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DOOR OPERATING AND LOCKING DEVICE

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9 Claims. (Cl. 292—113)

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This invention relates to door operating and locking devices and in particular to such devices when applied to railway box car doors.

Most car doors are now equipped with separate mechanisms for operating and locking the doors, although certain doors are equipped with combined locking and starting devices. However, most of the combined devices are cumbersome, expensive and frequently not positive in their locking action. All car doors are subjected to considerable shock and vibration during travel of the car and a lock to be satisfactory should be self-tightening so that any slack may be automatically taken up by the device. It is an object, therefore, of the present invention to provide a combined door operating and locking device in which the parts are so arranged as to automatically take up any slack between the door and the door jamb.

A further object of the invention is the provision of a door locking device which may also be operated to exert a powerful leverage for forcing the door open or pulling the door closed.

A still further object of the invention is the provision of a door operating and locking device which may be used to give the door a rapid opening impulse and be automatically disengaged from the keeper to permit the door to continue its opening movement.

A yet further object of the invention is the provision of a door operating and locking device in which the parts are so mounted and controlled as to normally remain clear of the opening between the door edge and door jamb, yet which may be projected into the opening for locking or operating purposes.

These and other objects of the invention will be apparent to persons skilled in the art from a study of the following description and accompanying drawings, in which

Fig. 1 is an elevational view of the improved operating and locking device and showing the locking-cam or wedge-lock in engaged and disengaged positions;

Fig. 2 is a sectional view taken through the door and showing the locking device in end elevation;

Fig. 3 is a sectional view through the door and jamb showing the locking device in plan;

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 1;

Fig. 5 is a sectional view taken through the device and showing the device in two positions of operation;

Fig. 6 is a view similar to Fig. 5 but showing

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the locking device in its normal condition when unlocked with all parts carried clear of the opening, and

Fig. 7 is a view similar to Fig. 5 but showing in full line the parts when in the position shown by line and dash in Fig. 5.

Referring now to the drawings in detail, it will be seen that the door operating and locking device is formed of four parts, namely, a handle operator or lever A, a hook or latch B, a wedge-lock or locking-cam C, and a keeper or lug D. As clearly shown in the figures, the operating and locking device has been applied to a car door formed of a main sheet 2 corrugated along its front edge as at 4 and having the corrugation capped and reinforced by a metal strip 6, flanged as at 8 to provide the nose or leading edge of the door. This nose or leading edge of the door is adapted to engage within a roughly channel-shaped recess 10 formed as part of the door post or jamb 12. In order to brace the U-shaped portion of the door post a casting or forging 14 is secured by rivets 16 to the car side wall 17 and post 18 and also to the door jamb member by rivets 20. The bracing casting or forging is formed adjacent its outer edge with a shank portion 22 terminating in a head portion 24, thus providing the locking lug or keeper D previously referred to.

In order to provide a mount for the movable parts of the locking device a base casting or forging 25 is provided which straddles the vertical corrugation of the door and is secured to the door by suitable securing means, such as rivets 26. The base casting or forging is so formed as to provide a relatively flat surface 28 interrupted by two openings, one adapted to receive a pin 30, and the other a pin 32. The pin 32 forms a pivot mount for the operating handle or lever A previously referred to. This operating handle or lever is formed with a hand-grip portion 34 adjacent one end and adjacent the other end with a bifurcated portion 36 which is perforated to receive a connecting means, such as rivet 38. Pivotaly mounted on the rivet 38 between the bifurcated ends 36 is the hook or latch B previously referred to. The hook or latch is formed from a flat plate and is provided with a curved nose portion 40 located outwardly of a recess 42, which is adapted to engage the keeper D. The edge of the recess adjacent the nose of the hook or latch is curved so as to closely engage the keeper and normally prevent lifting of the hook from the keeper while the inner edge of the recess is preferably made straight as at 44 so as to

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engage the inner portion of the keeper for forcing the door to an open position. Intermediate the recess 42 and the pivot pin 33 the hook or latch is formed with an enlarged opening 48 through which the pin 32 may extend. A portion of the upper edge defining the opening 48 is curved as at 50 and merges into a straight portion 52 for a purpose later to be described. The vertical width of recess 48 is sufficient to permit the lifting of the hook or latch relative to pin 32 so that the nose of the hook or latch may clear the keeper D.

In order to lock the operator or lever A and hook or latch B against relative movement, the wedge-lock or locking-cam C is provided. This wedge-lock or locking-cam is preferably formed from a flat piece of metal having substantially identical side pieces 60, pierced for pivotal mount on rivet or pin 32 and joined together by connecting part 62. Portions of the side pieces are curved as at 64 to form cam or wedge surfaces adapted to engage the bifurcated ends 36 of the operating handle or lever. These camming or wedging surfaces are so formed as to tend to increase the distance between pins 32 and 38 as the wedge-lock or locking-cam C is rotated in a clockwise direction as viewed in the figures. Under certain conditions it might be possible for the hook or latch to be lifted from keeper D. Accordingly, in order to prevent such lifting a projection 58 is welded or otherwise secured to the lower edge of the hook or latch and extends outwardly beneath the wedge-lock or locking-cam C and in close proximity to a curved projection 70 welded or otherwise secured to the outer side member of the locking cam. Projections 68 and 70 are pierced as at 72 (Figs. 3 and 4) to receive a seal (not shown).

The operation of the device is as follows: Assuming the parts in locked position as shown by full lines of Fig. 1, it is only necessary for the person unlocking the door to swing the wedge-lock or locking-cam C in a counter-clockwise direction to its pivot 32 to the line and dash position shown. The person then grasps the operating handle and swings it in a counter-clockwise direction on its pivot 30. This swinging of the operating handle or lever A moves rivet or pin 38 and causes the hook or latch member to thrust against the keeper D. This thrust causes the door to open. During the initial opening movement of the door the curved surface 50 of the hook or latch is in engagement with pin 32 and is so shaped as to cause the hook or latch to move in a substantially horizontal direction. As soon, however, as the door has moved sufficiently for surface 52 to strike pin 32, the hook or latch is abruptly lifted and carried clear of the keeper to the line and dash position shown in Fig. 5, also by full lines in Fig. 7. Thus it will be seen that the person grasping operator or lever A can by exerting considerable force cause a quick opening of the door with the latch or hook automatically lifting to clear the keeper or lug. In this way the person may take advantage of the momentum of the door to open it a greater amount than would otherwise be possible with the ordinary locking or starting device. As soon as the door has been opened sufficiently for the hook or latch to release the keeper, the person opening the door may release the lever and the parts will immediately assume the position shown in Fig. 6 in which the hook or latch is clear of the opening between the door nose flange 8 and the door jamb. The parts will be held in this

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position due to the weight of the operating handle or lever. As the door is moved from an open toward a closed position the person moving the door may grasp lever A and move it in a counter-clockwise direction to the position shown in line and dash in Fig. 5. From this position clockwise rotation of the lever will cause a lowering of the hook or latch until keeper D is engaged within the recess 42. Full clockwise rotation of the lever will pull the door tight against the door jamb or post and then clockwise rotation of the wedge-lock or locking-cam will bring the door to the same position as shown in full line in Fig. 1. It is to be noted that the door may be forced fully closed with the operating device in the position shown in Fig. 6 without in any way injuring the device. It is also possible for the lever to be held in an intermediate position between the full line and line and dash position of Fig. 5 during closing of the door. In this case the curved nose 40 of the hook or latch will cause the same to be lifted so that the keeper may be engaged within the recess 42. This raising of the hook or latch is permitted due to the vertical depth of the opening 48 in the hook or latch member. Attention is also directed to the fact that with the parts in the locked position shown in Fig. 1, the center of mass of the wedge-lock or locking-cam is to the right of pivot 32, thus constantly tending to urge the wedge-lock or locking-cam in a clockwise direction. Also, the center of mass of the operator or lever A is to the right of its pivot 30, thus tending to rotate it in a clockwise direction. In this manner the vibration which might tend to increase the space between the door and door jamb can not do so since such vibration will assist the lever and locking-cam to rotate in clockwise directions and such rotation automatically tightens the lock, thus it becomes impossible for the lock to loosen in service. This self-tightening feature will also compensate for considerable wear of the parts during the life of the device and insure a tightly locked door.

It will be seen from the preceding description that the bulk of the parts may be made either by casting or by forging, or the operating parts may be made from flat plate cut to shape and bent or welded together to form the complete device. It will also be seen that various modifications and rearrangements of parts, other than those shown and described, may be made and all such modifications and rearrangements of parts are contemplated as will fall within the scope of the following claims defining my invention.

What is claimed is:

1. In a door operating and locking device, the combination of operating and locking members and a keeper member mounted respectively on parts having relative movement toward and away from each other, said operating and locking members including an operating lever pivotally mounted on one of said parts, a latch member pivotally mounted on said lever and adapted to engage said keeper member, and means carried by the last referred to part and engageable with said latch to control the movements thereof, said means having mounted thereon a locking cam engageable with said operating lever to prevent pivotal movement of said operating lever in at least one direction.

2. In a door operating and locking device, the combination of operating and locking members and a keeper member mounted respectively on parts having relative movement toward and away from each other, said operating and locking

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members including an operating lever pivotally mounted on one of said parts, a latch member pivotally mounted on said lever and adapted to engage said keeper member, guiding surfaces formed on said latch member and at least partially defining an opening therein, and a guide pin carried by said last referred to part and extending through the latch opening and engageable by said guiding surfaces, said guiding surfaces and guide pin causing said latch to move substantially in a horizontal direction to open the door and then swing vertically to unlock the door.

3. In a door operating and locking device, the combination of operating and locking members and a keeper member mounted respectively on parts having relative movement toward and away from each other, said operating and locking members including an operating lever pivotally mounted on one of said parts, a latch member pivotally mounted on said lever and adapted to engage said keeper member, guiding surfaces formed on said latch member and at least partially defining an opening therein, a guide member carried by said last referred to part and extending through the latch opening and engageable by said guiding surfaces, and a locking cam pivotally mounted on said guide member and having parts engageable with a portion of said lever and with the latch member to lock the same against movement.

4. In a door operating and locking device, the combination of operating and locking members and a keeper member mounted respectively on parts having relative movement toward and away from each other, said operating and locking members including an operating lever pivotally mounted on one of said parts, a latch member pivotally mounted on said lever and adapted to engage said keeper member, guiding surfaces formed on said latch member and at least partially defining an irregular shaped opening therein, a guide member carried by said last referred to part and extending through the latch opening and engageable by said guiding surfaces, said irregular shaped opening and guide member being so formed and arranged as to permit lifting of the latch member out of engagement with the keeper member independently of the operating lever, a locking cam pivotally mounted on said guide member and engageable with a portion of said lever to lock the same against movement, and means formed on said latch member and locking cam and cooperating to prevent lifting of the latch member out of its engagement with said keeper when the door is locked.

5. In a door operating and locking device, the combination of operating and locking members carried on the door and a keeper member carried on the door jamb, said operating and locking members including, an operating lever pivotally mounted on the door, a latch member pivotally mounted on the lever and movable thereby for engagement with said keeper, a guide pin carried by the door, and guide surfaces formed on the latch member and cooperating with said guide pin to control the movements of the latch mem-

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ber, said guide surfaces being so formed and arranged as to cause said latch member to move substantially horizontally outward toward the door jamb and then to move outward and upward during movement of said operating lever toward door unlocking position.

6. In a door operating and locking device, the combination of operating and locking members carried on the door and a keeper member carried on the door jamb, said operating and locking members including, an operating lever pivotally mounted on the door, a latch member pivotally mounted on the lever and movable thereby for engagement with said keeper, a guide pin carried by the door, and guide surfaces formed on the latch member and cooperating with said guide pin to control the movements of the latch member, and a locking cam pivotally mounted on the door and movable into engagement with said lever and latch member to lock the same against movement toward a door unlocking position.

7. In a door operating and locking device, the combination of operating and locking members carried on the door and a keeper member carried on the door jamb, said operating and locking members including, an operating lever pivotally mounted on the door, a latch member pivotally mounted on the lever and movable thereby for engagement with said keeper, a guide pin carried by the door, and guide surfaces formed on the latch member and cooperating with said guide pin to control the movements of the latch member, and a locking cam pivotally mounted on the door and movable into engagement with said lever to lock the same against movement toward a door unlocking position, said locking cam and operating lever when in door locking position each having its center of mass so located as to constantly urge the door toward closed position to thereby maintain the members in a tight locked relationship.

8. In a door operating and locking device, the combination with an operating lever; of a latch member; and a locking cam carried by said door and having a part for locking said lever and also having a part for locking said latch member when the door is in closed and locked position.

9. In a door operating and locking device, the combination with an operating lever; of a latch member; and a locking cam carried by said door for locking said lever when the door is in closed and locked position, said locking cam and lever having their centers of mass so positioned as to constantly urge the door toward the closed position to thereby maintain a tight locked relationship of the parts.

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