July 25, 1950 F. M. HESS 2,516,210

FIXTURE FOR FREIGHT CAR DOORS

Filed May 9, 1947 2 Sheets-Sheet 1

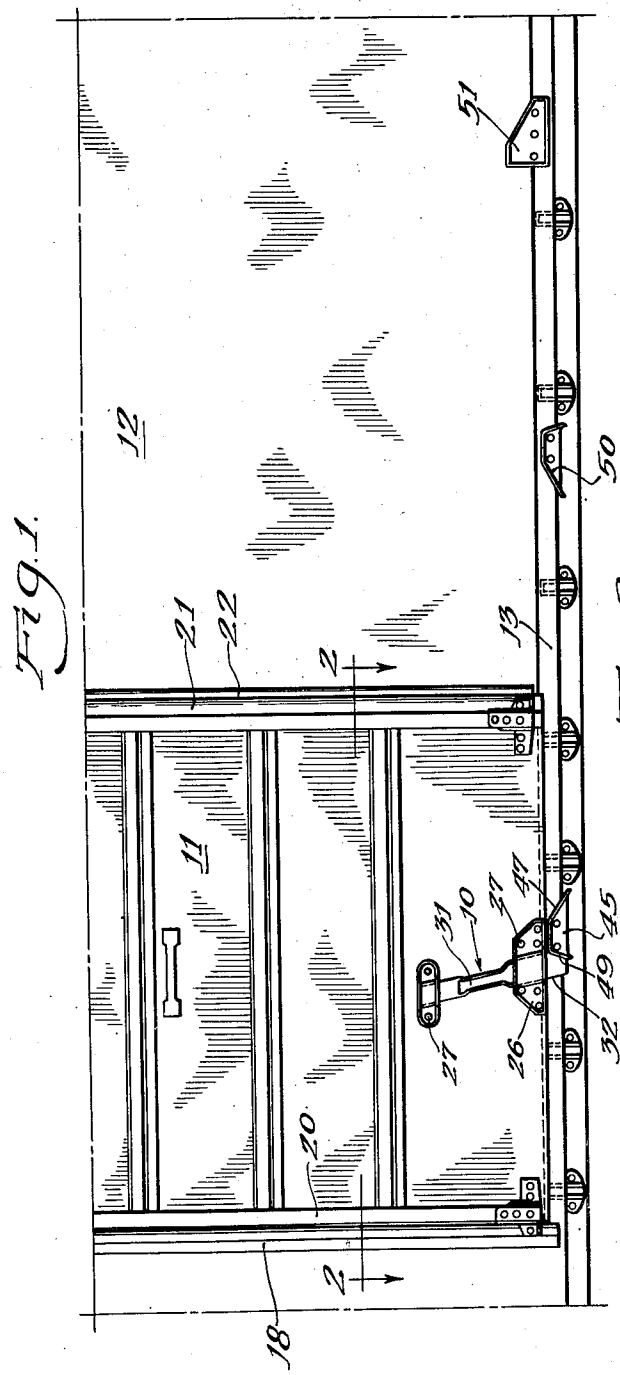


Fig. 1.

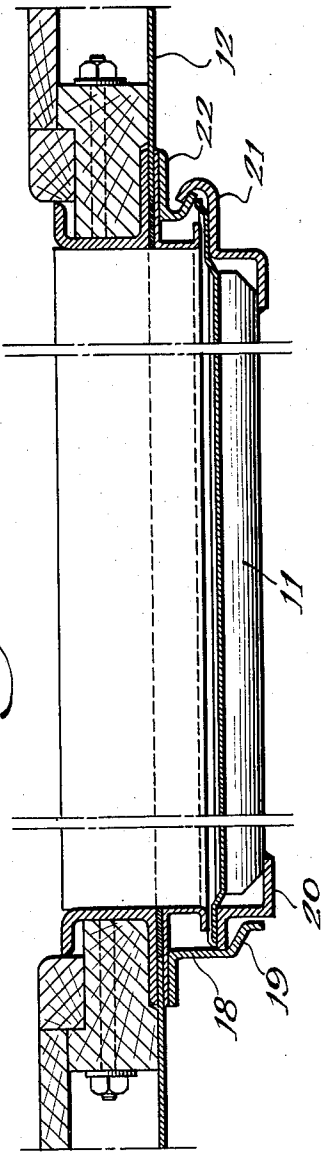


Fig. 2.

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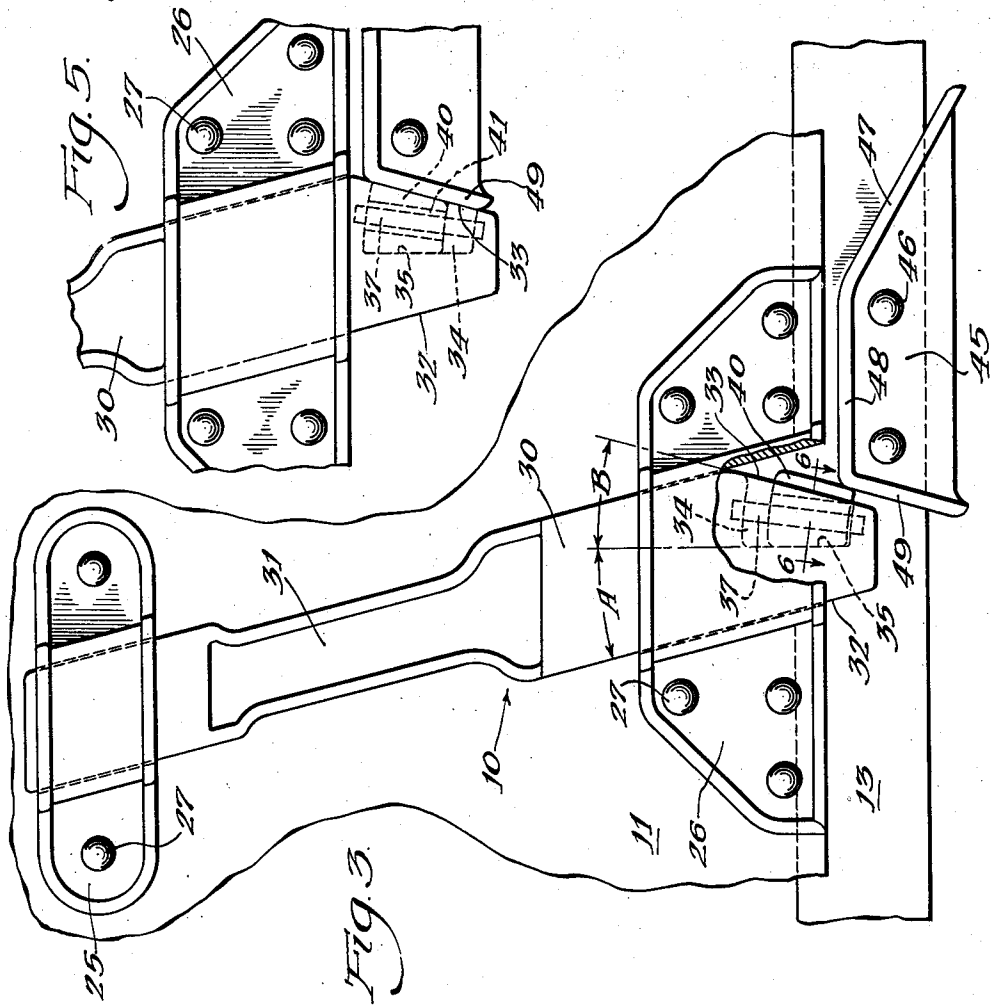


Fig. 5.

Fig. 3.

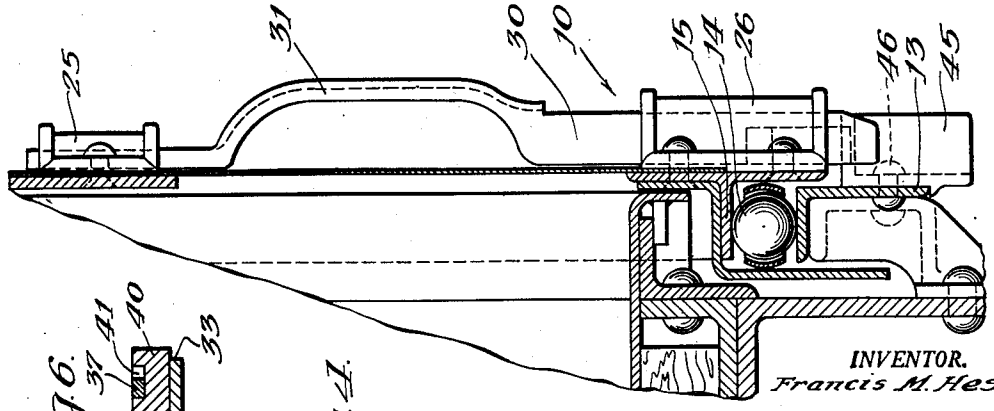


Fig. 6.

Fig. 4.

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2,516,210

FIXTURE FOR FREIGHT CAR DOORS

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12 Claims. (Cl. 292—183)

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This invention relates to sliding doors, as for example the side doors for railway box cars, and more particularly to a take-up for maintaining the door in its extreme, closed position. The take-up may also cooperate to maintain the door in open position. The take-up herein is adapted to eliminate slack between a sliding door and the associated car side, but in addition, it is yieldable so that impact shocks or stresses are compensated for to avoid impact damage.

One object of the invention is to provide a take-up capable of maintaining a sliding door in pressure engagement with a front door stop which, among other things, cooperates to maintain a weatherproof seal. As used herein, front door stop contemplates a member against which the door bears when in an extreme, closed position.

Another object of the invention is to provide a device of this character that may be readily and conveniently applied to a sliding door. The device is sufficiently flexible in design so as to compensate for the usual tolerances that are necessary in the construction of cars because the car uses heavy members and because heavy duty is imposed on the car. This feature greatly facilitates sub-assembly of the various parts of the invention to the members which are later applied to the car.

Still another object is to provide a take-up wherein parts thereof that bear against each other have an angular relationship with movable cooperating parts, such that displacement or temporary release occurs under conditions of impact. As will be understood, impact stresses or shock occur between a door and the associated car side, and therefore the provision of a yieldable or releasable take-up is necessary to avoid damage. Following this momentary or temporary release of the take-up the relationship of the parts is such that they go into action very rapidly to firmly reset the take-up to hold the door tightly in closed position. This feature of the angular relationship is a distinct aid in the periodic movement of the several members as described and makes possible the aforementioned compensation for sub-assembly tolerances.

A take-up of the character herein functions to apply pressure to a sliding door such that the door at all times is forced forwardly against its front door stop. As the front door stop and the front edge of the door as well as the rear spark strip and its associated door edge usually are provided with weather strip elements, the use of a take-up insures the proper operation of these

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elements to thus weatherproof between the door and the car side at these points. Also by maintaining the door under pressure against the stop undesirable play between these parts is eliminated to thus avoid objectionable vibrations resulting in undue wear.

Other objects and advantages of the invention will be apparent as the description proceeds, reference being had to the accompanying drawings wherein one form of the invention is shown. It is to be understood that the description and drawings are illustrative only, and are not to be taken as limiting the invention except insofar as it is limited by the claims.

In the drawings:

Fig. 1 is a fragmentary elevational view of a railway box car side showing a portion of a sliding door equipped with the take-up of the invention;

Fig. 2 is an enlarged sectional view on line 2—2 of Fig. 1;

Fig. 3 is a front view of my take-up;

Fig. 4 is a side view, partly in section, showing the take-up in side elevation;

Fig. 5 is a fragmentary front view of the take-up showing the device in its down, door holding position; and

Fig. 6 is a sectional view on line 6—6 of Fig. 3.

Referring to Figs. 1, 2 and 4, my take-up 10 is shown applied to sliding door 11 that is associated with side 12 of a railway box car. The box car side below the door opening has door track 13 that provides a raceway for a plurality of ball bearings 14 (Fig. 4). Door 11 carries flange 15 adapted to ride on the top of balls 14. Members 13, 14 and 15 cooperate to support the door and permit easy sliding door action.

A front door stop 18 (Figs. 1 and 2) extends vertically at the front side of the door opening, stop 18 being bent at its exposed flange as shown at 19 to provide ready engagement with cooperating member 20 carried by the front edge of door 11. Stop 18 and member 20 also function as interlocking weather strip elements, and thus a pressure engagement between them is desirable. The rear edge of the door carries weather strip element 21 that cooperates with an interlocking member 22 carried on the car side at the rear of the door opening.

The take-up 10 (Fig. 3) comprises upper guide 25 and spaced lower guide 26, the two guides being associated with door 11 near the bottom edge thereof. Guides 25 and 26 each have a U-shaped offset to provide guide surfaces, and the upper guide 25 is positioned on door 11 somewhat

forwardly of lower guide 26. The guide surfaces of the two guides are disposed at an angle with the vertical so that they are in proper alignment to correspond with the predetermined position of the presently to be described lift handle which is supported thereby. Guides 25 and 26 are mounted on door 11 in any suitable manner as by rivets 27 or by welding.

A lift handle 30 is mounted in sliding relationship to door 11 by means of guides 25 and 26, lift handle 30 having its axis thus inclined at the angle to the vertical as predetermined, depending upon materials used, etc., as will be discussed hereinafter. Lift handle 30 is provided with hand grip 31 for use by the trainman in opening and closing the door.

The lower portion of lift handle 30 has its front surface 32 parallel to the handle axis and thus inclined at an angle forwardly of the vertical, while its rear surface 33 is tapered so that it inclines rearwardly of the vertical at a similar angle. Thus the lower portion of lift handle 30 is shaped like a keystone wedge. This lower portion is provided with a wedge-shaped recess 34 that extends inwardly from rear surface 33, as shown in Figs. 3 and 5. The inner or front surface 35 of recess 34 is substantially vertical, the wide dimension of the recess thus being at the top and the narrow dimension at the bottom. An elongated guide means or keeper 37 extends from top to bottom within the recess, the keeper lying on an axis that bisects the angle between surface 35 of the recess and the rear surface 33 of the lift handle lower portion.

A wedge-shaped member or keystone 40 is disposed within recess 34, keystone 40 having a recess 41 that receives keeper 37. The keystone recess 41 is substantially wider than keeper 37 so that loose engagement between the two elements is provided, this loose engagement permitting horizontal displacement between keystone 40 and lift handle 30.

Thus horizontal motion between these members as well as vertical motion is possible, and these two motions occur in a cooperative manner to perform certain of the functions accomplished by the invention. It will be noted that the opposing effective sides of keystone 40 are disposed with respect to each other at the same angle as exists between surface 35 of recess 34 and the rear surface 33 of the lift handle.

A take-up stop 45 is mounted by rivets 46 or by welding to door track 13 in operative relationship to the above described other parts of the take-up. Stop 45 comprises three effective portions, a gently inclined portion 47, a horizogntal portion 48 and a more steeply inclined portion 49. These portions have surfaces extending outwardly from door track 13 that are adapted to engage the lower portion of lift handle 30. As the sliding door is being closed, the lower portion of lift handle 30 first engages gently inclined portion 47 with the result that lift handle 30 is accordingly moved upwardly. The handle is maintained in this position by horizontal portion 48, and as the door is moved to the left toward its extreme, closed position, lift handle 30 falls under the force of gravity so that its inclined rear surface 33 or the rear surface of keystone 40 engages steeply inclined portion 49, as shown generally in Figs. 3 and 5. The engagement of these parts serves as a lock to insure against inadvertent door opening, but in addition, due to the arrangement of the take-up it also gives rise to a constant pressure that urges the door to its extreme, closed position. This pressure results from the action of gravity upon lift handle 30 and the angular relationship that exists between lift handle surface 33, keystone 40 and portion 49 of the stop.

There is thus provided a take-up device that comprises two movable members that coact to provide an effective holding or locking member for maintaining the car door closed. The lift handle 30 is relatively large and heavy and therefore its movement is relatively slow and sluggish. This sluggishness is further accentuated by the fact that there is a relatively large amount of friction between the lift handle and the upper and lower guides 25 and 26. This is particularly true due to the fact that the handle 30 moves along an axis that is sloping with respect to the vertical so that two of the faces of the guides 25 and 26 actually support at least some of the weight of the handle 30. The friction on the faces is therefore relatively great.

The keystone 40, on the other hand, moves along a vertical surface 35 where none of the weight of the keystone is supported. Thus the keystone 40 can drop almost freely by gravity. Also keystone 40 is light in comparison with the lift handle 30 and therefore moves quickly.

Thus when the lift handle 30 is retracted upwardly due to impact loads on the car, its returning downward movement is relatively slow, whereas the keystone 40 drops rapidly to quickly fill in the momentary gap between the face 33 of the lift handle 30 and the cooperating face of the inclined portion 49 of stop 45. This results in very effective take-up action at all times.

When an impact load occurs the handle 30 is retracted as previously described and then returns relatively slowly to its pressure tight position. During this movement of the handle 30 the lighter keystone 40 rapidly drops by successive small increments to supplement the take-up of the space between the inclined portion 49 of stop 45 and the rear surface 33.

In the embodiment of the invention shown, the faces 32 and 33 have the same angle of slope with respect to the vertical symmetrical axis. In other words, angle A (Fig. 3) is equal to angle B. The keystone 40 is disposed entirely on one side of the vertical symmetrical axis and has substantially true vertical movement. The angle between the forward and rearward faces of keystone 40 is equal to the angle B.

Though the take-up device is shown midway between the forward and rear edge of the door, it obviously may be located anywhere else along the bottom edge.

Due to the fact that the parts of the take-up are so designed as not to be in a rigid shear relationship, impact stresses are harmlessly compensated for by the yieldable character of the take-up. The angle with the vertical made by portion 49 and the opposing surfaces carried by lift handle 30 is so chosen with respect to the direction of the lift handle axis and the coefficient of friction of the materials used for the parts that sliding action occurs when stresses develop. Thus lift handle 30 would retract or move upwardly and the impact stress would be harmlessly compensated for by the release of the take-up. As mentioned, however, upward motion of lift handle 30 does not involve any substantial loss of contact with stop 45 since keystone 40 moves rapidly and also in effect moves to the right (Fig. 3) to maintain the contact relationship. Thus a positive metal to metal contact be-

tween door track 13, door 11 and front door stop 18 is substantially always maintained.

Another advantage of the present take-up resides in the fact that the relationship between the position of its parts on the door and the position of its stop on the door track is not particularly critical. This feature is important in connection with fabrication of the car wherein it is possible to sub-assemble the appropriate parts on the door and also sub-assemble take-up stop 45 on the door track. The angular relationship of the cooperating parts is amply sufficient to compensate for assembling tolerances of the degree ordinarily encountered.

In prior take-up arrangements the stop 45 is installed after the car is assembled so that the stop can be properly located with respect to the take-up parts. In other words, prior devices are "tailor made." The increased take-up in the present device permits mass production or assembly line methods to be employed and at the same time obtains a superior result.

The angular relationship of the respective parts of the take-up is dependent upon the coefficient of friction of the material used for the parts. The angles shown in general in the drawings have been found to be suitable where the lift handle, take-up stop and keystone were made from metal forgings. However, if cast material were used, the coefficient of friction would be somewhat larger and therefore the angle sizes measured from the vertical would necessarily be increased. If the contact surfaces were rubberized or otherwise modified by a material possessed with an increased coefficient of friction, the angle sizes would be further increased. The important consideration is to use materials and angles that will cooperate to provide release in case of impact; i. e. avoid rigid shear relationships. Otherwise, impact would result in damage to some portion of the assembly.

Referring back to Fig. 1, door track 13 may be provided with an open position or back take-up stop 50, this stop being a reversed variation of closed position stop 45. Back stop 50 cooperates with lower surface 32 of lift handle 30 to maintain the door in open position against lower back stop 51.

From the above description it is thought that the construction and advantages of this invention will be readily apparent to those skilled in the art. Various changes and modifications may be made without departing from the spirit or losing the advantages of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. An impact release take-up for use on sliding doors for vehicles and the like for establishing pressure contact between the door and door frame in closed position, said take-up comprising a lift handle having a lower end in the shape of a keystone wedge, and an upper end that is inclined toward one end of the door, a take-up stop, the long axis of the lift handle being parallel with the front taper of the keystone wedge, a contact surface on the take-up stop disposed parallel with the rear taper of the keystone wedge, and a movable keystone slidably mounted on the keystone wedge so as to move lengthwise of the keystone wedge between an upper position and a lower position on the keystone wedge, the movable keystone having a rear tapered face substantially parallel with the rear face of the first mentioned keystone wedge, the movable keystone in its upper position being disposed with its rear edge disposed substantially within the limits of the rear edge of the keystone wedge and in its lower position projecting beyond the rear edge of the keystone wedge.

2. An impact release take-up for use on sliding doors for vehicles and the like for establishing pressure contact between the door and door frame in closed position, said take-up comprising a lift handle having a lower end in the shape of a keystone wedge, and an upper edge that is inclined toward one end of the door, a take-up stop, the long axis of the lift handle being parallel with the front taper of the keystone wedge, a movable keystone mounted on the keystone wedge portion of the lift handle and having a rear tapered face substantially parallel with the rear face of the first mentioned keystone wedge, the lift handle being adapted to move up and down at a relatively slow rate and the movable keystone being adapted to move up and down at a relatively faster rate, and a contact surface on the takeup stop disposed parallel with the rear taper of the movable keystone, the movable keystone being adapted to move rapidly into the space between the keystone wedge and the last mentioned contact surface.

3. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a pair of vertically spaced guides carried at the bottom of the door front, the upper guide being disposed forwardly of the lower guide, a lift handle extending through and movable within said guides and having its axis inclined as determined by the positions of the guides, the lower portion of said lift handle having its front surface parallel to the handle axis and thus inclined forwardly of the vertical, the rear surface of said lower portion being inclined rearwardly of the vertical at a like angle, said lower portion having a wedge-shaped recess extending inwardly from said rear surface, the inner surface of said recess being vertical, a keeper extending lengthwise of said recess and bisecting the angle between said inner surface and said rear surface, a movable keystone within said recess, said movable keystone having a keeper receiving recess substantially wider than said keeper and a take-up stop carried by a member fixed with respect to said front door stop, said take-up stop having an effective surface parallel to and adapted to bear against the rear surface of said lower handle portion and the rear surface of said movable keystone, whereby said lift handle under the force of gravity tends to assume a lowermost position and thus cooperate with said take-up stop to urge the door against the front door stop, the angular relationship between the bearing surface of said lift handle lower portion and the handle axis cooperating under stress to effect temporary release of the take-up while said movable keystone maintains continuous contact with said take-up stop.

4. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle associated with said door and having its axis inclined forwardly at an angle to the vertical, means for mounting said lift handle on said door for movement along its axis, the lower portion of said lift handle having its rear surface inclined rearwardly of the vertical at an angle corresponding to the angle made with the vertical by the handle axis, said lower portion having a wedge-shaped recess extending inwardly from said rear surface, the inner surface of said recess being vertical, guide

means extending lengthwise of said recess and bisecting the angle between said inner surface and said rear surface, a movable keystone disposed within said recess and loosely mounted for vertical and horizontal motion on said guide means, and a take-up stop carried by a member fixed with respect to said front door stop, said take-up stop having an effective surface parallel to and adapted to bear against the rear surface of said lower handle portion and the rear surface of said movable keystone, the angular relationship between the bearing surface of said lift handle lower portion and the handle axis cooperating under stress to effect temporary release of the take-up while said movable keystone maintains continuous contact with said take-up stop.

5. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted on said door with its axis inclined forwardly at an angle to the vertical, the lower portion of said lift handle having its rear surface inclined rearwardly at a like angle to the vertical, said lower portion having a wedge-shaped recess extending inwardly from said rear surface, the inner surface of said recess being vertical, guide means extending lengthwise of said recess and bisecting the angle between said inner surface and said rear surface, a movable keystone within said recess and associated with said guide means for vertical and horizontal motion with respect to said lower portion, and a take-up stop carried by a member fixed with respect to said front door stop, said take-up stop having an effective surface parallel to and adapted to bear against the rear surface of said lower handle portion and the rear surface of said movable keystone, the angular relationship between the bearing surface of said lift handle lower portion and the handle axis cooperating under stress to effect temporary release of the take-up while said movable keystone maintains continuous contact with said take-up stop.

6. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted on said door with its axis inclined forwardy at an angle to the vertical, the lower portion of said lift handle having its rear surface inclined rearwardly at a like angle to the vertical, said lower portion having an elongated guide means bisecting the angle between the vertical and said rear surface, a movable keystone carried by said guide means and movable vertically and horizontally with respect to said lower portion, means on said lower portion providing continuous contact with the front surface of said movable keystone, the rear surface of said movable keystone being parrallel to the rear surface of said lower portion, a take-up stop carried by a member fixed with respect to said front door stop, said take-up stop having an effective surface parallel to and adapted to bear against the rear surface of said lower handle portion and the rear surface of said movable keystone, the angular relationships between the respective moving members and the vertical being correlated with the coefficients of friction of the materials used whereby conditions of stress effect temporary release of the take-up while said movable keystone maintains continuous contact with said take-up stop.

7. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted on said door with its axis inclined forwardly at an angle to the vertical, the lower portion of said lift handle having its rear surface inclined rearwardly of the vertical at a like angle, a take-up stop carried by a member fixed with respect to said front door stop, said take-up stop having an effective surface parallel to and adapted to bear against the rear surface of said lower handle portion, and a movable keystone carried by said lower handle portion and adapted to move vertically and horizontally with respect to said portion, said movable keystone having a front surface continuously in contact with said lower portion and a rear surface parallel to the effective surface of said take-up stop, the angular relationships between the bearing surfaces of said members and the vertical being correlated to the coefficients of friction of the materials used whereby stress conditions effect temporary release of the take-up while the rear surface of said movable keystone maintains continuous contact with said take-up stop.

8. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted on said door with its axis inclined forwardly at an angle to the vertical, a take-up stop carried by a member fixed with respect to said front door stop and disposed in effective relation to the lower portion of said lift handle, the lift handle lower portion and said take-up stop having cooperating opposing bearing surfaces disposed at an angle rearwardly of the vertical, the said last named angle and the angle between the handle axis and the vertical being chosen with respect to the coefficients of friction of the material used whereby conditions of stress between said lift handle and said take-up stop effect temporary release of the take-up, and a separate relatively lighter take-up member mounted on the lift handle lower portion and movable independently of the lift handle to take-up slack between the lower portion of the lift handle and the take-up stop during the temporary release of the take-up.

9. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted for substantially vertical motion on said door, a take-up stop carried by a member fixed with respect to said front door stop in effective relation to the lower portion of said lift handle, the lower portion of said lift handle and said take-up stop having opposing bearing surfaces inclined at an angle to the vertical whereby stress developed between said lift handle and said take-up stop effects vertical motion of said lift handle to temporarily release said take-up, the force of gravity on said lift handle tending to maintain a continuous contact between said bearing surfaces and thus urge the door against its front door stop, and a separate relatively lighter take-up member mounted on the lift handle lower portion and movable independently of the lift handle to take up slack between the lower portion of the lift handle and the take-up stop during the temporary release of the take-up.

10. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted for substantially vertical motion on said door, a take-up stop carried by a member fixed with respect to said front door stop, the lower portion of said lift handle and said take-up stop having opposing bearing surfaces inclined at an angle

to the vertical whereby stresses between said surfaces cause vertical displacement of said lift handle to momentarily release said take-up, and a movable keystone carried by said lift handle and having a rear surface continuously in contact with said take-up stop.

11. A take-up for maintaining a sliding door in closed position against a front door stop, said take-up comprising a lift handle slidably mounted on said door with its axis inclined forwardly at an angle to the vertical, a take-up stop carried by a member fixed with respect to said front door stop and disposed in adjacent relation to the lower portion of said lift handle, the lift handle lower portion and said take-up stop having cooperating opposing bearing surfaces disposed at an angle inclined rearwardly of the vertical, the said last named angle and the angle between the handle axis and the vertical being chosen with respect to the coefficients of friction of the material used whereby conditions of stress between said lift handle and said take-up stop effect temporary release of the take-up, and a movable keystone carried by the lower portion of said lift handle, said movable keystone having a front surface continuously in contact with said lift handle and a rear surface parallel to the bearing surface of said take-up stop, said movable keystone being mounted for limited vertical and horizontal motion whereby the rear surface thereof maintains continuous contact with said take-up stop irrespective of the momentary vertical position of said lift handle.

12. An impact release take-up for use on sliding doors comprising a relatively large lift handle having a lower end in the shape of a keystone wedge and a relatively smaller keystone take-up member mounted on the keystone wedge so as to move lengthwise with respect to the keystone wedge between upper and lower positions on the wedge, the keystone take-up member when in its upper position being disposed within the limits of one edge of the keystone wedge and when in its lower position projecting beyond said edge of said keystone wedge.

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