Sept. 17, 1929. P. R. DRENNING 1,728,530

DOOR SECURING MECHANISM

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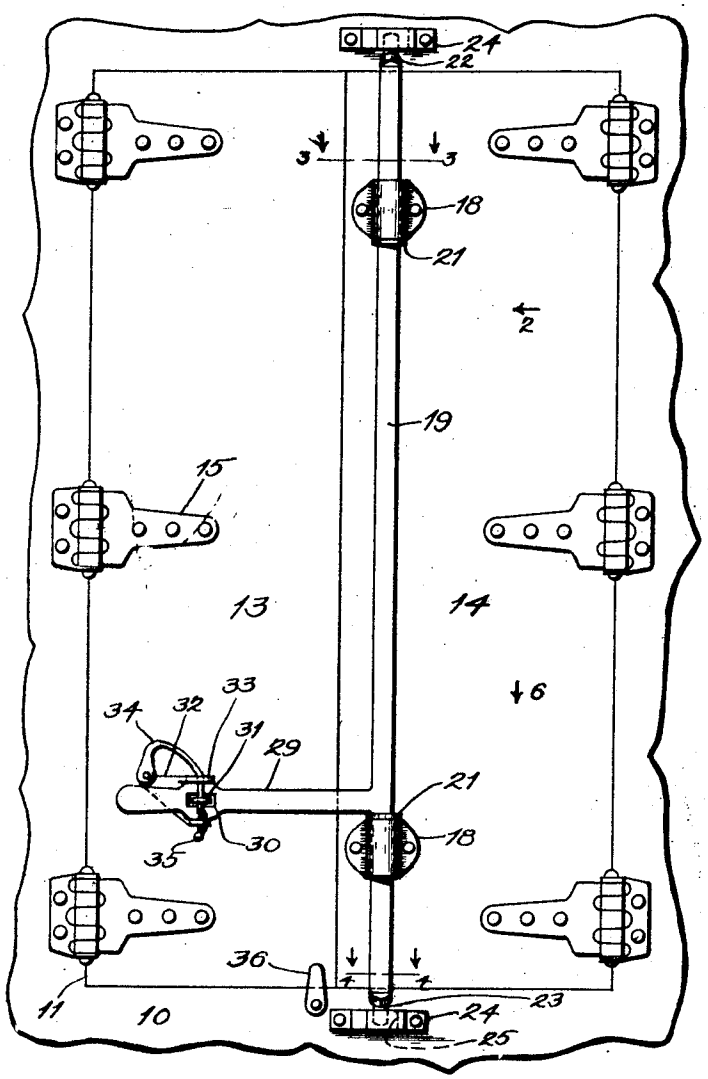


Fig - 1

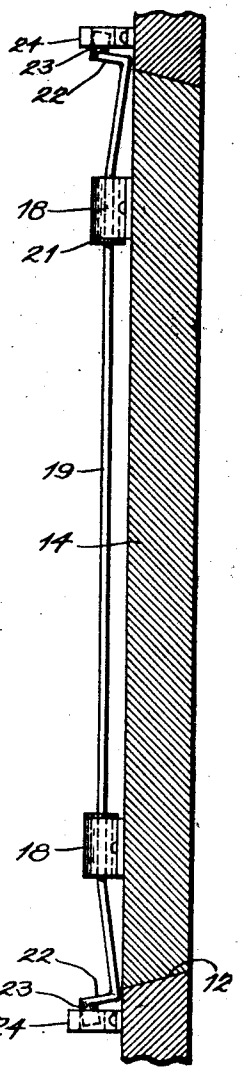


Fig - 2

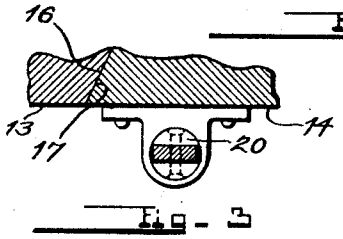


Fig - 3

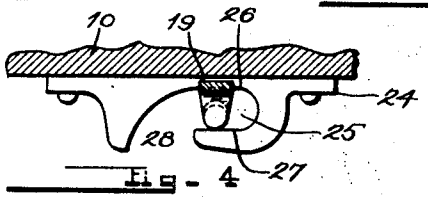


Fig - 4

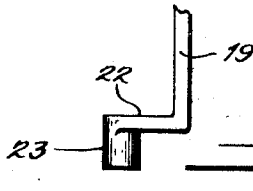


Fig - 5

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UNITED STATES PATENT OFFICE

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DOOR-SECURING MECHANISM

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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 provide a securing mechanism for doors in which the pressure is applied to the door at points which insure a more uniform and effective closing force and which also serves to prevent bowing of the doors.

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 the practice 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 and is expensive to install.

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 bending force, resulting either in an actual strain or bending, 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 bending 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 the art.

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

In the drawing:

Fig. 1 is an elevation of a pair of refrigerator car doors showing my door securing mechanism applied thereto.

Fig. 2 is a vertical section along the right hand door in Fig. 1, looking in the direction of the arrow 2 in said figure.

Figs. 3 and 4 are sections along the lines 3—3 and 4—4, respectively, in Fig. 1, looking in the direction of the arrows.

Fig. 5 is a side view of one end of the locking bar used in my mechanism.

In the drawing:

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 said opening 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 suitable packing strips of canvas, felt, or other sealing material, that will afford an air tight joint therealong when said doors are closed.

Aligned bearing blocks 18 are secured to the door 14 adjacent the swinging edge thereof and are spaced from the end edges of said door at some convenient distance for a purpose hereinafter explained. A locking bar 19, preferably rectangular in cross section, is rotatably mounted in said blocks through the medium of circular segments 20 which are secured thereto. Said bar extends through said blocks beyond the end edges of said door and collars 21 secured to said bar adjacent said blocks prevent endwise movement thereof. A crank arm 22 is formed on each end of the bar 19 and carries a bearing pin 23 which may be formed integrally therewith or otherwise.

A bracket 24 is secured to the car side 10 adjacent each of the pins 23 and said bracket comprises a slot 25 having the walls 26 and 27 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 23 passes in the operation of the mechanism as hereinafter explained.

An operating lever 29 is secured to the bar 19 above the lower block 18 and said lever may be provided with a suitable hand grip. A slot 30 is formed in said lever for engagement with a staple 31 which is carried by a bracket 32 mounted on the door 13. Said bracket may be further provided with ears 33 through which and the staple 31 a hook 34 may pass in order to maintain the lever 29 in a locked position. The usual sealing wire 35 may be passed through said hook and any conventional portion of the bracket 32. The numeral 36 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 opened or closed.

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 and latch 36 moved to a retaining position, followed by a similar movement of the door 14 to a partly closed position, or one in which the pin 23 registers approximately with the mouth 28. In this position, the lever 29 will occupy such a position as will secure the aforesaid mentioned result.

Said lever will then be grasped and moved in a clockwise direction, when viewed as indicated by the arrow 6 in Fig. 1, thus causing a similar movement on the part of the arm 22 to bring the pin 23 within the slot 25. Continued movement of said lever eventually brings said pin into contact with the wall 27 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 18 serves to close the door 14. The lever 29 may then be secured in position by means of a hook 34 and the sealing wire 35 applied in the usual manner.

During this functioning and due to the manner in which the bar 29 is supported on the door 14, it is evident that a bending force will be applied to the pin 23 by the wall 27 and will effect an actual bend of said bar over the edge of each block 18 which is adjacent to the corresponding pin 23. It will be understood that the bar 19 will be made of suitable material and will possess an appropriate cross section to facilitate the application of the bending force without any possibility of acquiring a permanent set. In other words, the bar will embody a resilient characteristic which affords a means of storing energy therein when bent, and which is present in both ends of the bar.

The advantages of storing up this energy can be readily understood by reference to Fig. 4. The reaction between the pin 23 and the wall 27 due to the bending stress may be considered as additional to that arising from the rotation of the bar 19. The latter corresponds to that which is obtainable in present constructions of this character, but it is obvious that after the door has been closed and the operating lever has reached its final position, no further means are available for effecting an additional closing due to the play occasioned by wear or other causes. However, in my arrangement, the pin 23 is capable of additional movement in a direction to cause a further motion of the door by reason of the energy stored in the bent portion of the bar 19 during its rotation to close said door. Accordingly, as wear occurs, the tendency of said bar to resume its normal shape operates as an effective means for maintaining the tightness of the door, since there is always a pressure exerted in a direction to fully seat the door, within the limitations of the device.

It is evident from the foregoing that my securing mechanism possesses superior advantages over those which depend entirely upon a camming action, or similar modes of operation, to obtain a closing of the door.

As an aid in this respect, it will be noted first, that the blocks 18 are positioned relatively close to the swinging edge of the door 14 and second, that said blocks are spaced from the end edges of said door. From these considerations, it follows that pressure is applied to said door in locations which insure the most effective closing, and also that, consistent with this feature, the maximum bend may be given to the ends of the bar 19 in order to secure a maximum take-up of the door. Further, it will be noted that the spaced disposition of the blocks 18 from the end edges of the door eliminates any tendency of the latter to bow during the closing movement.

If it is desired to open the doors, it is only necessary to remove the hook 34 and rotate the lever 29 in a counter clockwise direction. The bearing pin 23 will then be moved into contact with the wall 26 of the slot 25, the reaction from which operating through the bar 19 and blocks 18 will open the door 14.

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 appear.

While I have shown one set of elements and combinations thereof for effectuating my improved securing mechanism, it is to be understood that the same are for the purpose of illustration only and in nowise to limit my device to the exact forms and structures shown, 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, a bracket adjacent said opening adapted to coact with said bar upon rotation thereof to close said door and to bend said bar, and a lever for rotating said bar, said bar resuming its original shape when said door is opened.

2. A door securing mechanism comprising in combination, a door for closing an opening, bearing blocks carried by said door and spaced from the upper and lower edges thereof, a locking bar rotatably mounted in said blocks, brackets adjacent said opening adapted to coact with said bar upon rotation thereof to close said door and to bend said bar over the outer edges of said blocks, and a lever for rotating said bar, said bar resuming its original shape when said door is opened.

3. A door securing mechanism comprising in combination, a door for closing an opening, a locking bar rotatably mounted on said door and extending beyond the upper and lower edges thereof, crank arms provided with bearing pins formed on each end of said bar, a bracket comprising an open ended slot located adjacent each of said pins and adapted for coaction therewith upon rotation of said bar to close said door and to bend said bar, and a lever for rotating said bar, the extent of said bend being a maximum when said door is closed and said bar resuming its original shape when said door is opened.

In testimony whereof, I affix my signature.

PERCY R. DRENNING.