

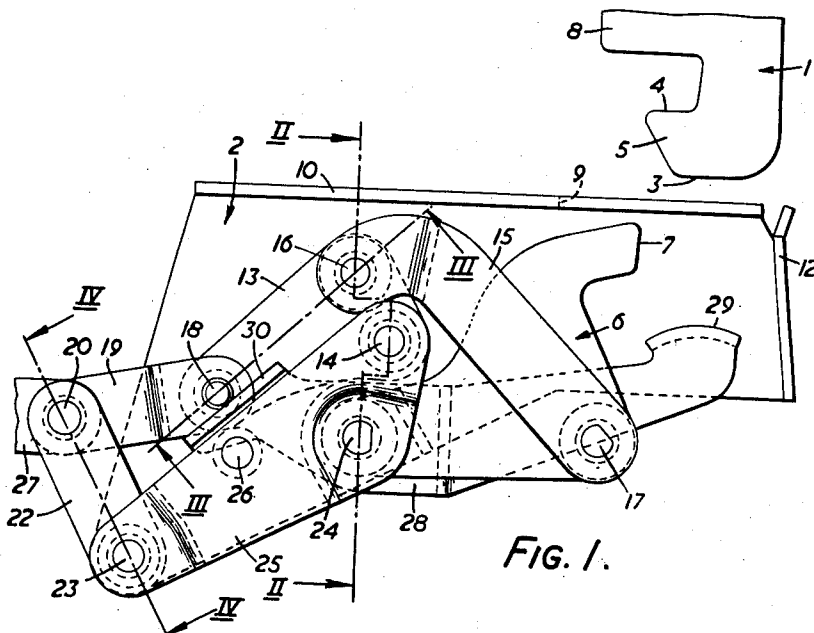
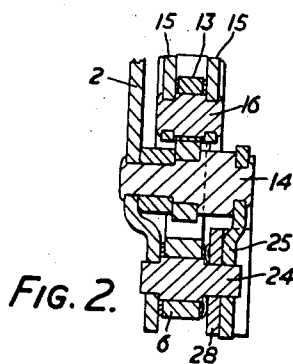
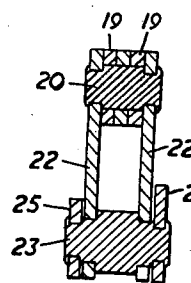
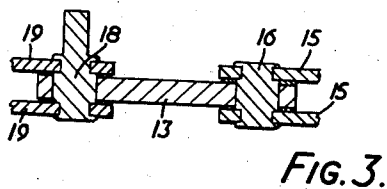
Nov. 27, 1962

A. BARKER ETAL
DOOR FASTENINGS

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Filed July 1, 1960

3 Sheets-Sheet 1



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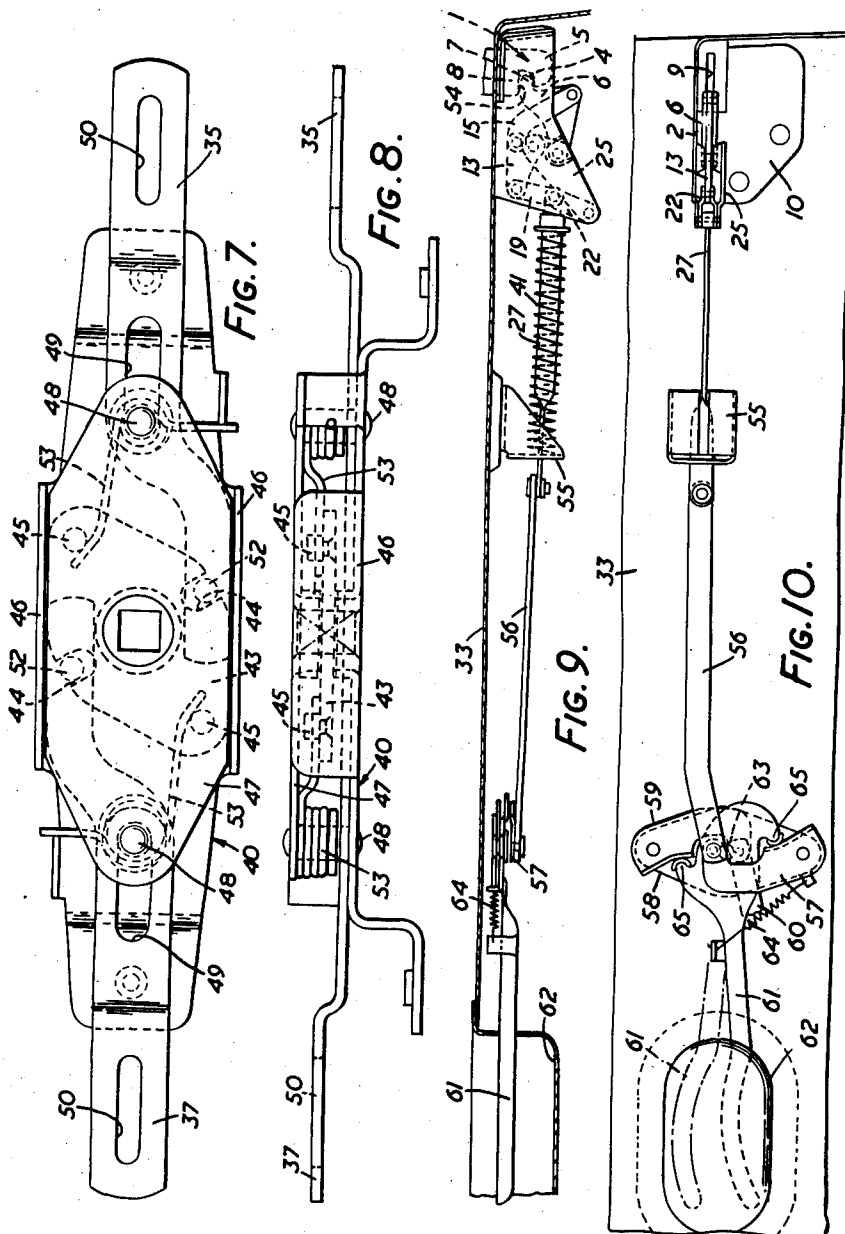
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DOOR FASTENINGS

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This invention relates to door fastenings of the "link latch" type in which a pivotally mounted latch piece adapted for latching engagement with a keeper is connected to a linkage of the fastening which holds the latch piece in the latched position or moves it to the unlatched position.

Door fastenings used with hinged tailgate doors of motor vehicles of the shooting brake or estate car type are normally of the sliding or rotary bolt type arranged in opposed pairs on the side edges of the doors. With the former type it is necessary for the tailgate to be closed against the door seals and the respective keepers aligned with the bolts before the latter can be operated; with the latter type the pressure of the door seals has also to be overcome before the locking position is reached and it is possible as a result of door distortion by seal pressure for only one side of the door to be latched so that the latter is not properly secured and one of the fastenings is overloaded.

The object of the invention is to provide a new or improved door fastening of the link latch type which is particularly, though by no means exclusively, suitable for use with a motor vehicle tailgate door and for such an application can readily be designed so that operation of the fastening itself serves to compress the door seals.

According to a further object of the invention a door fastening of the link latch type embodies a spring-loaded toggle linkage which is extended when the latch piece is in the latched position and retains it in that position, and release means arranged to collapse the toggle linkage to release the fastening.

Preferably the release means comprise an actuating rod attached to the toggle linkage, and this rod may be spring loaded in a direction opposite to the releasing direction so that the resultant spring loading of the toggle linkage serves to urge the latch piece in the fastening direction during a fastening operation.

The fastening may embody a further toggle linkage which is extended when the latch piece is in the unlatched position and has to be collapsed before the latch piece can move to the latched position under the influence of the spring loading of the other toggle linkage. Both toggle linkages conveniently utilise a common link pivotally connected between two levers which are pivotally mounted on a body part of the fastening and respectively provide the toggle linkages together with the common link.

The latch piece may be connected to the toggle linkages by a further link the ends of which are respectively pivotally connected to the latch piece and the lever of the further toggle linkage, and the arrangement may be such that the fastening is "tripped" to collapse the further toggle linkage as a result of the latch piece striking the keeper of the fastening. With such an arrangement the keeper may include an abutment surface and a relatively spaced limb extended partially across the abutment surface, the latch piece having a nose adapted to engage the abutment surface during the fastening operation and to engage behind said limb when in the latched position. Engagement of the latch piece and the abutment surface during the fastening operation displaces the latch piece and, through the link connecting the latter to the toggle linkages, collapses the further toggle linkage.

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In an alternative arrangement a trip member may be provided for engagement with the keeper during the fastening operation, the resultant displacement of the trip member acting to collapse the further toggle linkage.

The trip member is preferably a trip lever pivotally mounted intermediate its ends on the body part, with the outer end arranged for said engagement with the keeper and the inner end arranged to act directly on the further toggle linkage. The use of a trip member enables the tripping action to be made very much more sensitive so that it is considerably easier to trip the fastening and close the associated door.

The invention will now be further described with reference to the accompanying drawings which illustrate, by way of example, two motor vehicle door fastenings in accordance with the invention, and in which:

FIGURE 1 is a somewhat diagrammatic view of one of the fastenings,

FIGURE 2 is a sectional view on the line II—II in FIGURE 1,

FIGURE 3 is a sectional view on the line III—III in FIGURE 1,

FIGURE 4 is a sectional view on the line IV—IV in FIGURE 1,

FIGURE 5 is a view similar to FIGURE 1 showing the fastening in the latched position,

FIGURE 6 is a fragmentary horizontal section through an upper tailgate door showing the fastening of FIGURES 1 to 5, mounted therein,

FIGURE 7 is a front view of a central mechanism of the arrangement of FIGURE 6,

FIGURE 8 is a plan view of the mechanism of FIGURE 7,

FIGURE 9 is a view generally similar to that of FIGURE 6 showing the other fastening, which is of a somewhat simpler form, fitted to the lower tailgate door of a motor vehicle, and

FIGURE 10 is a view with the outer door panel removed of the arrangement of FIGURE 9.

The fastenings illustrated are designed for use with the tailgate doors of motor vehicles of the shooting brake or estate car type, in which a lower rectangular door is pivotally mounted about its lower edge and an upper rectangular door pivotally mounted about its upper edge is adapted partly to overlap the lower door when closed.

Referring particularly to FIGURES 1 to 5, the fastening illustrated therein comprises a keeper 1 adapted to be mounted on a relatively fixed part of the vehicle body and a body part comprising a backplate 2 adapted to be mounted adjacent a side edge of the corresponding door. Only the part of the keeper 1 which is necessary to the function of the fastening is shown in the drawings, and the keeper can be suitably flanged or otherwise formed for attachment to the relatively fixed part in the desired manner.

The keeper 1 presents an abutment surface 3 and a relatively spaced latch retaining surface 4 formed respectively by the opposite sides of a limb 5 which when fitted extends transversely across the vehicle. The backplate 2 has pivotally mounted thereon a latch piece 6 with a hook-like nose portion 7 formed for latching engagement between the limb 5 and the main body portion 8 of the keeper 1.

When fitted, the nose 7 is so arranged with respect to the keeper 1 that as the door is closed with the latch piece 6 in the unlatched position (as shown in FIGURE 1) the limb 5 can enter a guide aperture 9 formed in a front flange 10 of the backplate 2 without abutting against the nose 7, thereafter angular movement of the latch piece 6 to the latched position (as shown in FIGURE 5) causing the nose to engage behind the limb 5 and thereby pre-

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vent opening of the door. As the keeper 1 enters the backplate 2 it is guided by the side edges of the guide aperture 9 and a bent-up guide flange 12 at the adjacent side edge of the backplate 2.

Also pivotally mounted on the backplate 2 is a first lever 13 of generally triangular shape with the corresponding pivot pin 14 arranged adjacent one apex of the lever. One end of a first link 15 is pivotally connected at 16 to the lever 13 adjacent a second apex thereof, and the other end of this link is pivotally connected at 17 to the latch piece 6. As shown more clearly in FIGURE 2 the link 15 is formed by two spaced link plates between which the lever 13 and the latch piece 6 are respectively received. The other apex of the triangular lever 13 is pivotally connected at 18 to one end of a second link 19 which at its other end is pivotally connected at 20 to the free end of a second lever 22 mounted on a pivot pin 23 on the backplate 2.

As shown more clearly in FIGURES 3 and 4 the link 19 is formed by two spaced link plates between which the lever 13 is received and which are cranked so that they are in turn received between two spaced lever plates forming the lever 22. The pivot pins 14 and 23, and a pivot pin 24 of the latch piece 6, are mounted between the backplate 2 and an outrigger plate 25 which is held in position by the pivot pins which are each riveted over at both ends.

The link 19 and lever 22 form a toggle linkage which is extended (as shown in FIGURE 5) when the latch piece 6 is in the latched position, this toggle linkage being moved slightly over centre into contact with a stop 26 mounted between the backplate 2 and the plate 25. An actuating rod 27 is pivotally connected to the toggle linkage at the common pivot point 20 of the link 19 and lever 22, this rod 27 being arranged to be spring loaded in a direction opposite to the releasing or unlatching direction as described later in connection with FIGURE 6. When the fastening is in the latched position of FIGURE 5 unlatching movement of the latch piece 6 is prevented until the actuating rod 27 is moved against its spring loading to collapse the toggle linkage, thereby preventing inadvertent disengagement of the latch piece 6 from the keeper 1.

A third or trip lever 28 forming a trip element is pivotally mounted intermediate its ends on the pivot pin 24 and is formed at its outer end 29 for engagement with the abutment surface 3 during the fastening operation. At its other or inner end 30 the lever 28 is flanged for engagement with an extension of the common pivot 18 of the lever 13 and link 19 when the fastening is in the unlatched condition of FIGURE 1. As shown in that figure the lever 13 and link 19 form a further toggle linkage which is extended when the fastening is unlatched to hold the latch piece 6 in the unlatched position against the action of the spring loading of the rod 27. When so extended the further toggle linkage is moved slightly over centre with the lever 13 in engagement with the stop 26.

During the fastening operation the parts approach one another as shown in FIGURE 1, and near to the latching position the end 29 of the lever 28 engages the abutment surface 3 of the keeper 1. This displaces the lever 28 about the pivot pin 24, and the inner end 30 of this lever in turn displaces the pivot 18 of the toggle linkage formed by the lever 13 and link 19 to collapse this toggle linkage, whereupon the spring loading of the rod 27 acting through the link 19, lever 13 and link 15 turns the latch piece in the latching direction so that the nose 7 snaps into latching position behind the limb 5. The arrangement is such that the lever 28 engages the keeper 1 before the corresponding door seals are compressed so that distortion of the door by the seals does not affect tripping of the fastening, and the arrangement is further such that when the fastening is tripped the latch piece 6 and keeper 1 are aligned for latching engagement.

The action of the spring loading also urges the door

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against the door seals and moves the toggle linkage formed by the lever 13 and lever 22 to the extended position already described, so that fastening is held securely latched by this toggle linkage until the latter is collapsed by releasing movement of the actuating rod 27.

The distance between the pivot of the lever 28 and the outer end 29 thereof is greater than the distance between that point and the inner end 30, so that a mechanical advantage is obtained assisting the tripping action. As a result, the toggle linkage formed by the lever 13 and link 19 can be collapsed very readily when a relatively light closing force is applied to the door. Referring to FIGURE 6 which illustrates one fastening of the upper tail-gate door 31 in position therein, the actuating rod 27 of this fastening extends through a guide bracket 32 fixed to the inner door panel 33. The rod 27 is attached to one end of a connecting link 34 the other end of which is attached to the outer end of a corresponding metal slide 35 forming an operating link of the central mechanism illustrated more particularly in FIGURES 7 and 8. This mechanism is operated by an outer door handle 36 which can be turned to release the two fastenings of the door, the other fastening being connected to an operating link 37 in a similar manner.

As shown in FIGURE 6 the front flange 10 of the backplate 2 is plunged and tapped at positions such as 38 for attachment of the fastening to the inner door panel 33, the fastening itself not being illustrated in detail in this figure. The link 34 incorporates a turnbuckle 39 which enables the effective length of the link to be adjusted on assembly. A coiled compression spring 41 around each actuating rod 27 produces the aforesaid spring loading and acts between a shoulder on the rod 27 and the respective guide bracket 32.

As shown more particularly in FIGURES 7 and 8 the central mechanism comprises a sheet metal body part comprising a backplate 40 which is cranked at each end for attachment to the door panel 33. The handle 36 has a square-section spindle 42 on which is mounted a cam 43 having a pair of diametrically opposed peripheral slots 44 and a pair of diametrically opposed projecting spring operating pins 45. The operating links 35, 37 are slidably mounted between parallel flanges 46 along the upper and lower edges of the backplate 40 and they are retained, together with the cam 43, between the backplate 40 and an outrigger plate 47 fixed to the backplate by spacing rivets 48. These rivets engage longitudinal slots 49 in the operating links 35, 37 to allow and limit sliding movement of the latter, and each of the operating links has a longitudinally extending slot 50 adjacent its outer end for a pin and slot connection with the corresponding connecting link such as 34 to provide a lost motion connection therewith.

At its inner end each of the operating links 35, 37 is swan necked so that both inner ends can pass each other between the flanges 46 on opposite sides of the spindle 42, and adjacent this end each carry a projecting operating pin 52. This pin 52 is engaged with the corresponding cam slot 44 so that angular movement of the cam 43 with the handle 36 imparts opposite and equal sliding movements to the operating links 35, 37, against the spring loading of the actuating rods 27, to unlatch the fastening at each side of the door. The handle 36 is spring loaded towards the latched position by a pair of coiled tension springs 53 respectively positioned around the rivets 48 and the ends of which are engaged respectively between the pins 45 and an abutment on the backplate 40.

On release of the handle 36 after the fastenings have been unlatched and the door opened the central mechanism is automatically returned by the springs 53 to the normal unlatched position, the lost motion connections provided by the slots 50 allowing such return movement without loading the actuating rods 27. When the door is subsequently shut the fastenings are tripped and the rods 27 moved by the springs 41 to the latched positions;

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this takes up the lost motion of the slots 50 so that releasing movement of the links 35, 37 can again unlatch the fastenings.

The simpler fastening illustrated in FIGURES 9 and 10 is basically similar to the fastening already described and like parts are preferred to by corresponding reference numerals, the simplification residing in the omission of the trip lever 28. The latch piece 6 is itself moved during the fastening operation to trip the fastening and collapse the toggle linkage provided by the lever 13 and link 19, the nose 7 engaging for this purpose an abutment surface 54 formed on the main body 8 of the keeper 1 instead of the abutment surface 3 of the previously described fastening. As is shown in FIGURE 9 the nose 7 has a rounded leading profile to provide smooth abutment and facilitate the tripping action.

In the lower tailgate door arrangement of FIGURES 9 and 10, which could if desired incorporate the fastening described in connection with FIGURES 1 to 5, the actuating rod 27 of the fastening illustrated extends through a guide bracket 55 fixed to the outer door panel 33. The rod 27 is pivotally connected to one end of a limb 56 pivotally connected at its opposite end to an actuating lever 57 of the corresponding central mechanism which comprises an attachment or backplate 58 secured to the door panel 33. The other fastening of the door is similarly connected in a manner which is not illustrated in detail to a similar actuating lever 59 of the central mechanism through a limb 60. A lever-type inner door handle 61, which is accessible in a recess 62 in the door panel 33 when the upper door is unlatched and open, is pivotally mounted at 63 on the backplate 58. The handle 61 is spring-loaded towards a position corresponding to the latched position of the door by means of a spring 64 acting between it and the plate 58.

At its inner end the handle 61 is of cam form with two diametrically opposed cam portions 65 which respectively bear against the levers 57, 59 to displace the latter in opposite directions when the handle 61 is moved to the unlatched position (shown in broken lines in FIGURE 10). This movement of the handle 61 imparts similar but opposite movement to the actuating rods 27 of the two fastenings of the door so that the latter is unlatched. With this arrangement there is no need to provide a lost motion connection between the central mechanism and the actuating rods 27 as return movement of the handle 61 under the influence of the return spring 64 does not return the limbs 56; these limbs are later returned to the latched position when the door is closed and the fastenings tripped by engagement of the latch pieces 6 and keepers 1.

Thus both arrangements permit the necessary amount of free or lost movement between the handle 36 or 61 and the actuating rods 27 in order that each latch piece 6 may be moved from its unlatched to its latched position without movement of the handle.

As with the upper door, compression springs 41 around the actuating rods 27 provide axial spring loading of the latter. The springs 41 are for clarity omitted from FIGURE 10.

We claim:

1. A door fastening comprising a latch piece pivotally mounted for movement between latched and unlatched positions, a keeper adapted for latching engagement with said latch piece when in said latched position, a linkage which acts to retain said latch piece in one or other of said positions and means interconnecting said latch piece and said linkage, said linkage comprising first and second levers respectively pivotally mounted about axes parallel to and fixed relatively to the pivot axis of said latch piece and a common link pivotally connected between said first and second levers, said first lever and said link together forming a toggle linkage which is extended when said latch piece is in said unlatched position and said second

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lever and said link together forming a toggle linkage which is extended when said latch piece is in said latched position, means spring loading the toggle linkage including said second lever towards the extended position, and release means arranged to collapse said last-mentioned toggle linkage against the action of said spring-loading means when said latch piece is in said latched position whereby to release the fastening.

2. A door fastening comprising a body part, a latch piece pivotally mounted on said body part and moveable about the pivot mounting between latched and unlatched positions, first and second levers pivotally mounted on said body part and respectively connected by means of spaced pivots to opposite ends of a common link, one of said levers and said common link together forming a toggle linkage which is extended when said latch piece is in said latched position and the other lever and said common link forming a further toggle linkage which is alternatively extended when said latch piece is in said unlatched position and has to be collapsed before the latter can move to said latched position means connecting one of said toggle linkages to said latch piece, spring means loading said first-mentioned toggle linkage towards the extended position, and release means adapted to collapse that toggle linkage to release the fastening.

3. A door fastening according to claim 2, wherein said release means comprise an actuating rod connected to the pivot of said first-mentioned toggle linkage, and said spring means act to load said actuating rod towards that pivot.

4. A door fastening comprising a pivotally mounted latch piece moveable about the pivot mounting between latched and unlatched positions, a keeper adapted for latching engagement with said latch piece, a spring-loaded toggle linkage which is extended when said latch piece is in said latched position to retain it in that position, release means arranged to collapse said toggle linkage to release the fastening, a further toggle linkage which is extended when said latch piece is in said unlatched position, a link connected between one of said toggle linkages and said latch piece, and a trip member arranged for engagement with said keeper during a fastening operation, the resulting displacement of said trip member bringing that member into engagement with said further toggle linkage whereby it acts to collapse said further toggle linkage to allow said latch piece to turn from said unlatched position.

5. A door fastening according to claim 4, wherein said trip member is in the form of a trip lever mounted intermediate its ends on a fixed pivot and adapted at one end for engagement by said keeper and at the other end for engagement with said further toggle linkage.

6. A door fastening of the link latch type, comprising: a body part; a latch piece pivotally mounted on said body part for pivotal movement between latched and unlatched positions; a keeper adapted for latching engagement with said latch piece; a linkage which acts to retain said latch piece in one or other of said positions, comprising two levers separately pivotally mounted on said body part and a common link pivotally mounted to and between said levers, one of said levers and said link together forming a toggle which is extended when said latch piece is in said latched position and the other of said levers and said link together forming a toggle which is extended when said latch piece is in said unlatched position; means connecting said linkage and said latch piece, an actuating rod arranged for movement in one direction to collapse said first-mentioned toggle to release the fastening; and spring means loading said actuating rod in a direction opposite to the releasing direction and thereby urging said first-mentioned toggle towards the extended position, said spring means acting through said linkage to move said latch piece to the latched position during a fastening operation.

7. A door fastening comprising a latch piece pivotally

mounted for movement between latched and unlatched positions, a keeper adapted for latching engagement with said latch piece, a spring-loaded toggle linkage which is extended when said latched piece is in said latched position to retain it in that position, release means arranged to collapse said toggle linkage to release the fastening, a further toggle linkage which is extended when said latch piece is in said unlatched position, a link pivotally connected adjacent its ends to said latch piece and a lever of one of said toggle linkages, and spring means which load said spring-loaded toggle linkage and turn said latch piece to the latched position when said further toggle linkage is collapsed.

8. A door fastening comprising a latch piece pivotally mounted for movement between latched and unlatched positions and formed with a nose portion, a keeper adapted for latching engagement with said latch piece and having an abutment surface and a relatively spaced limb extending partially across said abutment surface and behind which said nose portion engages when the fastening is latched, a spring-loaded toggle linkage which is extended when said latch piece is in said latched position to retain it in that position, release means arranged to collapse said toggle linkage to release the fastening, a further toggle linkage which is extended when said latch piece is in said unlatched position, means interconnecting said latch piece and one of said toggle linkages, said nose portion being arranged for engagement with said abutment surface during a fastening operation to trip the fastening by collapsing said further toggle linkage whereby to allow said latch piece to move from said unlatched position, and spring means which act to load said first-mentioned toggle linkage and turn said latch piece to said latched position when said further toggle linkage is collapsed.

9. A door fastening comprising a latch piece pivotally mounted for movement between latched and unlatched positions, a keeper adapted for latching engagement with said latch piece, a spring-loaded toggle linkage which is extended when said latch piece is in said latched position to retain it in that position, release means arranged to collapse said toggle linkage to release the fastening, a further toggle linkage which is extended when said latch piece is in said unlatched position, a trip lever pivotally mounted intermediate its ends and arranged for engagement at the outer end with said keeper during a fastening operation, as a result of which engagement the inner end of said trip lever engages said further toggle linkage to collapse the latter and allow said latch piece to turn from said unlatched position, means interconnecting said latch piece and one of said toggle linkages, and spring means loading said spring-loaded toggle linkage and acting to turn said latch piece to the latched position when said further toggle linkage is collapsed.

10. A door fastening of the link latch type, comprising: a body part; a latch piece pivotally mounted on said body part for movement between latched and unlatched positions; a generally triangular-shaped lever pivotally mounted adjacent one apex on said body part; a generally straight lever pivotally mounted adjacent one end on said body part; a common link pivotally connected at one end to the other end of said straight lever and at the other end to said triangular lever adjacent a second apex thereof, said link forming with said straight lever one toggle which is extended when said latch piece is in said latched position and said link forming with said triangular lever a further toggle which is extended when said latch piece is in said unlatched position; a further link pivotally connected at one end to said latch piece and at the other end to said triangular lever adjacent the third apex thereof; an actuating rod connected to said one toggle and moveable in one direction to collapse that toggle to release the fastening; and spring means which load said one toggle towards the extended position and act, during a fastening operation, through said further link to turn said latch member to said latched position on collapse of said further toggle.

11. A door fastening comprising a latch piece pivotally mounted for movement between latched and unlatched positions, a keeper adapted for latching engagement with said latch piece when in said latched position, a linkage which acts to retain said latch piece in one or other of said positions and comprises first and second levers respectively pivotally mounted about axes parallel to and fixed relatively to the pivot axis of said latch piece and a common link pivotally connected between said first and second levers, said first lever and said linkage together forming a toggle linkage which is extended when said latch piece is in said unlatched position, and said second lever and said linkage together forming a toggle linkage which is extended when said latch piece is in said latched position, a further link connecting said latch piece to said toggle linkages, means spring loading the toggle linkage including said second lever towards the extended position, and release means arranged to collapse said last-mentioned toggle linkage against the action of said spring-loading means when said latch piece is in said latched position whereby to release the fastening.

12. A door fastening according to claim 11, wherein the ends of said further link are respectively pivotally connected to said latch piece and said first lever.

References Cited in the file of this patent

UNITED STATES PATENTS

2,469,113	Hooker	May 3, 1949
2,696,999	Rop	Dec. 14, 1954
2,911,247	Corbin	Nov. 3, 1957