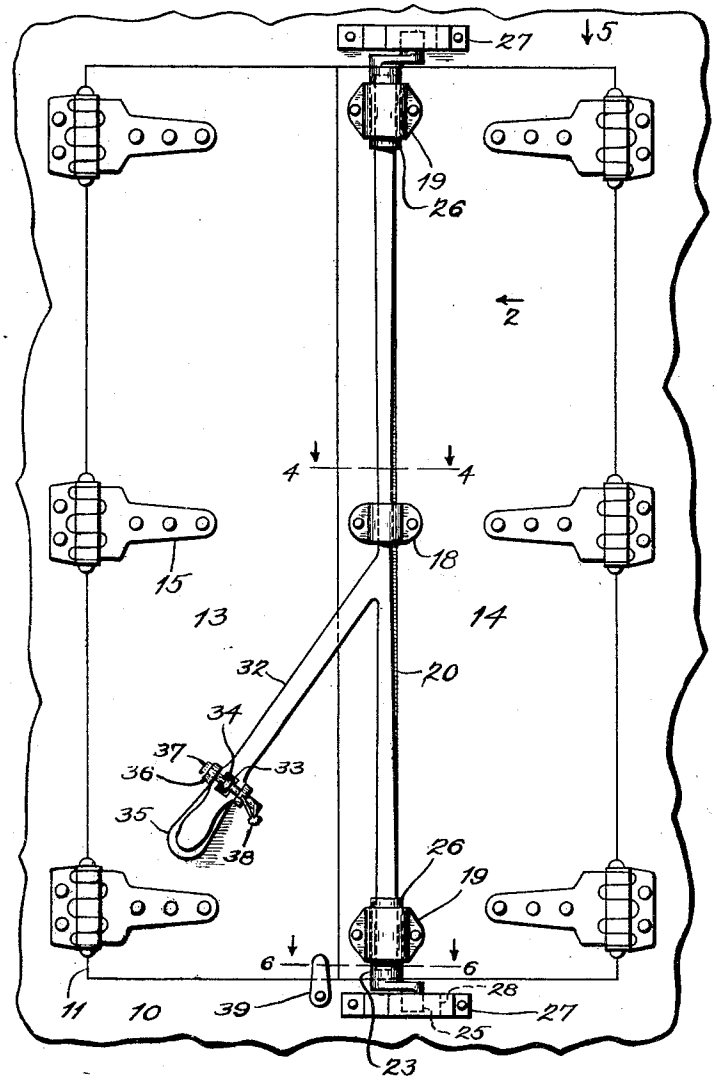
Dec. 8, 1931. T. H. SYMINGTON 1,835,100

DOOR SECURING MECHANISM

Filed Feb. 9, 1927 2 Sheets-Sheet 1



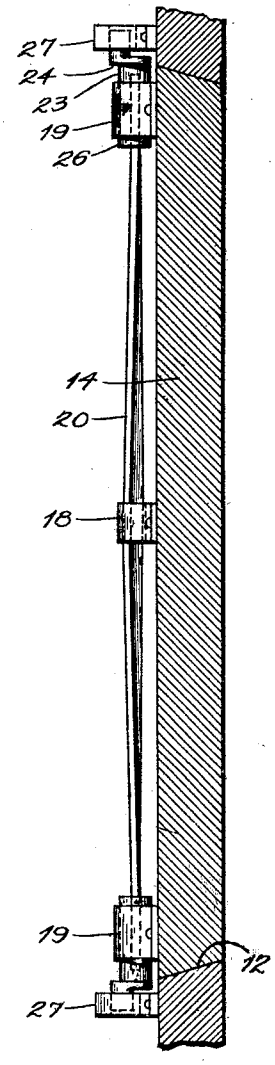


Fig - 1

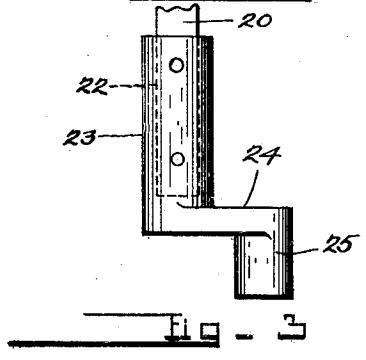


Fig - 3

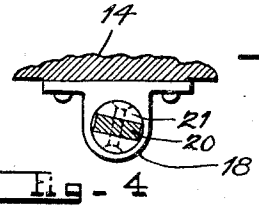


Fig - 4

Fig 2

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DOOR SECURING MECHANISM

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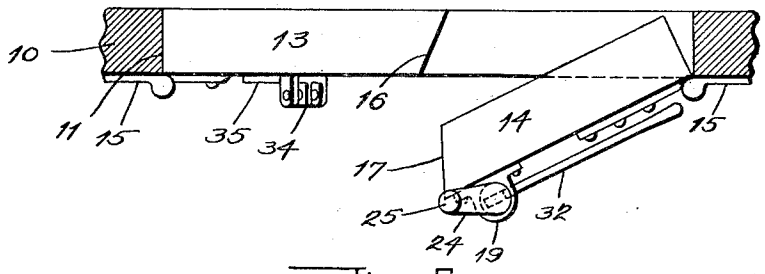


Fig - 5

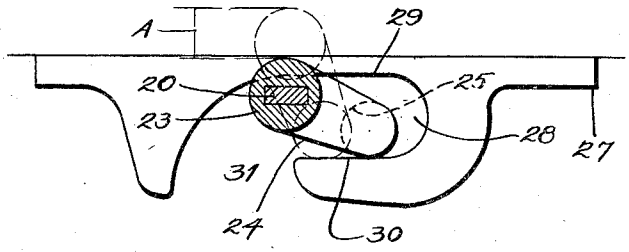


Fig - 6

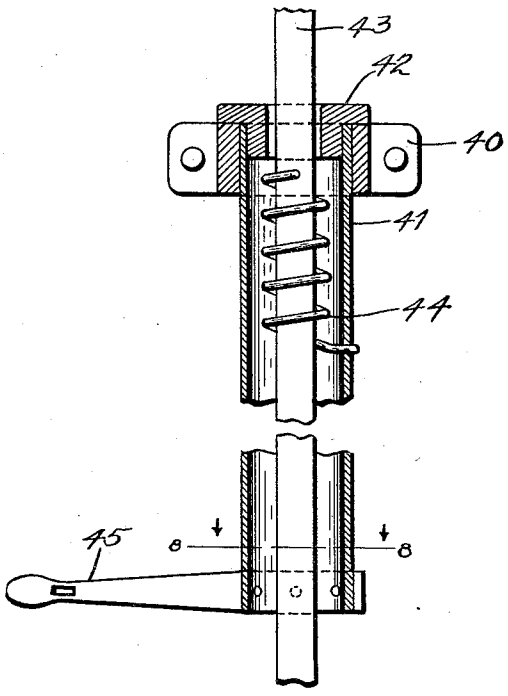


Fig - 7

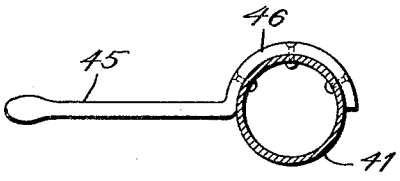


Fig - 8

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UNITED STATES PATENT OFFICE

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DOOR SECURING MECHANISM

Application filed February 9, 1927. Serial No. 166,872.

My invention relates to door securing mechanisms.

The principal object of my invention is to devise a mechanism for use on the doors of refrigerator cars and similar constructions which is arranged to effect their air tight closure when operated in one direction and also to cause a preliminary movement of the same as an aid in opening, when operated in the opposite direction.

A further object is to devise a mechanism of the character described which is arranged to maintain an effective closure of the doors over a considerable period of time, regardless of wear, tendency of the doors to acquire an abnormal setting, or other factors which act to break down the seal between the door and frame edges, and accordingly serve to destroy the refrigerating temperature within the car.

A further object is to arrange the foregoing mechanism so that it is capable of easy and positive operation, is simple and durable in construction and to which the conventional security seal may be applied.

In general, my invention belongs to that class of door locks in which a locking bar spans the door and is given a motion of rotation to effect an initial opening or final closing of the door. For this purpose, suitable brackets are provided on the door frame which coact with crank arms, eccentrics, or other elements on the locking bar to produce the desired result. As this arrangement has been heretofore known in the art, considerable difficulty has been experienced in achieving an effective seal between the doors and between any door and the adjacent portion of the frame, after wear occurs or other air leakage causes intervene. The movement which present locks impart to a door is fixed by the space relation of the component elements and no provision is made for compensating for the looseness of the doors that may arise from the foregoing causes. Accordingly, the refrigerating capacity of the car gradually decreases with use, due to the breaking of the air tight seal at the doors.

As a solution of this problem, it has been proposed to mount resilient packing strips on the doors which will act to take up the additional clearance and hence maintain the seal. However, this construction requires additional changes in the doors, is expensive to install and is not entirely satisfactory.

My invention necessitates no changes in the doors proper and permits the retention of the usual felt and canvas packing, while at the same time, it is arranged to secure an effective closing of the doors, whether worn or otherwise. Essentially, it comprehends a locking bar, which during the final closing of the door, undergoes a torsional stress, resulting either in an actual strain, or twisting, or in a tendency so to act, the reaction from which is additive to that existing between the bar, due to its bodily rotation, and the brackets on the frame. The latter may be called the primary reaction and is capable of closing a new door tightly, while the torsional reaction is secondary in nature and serves as a reservoir from which pressure may be derived for taking up play in the door as wear occurs. Hence, the effective life of the door, from the standpoint of maintaining the refrigerating temperature within the car, is preserved over a longer period of time than now obtains in present practice.

These and further objects of my invention will be set forth in the following specification, reference being had to the accompanying drawings, and the novel means by which said objects are effectuated will be definitely pointed out in the claims.

In the drawings:

Fig. 1 is an elevation of the doors of a refrigerator car showing my improved mechanism applied thereto.

Fig. 2 is a vertical section taken along the right hand door as viewed in Fig. 1, and looking in the direction of the arrow 2 in said figure, the operating lever being omitted.

Fig. 3 is an enlarged view of the lower end of the locking bar as viewed in Fig. 1.

Fig. 4 is a section along the line 4—4 of Fig. 1, looking in the direction of the arrows.

Fig. 5 is a section along the upper edges of the doors, looking in the direction of the arrow 5 in Fig. 1.

Fig. 6 is an enlarged view along the line

6—6 in Fig. 1, looking in the direction of the arrows, the door and car structure being omitted.

Fig. 7 is a sectional elevation showing a modified method of applying a torsional force to the locking bar.

Fig. 8 is a section along the line 8—8 in Fig. 7, looking in the direction of the arrows.

In the drawings:

The numeral 10 denotes the side of a refrigerator car in which is formed the usual opening 11, the upper and lower boundary surfaces of which may be inclined as at 12 in the customary manner. Doors 13 and 14 are pivotally mounted, as by hinges 15, in the opening 11 and the meeting edges thereof, 16 and 17, respectively, may be inclined to the thickness of said doors in accordance with present practice. Said edges may have applied thereto packing strips of canvas, felt, or other sealing material that will afford an air tight joint therealong.

An intermediate bearing block 18 is disposed adjacent the swinging edge of the door 14 and aligned therewith are bearing blocks 19 which are located adjacent the upper and lower edges of said door. A locking bar 20, preferably rectangular in cross-section, is rotatably mounted in the block 18 through the medium of circular segments 21 which are secured to said bar. The bar 20 extends upwardly and downwardly from the block 18 and each end thereof is mounted in a socket 22 which is formed in a cylindrical body portion 23, said portion being rotatably mounted in the block 19. The portions 23 extend beyond the upper and lower edges of the door 14 and each has formed thereon a crank arm 24 provided with a bearing pin 25, it being understood that said pins extend beyond the upper and lower edges of said door for coaction with elements hereinafter described. A collar 26 is secured to the bar 20 adjacent each of the blocks 19 in order to prevent endwise movement of said bar.

A bracket 27 is secured to the car side 10 adjacent each of the pins 25 and said bracket comprises a slot 28 having the walls 29 and 30 which are substantially parallel to the surface of the side 10. Said slot is closed at one end but communicates at the opposite end with a mouth 31 through which the pin 25 passes in the operation of the mechanism as hereinafter explained.

An operating lever 32, provided with a suitable hand grip, is attached to the bar 20 in any approved manner substantially at the mid point thereof for a purpose hereinafter explained. Said lever extends downwardly so that it may be readily grasped and comprises a slot 33 through which a staple 34 passes when the doors are closed, as shown in Fig. 1. Said staple may be formed on a bracket 35 which is secured to the door 13 and is provided with ears 36. A pin 37 passes through said ears and staple in order to maintain the lever 32 in position, and a sealing wire 38 passes through said pin and one of said ears. The numeral 39 represents a conventional latch which is pivotally mounted on the side 10 and adapted to hold the door 13 in a closed position, when the other door is open.

The operation of my improved door securing mechanism is as follows:

Assuming that the doors are open and that it is desired to close the same, the door 13 will first be moved to a closed position by hand, followed by a similar movement of the door 14 to a partly closed postion, or one in which the pin 25 registers approximately with the mouth 31. In this position, the lever 32 may occupy the position shown in Fig. 5, or one slightly displaced therefrom.

Said lever will then be grasped and moved in a clockwise direction, thus causing a similar movement on the part of the arm 24 to bring the pin 25 within the slot 28. Continued movement of said lever eventually brings said pin into contact with the wall 30 of said slot. Further movement of said lever will then set up a cam-like action between said pin and said wall, the reaction from which operating through the blocks 19 serves to close the door 14. The lever 32 may then be secured in position by means of the pin 37.

During this functioning and due to the location of the point of attachment of the lever 32 to the bar 20 and also by reason of the fact that rotation of the ends of said bar tends to be retarded by the interaction between the pins 25 and the walls 30, it is evident that a torsional strain will be effected in the bar 20, the reaction from which is in addition to that exerted by the bodily rotation of said bar. In order to facilitate this torsional action, the bar 20 will be made of a suitable material and will possess an appropriate cross section.

The advantages of storing up additional energy by the method aforesaid can be readily understood by reference to Fig. 6. In this figure, the full lines represent the approximate position reached by the arm 24 upon completion of the closing movement for a new door. In present constructions of this character, this position represents the ultimate movement by reason of the fact that the operating lever has reached its final position, but in my arrangement, the arm 24 is capable of additional movement in a clockwise direction due to the tendency of the bar 20 to straighten itself. Accordingly, as wear occurs, the energy stored in the twisted bar 20 serves to rotate the arm 24 until it finally reaches the position shown by dotted lines in Fig. 6. During this movement, the door is moved a distance "A" which may be regarded as the maximum take-up necessary.

It is evident therefore that my device possesses superior advantages over those which depend merely upon a camming action, or similar modes of operation, to secure the closing of the door, since adequate provision is made for compensating for wear as it occurs. In other words, there is always a pressure tending to fully seat the door in order to maintain the air tight seal. As an aid in this respect, it will be noted that the lever 32 is attached to the bar 20 midway of its ends and hence in a position to obtain the maximum torsional effect.

If it is desired to open the doors, it is only necessary to remove the pin 37 and rotate the lever 32 in a counter clock-wise direction as viewed in Fig. 5. The bearing pin will then be moved into contact with the wall 29 of the slot 28, the reaction from which operating through the blocks 19 and bar 20 will open the door 14.

A modified method of obtaining a torsional effect is illustrated in Fig. 7. The numeral 40 represents a bearing block which is similar to the block 18 and located midway of the ends of the door. A sleeve 41 is rotatably mounted at one end in the block 40 and extends downwardly towards the lower edge of the door. A hollow cap 42 provided with a suitable flange is secured internally to said sleeve and serves to prevent disengagement from said block. The locking bar 43 passes through the sleeve 41 and is rotatably mounted in blocks similar to 19, but said bar will possess sufficient rigidity to resist twisting as hereinbefore described for the bar 20. A torsion spring 44 embraces the bar 43, one end of said spring being anchored to said bar and the other end to the sleeve 41. At the lower end of said sleeve, the operating lever 45 is secured by means of a yoke 46.

In this construction, when the door is closed through operation of the lever 45, the bar 43 will be rotated together with the crank arms which it carries in the manner similar to the bar 20, but the former bar will not be twisted. As a substitute therefor, rotation of the sleeve 41 exerts a torsional stress upon the bar 43 through the medium of the spring 44. Hence, as wear occurs and the door becomes capable of further movement, the energy stored in said spring will cause a rotation of said bar to create the necessary pressure against the door.

It is not contemplated that my device will be limited in its application to the doors of refrigerator cars, as it is obvious that it is readily adaptable to other situations in which the same problems are present.

While I have shown one set of elements and combinations thereof for effectuating my improved securing mechanism, it is to be understood that I do not desire to be limited to the exact forms and structures shown, as they are disclosed for the purpose of illustration only, for many changes may be made therein without departing from the spirit of my invention.

I claim:

1. A door securing mechanism comprising in combination, a door for closing an opening, a locking bar rotatably mounted on said door and arranged to be twisted between and relative to its ends, brackets adjacent said opening adapted to coact with the ends of said bar upon rotation thereof to close the door, a lever for rotating said bar, and means for maintaining said lever in the door closing position, the straightening tendency of said bar exerting a continuous pressure against the ends thereof for maintaining a tight closure of the door.

2. A door securing mechanism comprising in combination, a door for closing an opening, a locking bar rotatably mounted on said door and arranged to be twisted intermediate and relative to its ends, brackets adjacent said opening adapted to coact with the ends of said bar upon rotation thereof to close the door, a lever for rotating said bar carried thereby and extending downwardly toward the lower edge of the door, and means for maintaining the lever in the door closing position, the straightening tendency of said bar exerting a continuous pressure against the ends thereof for maintaining a tight closure of the door.

3. A door securing mechanism comprising in combination, a door for closing an opening, a locking bar rotatably mounted on said door, upper and lower crank arms each provided with a bearing pin socketed for the reception of and secured to the corresponding end of said bar and extending beyond the corresponding edge of the door, brackets having open ended slots located adjacent said arms and adapted for coaction with said pins upon rotation of said bar to close the door, a lever for rotating the bar, and means for maintaining the lever in door closing position, said bar being arranged to be twisted by the movement of said lever whereby the straightening tendency of the bar exerting a continuous pressure against the ends thereof will react with said brackets to maintain a tight closure of the door.

In testimony whereof, I affix my signature.

THOMAS H. SYMINGTON.