April 7, 1953 R. ROBERTSON 2,634,147

LOCK FOR DOORS

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Fig. 1.

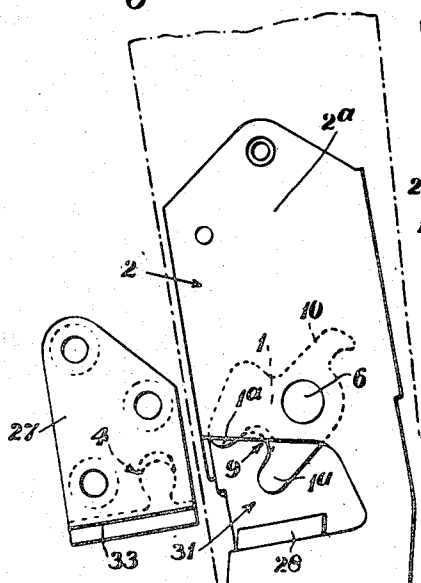


Fig. 2.

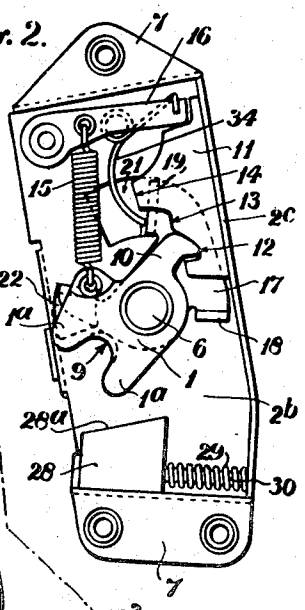


Fig. 3.

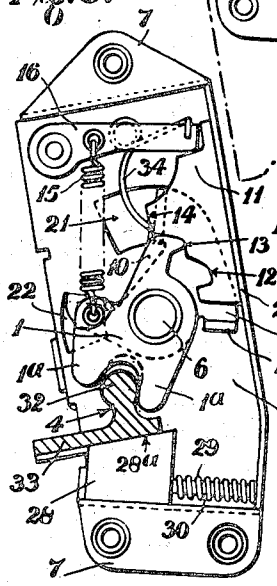
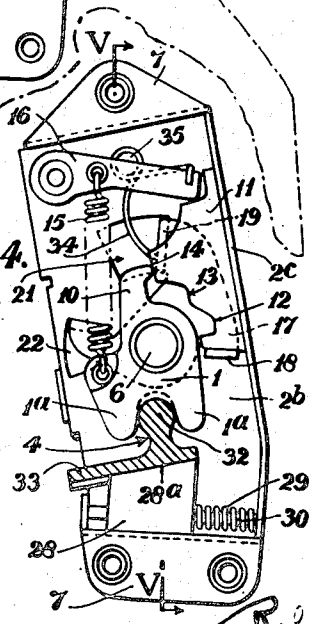


Fig. 4.



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Fig. 5.

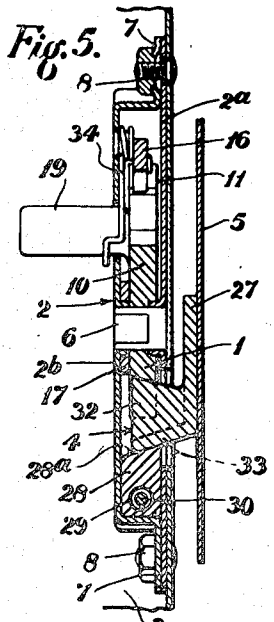


Fig. 6.

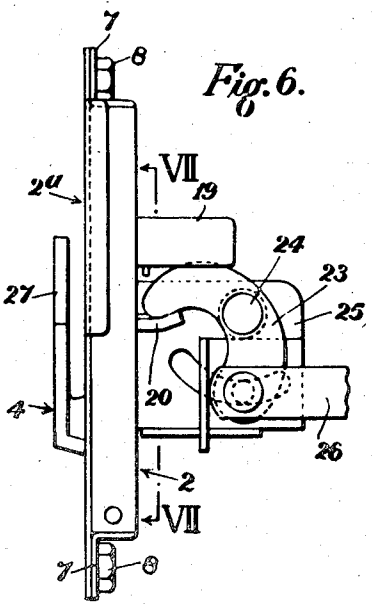


Fig. 7.

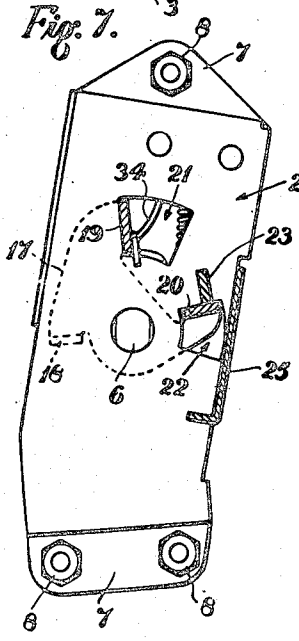


Fig. 8.

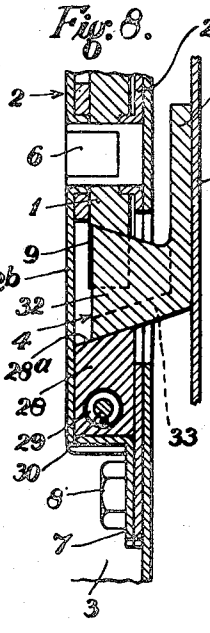
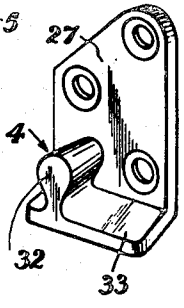


Fig. 9.



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Fig. 10.

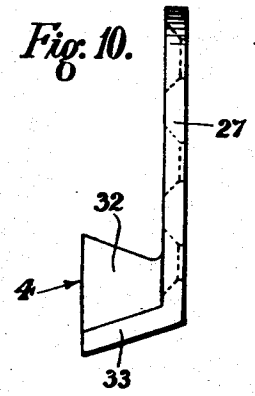


Fig. 11.

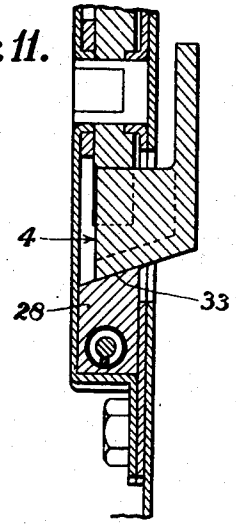
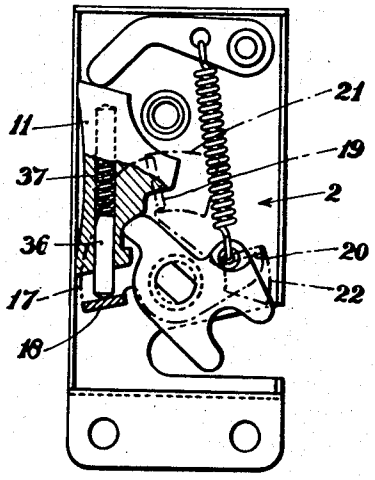


Fig. 12.



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UNITED STATES PATENT OFFICE

2,634,147

LOCK FOR DOORS

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Application August 31, 1951, Serial No. 244,579
In Great Britain September 25, 1950

3 Claims. (Cl. 292—216)

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This invention relates to locks for the doors of vehicles, particularly motor vehicles, such locks being of that kind which comprise a latch element preferably in the form of an angularly-movable forked or other arm, carried by a lock casing adapted to be fixed, for example, to the door, such as to the face of the door edge, and a striker adapted to be secured, such as by an attachment plate, to an opposed part, such as to a vehicle body, the said arm and the striker co-operating to hold the door closed.

One of the objects of the present invention is to provide a door lock of the above kind of an improved and sturdy construction, wherein the number of moving parts are reduced to a minimum, so that the lock is not liable to get out of order and may be cheaply manufactured.

A further object is to produce a lock mechanism wherein the presence of an exposed latch element disposed outside the lock casing is dispensed with. Where, in locks of the kind referred to, a pivoted latch is mounted outside the lock casing for engagement by the striker, it is liable to be inadvertently turned into a door locking position when the door is open, and the subsequent slamming of the door is then liable to break or damage the lock mechanism. This is avoided by the present lock construction.

A further object is to provide simple and compact means for preventing a hinged door to which the lock is fitted from moving, when closed, either upwards or downwards in the plane of the hinge axis, whilst a still further object is to provide simple and effective means for preventing movement of the door in the direction of the length of the vehicle, in the case of a hinged vehicle door; or in the case of a sliding door, in a direction transverse to the door.

According to the invention, a door lock comprises an angularly-movable or pivoted latch element disposed within a casing, or behind a cover plate, so that it is partly concealed when in use, the said latch element being adapted to be engaged by a striker entering an aperture in the casing or cover plate so that the latch is moved by the striker into a door retaining position during the closing of the door; in combination with a locking device for holding the latch element in a door retaining position, and means for operating the locking device to release the latch element to cause or permit of the opening of the door.

Also, according to the invention, a door lock comprises an angularly-movable or pivoted latch element disposed within a casing, or behind a

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cover plate, and adapted to be engaged by a striker entering an aperture in the casing or cover plate, so that the latch is moved by the striker into a door-retaining position during the closing of the door; in combination with means for preventing the door, when closed, from moving upwards or downwards in its own plane, such means consisting of a wedge or abutment opposed to the latch element and disposed within the lock casing, or behind the cover plate, so that the striker, or a part carried thereby, lies or extends between the latch element and the said wedge or abutment when the door is closed.

Figure 1 of the accompanying drawings represents a front view of a door lock constructed according to the present invention, and shown fitted to the edge of a vehicle door (indicated by broken lines), the latch being in its door release position and the striker being shown about to enter the lock casing to actuate the latch.

Figure 2 is a view of the lock mechanism, the cover of the lock casing being removed and the latch being in the position shown in Figure 1.

Figure 3 shows the positions of the lock parts after the striker has entered the lock casing to move the latch into its "safety-catch" position.

Figure 4 shows the position of the lock parts after the striker has moved the latch into its door-retaining position.

Figure 5 represents a section through the lock on the line V—V, Figure 4.

Figure 6 is a view showing the edge of the lock casing in elevation.

Figure 7 is a section on the line VII—VII, Figure 6.

Figure 8 represents a sectional view through part of the lock upon a larger scale, showing the undercut part of the latch and the cross-sectional shapes of the striker and wedge member.

Figure 9 is a perspective view of the striker.

Figure 10 is an end view of the same.

Figure 11 illustrates a modified form of the invention.

Figure 12 shows a further modification.

Referring to Figures 1 to 10 of the drawings, the improved lock is provided with a latch element 1, which, instead of being fully exposed, is pivotally mounted within a shallow box-like casing 2, where it is protected and almost entirely concealed from view. The casing 2 is intended to be let into the face of the outer edge of a vehicle door 3 (indicated by broken lines in Figure 1) so as to co-operate with a striker 4 on an opposed face of a fixed door pillar or body part 5 (Figure 5) during the closing of the door,

means being provided for locking the latch element 1 in a door retaining position, and for actuating the locking means to release the door. The said latch element 1 is carried by a short transverse spindle 6 which projects from opposite sides of the latch and forms a pivot about which it may turn, the one end of the spindle 6 engaging a bearing hole in the front wall 2a of the casing, and its other end engaging a bearing hole in a rear wall 2b of the casing. The top and bottom end walls of the latch casing are formed integral with the rear wall 2b and have attachment flanges 7 which lie beneath end extensions of the front wall 2a, the said end extensions and attachment flanges being secured together and to the wall of the door edge by screws or bolts 8. The latch 1 is disposed towards the lower end of the casing 2, and its lower portion is of a forked formation, being formed in its lower edge with a deep notch or recess 9 disposed between a pair of side portions or arms 1a having rounded ends, the recess 9 being adapted to receive the striker during the closing of the door so that the latch element is turned angularly into a door-retaining position. The said latch element 1 is provided at its upper end with a short integral arm 10, and this arm 10 is adapted to be engaged by a locking slide 11 which is arranged to hold the latch 1 in one or other of three different positions. For this purpose, one edge of the slide 11, that is an edge opposed to the arm 10 of the latch, is of a stepped formation, as shown, providing three abutments 12, 13 and 14. The arrangement is such that when the arm 10 of the latch element engages the lowermost abutment 12 the said latch element is held in its door releasing position shown in Figure 2, whilst when the arm 10 engages the top abutment 14, as shown in Figure 4, the latch element 1 is held in a door-retaining position. When, on the other hand, the arm 10 engages the intermediate abutment 13, as illustrated in Figure 3, the latch is held in a safety-catch position.

The slide 11 has its one edge bearing against a side edge 2c of the casing, which forms a guide, the lower portion of the slide lying more or less between the said side edge of the casing and the arm of the latch 1, according to the position of the latter. The latch 1 is acted upon by a coiled tension spring 15 which tends to turn it into its door releasing position, this spring being anchored at its one end to the latch element and at its other end to an arm 16 disposed at the top of the casing and pivoted between the front and rear walls of the latter, the spring tending to move the arm 16 angularly downwards. This arm 16 extends almost entirely across the top of the casing, adjacent the top end wall of the latter, and its outer unpivoted end bears upon the upper end of the slide 11. The tension spring 15 thus serves a dual purpose, namely to turn the latch 1 into a door releasing position and to move the slide 11 downwards.

To enable the slide 11 to be readily actuated, either from the outside or from the inside of the vehicle, there is fitted inside the lock casing 2, over the one end of the latch spindle 6, a rotary actuating plate 17 (see Figure 7) having three laterally-bent and peripherally-spaced arms 18, 19 and 20. The arm 18 is adapted to engage the lower end of the slide 11 and the other two arms 19 and 20, which are bent to extend in the opposite direction, project out through apertures 21 and 22 cut in the rear wall of the casing 2. The arm 19 is adapted to be operated from the outside of

the door by a push-button (not shown), and the other arm 20 is adapted to be actuated by suitable means from the inside of the vehicle. It may, for example, be engaged by the one end of a bell-crank lever 23 pivotally mounted at 24 on a side wing 25 carried by the rear wall of the lock casing, the other end of the bell-crank being connected for example, by a bar or rod 26, to an angularly-movable arm (not shown) operated by a suitably disposed handle inside the vehicle.

There is provided within the lock casing, immediately below but spaced from, the forked lower end of the latch element 1, and in the same plane as the latter, a sliding wedge element 28. The latter is slidable transversely of the lock casing against the action of a coiled compression spring 29 also disposed within the casing, and the wedge is guided between the front and rear walls of the lock casing by a rod 30 passing through the wedge and through opposite-edge walls of the said casing, one of the edge walls serving as a stop for the wedge. The front wall 2a of the casing and part of the side edge wall integral therewith are cut away to provide an aperture 31 (see Figure 1) to expose the lower portion of the latch 1 and also the upper portion of the wedge 28, the cut-away portion enabling the striker to enter the casing and engage and operate the latch element during the closing of the door.

The striker 4, which is on the fixed pillar or vehicle body, is of a substantially L-shape in front elevation as shown in Figure 9, being carried by, and projecting out from, the lower portion of an attachment plate 27, with which it is an integral part. The said striker thus comprises a projection 32 in the form of a short upstanding arm with a rounded enlarged upper edge portion, the said projection 32 being at the leading end of the striker, and a longer arm or flange 33 slightly inclined to the horizontal in the direction of its length, the said arm extending away from the upwardly-extending projection 32 along the lower edge of the attachment plate 27. During the closing of the door the pivoted latch 1 engages, and is turned by, the upstanding projection 32, and, as the door closes, the longer arm or flange 33 engages the upper surface of the wedge 28 which is forced back against its spring 29.

When the door is open the arm 10 of the latch engages the lowermost abutment 12 of the slide 11, the slide being then in its fully raised position. As the door closes the projection 32 of the striker engages one of the arms 1a of the fork and turns the latch angularly into the door retaining position shown in Figure 4, so that the arm 10 of the latch element engages the top abutment 14 of the slide, the latter which is moved automatically downwards by the spring 15 and arm 16, positively holding the latch 1 in this position, with the door held closed. Should the door be not fully closed the arm 10 of the latch engages the intermediate abutment 13, so that the latch is thus held in its safety-catch position, the slide 11 being prevented from moving downwards to its fullest extent. To open the door, the rotary actuating plate 17 is turned, either by the outside push-button, or by the inside handle, so that the slide 11 is moved up by the arm 18 of the said plate against the action of the tension spring 15. The latch is thus released and is turned angularly by the spring 15 until the arm 10 of the latch engages the bottom abutment 12 of the slide, the angular movement of the latch being such as to give an initial opening movement to the door.

As the door closes the flange 33 of the striker

engages, and moves over, the top face of the wedge 28 whose top face is disposed at a slight angle to the horizontal, the wedge being moved back slightly during this process against the action of its spring 29. The arrangement is such that when the door is closed it is effectively prevented by the wedge 28 from moving upwards in the plane of its hinge axis, being prevented from moving in the opposite direction, that is downwards, by the co-operation of the latch 1 with the projection 32 of the striker.

In order to prevent the door from moving away from the pillar or part which carries the striker 4, in its own plane in the direction of the length of the vehicle, the flange 33 of the L-shaped striker is downwardly inclined in a transverse direction as shown in Figure 10, so that its underside lies at an acute angle to the door pillar to which the device is fitted, the outer longitudinal edge of the flange 33 being lower than its inner longitudinal edge. To co-operate with the said flange 33 the top surface 28a of the spring-pressed wedge member 28 is similarly inclined in a transverse direction, as shown in Figure 8, its inner longitudinal edge being lower than its outer longitudinal edge. Also, the rounded top edge of the upwardly-extending projection 32 of the striker is inclined or undercut, so that the leading end of the striker is of a dovetail or wedge shape, being narrower where it joins the attachment plate 27. To co-operate with this inclined or undercut end of the projection 32 of the striker the bend or crotch of the notch 9 between the arms 1a of the pivoted latch is likewise inclined or undercut at 1b (Figure 8) although the opposed surfaces of the latch arms 1a may be parallel, the inner end of the notch 9 being larger at the rear side of the latch 1 than at the front side of the latter.

As the door closes the upstanding projection 32 of the striker first engages and turns the latch element 1, and interlocks therewith owing to the co-operating inclined or undercut surfaces, whilst the longer arm or flange 33 of the striker, owing to its transverse inclination interlocks with the inclined top surface of the wedge 28. This double interlocking action positively and effectively prevents the door from moving away from the door pillar in the direction of the length of the vehicle.

In addition to the tension spring 15 a two-armed wire torsion spring 34 is mounted on a pin 35 in the upper part of the lock casing 2, the pin 35 engaging a loop at the junction of the two arms, and the spring being retained in place on the pin by the arm 16 which engages the upper end of the slide 11. One of the arms of this torsion spring 34 bears on the slide-engaging arm 16 so that it exerts a certain amount of downward pressure on the latter, whilst the other arm of the torsion spring 34 engages the arm 19 of the rotary actuating plate 17 and keeps the two projecting plate arms 19 and 20 normally pressed up against the edges of the apertures in the casing, so that the press-button and inside handle remain undisturbed during the closing of the door.

Should the tension spring 15 break the torsion spring 34 alone will, in fact, enable the lock to function since it exerts a downward pressure on the slide 11; or the mechanism will function, although not so effectively, without springs, the slide 11 moving down by its own weight and locking the latch when the door is closed.

The lock may be mounted on the door the reverse way, if desired, that is with the forked end of the latch 1 and the wedge 28 at the top, the striker being arranged to correspond. Also, by varying the position of the attachment flanges, the lock casing may be fixed to the door edge, to lie inside or outside the door, that is either so that its front wall lies substantially flush with the outer surface of the door edge, as shown, or so that the lock projects out from the door edge.

If desired, only the flange 33 of the striker 4 and the co-operating surface of the wedge 28 may be inclined or undercut, as shown in Figure 11 of the drawings, the crotch of the forked end of the latch having its surface at right-angles to the sides of the latch. Also, the part 32 which engages the latch element and the flange or part 33 for engaging the wedge 28 may be separate or spaced apart, if required. The striker may carry any other suitably shaped or undercut part for co-operating with a suitable part of the lock for positively preventing movement of the door away from the door pillar, in its own plane, in the longitudinal direction of the vehicle.

In the case of a sliding door, the lock, with the pivoted latch element, would be mounted on a side face of the door, such as upon its inner side, to co-operate with a striker on the corresponding side of the fixed part or pillar. The construction of the parts would be the same as above described, but the co-operating undercut or inclined parts of the striker and latch element and/or wedge member would, in this case, prevent movement of the door in a lateral direction.

In the modified construction illustrated in Figure 12, there is no wedge within the lock casing 2 and the wire torsion spring is omitted. The slide 11, in this case, houses a plunger 36 acted upon by a spring 37, the plunger 36 acting on the arm 18 of the rotary member 17 so that the other arms 19 and 20 of the latter are normally maintained against the edges of the apertures 21 and 22 in the casing, the plunger moving into its housing in the slide 11 during the operation of the latter to release the latch. In this construction a wedge may be provided on the door pillar adapted, if desired, to engage the top edge of the lock casing, when the door is closed.

I claim:

1. A door lock comprising a casing having an apertured edge and an opposite closed edge with an inner fixed surface, a spring tensioned pivoted latch element, said latch element consisting of forked arms disposed adjacent the aperture of said apertured edge and a diametrically opposed single arm spaced from said inner fixed surface, a spring tensioned slide member bearing against said inner surface of the closed edge of the casing, a plurality of abutments on said slide member on the side opposite to the bearing surface and adapted to engage said single arm, said abutments being arranged in stepped relationship, the topmost abutment being spaced a greater distance and the middle and lower abutments of progressively lesser distance from the bearing surface of the slide member to hold said latch in successively latched positions, and a spring tensioned pivoted arm bearing against the upper portion of the slide member, and biasing the slide member downwardly between the inner fixed surface and the single arm.

2. A door lock comprising a casing having an apertured edge and an opposite closed edge with an inner fixed surface, a spring tensioned pivoted

latch element, said latch element consisting of forked arms disposed adjacent the aperture of said apertured edge and a diametrically opposed single arm spaced from said inner fixed surface, a spring tensioned slide member bearing against said inner surface of the closed edge of the casing, a plurality of abutments on said slide member on the side opposite to the bearing surface and adapted to engage said single arm, said abutments being arranged in stepped relationship, the topmost abutment being spaced a greater distance and the middle and lower abutments of progressively lesser distance from the bearing surface of the slide member to hold said latch in successively latched positions, a pivoted arm bearing against the upper portion of the slide member and a spring biasing the slide member downwardly between the inner fixed surface and the single arm, and a rotary actuating plate mounted on the same spindle as said pivoted latch and consisting of a plurality of spaced arms, one of said arms engaging the lower portion of the slide member when the said forked arms of the pivoted latch element are in latching position and the single arm is engaging the top abutment, with an opposite arm biased by the spring attached to the pivoted arm.

3. A door lock comprising a casing having an open edge, an opposite closed edge with an inner fixed surface and a rear wall with apertures, a spring tensioned pivoted latch element, said latch element consisting of forked arms disposed adjacent the opening of said open edge and a diametrically opposed single arm spaced from said inner fixed surface, a spring tensioned slide member bearing against said inner surface of the closed edge of the casing, a plurality of abutments on said slide member on the side opposite to the bearing surface and adapted to engage

said single arm, said abutments being arranged in stepped relationship, the topmost abutment being spaced a greater distance and the middle and lower abutments of progressively lesser distance from the bearing surface of the slide member to hold said latch in successively latched positions, a pivoted arm bearing against the upper portion of the slide member and a spring biasing the slide member downwardly between the inner fixed surface and the single arm, and a rotary actuating plate mounted adjacent to and on the same spindle as the pivoted latch and consisting of a plurality of spaced arms, a first of said arms engaging the lower portion of the slide member when the said forked arms of the pivoted latch element are in latching position and the single arm is engaging the top abutment, a second arm of the rotary actuating plate projecting through one of said rear wall apertures, said latter arm being adapted to be operated by means from the exterior of a door on which the casing is mounted and being biased by the spring attached to the pivoted arm, and a third arm adapted to extend through the other of said apertures to be operated by means located on the interior of the door.

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