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DOOR OPERATING MECHANISM

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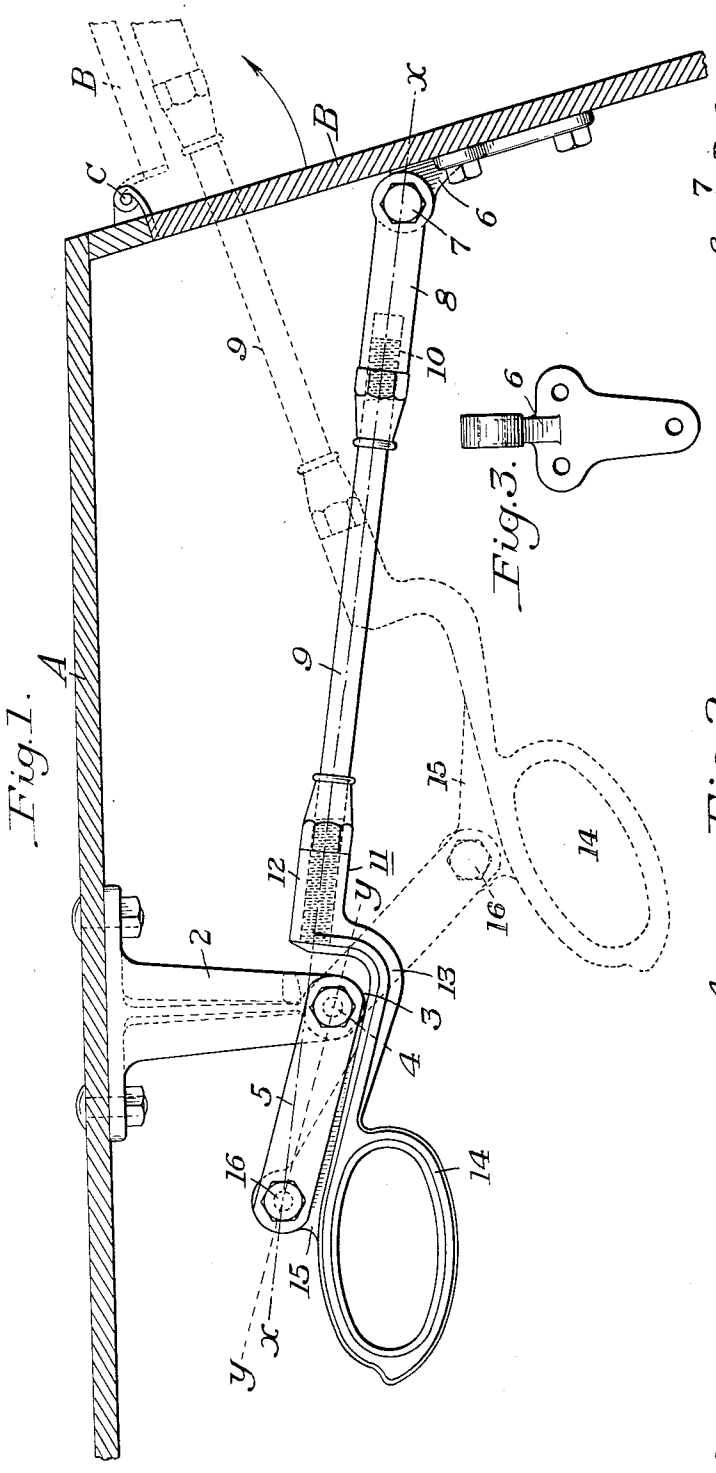


Fig. 1.

Fig. 3.

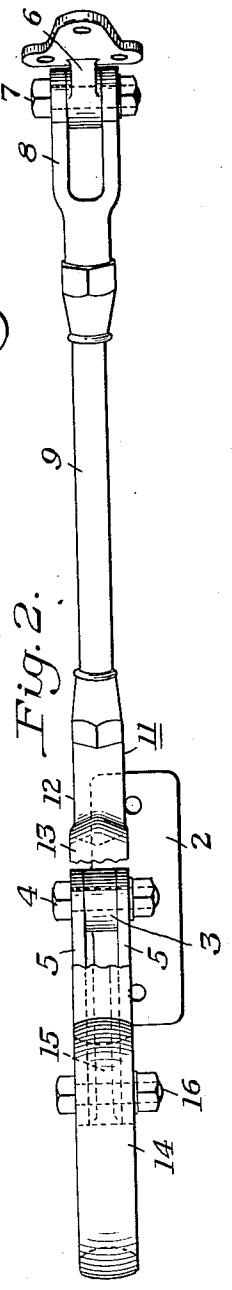


Fig. 2.

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DOOR OPERATING MECHANISM

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1 Claim. (Cl. 268—3)

This invention is for a closure operator, and relates more particularly to a door operating mechanism of the type commonly employed on busses, although it is not limited to such use.

It is quite common in the art to provide in busses a door operating mechanism comprising a pivoted hand lever supported on a bracket on the dash of the bus adjacent the driver's seat and to provide a connecting link which is pivotally secured to the hand lever intermediate its ends, the other end of this operating rod being pivotally connected to the door. Such an assembly therefore has three pivot points, one between the door and the operating rod, one between the operating rod and the operating lever, and the third is the pivotal support for the lever on the bracket on which it is carried. An operating mechanism of this kind is provided not only for opening and closing the door, but is also adapted to hold the door closed when the bus is in motion.

In order that the mechanism heretofore provided will serve to hold the door closed, the operating lever must always move past dead center so that the three pivot points referred to are at the angles of a triangle and any pull tending to force the door open is then exerted in a direction tending to move the handle in the direction opposite to which the handle is moved to open the door. To limit this reverse movement of the handle past the dead center position an adjustable stop has been necessary.

In such a construction the operating rod has to pass over or under the bracket which supports the hand lever when the door is in closed position so that the pivotal connection between the hand lever and the operating rod is above or below this bracket so that one of these pivots is in a plane above or below the other. This arrangement, particularly when the vehicle is going over uneven ground, places a considerable twisting strain on the various parts, with the result that the bolts or pins forming the pivotal connections between the hand lever and the supporting bracket and the hand lever and the operating rod wear out or develop looseness more rapidly than is necessary. Moreover, in different busses the operating rod must be connected to the door at different distances from the hinge. If the adjustable stop hereinbefore mentioned is not provided, the over-center arrangement by means of which the door is held shut could not be secured for these variations in the positioning of the connection between the operating rod and the door.

The present invention provides a construction which is not only of better appearance than the mechanism heretofore provided, but is one wherein all of the parts are more nearly in the same plane, reducing twisting strains on the bolts or pins which function as pivots for the various parts.

The present invention, moreover, eliminates any need for an adjustable stop.

The invention may be readily understood by reference to the accompanying drawing, in which

Figure 1 is a top plan view of the door operating mechanism, a portion of the door and the dash of the body being more or less schematically shown. In this view the full line position indicates the normal position of the parts for an outwardly swinging door when it is closed, and the dotted line shows the position which the parts assume for opening the door;

Figure 2 is a front elevation of the mechanism shown in Figure 1; and

Figure 3 is a detail view of the eye member for pivotally connecting the operating rod with the door.

In the drawing, A designates the dash of a vehicle and B designates a door adapted to swing outwardly to the open position. The door is carried on hinges at C.

Secured to the dash A, or otherwise mounted in the vehicle, is a bracket member 2 having an outer end portion 3, the outer end portion 3 being rounded on a true radius. At the center of this outer portion 3 is a hole for receiving a bolt or pin 4. This bolt or pin 4 also passes through the inner ends of a pair of links 5 one of which has its inner end bearing on the top of the bracket 2 and the other of which has its inner end bearing against the bottom of the bracket 2. This is clearly shown in Figure 2 where a portion of the operating connection is broken away to show the disposition of these links.

Mounted on the door B is an eye member 6 through which passes a pin 7, this pin also passing through the bifurcated end 8 of an operating rod 9. There is preferably a screw-threaded connection between the rod 9 and the bifurcated end portion 8, this screw-threaded connection being indicated at 10. The other end of the rod 9 is connected, preferably by a threaded joint, to an operating extension 11. The member 11 has a connector portion 12 into which the rod 9 is screwed and a forwardly offset extension 13, this extension being provided with an operating handle, preferably in the form of an integral loop 14 as shown. The offset portion 13 has a rearwardly

projecting lug 15 thereon extending between the outer ends of the two links 5, and a bolt or pin 16 passing through the outer ends of the link 5 and through this lug 15 serves to connect the extension 13 with the links 5.

Assuming the parts to be in the position shown in the full lines in Figure 1, a line drawn through the centers of the pins 7 and 16 is at an angle to a line drawn through the centers of the pins 4 and 16. In Figure 1 the line x—x represents the first line and y—y represents the second line. It will thus be seen that the pins 7, 4 and 16 are at the points of a triangle. Any tendency of the door B to open of its own accord is resisted by reason of the fact that the three pivot points are not in line and that any tendency of the door to open would tend to increase the height of this triangle. The extension 13, however, bears against the rounded end portion 3 of the lever 2 and prevents any further over-center movement of the point 16.

To open the door, the handle 14 is pulled forwardly to the dotted line position shown in Figure 1. In so doing, the links 5 swing in an arc about the pin 4. When the operating handle reaches the position shown in Figure 1 the door will be fully opened.

Due to the offset at 13 in the extension member 11 and the fact that the portion 13 bears against the outer end of the bracket 2, it is not necessary to provide any stop to limit the over-center movement of the pin 16. It cannot move beyond the position shown in Figure 1.

Due to the fact that the rounded end 3 of the bracket 2 is rounded on a true radius, it will be seen that if the eye member 6 is positioned closer to the hinge C the angle x—y will remain the same, and if the member 6 is moved further out on the door B, the angle x—y will still be the same. This is because the depth of the offset in the member 11 is fixed and the portion 13 engages a surface 3 which is rounded on a true radius.

Thus it is unnecessary to provide any adjustable stop to limit the movement of the parts in the over-center position as, irrespective of the position which the member 6 has on the door B, the angle between the line x—x and the line y—y has to be constant.

The offset operating member 11 is in reality a continuation of the operating rod 9 and except for manufacturing convenience and the desirability of providing an adjustable connection, the whole operating connection comprising the bifurcated end member 8, the rod 9 and the extension 11 might be integral. By offsetting the operating rod around the outer end of the bracket 2, it is possible for the operating rod to be in a horizontal plane between the two links 5 and the pivots or pins 7, 4 and 16 are all in the same horizontal plane. The bracket 2 does not overhang the operating connection.

It will be noted further that the operating handle is on the extension of the operating rod 9 and not on the links 5. Heretofore it has been customary to use an operating handle in place of the links 5 and make the handle much longer than the links 5.

Due to the fact that the pivots 7, 14 and 16 lie in the same plane, there is less twisting action on them and less twisting action on the bracket, with the result that wear at these points is decreased. In addition to these mechanical advantages, the present construction presents a more compact and consequently neater appearance, which is important in a mechanism of this type and which is usually located at a conspicuous point in the vehicle.

While I have shown my invention as applied to a single outwardly opening door B, it will be understood that the invention can be used on an inwardly or outwardly opening sectional door such as are sometimes used on busses and other vehicles. If used on an inwardly opening door, the direction of movement for the operating extension would of course be reversed.

While I have shown a preferred construction for the various parts of the assembly, it will be understood that various changes and modifications may be made therein and that the hand loop 14 may be otherwise formed and various other modifications made in the construction within the contemplation of my invention and under the scope of the following claim.

I claim:

A bus door-operating mechanism comprising a bracket, a link pivotally supported at one end on the bracket, a connecting unit comprising a rod member, and a handle member rigidly connected, the handle member having a portion for engagement with the rod, the handle member having an offset portion and also having an extension on the offset forming in effect an offset extension of the rod, a handle at the outer end of the extension, said extension having an offset lug thereon reverse to the said first offset portion, the other end of said link being pivotally connected to the lug, the offset in the handle member permitting the end of the link at its point of attachment to the offset lug to be in line with the longitudinal axis of the rod and over-center with respect to the point where the link is supported on the bracket.

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