

Door latch arrangement

The invention relates to a door latch arrangement.

5 The invention is particularly useful as an
emergency release mechanism for actuator driven doors
which are positively latched in the closed position.
Doors of this type may be found on vehicles,
particularly railway vehicles, and most recently as
10 safety doors along the edge of a platform in an
underground railway or mass rapid transit railway
system.

 According to the invention there is provided a
15 latch arrangement for at least one door having an
opening and closing mechanism comprising co-operating
latch members arranged to mutually engage to latch a
door in the closed position and, for unlatching the
door manually, a handle in the door connected to a
20 first unlatching member carried in the door which is
arranged upon movement of the handle to unlatch the
co-operating members, and in a door-frame a member
disposed to abut the member in the door, in the closed
position, for movement therewith to effect
25 de-energisation of a prime mover in the opening and
closing mechanism.

 In the case where the door is driven by a
pneumatic actuator, the door-frame member is arranged
30 to release pneumatic pressure from an actuator
cylinder to permit movement of the door. Preferably
when the actuator is electrically controlled the
headframe member may be arranged to effect electrical
isolation of the actuator.

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 The invention, and how it may be carried into
practice, will now be described by way of example of

only, with reference to the accompanying drawings, in which:

Fig 1 shows a general view of a door latch arrangement,

Fig 2 shows a detail view of part of the emergency release mechanism, and

Fig 3 shows a detail view of the door latching mechanism.

The embodiment of the invention which will now be particularly described concerns platform edge doors, which according to latest safety thinking, are installed along a platform edge in an underground railway or mass transit station to provide an effective safety screen between waiting passengers on the platform and the railway track area and particularly a moving vehicle. In a typical installation there is provided a continuous half-glazed screen along the platform edge with sliding doors spaced apart at intervals co-incident with the door spacing of the railway vehicles.

The screen doors are operated by actuators and normally latched in the closed position except when a train has come to rest in the correct position whereupon the screen doors are opened, together with the vehicle doors, to permit passengers to enter and exit the vehicle. The screen doors maybe automatically or, at least, remotely operated and are not intentionally provided with any means of opening accessible to waiting passengers.

However, in order to allow vehicle passengers to leave the vehicle in an emergency, it is intended to

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provide an emergency door unlatching mechanism which can be operated by passengers only from the track side of the screen doors, although facility is provided for operation from the platform side by authorised personnel by means of a special key. Each door, or each set of doors, is provided with a handle on the track side which may be operated by a passenger standing in the open doorway of a vehicle, and which unlatches the doors. Preferably this also releases pneumatic pressure from the door actuator which maybe retained normally to positively hold the screen doors in the closed position. Thus in an emergency the screen doors can be opened manually.

Referring now to Fig 1 there is shown a side view of part of a screen door carriage and latching mechanism for a pair of bi-parting doors. The two doors are of the sliding type and are carried by roller carriages, two of which are shown at 3 and 4 respectively which run in roller tracks 5 and 6 extending longitudinally with respect to the screen (not shown) and positioned above the door opening and to either side thereof. The inner edges of the doors are provided with lip seals 1a and 2a which abut each other when the doors are closed, as shown in the drawings.

The doors 1 and 2 are suspended from carriages 3 and 4 by brackets 7 and 8 which extend downwardly through elongate slots in the underside of a headframe cover. The tracks 5 and 6 carriage, brackets and other parts of the mechanism are all concealed by the headframe cover, not shown in the drawing.

The actuator which powers the door closing/opening mechanism is generally indicated at 9 and comprises a long stroke, double-acting linear actuator in which a



moving piston (not shown) located within the cylinder 10 of the actuator is connected to an actuator rod 11. The motive power of the actuator 9 is provided by pneumatic pressure which maybe admitted through valve means to either end of the actuator cylinder 10. Thus, by moving the piston the rod 11 can be extended leftwards in the drawing to open the doors, or retracted to close the doors. The actuator rod 11 is connected to the drive bracket 13 of the left hand door 1 and the actuator force is transmitted to the right hand door 2 by an endless belt 30 connected to both brackets. In the drawing the door on the left is driven and that on the right is a slave door.

The mechanism for latching the doors in the closed position comprises a pivoted latch member 12 mounted on the bracket 13 of the driver door and which a hooked part 12a engages with a peg or block 14a fixed to the bracket 14 of the slave door. The latch member 12 may be pivoted anti-clockwise to disengage the latch release the doors from the locked position.

The latch member 12 is operated by abutment with a flanged latch striker 15 carried towards the outer end of the actuator rod 11. This remote end of rod 11 is provided with a resilient overtravel mechanism 16, by means of which the drive bracket 13 is connected to the actuator rod 11 for limited relative movement. When the driven door and therefore drive bracket 13, has reached the closed position the rod 11 is permitted a limited amount of overtravel during which the latch striker 15 abuts a heel 17 on part of the latch member 12, and rotates the member 12 into locking engagement with latch block 14a on the brackets 14, providing that the slave door has not been obstructed and has also completely closed. This position of the rod 11 and associated parts, reached

through the overtravel movement, is held while the doors are locked, by residual pressure in the actuator 9.

5 In a normal opening sequence as soon as pressure is vented from the "closing" end of the actuator cylinder 10 the resilience of the overtravel mechanism 16 takes up the overtravel distance thereby moving the latch member 12 to the unlatched position which allows
10 the doors to be moved by subsequent further movement of the actuator rod 11 under the influence of pneumatic pressure in the "opening" end of the cylinder. The emergency unlatching mechanism provided by the invention is intended inter alia to permit
15 manual release of the trapped pressure in the actuator thereby unlatching the doors so that they may be pushed open.

As previously mentioned, the screen doors have an
20 emergency release handle (not shown) for manual operation located on the track side of one of the doors. The emergency release handle is connected to a push rod 18 mounted within the door 2 for vertical axial movement. Co-axial with the rod 18, but mounted
25 for vertical axial movement within the headframe space is a further rod or member comprising two parts 19 (Fig. 2) and 19a (Fig. 3) which carry several fixed abutments or flanges, a first of these is a member 20 fixed to the rod 19 adjacent latch member 12 and in a
30 position to abut a pin 20a secured in the latch member 12. A second such member provides a shoulder 21 on the rod 19 adjacent an isolating valve 22 connected in the pneumatic system of actuator 9. Isolating valve 22 comprises a pressure release valve having a valve
35 operating member 23 which is depressed to open the valve 22 and release actuator pressure.

Normally, that is when the door emergency release handle is not operated, the upper end of rod 18 is substantially flush with the upper surface of door 2, when the handle is operated the rod 18 is extended into the headframe space abutting the lower end of rod 19 thereby moving it axially and vertically upwards. The corresponding upward movement of rod 19 brings member 20 into abutment with the pin 20a of latch member 12 (see Fig 3), and the shoulder 21 into contact with the operating member 23 of the isolating valve 22 (see Fig 2). Deployment of the emergency release handle causes the shoulder 21 to depress the operating member 23 releasing pressure from the actuator cylinder, to rotate the latch member 12 in an anti-clockwise direction to unlatch the doors. Thereafter, it is possible for the doors 1 and 2 to be manually pushed back from the closed position since there will now be no opposing force other than the inertia and friction of the mechanism.

The emergency release arrangement of the described embodiment only isolates the pneumatic parts of the door actuator system and leaves the electrical control system uninterrupted. In an alternative arrangement it may be preferred to break the electrical control circuits also, for example by means of a switch, such as a microswitch 24, connected in series with the control circuits and operated by the shoulder 21. The switch 24, in the embodiment, is a rocker type switch and the rocker operating member is disposed to be engaged by the shoulder 21 formed on rod 19 and preferably subsequent to said shoulder having deployed the valve operating member 23.

Upon the doors being manually opened, the lower part of the rod 19a resets to allow the doors to be manually closed and latched, but retaining pneumatic

or pneumatic and electrical isolation. The member comprising shoulder 21 on rod 19 also provides two stepped shoulders 25 and 26, seen in Fig 2, which co-operate with a spring loaded plunger or detent mechanism to engage and hold the rod 19 in either of two deployed positions. This mechanism comprises a plunger 27, sprung against the member 21a by a coil spring 28 in compression. The plunger may be withdrawn against the bias of spring 28 by means of a latch type arrangement operated by a square drive keyway 29, a co-operating key being normally issued to authorised personnel for the purpose of resetting the emergency door release mechanism.

In emergency operation use of the passenger handle raises the member 21a sufficiently for the plunger 27 to extend by a first step and positively engage the first step 25, in which position the pneumatic isolation valve 22 is operated enabling the doors to be opened manually. Engagement of the plunger 27 with the shoulder 25 ensures that pneumatic pressure cannot be readmitted to the actuator until the mechanism is reset.

The rod 19 may be raised further to obtain operation of the electrical isolation switch 24, in which position plunger 21 extends to a second step engaging with the second stepped shoulder 26. Again the electrical circuits can only be remade by resetting the mechanism by withdrawal of plunger 27. This second position cannot normally be achieved by operation of the passenger accessible door mounted emergency handle only, because the rod located in the door does not impart sufficient lift to the rod in the door-frame housing.

The additional lift required is provided in one

embodiment by means of a straight forward lifting handle 34 attached to the member 21a, see Fig 2.

5 In an alternative arrangement, which is depicted in Fig 1 the door actuator may be isolated e.g. for maintenance by means of a lever 33 pivoted about a horizontal axis 31 and having at one end a handle 32 which may be pulled down on the platform side of the platform doors. The other end of lever 33 is linked
10 to the upper end of rod 19, so that by pulling down on the handle 32 the rod 19 is lifted and the actuator isolating valve 22 is operated.

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CLAIMS

1. A latch arrangement for at least one door having an opening and closing mechanism comprising co-operating latch members arranged to mutually engage
5 to latch a door in the closed position and, for unlatching the door manually, a handle in the door connected to a first unlatching member carried in the door which is arranged upon movement of the handle to unlatch the co-operating members, and in a door-frame
10 a member disposed to abut the member in the door, in the closed position, for movement therewith to effect de-energisation of a prime mover in the opening and closing mechanism.
- 15 2. An arrangement according to claim 1 wherein the members in the door and the door-frame are arranged for axial movement on a common axis when the door is closed.
- 20 3. An arrangement according to either claim 1 or claim 2 wherein the handle is disposed on one side of the door only.
- 25 4. An arrangement according to any preceding claim wherein the prime mover is a pneumatic actuator and the member in the door-frame acts to release pressure in the actuator.
- 30 5. An arrangement according to any preceding claim wherein the prime mover is electrically controlled and the member in the door-frame acts to effect electrical isolation.
- 35 6. An arrangement according to claim 4 or 5 wherein said door-frame member carries an abutment disposed to operate at least a pneumatic pressure release valve upon movement of the member.



7. An arrangement according to claim 6 wherein the door-frame member comprises a rod or the like and the abutment is formed by a section of increased lateral dimension.

5 8. An arrangement according to claim 7 wherein at least the release valve is operated by depression of a valve operating member disposed to be engaged by the abutment.

10 9. An arrangement according to any preceding claim wherein said door-frame member has an abutment disposed to operate an electrical isolation switch.

15 10. An arrangement according to claim 9 in combination with any one of claims 4 to 8 wherein it is arranged for the door-frame member to operate the pressure release valve in a first part of its movement and an electrical isolation switch in a second and subsequent movement.

20 11. An arrangement according to claim 10 wherein said second movement of the door-frame member may be achieved only by operation of the second manual operator.

25 12. An arrangement according to any preceding claim wherein a detent mechanism is disposed to engage and hold the door-frame member in an operated position to maintain de-energisation of the prime mover.

30 13. An arrangement according to claim 12 in combination with claim 10 or 11 wherein the detent mechanism is disposed to engage and hold the door-frame member in either of said two parts of its movement.





14. An arrangement according to claim 12 or 13 wherein the detent mechanism comprises a spring biased member adapted to engage a shoulder formed on the movable member.

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15. An arrangement according to claim 14 wherein the spring biased member is retractable manually by means a key.

10 16. An arrangement according to any one one of claims 12 to 15 wherein the door-frame member is comprised of two abutting parts, a first of which abuts the member carried by the door and is arranged to unlatch the engaged door latch members, and a second part of
15 which is adapted for de-energising the prime mover, and only said second part is engaged and held by the detent of mechanism.

17. An arrangement according to any preceding claim
20 wherein the door or doors are provided in a railway platform screen and the door handle is located on the railway track side of the door.

18. An arrangement according to claim 17 in
25 combination with claim 11 wherein the second handle is provided on the opposite, i.e. the platform side, of the screen.

19. A latch arrangement for at least one door
30 substantially as hereinbefore described with reference to the accompanying drawings.

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PATENTS ACT 1977
SPECIFICATION NO. 2156897A

The following corrections were allowed under Section 117 on
3 May 1988

Front page Heading (71) Applicants
for Westinghouse Brake and Signal Company
read Westinghouse Brake and Signal Company Limited

THE PATENT OFFICE
27 May 1988