Feb. 2, 1960 L. J. NACK 2,923,026

DOOR CLOSER MECHANISM

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Fig. 1

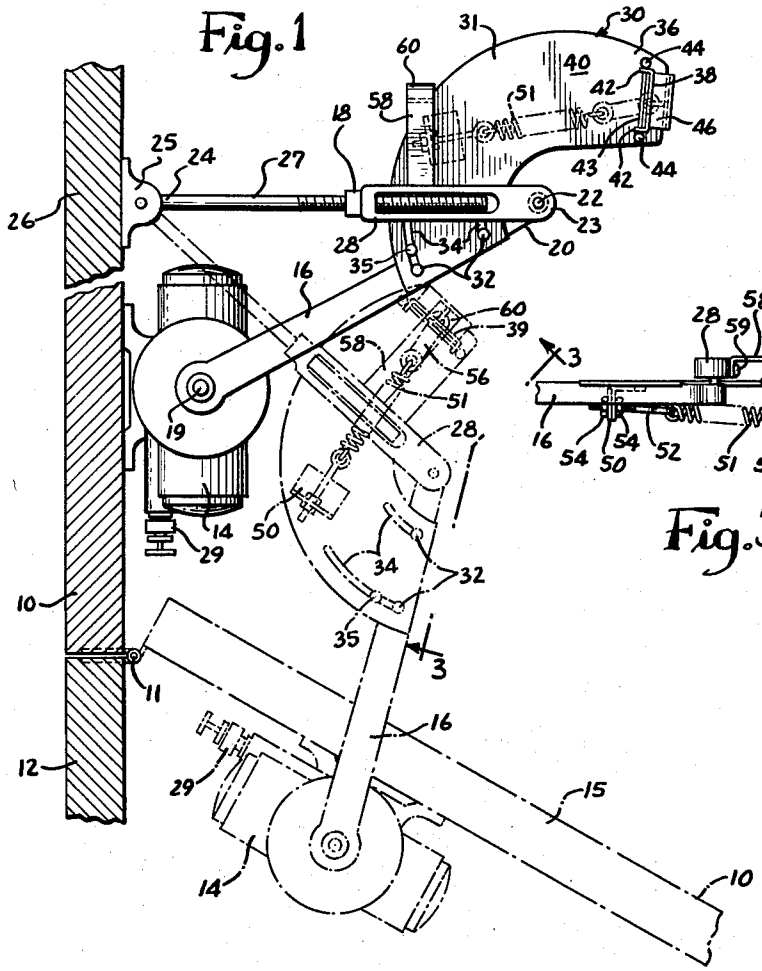


Fig. 3

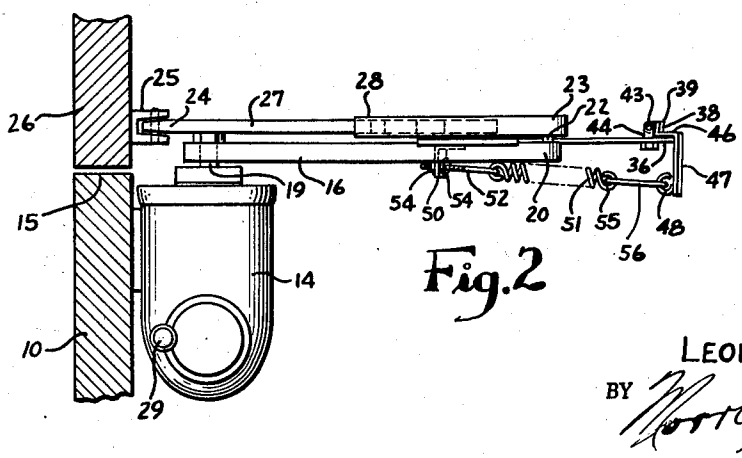


Fig. 2

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DOOR CLOSER MECHANISM

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8 Claims. (Cl. 16—49)

This invention relates to improvements in automatic closer mechanism for doors, windows and the like, and has particular reference to the provision of improved control means in operative association with such mechanism and normally effective in a door-open condition thereof, for releasably holding the mechanism against door-closing operation.

An object of the invention is to provide in operative association with door closer mechanism of known type, a relatively simple yet highly reliable latch form control which is effective for restraining or holding the mechanism against door-closing operation from a given door-open condition thereof, yet is readily releasable from its holding condition as in response to manual or other force applied to the door in the closing direction.

Another object is to provide an improved latch form control for automatic door closer mechanism, effective for restraining door-closing operation of the mechanism as aforesaid, and which embodies heat responsive means for rendering the latch control ineffective as in the event of fire, whereby to release the mechanism for door-closing operation.

Another object is to provide for automatic closer mechanism having cooperating relatively movable arms between a door and the door frame, an adjustable latch form control normally operable in any of a number of different relative door-open positions of such arms selectively according to adjustment of the control, to effect a releasable holding connection between the arms and thereby to restrain the mechanism against door-closing operation.

Yet another object is to afford an improved, simple and reliable latch form control for the purpose indicated in the foregoing objects, which is adapted for ready and easy application to the relatively movable arms of existing door closer mechanism.

The foregoing and other objects and advantages of the present invention will appear from the following description of a presently preferred embodiment thereof as illustrated in the accompanying drawing, wherein:

Fig. 1 is a top plan view of a door closer mechanism embodying a latch form control according to this invention, shown in solid lines with the door closed, and in broken lines with the door in an open position and retained therein by the control;

Fig. 2 is a side elevational view of the closer mechanism and control, as such appear in the closed position of the door (solid line showing of Fig. 1), and

Fig. 3 is a fragmentary side elevational view as taken along line 3—3 in Fig. 1, showing the control in latched condition.

Referring now to the drawing, 10 is a closure member which, for the purpose of present example of the invention, may be a door suitably hinged (one hinge shown at 11) to a door frame shown in part at 12, for swinging displacement about a vertical axis to and between a closed position (solid line shown in Fig. 1) and an open position such as that indicated in Fig. 1 by the broken line showing

of the door. Door 10 is provided with an automatic closer device or mechanism of well known or conventional form as shown, which comprises a fluid or spring type actuator 14 suitably mounted on the door 10 near the top or upper door margin 15, and a pair of pivotally connected actuator arms 16 and 18. The arm 16 is secured at one end to the actuator spindle 19, and extends therefrom in a horizontal plane above the top margin of the door. At its outer end 20 the arm 16 is pivotally connected, as by a suitable pivot element or pin 22, to one end 23 of arm 18. The arm 18 extends in a plane above and parallel to the plane of arm 16, and has its opposite end 24 pivoted to a bracket 25 mounted on the top cross member (shown in part at 26 in Figs. 1 and 2) of the door frame.

Preferably and as here shown, arm 18 is comprised of threadedly interconnected parts 27 and 28 to permit of length adjustments thereof, as to facilitate application of the closer mechanism between the door and its frame. In operation, the actuator 14 imposes on arm 16 through the spindle 19, a turning force normally tending to cause arm rotation in a direction to effect, by resultant relative pivotal displacements of the arms 16 and 18, swinging movement of door 10 from any position toward and to its closed position. Thus, the closer mechanism while yielding to permit ready opening of the door, operates automatically in the absence of restraint thereof or a holding of the door in open condition, to close the door. Moreover, the actuator is regulatable for determining the degree of turning force on arm 16, with such regulation attained in known manner through operation of the adjustment device indicated at 29.

In accordance with the present invention, the closer mechanism is provided with improved control means of relatively simple yet highly effective and reliable latch character, which is adjustably associated with the closer arms 16 and 18 and operable in any given open condition of the door as determined or selected within the adjustment range of the control means, for releasably restraining or holding the mechanism against door closing operation. As will presently appear, the control means is readily releasable upon and in response to manual closing of the door, and embodies a fusible element for rendering the control ineffective in the event of abnormally high temperature conditions in the vicinity of the element, as in the event of fire.

The control means in its presently preferred form, includes a latch unit generally indicated at 30, providing a support member 31 which by preference is a plate member of metal or other suitable rigid material, having an arcuate or sector shape as shown. The plate 31 is secured at one end on the upper side of the arm 16, by means of suitable attachment bolts 32 extending through arcuate plate slots 34, and projects laterally and forwardly of the arm 16 below the part 28 of arm 18. The plate slots 34 permit angular positional adjustments of the plate relative to the arm 16, as for a purpose to be described. For assuring retention of the plate in adjusted position on arm 16, a suitable lock bolt 35 may be provided through one of the slots 34 and tightened in abutment with the arm 16.

Adjacent the forward or free end 36 of plate 31 is a unitary latch element 38 formed of suitable rigid material, as stainless steel for example. It provides a latch end or nose portion 39 on the upper side 40 of the plate, with such portion of appreciable width, as shown, and terminating at its opposite sides in laterally projecting pivot portions or ears 42. The pivot portions or ears 42 are apertured to receive a pivot pin 43 supported on plate 31 by supports 44, thereby to effect pivotal support of the latch element on the plate. Latch element 38 is of angulate form as shown, including a portion 46 adapted for abutment with plate end 36 to determine the effective

latch position of the latch with its nose 39 upstanding on side 40 of the plate. Extending from the latch portion 46 and transversely of the plate 31 over the end 36 of the latter, is a latch extension or tail portion 47 which has secured to its free end a hook-eye element 48 for latch biasing means now to be described.

Secured to the plate 31 on its underside and near its central region, is a bracket 50. Connected between the bracket 50 and the hook-eye element 48 of latch element 38 is a biasing linkage which includes a suitable coil spring 51. One end of the spring is connected to the bracket 50 by a link 52 which has a threaded end passing through an aperture in the bracket and provided with lock nuts 54. Connecting the opposite end 55 of the spring to the hook element 48 of latch 38, is a fusible link element 56 which may be of well known or conventional construction. The biasing means thus provided and wherein the tension of spring 51 is adjustable through the link 52 and its lock nuts 54, normally urges the latch element 38 to its latching position wherein its nose 39 is upstanding on plate 31 with the latch portion 46 abutting the plate 31.

Completing the latch control is a catch element 58 on the closer arm 18, such catch in the present example preferably being an elongate, flat strip of suitable laterally flexible spring material, as stainless spring steel. The element secured at one end to the arm part 28, as by screws 59, projects generally parallel to plate 31 thereover and laterally of the arm part in the direction shown, and terminates in a downturned hook like catch end 60 adapted for latching engagement over the nose 39 of latch element 38. As appears in Fig. 1, the width of the catch end 60 is appreciably less than the width of the latch nose 39. It is to be noted here that the length of catch element 58 and its position on arm part 28 are predetermined with regard to the latch unit 30 in any adjusted position on arm 16 within its angular adjustment range as determined by the arcuate plate slots 34, such that as the door 10 is opened with consequent relative pivoting of arms 16 and 18, the catch element 58 will engage the latch element 38 at a particular point in opening displacement of the door, according to the adjusted position of latch unit 30. Moreover, the heretofore indicated greater width of latch nose 39, relative to the width of catch end 60, facilitates and assures effective latching engagement of these elements in any adjusted position of latch unit 30 within its adjustment range relative to arm 16.

Turning now to the operation of the closer mechanism control and assuming the latch unit 30 to be in maximum extension from arm 16, as shown in the drawing, swinging displacement of door 10 from its closed position toward and to the open position shown in broken lines in Fig. 1, will bring the closer arms 16 and 18 to the relative broken line position shown. As the arms approach and reach such position, the end 60 of catch element 58 abuts the nose 39 of latch element 38 and rides thereover (as permitted by the lateral flexibility of the catch element) to latch engagement with the latch nose (Fig. 3). Whereupon the latch control as so engaged, will restrain the closer mechanism from door-closing operation, so that the door will be thereby retained in the open position shown. However, the latch control is readily releasable to permit operation of the closer mechanism to close the door, upon the application of manual or other door-closing force on the door sufficient to overcome the latching force of the latch spring 51. In such case, the latch element 38 will pivot in the direction to permit and effect disengagement of the catch end 60 from the latch nose 39. It will be appreciated, of course, that the door 10 may be opened to a greater extent than the broken line open position shown in Fig. 1, and in that event the catch element will merely ride over the latch nose 39. Subsequently upon release of the opening force on the door, the door closer mechanism will operate to effect door displacement in the closing direction until the catch element engages the latch element, when the closer mechanism will be restrained against further door closing operation, and the door will be thereby held in the open position indicated in broken lines in Fig. 1.

The foregoing operation of the latch control will obtain in like manner, in any other adjusted position of the latch unit 30 within its adjustment range. The door closing mechanism then will be restrained from door closing operation in any open position of the door less than the open position shown in broken lines in Fig. 1, dependent upon and corresponding to the adjusted position of the latch unit 30 relative to closer arm 16.

A particularly advantageous feature of the presently improved and greatly simplified door closer latch control resides in the inclusion of the fusible link 56 in the spring bias linkage on latch element 38. Such fusible link may be of any well known or conventional construction and adapted for separation by fusion in response to heat in the vicinity of the link at and above a predetermined minimum abnormal temperature, such as would obtain in the case of fire. Thus, in any door open condition wherein the latch control is in effect to hold or restrain the closer mechanism from door closing operation, fusion separation of the fusible link in response to abnormal heat, will thereby remove the spring bias on latch element 38. Element 38 then will be free to pivot in the latch-releasing direction, under the door closing force of the closer actuator 14 acting through the arms 16 and 18 to retract the catch element 58 from the element 38, with consequent release of the closer mechanism for effecting closure of the door. The resultant automatic closure of the door as in the event of fire, thus will cut off drafts and prevent or deter the spread of fire.

It will appear now from the foregoing, that the present invention affords a highly effective yet relatively simple latch type control for automatic door-closer mechanism of the conventional, pivotal arm character as shown. The latch structure of the improved character as here provided, is not only suitable for original embodiment in such closer mechanism as manufactured, but well adapted for application to such closer mechanism in existing installations thereof. Moreover, in any adjusted condition of the latch unit 30, determining the latched-open position of door 10, the latch control normally will be operated to latched condition each time the door is opened to such position, and to unlatched condition upon each closing displacement of the door from such position. Therefore and importantly to the present improvements, since there are but two movable parts in the present latch control, as the catch element 58 and the pivotal latch element 38 under the bias of spring 51, and further since the catch end 60 frictionally rides over the latch nose 39 in each latching and unlatching operation of the latch, there is a less likelihood of rust or corrosion seizure of these parts than exists in respect of other heretofore known and prevailing types and forms of closer mechanism holding devices. If, on the other hand, failure of the latch control should occur for any reason, such failure would become apparent immediately, in operation of the door relatively to its latched-open position.

Having now illustrated and described a presently preferred embodiment of the invention, it is to be understood that the same may be modified in many ways without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. For use with door closer mechanism having cooperating relatively movable arms; means for releasably retaining said arms against relative door-closing movement from a door-open condition of the mechanism, said means comprising a support adapted to be carried by one of said arms and adapted when mounted thereon to be adjustably extended therefrom, a latch element

swingably mounted on the support for movement to and from a latching position thereon, a projection on the support, means including a yieldable element adjustably connected between said projection and the latch element normally urging the latter to its latching position, and a catch element carried by the other of said arms in position thereon for engagement with said latch element in said door-open condition of the mechanism.

2. The combination as defined by claim 1 wherein the said means including a yieldable element is further characterized as including a fusible element.

3. For use with door closer mechanism having cooperating relatively movable arms, means for releasably retaining said arms against relative door-closing movement from a door-open condition of the mechanism, said means comprising a support member adapted to be carried by one of said arms and when carried thereby to extend outwardly therefrom, a latch element pivotally mounted on said member and having a portion adapted for abutment with the member to determine the latching position thereof on the member, a projection on said member, means including a spring element adjustably connected between said projection and the latch element, normally yieldably urging the latch element to said latching position, and a spring catch element adapted to be carried by the other of said arms in position thereon for engagement with said latch element in said door-open condition of the mechanism.

4. The combination as defined by claim 3 wherein the said means including a spring element is further characterized as including a fusible element.

5. For use with door closer mechanism including a pair of pivotally connected arms; means for releasably holding said arms against relative door-closing movement from a door-open condition of the mechanism, said means comprising a plate element adapted to be secured to one of said arms and when secured thereto to project outwardly therefrom, a latch element swingably mounted on the plate element for movement to and from a latching position thereon, said latch element including an extension lying substantially transversely of the plate element, a bracket on the plate element, a connection including a spring element and a fusible element, between said bracket and said extension normally biasing the latch element to said latching position, and an elongate laterally flexible catch element adapted to extend from the other of said arms in position thereon for engagement with said latch element in said door-open condition of the mechanism.

6. For use with automatic door-closer mechanism including a pair of pivotally connected arms; means for releasably holding said arms against relative door-closing movement from a door-open condition of the mechanism, said means comprising a plate adapted to be carried by one of said arms to form an adjustable support extending from said one arm, a unitary latch element having an abutment portion and a tail portion, means pivotally mounting the latch element on one side of said support for pivotal movement to and from an effective latching position determined by engagement of said abutment portion with the support, said tail portion of the latch element extending laterally of the support from the opposite side of the latter, a bracket on said opposite side of the support, linkage including a spring and a fusible element adjustably connected between said bracket and said latch element tail portion, normally biasing the latch element to its said effective latching position, and an elongate laterally flexible catch element adapted to be secured to the other of said arms

in position projecting therefrom for latching engagement with said latch element in said door-open condition of the mechanism.

7. For use with automatic door-closer mechanism including a pair of pivotally connected arms; means for releasably holding said arms against relative door-closing movement from a door-open condition of the mechanism, said means comprising a rigid plate adapted to be adjustably supported on one of said arms and when supported thereon to extend laterally therefrom and transversely of the other arm, said support terminating in an end portion forwardly of said one arm, a latch element pivotally carried by said support adjacent said end portion thereof, said latch element providing adjacent latch and abutment portions on the side of the support opposed to said other arm and a tail portion extending over the end portion of said support, the latch element being pivotally movable to and from an effective latching position determined by engagement of its said abutment portion with said end portion of the support, a bracket on the other side of the support, linkage including interconnected spring and fusible elements adjustably connected between said bracket and said tail portion, normally biasing the latch element to its said effective latching position, and an elongate laterally flexible catch element adapted to be secured to and when so secured to project from the other of said arms in position thereon for latching engagement with said latch portion of the latch element in said door-open condition of the mechanism.

8. For use with an automatic door closer mechanism including two connected and relatively movable arms normally operable to urge the door from an open position to a closed position; adjustable control means normally operable in any of a number of different relative door-open positions of said arms selectively according to adjustment of the control means, to effect a releasable holding connection between the arms, restraining the mechanism against door-closing operation, said control means comprising a latch unit providing a latch element movable to and from a latching position and biasing means including interlinked spring and fusible elements, connected to and normally biasing the latch element to its latching position, means for mounting said latch unit on one of said arms and adapted to permit adjustments in the mounted position of the unit relative to the arm, and an elongate laterally flexible catch element adapted to extend from the other of said arms in position thereon for latching engagement with said latch element in any one of said different relative door-open positions of the arms, according to the adjusted mounted position of said unit relative to said one arm, thereby to effect a holding connection between the arms to restrain the mechanism against door-closing operation, said spring yielding to a manual door-closing force on said door, to cause release of said latch element from said catch element and permit door-closing operation of said mechanism, and said fusible element upon fusion thereof while said latch and catch elements are in latching engagement, disconnecting said biasing means from the latch element and thereby releasing said latch element for disengagement from said catch element to permit door-closing operation of said mechanism.

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