lower portion of an outer face of said door, latch means mounted for limited relative pivoting on an eccentric portion of said eccentric means, said latch means extending through a slot in said door and being restricted by extremities thereof in pivoting on said eccentric portion for alignment with the forward opening in the housing on swinging of said door toward closed position, stop means in said housing rearwardly of said catch means, said latch means on rotation with said door stuck shut of said eccentric means in a direction to shift the eccentric portion thereof toward said catch means engaging and reacting against said stop means for unseating said door, and means in said housing above said stop means and engageable with said latch means on said swinging of said door toward closed position for directing said latch means toward and into position to engage said catch means.

11. Locking mechanism for a hinged door closing a discharge opening in a hopper, comprising a housing in and fixed to a bottom sheet of said hopper and opening forwardly therefrom toward said door, catch means in said housing, eccentric means mounted for rotation about a substantially horizontal axis on a lower portion of an outer face of said door, latch means mounted for limited relative vertical pivoting on an eccentric portion of said eccentric means, said latch means extending through a slot in said door and being restricted by vertical extremities thereof in pivoting on said eccentric portion for vertical alignment with the forward opening in the housing on swinging of said door toward closed position, stop means in said housing rearwardly of said catch means, said latch means on rotation with said door stuck shut of said eccentric means in a direction to shift the eccentric portion thereof toward said catch means engaging and reacting against said stop means for unseating said door, and means in said housing above said stop means and engageable with said latch means on said swinging of said door toward closed position for directing said latch means toward and into position to engage said catch means.

12. Locking mechanism for a hinged door enclosing a discharge opening in a hopper, comprising a housing fixed to said hopper and opening forward toward said door, a pair of upstanding catch elements fixed to and instanding from opposite side walls of said housing, a forwardly facing stop surface in said housing rearwardly of said catch elements, a downwardly and rearwardly directed deflecting surface in said housing above said stop surface and rearwardly of said catch elements, a crank mounted for rotation about a substantially horizontal axis on a lower portion of a front face of said door, a latch mounted for limited relative pivoting on a crank pin of said crank, latch elements outstanding from opposite sides of a head of said latch and each engageable with one of said catch elements, said deflecting surface on swinging of said door toward closed position engaging and directing said latch head downwardly into overlapping relation with said catch elements, and said latch on rotation with said door sealed shut of said crank in a direction to shift said crank pin toward said catch elements engaging and reacting against said stop surface for unsealing said door.

13. Locking mechanism for a hinged door closing a discharge opening in a hopper, comprising a housing fixed to said hopper and opening forwardly toward said door, a pair of upstanding catch elements fixed to and instanding from opposite side walls of said housing, a forwardly facing stop surface in said housing rearwardly of said catch elements, a downwardly and rearwardly directed deflecting surface in said housing above said stop surface and rearwardly of said catch elements, a crank mounted for rotation about a substantially horizontal axis on a lower portion of a front face of said door, a latch mounted for limited relative pivoting on a crank pin of said crank, a pair of latch elements outstanding from opposite sides of a head of said latch and each engageable with one of said catch elements, said deflecting surface on swinging of said door toward closed position engaging and directing said latch head downwardly into overlapping relation with said catch elements, said latch on rotation with said door sealed shut of said crank in a direction to shift said crank pin toward said catch elements engaging and reacting against said stop surface for unsealing said door, and means associated with one of said pairs of latch and catch elements and engageable with the other pair for supporting said latch in locked position and guiding said head thereof into engagement with said stop surface.

14. Locking mechanism for a hinged door closing a discharge opening in a hopper, comprising a housing fixed to said hopper and opening forwardly toward said door, a pair of upstanding catch elements fixed to and instanding from opposite side walls of said housing, a forwardly facing stop surface in said housing rearwardly of said catch elements, a downwardly and rearwardly directed deflecting surface in said housing above said stop surface and rearwardly of said catch elements, a crank mounted for rotation about a substantially horizontal axis on a lower portion of a front face of said door, a latch mounted for limited relative pivoting on a crank pin of said crank, latch elements outstanding from opposite sides of a head of said latch and each engageable with one of said catch elements, said deflecting surface on swinging of said door toward closed position engaging and directing said latch head downwardly into overlapping relation with said catch elements, said latch on rotation with said door sealed shut of said crank in a direction to shift said crank pin toward said catch elements engaging and reacting against said stop surface for unsealing said door, and shelves instanding from said opposite side walls of said housing and engageable with said latch elements for supporting said latch in locked position and guiding the head thereof into engagement with said stop surface.

15. Locking mechanism for a hinged door closing a discharge opening in a hopper, comprising a housing fixed to said hopper and opening forwardly toward said door, upstanding catch elements fixed to and instanding from opposite side walls of said housing, a forwardly facing stop surface in said housing rearwardly of said catch elements, a downwardly and rearwardly directed deflecting surface in said housing above said stop surface and rearwardly of said catch elements, a crank mounted for rotation about a substantially horizontal axis on a lower portion of a front face of said door, a latch mounted for limited relative pivoting on a crank pin of said crank, latch elements outstanding from opposite sides of a head of said latch and each engageable with one of said catch elements, said deflecting surface on swinging of said door toward closed position engaging and directing said latch head downwardly into overlapping relation with said catch elements, said latch on rotation with said door sealed shut of said crank in a direction to shift said crank pin toward said catch elements engaging and reacting against said stop surface for unsealing said door, and flanges outstanding from opposite sides of said latch rearwardly of said latch elements and engageable with upper extremities of said catch elements for supporting said latch in locked position and guiding the head thereof into engagement with said stop surface.

16. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening forwardly toward the other of said members, catch means in said housing, a crank mounted for rotation about a substantially horizontal axis on said other member, latch means pivotally mounted on a crank pin of said crank, a deflecting surface in said housing above and rearwardly of said catch means and engageable with said latch means on swinging of said door member toward closed position for directing said latch means downwardly into overlapping relation with said catch means, and an upwardly and rearwardly sloping leading edge on said catch means and engageable with said latch means for guiding said latch means above said catch means into engagement with said deflecting surface.

17. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening at its front toward the other of said members, catch means in said housing, latch means mounted on said other member in alignment in one direction with the front opening in said housing and swingable relative to said other member in a direction substantially normal to said first direction, means carried by said other member for limiting swinging of and thereby causing said latch means to enter said housing through said front opening in a position to engage said catch means, and means in said housing rearwardly of and above said catch means for driving said latch

means into overlapping relation in said second direction with said catch means.

18. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening at its front toward the other of said members, catch means in said housing, latch means mounted on said other member in alignment in one direction with the front opening in said housing and swingable relative to said other member in a direction substantially normal to said first direction, means carried by said other member for limiting swinging of and thereby causing said latch means to enter said housing through said front opening in a position to engage said catch means, means in said housing rearwardly of and above said catch means for directing said latch means into overlapping relation in said second direction with said catch means, and guide means in a front portion of said housing and engageable with said latch means for guiding said latch means past said catch means and into engagement with said directing means.

19. Locking mechanism for a hinged door member closing a discharge opening in a hopper member, comprising a housing fixed to one and opening at its front toward the other of said members, catch means in said housing, latch means mounted on said other member in alignment in one direction with the front opening in said housing and swingable relative to said other member in a direction substantially normal to said first direction, means carried by said other member for limiting swinging of and thereby causing said latch means to enter said housing through said front opening in a position to engage said catch means, and a forwardly and downwardly facing substantially flat surface in said housing above and rearwardly of said catch means for directing said latch means into overlapping relation in said second direction with said catch means.

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