April 16, 1935. J. J. TATUM 1,997,704

HOPPER DOORLOCK AND LOCK MOUNTING

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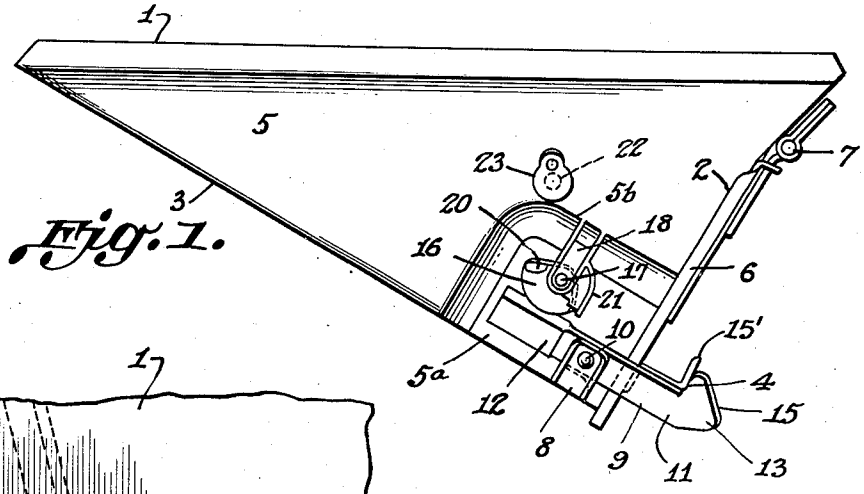


Fig. 1.

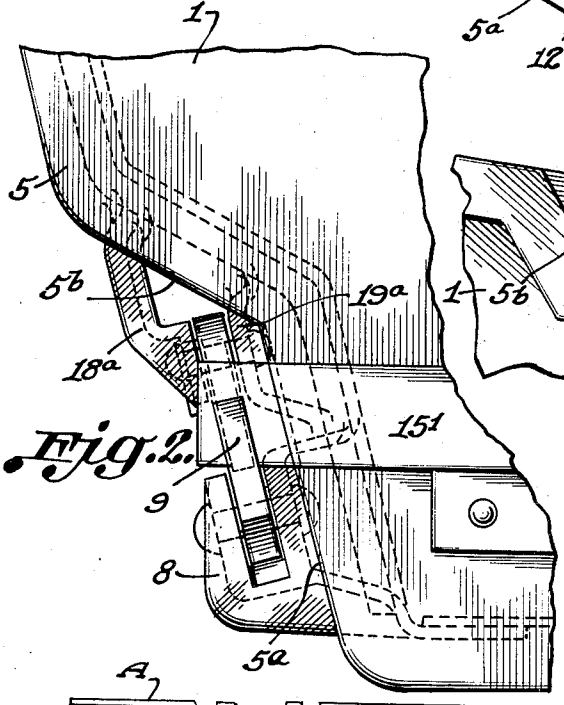


Fig. 2.

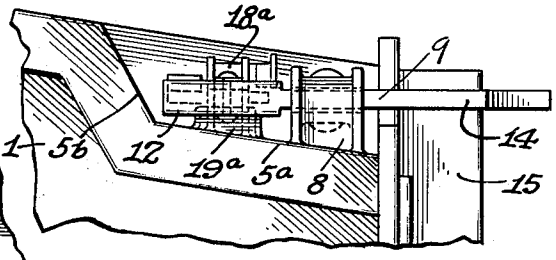


Fig. 3.

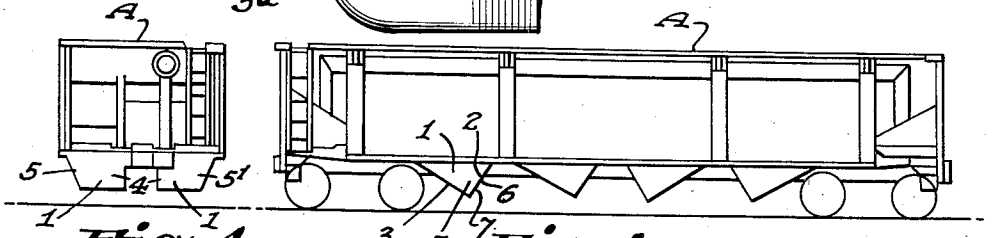


Fig. 4.

Fig. 5.

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HOPPER DOORLOCK AND LOCK MOUNTING

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3 Claims. (Cl. 105—308)

This invention relates to locks or latches for the doors of hoppers of hopper cars and the like, and to novel and improved means for mounting the same upon the hopper.

The hoppers of hopper cars are commonly made of pressed steel sheets, which sheets, because of the rough usage to which they are subjected in service, become bent or distorted and deteriorate from corrosion, so that such hopper sheets require frequent renewal and repairs. The latches for the doors cause trouble and expense also, because of the large number of separate and independent parts generally used, which are fastened to each other and to the hopper sheets by bolts or rivets which are liable to work loose, rendering the latches inoperative or insecure in action.

One object of my invention is to provide a novel and improved construction of hopper door latch and simplified mounting means therefor, whereby a positive, reliable and secure latch having a safe automatic locking action is produced and a type of mounting furnished which ensures an easy motion of the latch and a certain engagement of the latch with its keeper and the firm fastening of the latch in closed position.

Another object of the invention is to provide a hopper formed of cast steel sheets with which the parts of the hopper mounting may be integrally cast or to which cast mountings may be secured, thus furnishing a construction of hopper which is substantially free from the stated objections applying to pressed steel hoppers and which allows of the use of latch mountings of simplified form and composed of a lesser number of parts than ordinarily employed and which are less liable to work loose or to become otherwise inoperative or ineffective in locking action.

Still another object of the invention is to provide a construction of hopper adapted for the stable support of the latch and its mount while giving a proper space for third rail clearance when the car is used in electrified zones, and at the same time furnishing an outlet of increased area for the discharge of the load from the car.

With these and other objects in view, which will appear in the course of the subjoined description, the invention consists of the novel features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Fig. 1 is a view in side elevation of a hopper of saw-tooth type showing the application of my improved latch and latch mounting thereto, the latch appearing in door locking position.

Fig. 2 is a view in front elevation of the hopper shown in Fig. 1.

Fig. 3 is a fragmentary bottom plan view of the structure shown in Figs. 1 and 2.

Fig. 4 is a diagrammatic end view of a saw tooth hopper car embodying generally the improvements disclosed in Figs. 1, 2 and 3.

Fig. 5 is a side elevation of such a car as that shown in Fig. 4.

Referring now more particularly to the drawing, 1 designates a car hopper of a type commonly known as a saw-tooth hopper, of which a number may be arranged in rows or otherwise upon the bottom of a car A, as shown in Figs. 4 and 5, for the discharge of the contents thereof. In the hopper car structure shown in Figs. 4 and 5, two longitudinal rows or series of such discharge hoppers 1 are mounted upon the underside of the car on opposite sides of its longitudinal center, with the hoppers of each series arranged in groups on opposite sides of the transverse center of the car, the hopper doors of one group facing toward one end of the car and the hopper doors of the other group facing toward the opposite end of the car, in accordance with common practice. The arrangement of the hoppers upon the car may, however, be varied to accord with any of the established hopper car types or practices, my invention applying to a novel construction of lock or latch for the hopper doors and means, which may form part of the hopper construction, for mounting the same, and which is adapted for use upon hoppers of various types to provide safe and reliable door locking means therefor.

In the exemplified disclosure of saw-tooth hopper 1, the hopper is provided with a downwardly and rearwardly sloping front end portion 2 having a door opening therein, a downwardly and forwardly sloping bottom 3 arranged in convergent relation to the hopper front and intersecting the same at the bottom of the doorway, and inner and outer side walls 4 and 5. The doorway is adapted to be closed by a door 6 hinged, as at 7, at its upper edge to swing vertically on a horizontal transverse axis and adapted to normally close by gravity to seal the doorway against the escape of the hopper contents.

In accordance with my invention, the hopper side walls or sheets are preferably made of cast sheet steel instead of pressed steel, as pressed steel sheets are easily subject to buckling and distortion from the service strains and rough

usage which they are compelled to stand, as well as deterioration from corrosion due to the action of the elements, while cast steel is free or practically free from such objections. Moreover, the use of pressed steel sheets requires the employment of numerous separate mounting parts or fittings for the door locking elements and the riveting of these mountings or fittings in position, with the result that the locking elements are liable to work loose or to be broken or otherwise damaged or to be thrown out of alinement, so that they are rendered inoperative or ineffective and unreliable in action. By the use of cast steel sheets these objections may be wholly or largely obviated, as the greater number of the mounting parts or fittings may be cast integral therewith.

In the hopper structure shown, the outer side sheet **5**, at least, of the hopper body **1** is made in practice of cast steel, and on the sheet **5** are cast integral with the sheet the parts of the mounting for the locking latch and its locking dog. As shown, the sheet **5** is provided, adjacent to the bottom of the doorway, with the forked or bifurcated fulcrum bracket member **8** cast integral therewith and projecting laterally therefrom, between the arms of which forked bracket member **8** the door latch **9** is mounted. This latch comprises a bar, hinged intermediately of its length upon a fulcrum pin or rivet **10** engaging the fork arms of the bracket so as to provide said latch bar with a latch arm **11** and a controlling arm **12**. The latch arm **11** extends at its free end beyond the front of the doorway **2** and is provided with a latch hook **13** having a locking shoulder **14** and a beveled contact nose **15** leading thereto. The latch shoulder is adapted for engagement with the adjacent latch engaging or keeper portion of a spreader bar **15'** secured to the base of the door **6** for locking the door in closed position, and a special construction of said keeper portion of the bar **15'** and said shoulder of the latch is provided to secure a firm locking engagement between the latch and the spreader bar under pressure of the load, thereby adding to the security of the connection. The end or arm **12** of the latch is made of increased thickness or weighted with respect to the arm **11**, so that it normally tends to overcome the weight of the hooked end of the latch and to drop by gravity to automatically move the hooked locking end of the latch into locking position. This weighted end or arm of the latch is adapted for engagement by the curved peripheral face of a segmental locking dog **16** pivotally supported upon a pivot pin **17** caried by a pair of bracket members **18** and **19** formed upon and cast integral with the sheet **5**, which dog when in working position lies in the path of upward movement of the end **12** of the latch and prevents the latch from being casually retracted by jolts, jars, vibrations or other service motions and releasing the door **6**. The dog is provided with a stop projection **20** arranged to engage a stop projection **21** cast with the bracket member **19**, whereby the forward swinging movement of the dog when in release position is limited and said dog maintained in position to be engaged by the weighted latch arm in the closing movement of the door. The wall or sheet **5** is shown as provided with an opening **22** normally covered by a pivoted cover member or flap **23**, which opening is so arranged as to allow a rod, lever or other suitable tool to be inserted into the hopper through said wall or sheet and manipulated for the purpose of prying loose the lading in the car should it become packed hard or frozen. This opening can also be used for the insertion of a steam heating pipe or gas pipe for the purpose of heating the contents in the car if frozen in order to secure a free and quick discharge of the lading.

As before stated, a special construction of the keeper portion of the stiffener or spreader bar **15'** and the shoulder **14** of the latch **13** is employed in order to secure a firm locking engagement between the spreader bar and the latch. As shown, the latch shoulder **14** is beveled or undercut at an effective retaining angle between the plane of the door when in closed position and the plane of the latch when in door engaging position and the keeper portion of the bar is inclined at a corresponding angle so as to have an overlapping engagement, so that the outward pressure of the lading on the door will force the keeper portion of the bar **15'** into wedging engagement with the latch shoulder **14** which will overhang the surface of the bar **15'** engaged thereby. By this means a firm and positive interlocking engagement between the spreader bar and latch will be secured to increase the security of the locking connection and to prevent or reduce to a material degree liability of casual disengagement of the latch from the bar in the event that from any cause the retaining dog **16** should become retracted, torn away or rendered inoperative. In the form disclosed the bar **15'** is Z-shaped and disposed with its body portion extending outwardly from and at right angles to the door, one of its flanges, namely, its inner longitudinally extending flange, projecting downwardly and being fastened to the door, while its other or outer longitudinally extending flange projects upwardly and forms the keeper portion of the bar engaged by the latch shoulder for the locking action. This outer flange is inclined upwardly and toward the door at an angle corresponding to the angle of bevel or undercut of the latch shoulder **14**, so as to obtain the overlap locking action set forth. The arrangement is, therefore, such that when the door is closed and latched the arm **11** of the latch will lie under the body portion of the bar **15'**, while the shoulder **14** of the latch will overlap or overhang the inclined keeper flange of the bar **15'**, whereby a wedge-lock engagement between the bar and latch will be secured and maintained under the outward pressure of the lading on the door, to prevent or reduce to a minimum liability of the latch becoming casually disengaged even in the event that it is not held from retraction by the dog **16**.

In the hopper construction fragmentarily shown in Figs. 1, 2, and 3 and illustrated diagrammatically in Figs. 4 and 5, the inner hopper walls **4** are straight or vertical while the outer hopper walls **5** incline downwardly and inwardly between the top and bottom walls of the hopper, thus decreasing the width of each hopper toward its bottom and outlet end. By this means a clearance space is provided at each side of the car between the walls **5** and the vertical plane of each side of the car for third rail clearance in the travel of the car through electrified rail zones. This form of each hopper **1** is also advantageous in enabling the upper portions of the hoppers to be made wider so as to provide an increased size of discharge opening for discharge of the load over a construction in which the hopper walls **5** are straight and vertical and the hopper is of equal width from top to bottom, while at the same time providing the third rail clearance space

referred to. Also it will be seen that the latch when in locking position inclines downwardly and forwardly parallel with and at an angle of inclination conformably with that of the hopper bottom 3, with its hooked end 13 upwardly directed for upward locking movement and engagement with the locking or spreader bar 15' on the door. It will thus be understood that when the latch is in release position and the door open, the weighted arm or end 12 will drop and swing the hooked end 13 upwardly, so that the beveled nose 15 will lie in the path of movement of the extended end of the spreader bar 15'. As a result, when the door is allowed to close by gravity, as after the discharge of the load, the weight of the door in its closing motion will cause the extended end of bar 15' to engage and ride up on the beveled nose 15 of the latch, thus depressing the hooked end of the latch and permitting the bar 15' to ride thereover and into locking engagement with the shoulder 14, the weighted end of the latch then projecting the hooked end of the latch upward for positive locking engagement with the bar 15' and at the same time moving into engagement with the dog 16 to be locked thereby to maintain the latch in locking position. A very positive and reliable automatic locking action is thus obtained and, as the latch and dog mounts are of rigid construction and integral with the sheet 5, and therefore can not become displaced or warped or otherwise get out of shape, it will be evident that the parts of the latch will always be maintained in working alinement and the hooked end of the latch in position to interlock with the spreader bar. The slope of the wall or sheet 5 provides a third rail clearance space sufficient to receive and accommodate the latch and its working parts without liability of the same coming in contact with the third rail or its housing.

As particularly shown in Figs. 2 and 3 the lower portion 5a of the side wall or sheet 5 is offset inwardly, by means of an overhanging offset portion 5b between it and the superposed normal part of the wall or sheet, thus forming a third rail clearance space at such side of the hopper in which the latch elements are housed and overhung by the portion 5b so as to be protected to a greater degree against liability of injury by contact with extraneous stationary or flying objects. The latch fulcrum bracket 8 and the dog supporting brackets 18 and 19 are of suitable form to adapt them to be effectively cast upon and integrally with these portions 5a and 5b of the side sheet.

From the foregoing description, taken in connection with the drawing, the construction and operation of my improved latch mechanism will be readily understood and appreciated by those versed in the art without a further and extended description. While the structures disclosed are preferred, it will, of course, be understood, as stated, that changes in the form, proportion and details of construction of the parts may be made, within scope of the invention as set forth in the appended claims, without departing from the spirit or sacrificing any of the advantages of the invention.

What I claim is:—

1. In a hopper door lock, a hopper having a cast metal wall provided with an offset portion forming a recess lying inwardly of the plane of said wall, a latch support cast with the offset portion of the wall and arranged to lie wholly within said recess, and a door engaging latch mounted on said support.

2. In a hopper door lock, a hopper having a wall comprising an upper wall portion, a lower wall portion lying inwardly of the plane of said upper wall portion, and an oblique intermediate wall portion connecting said upper and lower wall portions, upper and lower supporting brackets mounted respectively upon the intermediate and lower wall portions, a door engaging latch carried by the supporting bracket on the said lower wall portion, and a latch engaging dog carried by the supporting bracket on the said intermediate wall portion.

3. In a hopper door lock, a hopper having a cast metal wall comprising an upper wall portion, a lower wall portion lying inwardly of the plane of said upper wall portion, and an oblique intermediate wall portion connecting said upper and lower wall portions, upper and lower supporting brackets mounted respectively upon and cast with the intermediate and lower wall portions, a door engaging latch carried by the supporting bracket on the said lower wall portion, and a latch engaging dog carried by the supporting bracket on the said intermediate wall portion.

JOHN J. TATUM.