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KEY-OPERATED LATCH

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This invention relates to a key-operated lock applicable especially to a multiple latch mechanism of a door such, for example, as is employed with lockers. Inasmuch as the latch mechanism of a locker door usually comprises a vertically reciprocable steel bar, extending for substantially the length of the door, for operation of a plurality of widely spaced catches, there is considerable weight and friction to be overcome when applying manual force to lift this bar. Because of this circumstance, it is customary to employ an operating handle by which to raise the bar, once it is freed for motion by operation of a suitable lock. The lock itself, whether it be of the combination or key-operated type, does no more than release the bar for movement in response to manual power. For this reason it is necessary to employ a handle of some sort for operation of the bar.

According to the present invention, I employ a key-operated lock through which an operating force is transmitted to the bar whereby it is raised to release a plurality of catches. My present lock has the further advantage that it is applicable to existing locker doors with multiple latch mechanisms as heretofore employed. It is simple in construction, easy and dependable to operate, and furnishes protection in accordance with all usual requirements. In addition, the key by which the lock is operated to lift the bar is retained within the lock only at such times as the locker door is to be opened or to remain open. Because of this circumstance, the locker door, when shut, is devoid of any projecting handle or knob such as might interfere with a person or object moving in the immediate vicinity. Considering the fact that a great number of lockers are usually crowded into a small space, this feature of avoiding exterior projections upon the locker doors is important.

A suggestive embodiment of my invention is set forth in the accompanying drawing wherein—

Figure 1 is a perspective view of a single locker showing its door, which is closed, equipped with my improved key-operated lock;

Fig. 2 which is a similar view shows the key inserted into the lock, the door being partly open;

Fig. 3 is a view in elevation of the inner side of the door, showing the lock fitted thereto;

Fig. 4 is an enlarged detail in section taken on line 4—4 of Fig. 1;

Fig. 5 is a fragmentary vertical section taken on line 5—5 of Fig. 4;

Fig. 6 is an elevation of the lock housing and connections extending therefrom, the view looking in the direction of the open side of the housing which, in service, is fitted against the inner side of the door;

Fig. 7 is a vertical section through the housing and cylinder lock therewithin, showing the parts

in the position which they normally occupy when the door is latched;

Fig. 8 which is a similar view shows the parts in the other extreme position; and

Fig. 9 is a longitudinal section through a cylinder lock of a type which is suitable for use with the present mechanism.

The present lock may be advantageously employed with the hinged door D of a locker L, such an application of the lock being hereinafter referred to simply for convenience. According to Fig. 4, the locker which may be made of steel is provided with an intumed flange 10 forming a jamb adjacent the free edge of the door which, as shown, is also flanged inwardly at 11 adjacent the jamb, the flange being formed with a return wall 12 which, together with the door, provides a channel open on the side opposite the jamb. Affixed to the jamb is one wall 15 of an angle plate whose web 16 is adapted to be engaged by the return wall of the door flange so as to serve as a stop therefor. A tongue 17 forming a keeper which is carried by the web in parallel but spaced relation to the wall 15 is adapted to lie transversely within the door channel when extended thereinto through an elongated slot 18 in the return wall 12. The door flange and return wall 12 are desirably extended for the full door length, but the angle plate 16 which is affixed to the jamb may be short, several of such plates being used, by preference, three being a suggested number. With such multiple angle plates, each requires one elongated slot 18 through the return wall for the reception therethrough of a keeper; and also multiple catches are required in cooperation with the keepers. These catches and associated keepers constitute a multiple latch mechanism the operation of which is controlled by means now to be described.

Mounted for vertical sliding movement within the door channel is a bar B, here shown as of U-form with its base wall 20 remote from the door flange so as to close the open side of the channel. One or more slots 21 in register with the slots 18 are formed in the U-bar to permit projection therethrough of the keepers which are fixedly carried by the door jamb. Extending fixedly between opposite walls of the bar is a bridge plate 25 which lies to the inside of each keeper. A slot 26 is formed in the bridge plate in register with another slot 27 in each keeper for the projection therethrough of a catch C which is extended laterally from one end of a leaf spring 30 (see Fig. 5) which lies spaced from the door flange toward which the spring at one end is inclined, as at 31, for connection therewith, as by the use of rivets 32. The inclined portion of the spring cooperates with the sliding cam-flange 33 formed transversely of the bridge at one end thereof. Since the bridge is fixedly

connected to the bar which is mounted for reciprocation vertically in the door, it follows that an upward movement of the slide will cam the spring-catch outwardly toward the door flange with a consequent disengagement from the keeper. Under such conditions the door may be freely opened. If the bar be lowered again, with a consequent descent of the slide, the spring-catch will be advanced inwardly to a position of engagement with the keeper, the beveled edge of the catch facilitating its sliding passage over the outer edge of the keeper until the catch is opposite the slot therein whereupon the catch may advance into the latching position shown in Fig. 4.

With a latch mechanism of this kind which is now a standard product, the lock of my invention is adapted to co-operate with special advantage inasmuch as it provides a key-operated cylinder (1) by which to raise and lower the bar to unlatch or latch the catch, and (2) by which to open the door, thereby dispensing with any requirement for a handle or knob. For this purpose I utilize a housing H which is affixed to the inner side of the door adjacent the bar, the housing being formed with a top wall 35 having therein an opening through which is slidably extended a plunger 36 connected at its upper end with a head 37 which is laterally extended from a transmission arm 38 which extends downwardly through a slot in the housing top to be slidably supported therewithin. Near its lower end the arm is slotted at 39 to receive an eccentric pin 40 which is carried at the rear end of the rotatable plug 41 of a cylinder lock. At its forward end the cylinder carries a cap 42 whose face is exposed through an opening in the door, the cap being provided with a slot for entry of an authorized key K.

By reference to Fig. 6, which is a view looking into the interior of the housing from its front open side, it will be noted that a pair of lugs 45 are extended therein from the back wall in spaced relation so as to accommodate therebetween the transmission arm 38. These lugs, together with the edges of the slot in the top wall 35 furnish a guide wherein the arm body is slidably supported. At the upper end of the arm is an offset lateral extension 46 the distant end of which is adapted to enter a slot 47 in the base wall 20 of the bar B, the size of the slot being such as to closely surround the arm whereby, in response to movements of the transmission arm in a vertical plane, the bar will be raised or lowered. The weight of the bar may be substantially counterbalanced by a spring 48 which is coiled around the plunger 36 so as to exert in a plane between the offset arm and its extension opposing thrust forces upon the head 37 and housing top 35. Accordingly any turning force applied to the key K will be transmitted through the cylinder lock and the arm extending therefrom to the vertically reciprocable bar to release or re-engage the multiple latch mechanism in the manner already explained.

As indicative of a type of key-operated lock which is suitable for the present invention, I have shown in Fig. 9 a plate-tumbler guide assembly, the tumblers being designated by the letters *t* and the guides by the letters *g*. Normally, the tumblers are spring projected so as to occupy positions within opposed grooves 50 (see Fig. 6) in the lock barrel 51, but upon insertion of the key the tumblers are forced inwardly to aligned positions where the plug is

free to rotate in response to turning movement of the key. The barrel is secured in any appropriate way within a tubular mounting 52 which extends transversely of the housing. Any suitable stop for limiting the plug rotation to a desired distance may be provided, it being preferred to confine the oscillating range to something less than 180° so that the key may be inserted or withdrawn only when the plug is in its initial position. It is the key alone operating through the plug which (1) communicates motion to the arm, and thence to the bar by which the multiple latches are released, and which (2) while non-releasably held in the lock, serves as the handle by which the door is opened. Return movement of the bar, by which the latches are permitted to re-engage with their keepers, is accomplished by a reverse operation of the key. When so reversely operated the door is free to close and latch itself by reason of the fact that the beveled faces of the several catches may ride over the edges of the keepers with which they first strike. And finally, it is only when the bar is down with the lock restored to its initial position that the key may be removed from the door.

In practice the present lock mechanism may be applied with facility to a locker door having a multiple latch mechanism as herein described. It is necessary merely that the housing be bolted or riveted in place, apertures in opposed flanges 53, adapted to bear against the inner door face, being provided to receive such fastening elements. When so positioned the arm extension is adapted to enter the slot 47, usually pre-formed in the bar, whereby to complete the operative connection between the lock and latch mechanism. This extension, it will be noted, proceeds in a plane intermediate of the door and rear end of the cylinder where the main part of the arm is located, in order to align with the bar slot 47. The thrust force which proceeds through the offset head is compensated for by the spring whose tension is exerted at this point of offset, thereby minimizing any friction due to canting. The entire assembly is, therefore, effective in the extreme, enabling an ordinary key-operated cylinder lock to control the latch mechanism and also to serve as a handle for the door whereby the usual exterior protuberances may be dispensed with entirely.

I claim:

1. A locking mechanism for doors including a vertically reciprocable latch operating bar, a lock housing, a cylinder lock mounted for oscillation within the housing, an arm slidably mounted within the housing and extended outwardly therefrom for engagement with the bar adapted to transmit vertical motion thereto, a spring in connection with the arm exerting thereon a force tending to balance the bar weight, and said cylinder lock being adapted for operation whereby to unlatch a door.

2. A locking mechanism for doors including a vertically reciprocable latch operating bar, a key-operated lock comprising a housing affixed in proximity to the bar, an arm slidably supported within the housing and extended therefrom for releasable engagement with the bar, a cylinder rotatably secured within the housing, an eccentric connection between said arm and cylinder whereby to impart vertical movements thereto in response to rotation of the cylinder, and a spring in connection with the arm exerting a tension force in opposition to the weight

of the bar adapted to afford a substantial counterbalance therefor.

3. A locking mechanism for doors including a vertically reciprocable latch operating bar, a lock housing affixed in proximity to the bar, a lock including a rotatable cylinder within the housing adapted to receive therein and release therefrom an operating key when the cylinder is in one rotative position only, an arm slidably supported by the housing and extended therefrom for releasable connection with the bar adapted to transmit vertical motions thereto, an eccentric connection between the arm and cylinder whereby rotary motions of the latter in response to operations of the key may be translated into reciprocatory movements of the former, and tension means exerting on the arm a force counter to the weight of the bar tending to equalize the torsional force requisite for operation of the key for moving the bar in both directions.

4. A locking mechanism for doors including a vertically reciprocable latch operating bar, a housing affixed in proximity to the bar, a key-operated rotatable cylinder lock within the housing, an arm slidably supported within the housing and extended therefrom for connection with the bar, a plunger extending from a point exteriorly of the arm through an opening in the housing adapted to slide therewithin in response to sliding movements of the arm, and a spring coiled about the plunger exerting a force tending to move the arm outwardly from the housing in opposition to the weight of the bar whereby to equalize the torsional force requisite for operation of the key for moving the bar in both directions.

5. A locking mechanism for doors including a vertically reciprocable latch operating bar, a housing affixed in proximity to the bar, means extended inwardly from one of the housing walls to provide a pair of spaced guides, an arm slidable between the guides within the housing and extended exteriorly thereof through a slot in one of its walls adapted for straight line reciprocation, a connection between the arm and the bar whereby the latter is reciprocated in response to movements of the former, a key-operated cylinder lock having an eccentric connection with the arm for operation thereof, and spring means exerting a tension on the arm in opposition to the weight of the bar adapted to equalize the torsional force requisite for operation of the key for moving the bar in both directions.

6. A locking mechanism for doors including a vertically reciprocable latch operating bar, a housing affixed in proximity to the bar, a key-operated lock cylinder adapted for rotation about a fixed axis within the housing, a vertically reciprocable arm slidably supported within the housing and extended therefrom for reciprocation exteriorly thereof, means connecting the arm and the lock cylinder in a manner whereby the latter is adapted to transmit a reciprocatory motion to the former, and means connecting the arm with the bar whereby the latter is caused to reciprocate in response to movements of the former.

7. A locking mechanism for doors including a vertically reciprocable latch operating bar, a housing affixed in proximity to the bar, a lock

including a rotatable cylinder within the housing adapted to receive therein and release therefrom an operating key when the cylinder is in one rotative position only and in all other rotative positions to retain the key therewithin whereby it may serve as a handle for a door, a transmission between the cylinder and the bar adapted upon application of a torsional force to the key to reciprocate the bar in one direction, and tension means in connection with the transmission exerting a force counter to the weight of the bar adapted to equalize the torsional force requisite for operation of the key to move the bar in both directions.

8. A locking mechanism for doors including a vertically reciprocable latch operating bar, a lock mounted in proximity to the bar and including a rotatable cylinder adapted to receive therein and release therefrom an operating key when the cylinder is in one rotative position only and in all other rotative positions to retain the key therewithin whereby it may serve as a handle for a door, a transmission between the cylinder and the bar adapted upon application of a torsional force to the key to reciprocate the bar in one direction, and tension means in connection with the transmission exerting a force counter to the weight of the bar tending to equalize the torsional force requisite for operation of the key to move the bar in both directions.

9. A locking mechanism for doors including a reciprocable latch operating bar, a key-operated lock comprising a housing affixed in proximity to the bar, an arm slidably supported within the housing and extended therefrom for releasable engagement with the bar, a cylinder rotatably secured within the housing, an eccentric connection between said arm and cylinder whereby to impart sliding movements thereto in response to rotation of the cylinder, and a spring in connection with the arm exerting a tension force in opposition to the weight of the bar tending to afford a substantial counterbalance therefor.

10. A locking mechanism for doors including a vertically reciprocable latch operating bar, a housing affixed in proximity to the bar, a key-operated lock including a rotatable cylinder within the housing, a transmission between the cylinder and the bar adapted upon application of a torsional force to the key to reciprocate the bar in one direction, and tension means in connection with the transmission exerting a force counter to the weight of the bar tending to equalize the torsional force requisite for operation of the key to move the bar in both directions.

11. A locking mechanism for doors including a vertically reciprocable latch operating bar, a key-operated lock mounted in proximity to the bar and including a rotatable cylinder, a transmission between the cylinder and the bar adapted upon application of a torsional force to the key to reciprocate the bar in one direction, and tension means in connection with the transmission exerting a force counter to the weight of the bar tending to equalize the torsional force requisite for operation of the key to move the bar in both directions.

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