Dec. 25, 1951 W. A. SMITH 2,579,621

SAFETY LATCH

Filed June 10, 1947 2 SHEETS—SHEET 1

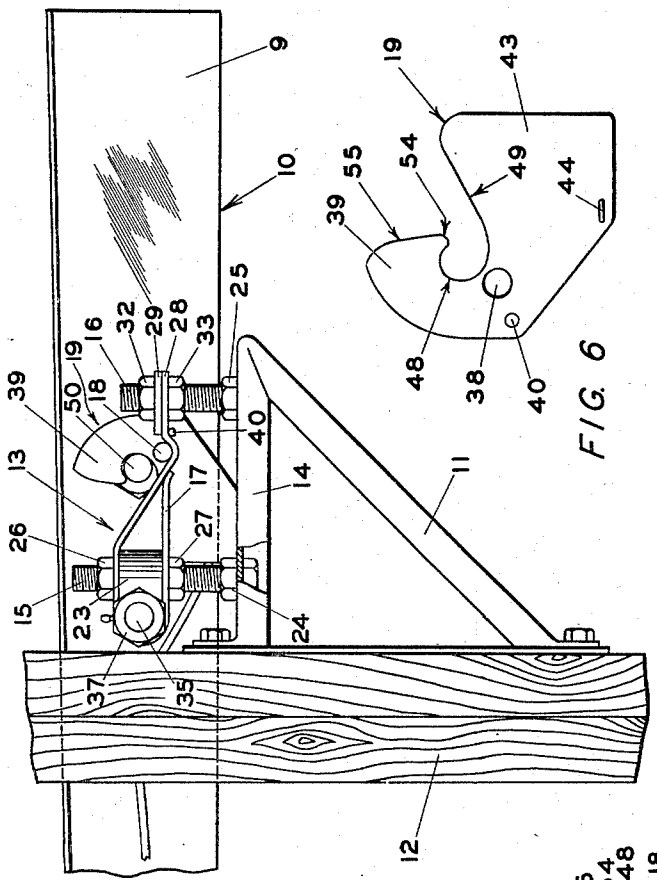


FIG. 1

FIG. 6

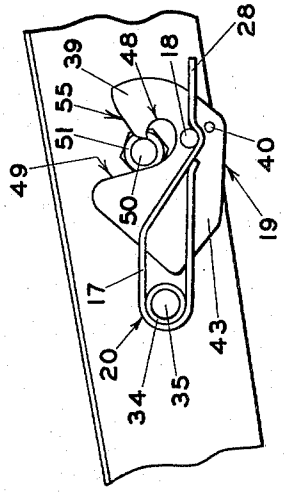
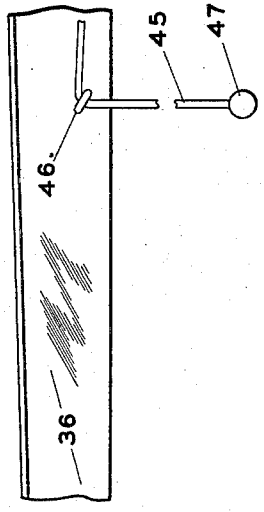


FIG. 3



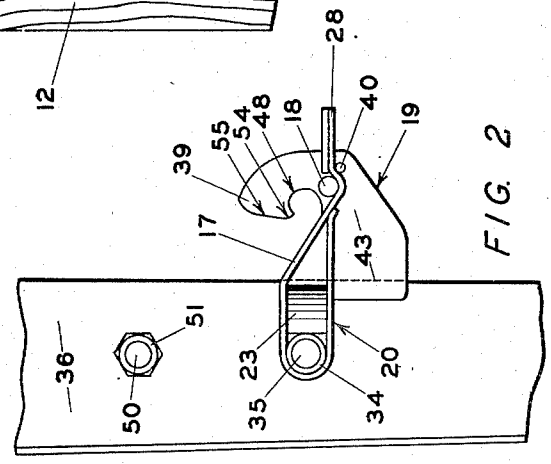


FIG. 2

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Dec. 25, 1951 W. A. SMITH 2,579,621

SAFETY LATCH

Filed June 10, 1947 2 SHEETS—SHEET 2

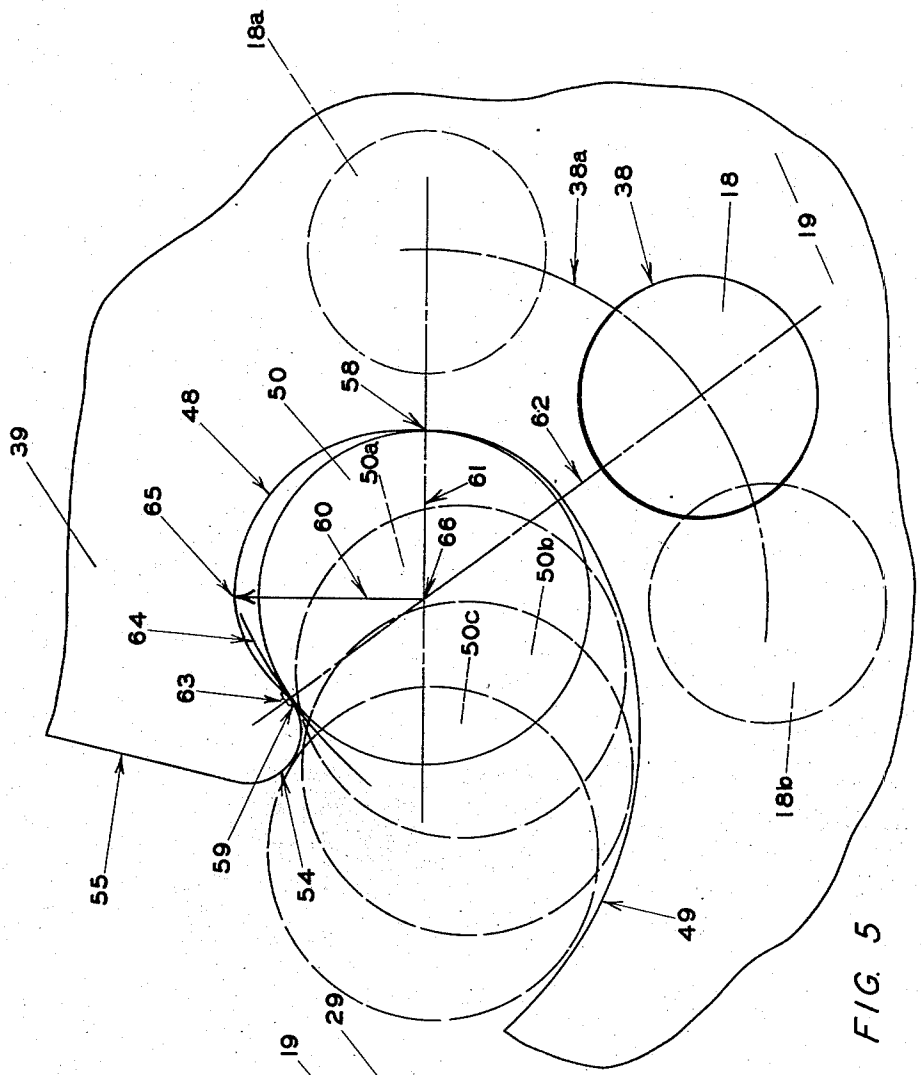

FIG. 5

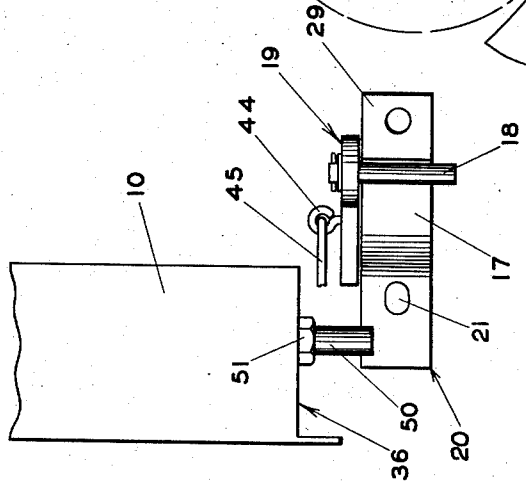

FIG. 4

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SAFETY LATCH

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Application June 10, 1947, Serial No. 753,722

9 Claims. (Cl. 292—133)

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This invention relates in general to a safety latch and more specifically to a type thereof designed to automatically engage and positively hold a horizontally hinged garage door in an open position.

Numerous attempts have been made to provide a satisfactory latch which automatically engages and rigidly holds a horizontally hinged object, such as a garage door, when said object is swung into the open or horizontal position. For illustrative purposes only, the latch to which this invention relates will be described as it may be applied to use with a horizontally hinged door. However, it must be understood that said safety latch may be applicable to other objects horizontally hinged, such as an ironing board or a table leaf.

Present methods for holding said horizontally hinged doors open are either not entirely safe or fail to be completely satisfactory in one or more of numerous other respects. For example, if a horizontally hinged garage door equipped with a type of latching mechanism presently available, is exposed to a heavy snowfall, a heavy rainfall, or a high wind while being suspended in the horizontal or open position, said doors may, and sometimes do, oscillate violently and may suddenly drop back into the closed position without notice. From this, serious personal injury and/or property damage has occasionally resulted. At present, a relatively awkward, complex, inconveniently braced locking device is the only alternative to the hazards of an unsafe door.

Consequently, it has long been apparent to persons familiar with horizontally hinged garage doors of the overhead type that a new and improved type of latching mechanism is not only desirable but vitally necessary.

Accordingly, a primary object of this invention is to provide a safety latch for a horizontally hinged garage door, which latch will automatically engage and securely hold said door in an open or horizontal position.

A further object of this invention is to provide a safety latch as aforesaid which will positively prevent a horizontally hinged garage door from closing accidentally, particularly as a result of abnormal conditions of wind, snow or rain.

A further object of this invention is to provide a safety latch as aforesaid which equals in its own performance all of the advantages of the latches presently available while avoiding the existing dangers, complexities and points of awkwardness in installation and/or operation thereof.

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A further object of this invention is to provide a safety latch as aforesaid which may be used either in combination with, or separately from, a suitable horizontal hinge means.

A further object of the invention is to provide a safety latch as aforesaid which can be manufactured and installed by relatively unskilled workmen.

Other objects and purposes of this invention will become apparent to persons familiar with this type of equipment upon referring to the accompanying drawings and upon reading the following specification.

In order to meet the objects and purposes set forth above, as well as others incidental thereto and associated therewith, I have conceived a new design in a hooked catch and have provided an improved horizontal hinging mechanism for mutual support of a horizontally hinged garage door and said hooked catch.

The hooked catch constitutes one of the oldest and most effective means for holding a hinged door open or closed. However, the conventional hooked catch has, so far as I have been able to find, always necessitated the presence of a fixed body against which said hinged door can bear, if said door is to be held rigidly in one position by said hooked catch. Furthermore, where said hooked catch is subjected to excessive stresses and must, therefore, be massive in size, said catch becomes too stiff to flex as it engages a door, thereby losing its ability to hold said door rigidly, especially when there is no fixed body against which said door may bear.

The hooked catch, which will be hereinafter described in detail as part of the safety latch to which this invention relates, is so designed that it will hold a horizontally hinged door rigidly in a desired position even though there is no fixed body against which said door may bear.

For an illustration of one, but by no means the only, embodiment of this invention, attention is directed to the drawings in which:

Figure 1 is a broken side view of the preferred embodiment of the invention mounted on the vertical jam of a garage door opening and supporting a garage door in the horizontal position.

Figure 2 is a skeleton side view of a safety latch with a fragment of the door in the vertical position.

Figure 3 is a skeleton side view of the safety latch with a fragment of the door in a partially open position.

Figure 4 is a skeleton top view of the safety

latch with a fragment of the door in a vertical position.

Figure 5 is a fragmentary, enlarged side view of the hooked catch, showing in detail where it is pivoted and where it engages said door.

Figure 6 is a side view of the hooked catch from the opposite side viewed in Figure 1.

Construction

A standard size, horizontally hung garage door requires only one safety latch, which may be installed on either side of the door. The figures herein illustrate a left side installation as viewed from the inside of the garage. Inasmuch as the parts required for both the said left side and right side installations are interchangeable, and the said installations, when completed, are mirror images of each other, a detailed description of the lefthand installation, only, will be given hereinafter.

It will be assumed that the righthand edge of said door, as viewed from the inside is pivotally supported by any suitable horizontal, vertically adjustable hinge means, not shown. It will be further assumed that the horizontally hinged door is of a conventional type such as shown in U. S. patent to Smith No. 2,067,623. This type of door is preferably fabricated throughout from metal, such as aluminum, thereby making it both light and weatherproof. The foregoing assumptions are not, however, to be construed as limiting the scope of this invention.

In this particular embodiment of the invention the said safety latch will be described and disclosed in combination with the hinging mechanism of the horizontally hinged garage door 10, shown in Figure 1. Said garage door is preferably provided with a counterweight, not shown, within the upper end 9 of said door. A suitable bracket 11, which may be fabricated from sheet metal, is secured, as by bolting, to the inside of a vertical jam 12 of a garage door opening. The combination hinge and safety latch mechanism 13 is adjustably supported upon the upper arm 14 of said bracket 11 by means of the two vertical adjusting bolts 15 and 16. The combination hinge and safety latch mechanism is comprised of the aforementioned vertical adjusting bolts 15 and 16, the support saddle 17, the hooked catch pivot pin 18 and the hooked catch 19.

The support saddle 17 may be cast, or shaped from metal such as $\frac{3}{16}$ inch strap iron, so that one end thereof has an elongated loop 20. Said adjusting bolt 15 penetrates the upper and lower sides of said loop, about midway between the extremities thereof. An adjusting bolt housing 23, which surrounds that portion of said adjusting bolt 15 lying within said loop, may be welded to the upper and lower sides of said loop, or, if the saddle is cast, may be an integral part thereof. The opening through the adjusting bolt housing 23 and the opening 21 in the upper side of the loop 20 is preferably elongated (Figure 4) longitudinally of said support saddle to permit proper adjustment of the said saddle upon the adjusting bolts 15 and 16.

The adjusting bolts 15 and 16 may be vertically affixed to the bracket arm 14 by means such as the hold down nuts 24 and 25, respectively. A pair of adjustment nuts 26 and 27 hold the inboard or loop end 20 of the saddle 17 in proper vertical adjustment with respect to the adjusting bolt 15, hence with respect to the bracket 11. The outboard end 28 of the support saddle 17, which may be reinforced by means of a steel plate 29, is substantially flat and parallel with said bracket arm 14. Said outboard end 28 is provided with a suitable opening through which said adjusting bolt 16 is slidably received. A pair of adjustment nuts 32 and 33 hold said outboard end of the support saddle in proper vertical adjustment.

A horizontal bushing 34 (Figure 2) is supported within the loop end 20 of the support saddle between said adjusting bolt housing 23 and the adjacent extremity of said support saddle. A garage door hinge pin 35, which is rotatably supported within said bushing 34, is secured to the vertical edge 36 of said garage door 10 by bolting, welding or other suitable means. A nut, or bolt head, 37 prevents accidental withdrawal of the hinge pin 35 from the bushing 34.

The hooked catch pivot pin 18 is cradled upon and secured, such as by welding, to the support saddle 17 intermediate said vertical adjusting bolts. In the event that said support saddle 17 is cast, the pivot pin 18 will advantageously become an integral part of the casting. Said pivot pin 18 may extend approximately equidistant beyond each side of said support saddle in order to render the support saddle assembly applicable to either a right side or left side installation.

Said support saddle assembly comprises: the support saddle 17, the hooked catch pivot pin 18, the bushing 34, the adjusting bolt housing 23 and the reinforcing steel plate 29. Since the description herein relates to a left side installation, the hooked catch 19 is rotatably supported upon the far end of the pivot pin 18 as appearing in Figure 1.

The hooked catch 19 has a pivot pin opening 38, through which the pivot pin 18 extends and whose location will be more exactly indicated hereinafter. Said catch also has a hook portion 39 which is normally held in an upright position, above said pivot pin 18, as illustrated in Figures 1 and 2, by the stop pin 40 which is secured to said hooked catch and which engages the underside of the support saddle 17 between said pivot pin 18 and said adjusting bolt 16. The stop pin advantageously protrudes from both sides of said hooked catch 19 so that said catch may be used interchangeably in a left side or right side installation. The stop pin 40 is preferably positioned as close to the pivot pin opening 38 as the thickness of said support saddle 17 permits.

The major portion of the hooked catch 19 extends inboard and below the pivot pin opening 38, thereby providing the counterweight portion 43 which by gravity effects a counterclockwise turning movement in said hooked catch about said pivot pin 18. The stop pin 40 arrests movement in response to this counterclockwise movement in said hooked catch, as aforesaid, when the said hooked portion 39 is in its normal upright position, as shown in Figures 1 and 2.

Said counterweight portion 43 of the hooked catch has a suitably threaded opening adjacent to its lower edge into which an appropriate screw-eyelet 44 may be received from either side thereof. A suitable length of release rope 45, which is affixed at one extremity to said eyelet 44, may be threaded through guides 46 near the bottom of the door 10, as illustrated in Figure 1. Said guides 46 may be secured to the vertical edge 36 of said door or may be positioned otherwise, as required or desired, provided that the

extremity of said rope, remote from said hooked catch, will be free and accessible to engagement by any convenient manual gripping means, such as the wooden handle 47.

A locking pin notch 48 is created by the relationship between the lower edge of said hook portion 39 and the upper edge 49 of said counterweight portion of said hooked catch 19. A locking pin 50, may be secured to said vertical edge 36 of said door 10 by means such as the nut 51, which is welded to said door, and is so positioned with respect to the hinge pin 35 that when the said door is placed in the horizontal, or open, position, said locking pin will be snugly and positively engaged within the locking pin notch 48. The tip 54 of said hook portion 39 of said hooked latch extends around said locking pin, when said pin is snugly within said locking pin notch, a distance limited by certain critical factors which will be described in detail hereinafter.

Said upper edge 49 of the counterweight portion 43 is preferably inclined and curved into smooth cooperation with said locking pin notch 48 so that there is no more space between said hook portion tip 54 and said counterweight portion upper edge 49 than necessary to permit the unobstructed passage of said locking pin 50.

Said hook portion 39 is provided with a cammed edge 55 which runs from the top of said hook portion down to the tip 54 thereof, as illustrated in Figures 2, 5 and 6. Figure 5 also illustrates how said cammed edge 55, said hook portion tip 54, the inside surface of said locking pin notch 48 and the upper edge 49 of said counterweight portion all conjoin to provide a continuous, smoothly contoured edge upon one part or another of which said locking pin 50 rides as it engages and disengages said hooked catch.

In the Figure 5, the numerals 50*a*, 50*b*, and 50*c* indicate in phantom successive positions of the locking pin 50, with respect to the hooked catch, as it moves to or from said locking pin notch 48.

Since further details of construction can best be understood in the light of operational procedure, attention will now be directed to the general operation of the parts thus far described.

General operation

Assuming a left side installation, as aforesaid, the bracket 11 and combination hinge and safety latch 13 will be mounted together upon the left vertical jam 12 of the garage door opening as appearing from the inside of the garage and as illustrated in Figure 1. The garage door 10 may be adjusted vertically on the side supported by the said support saddle assembly by means of the adjustment nuts 26 and 27 on the adjusting screw 15 and the adjustment nuts 32 and 33 on the adjusting screw 16. Such adjustments provide for precise control of clearances at the top and bottom of the door, and may be made while the door is either open or closed. Comparable means, not shown, is provided on the other edge of the door for adjusting the height of the door.

It will be apparent that the two ends of said support saddle assembly, which is built upon the support saddle 17, may be adjusted to different vertical levels. Since said hooked catch pivot pin 18 is mounted adjacent to the adjusting screw 16 and said garage door hinge pin 35 is mounted adjacent to the adjusting screw 15, said door is most readily adjusted first by means of the screw 15 to secure a proper vertical, or closed, position and then by appropriate adjustment of screw 16 to secure the proper horizontal, or open, position. When appropriate adjustments have been made so that said door will be in a horizontal position, or as near thereto as desired, when said locking pin 50 is engaged by said locking pin notch 48, the safety latch is ready for operation.

The door 10, which is generally held in a vertical, or closed, position by means of an appropriate, conventional door lock, not shown, normally commences its operating cycle from said closed position. After said door lock is released, the door rotates clockwise, as appearing in Figures 1, 2 and 3, upon the hinge pin 35 and a similar hinge pin, not shown, associated with that edge of said door 10 opposite to the edge 36, until the locking pin 50 engages the cammed edge 55 of the hook portion 39 of said hooked catch 19, near the upper end thereof. The inertia of said door 10 acting through the lock pin 50 on the said cammed edge 55 causes said lock pin 50 to rotate the hook catch 19 in a clockwise direction about its pivot pin 18 until said hooked catch reaches a position of maximum rotation, as illustrated in Figure 3. At this point, considering the motion of the pin with respect to the catch member, said lock pin 50 rounds said tip 54, passing between it and the upper edge 49 of said counterweight portion 43, and enters the notch 48. In so entering said notch 48, said lock pin strikes the upper edge 49 of the counterweight portion at a point inboard of the latch pivot 18 thus causing said hooked catch to reverse its direction of rotation and return to its original position. The weight of the counterweighted portion 43 of said hooked catch augments the pressure exerted upon the said upper edge 49 by said lock pin 50. As aforesaid, the lock pin is in close engagement with said upper edge 49 from the time said pin rounds said tip 54 until it is seated within said notch 48.

Examination of Figures 1 and 5 reveals that if said door, hence said locking pin 50, is urged to continue its clockwise rotation after becoming seated within said notch 48, said locking pin will urge a continued counterclockwise rotation of said hooked catch 19 about said pivot pin 18 and thereby tend to urge it further into pin engaging position.

If, on the other hand, an attempt is made to close the garage door 10 by pushing up on the inner end 9 thereof or by pulling down on the outer end, said hook portion 39 of said hooked catch 19 prevents response to such an attempt. The manner in which said hooked catch prevents accidental release of said door while it is in the open or horizontal position will be described in detail hereinafter.

Normal closure of the garage door 10 is accomplished by a firm, steady pull downwardly upon the handle 47 in Figure 1. The rope 45, which connects said handle 47 with an eyelet 44 secured, as aforesaid, adjacent to the lower edge of the counterweight portion 43 of said hooked catch, translates said downward pull of the handle 47 into a clockwise rotation of the hooked catch 19. Such movement of said hooked catch frees said locking pin 50 from the hold of the hook portion 39 of the hooked catch. The continuation of said downward pull on said handle 47 effects a counterclockwise rotation of the garage door 10 primarily as a result of the direct downward force applied to the guide 46 by the rope, which becomes taut when it has rotated the hooked catch as far as conditions will permit. Said counterclockwise rotation is also initiated by the upward pressure exerted by the upper edge 49 of

the counterweight portion 43 upon the locking pin 50 as said hooked catch is urged by said rope 45 to move in a clockwise direction.

When sufficient inertia has been imparted to said garage door to effect its closure and the handle 47 is released by the operator, the counterweight portion 43 will cause said hooked catch 19 to move in a counterclockwise direction until said stop pin 40 again engages the underside of said support saddle 17, as aforesaid, and said hook portion 39 is upright in its original position. Thus, the cycle of opening and closing a horizontally hinged door, equipped with the safety latch to which this invention relates, is completed.

Details of the safety catch

Returning now to the constructional details of the safety catch, it should be noted that its satisfactory operation depends almost entirely upon the proper positioning of the pivot opening 38, the extent to which the hook portion tip 54 reaches around the locking pin 50 when said pin is engaged by said notch 48, and the correct contour of the upper edge 49 of said counterweight portion 43 and the locking pin notch 48. The arrow 60 (Figure 5) indicates the approximate direction of tendency for movement and direction of force exerted by the locking pin 50 when said garage door is urged in a counterclockwise direction. For purposes of illustration and description only, it will be assumed that said locking pin 50 and said hinge pin 35 have the same horizontal centerline 61 when the door 10 is in the raised position. Such assumption, while usually substantially correct, is not to be construed as limiting the scope of the invention for it is conceivable that uses for this latch in other positions may readily be found.

The locking pin notch 48 and the contour of the upper edge 49 of said counterweight portion must, as stated above, fit the pin sufficiently closely that oscillation of the locking pin 50 within said notch is positively prevented. In order to accomplish this, the said notch must contact the locking pin 50 a sufficient distance below the horizontal centerline, indicated at 61 in Figure 5, that said pin 50 cannot move downwardly without tending to induce a counterclockwise movement around said pivot pin 18 which movement is impossible since it would require a leftward displacement of the locking pin 50 with respect to the door (Figure 1). Obviously, however, the sidewalls of the notch 48 cannot follow the contour of, or contact, the locking pin 50 for more than one-half of its circumference without trapping the pin within the notch. The contour of said upper edge 49 of said counterweight portion 43 is such that only enough space is provided between it and the tip 54 to permit the unobstructed passage of the locking pin 50.

A centerline 62 passes through the center of the pivot pin 18 and the locking pin 50 when said pin is in locked position, and there is a short zone of tangency 63 between the remote surface of said locking pin 50 and an arc 64 struck on the center of the pivot pin 18 through the point of intersection between said centerline 62 and said remote surface of said locking pin 50. The hook portion tip 54 may not extend beyond this said zone of tangency 63 without necessitating a downward movement of said locking pin 50 so that said hooked catch may be rotated clockwise to release said locking pin 50. Such a downward movement of said locking pin is not desirable because it would mean that said notch 48 could not follow the contour of said locking pin below the centerline 61, thereby permitting undesirable oscillation and consequent looseness, excessive wear and the danger of an accidental closure. Furthermore, although it is possible to cause said end 9 of said door 10 to move downwardly while pulling downwardly on the handle 47 at the opposite end of said door, this would introduce undesirable complexities into the door and latch construction.

It has been determined, as a result of extensive experimentation that the notch 48 is preferably and advantageously contoured as illustrated in Figure 5 and as hereinafter described. The point 58, where the horizontal centerline 61 intersects said notch 48, and the point 59, where said tip 54 engages said zone of tangency 63, both lie upon a circle which is concentric with said locking pin when same is in locked position and only enough larger than said locking pin 50 to provide operating clearance therebetween. Adjacent the point 58 the surface of said notch 48 defines a straight line which is perpendicular to the centerline 61 from the point 58 to a point slightly above, 1/16 inch in one embodiment involving a 3/4 inch locking pin. The remainder of said notch surface from the point 58 around to the point 65 lies upon the circle whose radius is preferably equal to that of the aforementioned circle passing through the points 58 and 59 and whose center is on the line 60 a distance above the point 66 equal to the length of said straight line above the point 58. The edge of the notch from the point 65 to the point 59 may be any smooth curve suitable for connecting these points.

Below the centerline 61, the edge of the said notch 48 preferably follows the contour of the locking pin 50 such a distance as may be required to prevent the oscillation of said locking pin as aforesaid, such as about 10 or 15 degrees of arc, but not beyond line 62, and then blends into the upper edge 49 of said counterweight portion 43.

It will be understood that the above detailed description of said notch 48 is given for illustrative purposes only because its satisfactory characteristics have been established. It is entirely conceivable, however, that said notch 48 may have numerous other contours without departing materially from the scope of the invention.

It will be observed that when said pin 50 is engaged by said notch 48, there is one area of contact at 58 and another area of contact at 59. The remainder of the notch between said points 58 and 59 is spaced from the locking pin. The contact is made at the point on both the pin 50 and the tip 54 when the tangents on each member are substantially parallel to each other and at a sufficiently wide angle, as about 40°, to the line 60 that the force exerted against said point by an upward urging of said pin will induce a leftward force on said tip 54. This will effect a counterclockwise moment in said hooked catch 19 about the pivot pin 18, which counterclockwise moment will cause said notch 48 to tighten further the grip of said hook on said locking pin. Consequently, in order to provide a maximum counterclockwise moment, and hence a maximum obstruction to an accidental disengagement between said hook and said locking pin, which disengagement might result from an upward movement of said locking pin 50, said

tip 54 engages said locking pin at the outermost point in the zone of tangency 63.

It has been noted that the leftward urging of the tip 54 results from the fact that the upwardly urged pin 50 contacts it at a mutual tangent which is at an angle with the horizontal of about 40°. Since wear will not materially, if at all, change the direction of this tangent, a substantial amount of wear may take place before the operation of the door is affected. In fact, tests show such operation to be affected only when the wear is sufficient to permit the pin 50 to contact the hook at the point 65.

Therefore, when said locking pin is snugly held within said notch 48, either an upward or a downward movemnet of said locking pin will effect a counterclockwise moment in said hooked catch 19 about said pivot pin 18, thereby intensifying the grip of the hook 39 upon the locking pin 50. Since the locking pin is limited to either an upward or a downward movement when in such position that it may be engaged by said notch, said pin 50 is positively held within said notch until such time as the hooked catch 19 is pivoted out of engagement with said locking pin by means of the rope 45, as hereinbefore mentioned.

It may be observed that since an unusual pressure bearing down upon the outer end of the door, will cause the notch 48 to grip the locking pin 50 tightly enough to require a substantial pull on the rope 45 to effect a release, and since normally it takes very little effort to trip the hooked catch 19, the operator will be warned that something is wrong whenever it is necessary to use much force to trip said catch. Such warning will considerably reduce, or entirely eliminate, the accidents which now sometimes result from releasing a door which is covered with snow or ice without first taking precaution to stand clear of the door.

In order to illustrate the principles determining the precise location of the pivot pin opening 38 with respect to the center 66 of the circle which passes through the points 58 and 59, a demonstration of the extreme positions of said pivot pin will be utilized. By inspection of the drawings it will be observed that if said pivot pin 18 were located at 18*a*, as indicated in phantom, there would be no substantial force preventing said locking pin from rotating said hooked catch clockwise as the pin is urged upwardly, and thereby releasing itself. It will also be similarly observed that if such pivot pin is located at 18*b*, as indicated in phantom, said locking pin is permanently locked within the notch 48 and it is impossible to rotate said hooked catch clockwise to release the locking pin 50 without changing the contour of the upper edge 49 of said counterweight portion 43 to permit a downward movement of said locking pin and thereby reintroduce all of the associated problems of the looseness above mentioned in connection therewith.

Therefore, it may be concluded that the pivot pin opening 38 in said hooked catch 19 is positioned on the arc 38*a* in a clockwise direction from the position 18*a* with respect to the center 66 of said notch 48 as far as possible in order to effect a maximum counterclockwise moment about the pivot pin 18 when the locking pin 50 bears against the tip 54, but without entering the range wherein there is a permanent locking of said locking pin 50 within said notch 48 and without sacrificing the close fitting contour, as

aforesaid, of the upper edge 49 of said counterweight portion with said pin 50.

By extensive experimentation it has been determined that the lines 61 and 62 should be approximately 45° to 50° apart and preferably about 50°. This will assure an effective counterclockwise gripping moment, as illustrated in Figure 5, when the pin 50 is pressing downwardly against the edge 49, or upwardly against the point 59 on the tip 54 of the notch 48, thereby positively preventing an accidental release of the door while it is in the horizontal or open position.

Although the above mentioned drawings and description apply to one particular, preferred embodiment of the invention, it is not my intention, implied or otherwise, to eliminate other variations or modifications which do not depart from the scope of the invention unless specifically stated to the contrary in the hereinafter appended claims.

I claim:

1. In overhead, horizontally pivoted, door construction, safety latch structure comprising in combination: a pin parallel to the axis of movement of said door and extending sidewardly therefrom; latch support means pivotally supporting a latch and mounted fixedly with respect to the axis of movement of said door; a latch having a latch closing arm and a pin hooking arm spaced for reception of said pin therebetween; latch pivot means pivotally supporting said latch upon said latch support means, said latch pivot means being located with respect to the pivot point of said door a distance greater than the corresponding distance of said pin and further located so that when said door is in open position a first reference line from said pivot point centrally through said pin makes an acute angle with a second reference line from said door pivot point to said latch pivot means, said pin hooking arm being shaped to contact said pin, when said door is fully open, on the side thereof which is leading as the door opens and to contact said side of said pin only within a zone between a reference point located at the intersection of said first reference line with the side of said pin remote from said door pivot point and a third reference line extending from said latch pivot means centrally through said pin, and said pin hooking arm being further shaped to contact said pin, when said door is fully open, on the side which is trailing as said door opens and to contact said side of said pin only within a zone commencing at the point of intersection with said side of said pin by said third reference line and extending around said side to a point on said side not less than 90 degrees removed from said reference point.

2. The combination defined in claim 1 wherein said point of contact between said hooking arm and the side of said pin which is trailing as said door opens is at the point of intersection with said side of said pin by said third reference line.

3. The combination defined in claim 1 wherein said zone of contact by said hooking arm with the side of said pin which is leading as said door opens extends from said reference point toward said third reference line a distance not to exceed 15 degrees on the circumference of said pin.

4. The combination defined in claim 1 wherein said first and third reference lines make an angle with respect to each other of from about 45 degrees to about 50 degrees.

5. The combination defined in claim 4 wherein said first reference line and said third reference

line make an angle with respect to each other of about 50 degrees.

6. In overhead, horizontally pivoted, door construction, safety latch structure comprising in combination: a pin parallel to the axis of movement of said door and extending sidewardly therefrom; latch support means pivotally supporting a latch and mounted fixedly with respect to the axis of movement of said door; a latch having a latch closing arm and a pin hooking arm spaced for reception of said pin therebetween; latch pivot means pivotally supporting said latch upon said latch support means, said latch pivot means being located with respect to the pivot point of said door a distance greater than the corresponding distance of said pin and further located so that when said door is in open position a first reference line from said pivot point centrally through said pin makes an acute angle with a second reference line from said door pivot point to said latch pivot means.

7. The combination defined in claim 6 wherein said hooking arm contacts said pin at two, and only two, points when said door is closed, one thereof being on the side which is leading when said door is closing and the other thereof being on the side which is trailing when said door is closing, said one point being between said first reference line and a third reference line extending from said latch pivot means centrally through said pin when said door is closed and said other of said points being adjacent to the point of intersection of said third reference line with said trailing side of said pin.

8. In overhead, horizontally pivoted, door construction having a safety latch, including a pin parallel to the axis of said door and sidewardly therefrom, latch support means pivotally supporting a latch and mounted fixedly with respect to the axis of movement of said door; a latch having a latch closing arm and a pin hooking arm spaced for reception of said pin therebetween, latch pivot means pivotally supporting said latch on said latch support means, which latch pivot means are located with respect to the pivot point of said door a distance greater than the corresponding distance of said pin and further located that when said door is in open position a first reference line from said pivot point centrally from said pin makes an acute angle with a second reference line from said door pivot point to said latch pivot means, the improvement in said hooking arm comprising: walls so defining the shape of said pin hooking arm that when said door is fully open said hooking arm contacts said pin on the side thereof that is leading as said door opens and effects said contact only within a zone between a reference point located at the intersection of said first reference line with the side of said pin remote from said pivot point and a third reference line extending from said pivot means centrally through said pin, and said pin hooking arm being further shaped for also contacting said pin, when said door is fully open, on the side which is trailing as said door opens and effects said contacting only within a zone commencing at the point of said intersection with said side of said pin by said third reference line and extending around said side to a point on said side not less than 90 degrees removed from said reference point.

9. In overhead, horizontally pivoted, door construction, safety latch structure comprising in combination: a pin affixed to said door and extending therefrom; latch support means pivotally supporting a latch and mounted fixedly with respect to the axis of movement of said door; a latch having a latch closing arm and a pin hooking arm spaced for reception of said pin therebetween; latch pivot means pivotally supporting said latch upon said latch support means, said latch pivot means being located with respect to the pivot point of said door so that when said door is in open position a first reference line from said pivot point centrally through said pin makes an acute angle with a second reference line from said door pivot point to said latch pivot means, said pin hooking arm being shaped to contact said pin, when said door is fully open, on the side thereof which is leading as the door opens and to contact said side of said pin only within a zone between a reference point located at the intersection of said first reference line with the side of said pin remote from said door pivot point and a third reference line extending from said latch pivot means centrally through said pin, and said pin hooking arm being further shaped to contact said pin, when said door is fully open, on the side which is trailing as said door opens and to contact said side of said pin only within a zone commencing at the point of intersection with said side of said pin by said third reference line and extending around said side to a point on said side not less than 9 degrees removed from said reference point.

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