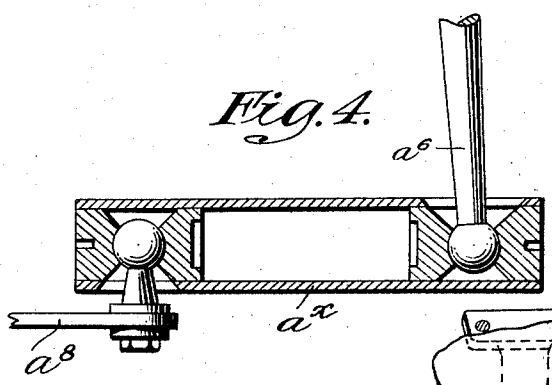
May 27, 1930. G. M. SCHANTZ 1,760,528

DOOR OPERATING MECHANISM

Filed May 5, 1927

Fig. 4.



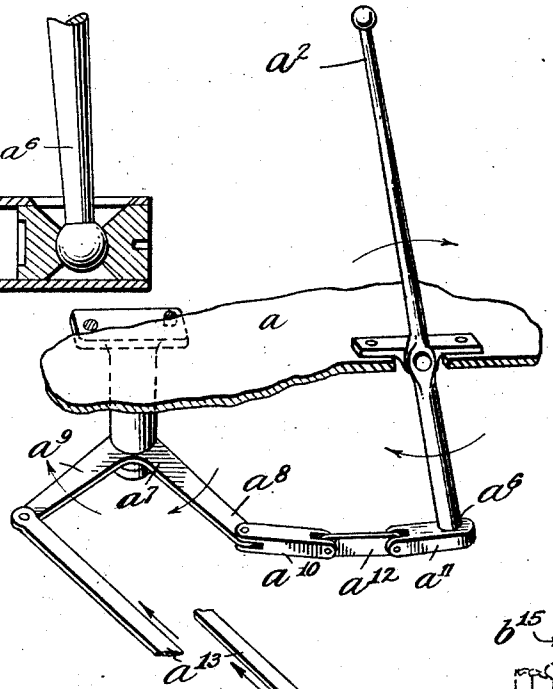


Fig. 1.

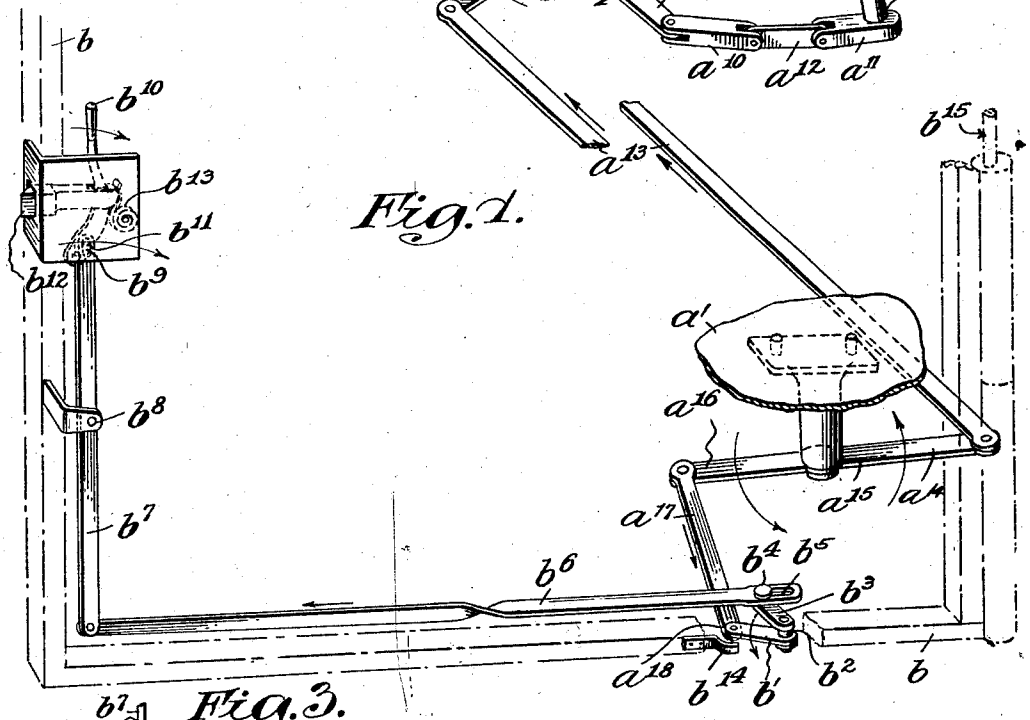


Fig. 3.

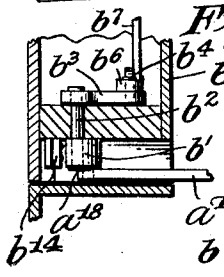
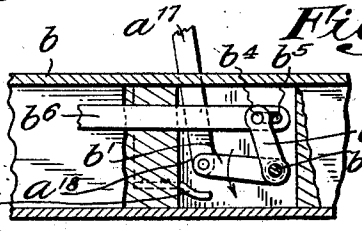


Fig. 2.



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UNITED STATES PATENT OFFICE

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DOOR-OPERATING MECHANISM

Application filed May 5, 1927. Serial No. 188,895.

This invention relates to door operating devices and contemplates particularly the provision of means to open and close the door of a motor vehicle bus, for instance from a point remote from the door. It is customary, in motor bus practice, to provide means whereby the operator can open and close a door in the side of the vehicle furthest from the driver's seat without leaving his post at the wheel. But such means have heretofore been of such a nature that it was necessary for the operator to lean forward in order to manipulate the operating mechanism and so made it awkward and difficult to apply the necessary force.

The present invention overcomes this difficulty by placing the handle of the door operating mechanism at a point within easy reach of the driver's seat. Accordingly, a lever handle is so mounted on the floor of the vehicle that a single movement in one direction will open the door and movement in the opposite direction will close it. The manipulation of the lever is simple and easy and requires no more effort on the part of the operator than the manipulation of a gear shifting lever.

In the door of a motor bus, as in any except a folding door, it is necessary to provide a bolt or other means to normally maintain the door in closed position. Consequently it is necessary to provide means in the door opening mechanism to withdraw the bolt before the door can be opened. Such means have heretofore been provided but the operating mechanism as a whole was of such a nature that the force required to open the door was impressed upon the means to withdraw the bolt. This was a disadvantage since it made it necessary to make the parts constituting the means to withdraw the bolt much heavier than would be necessary if they were not impressed with the force used to open the door. Since the means to withdraw the bolt must be mounted within the door itself the whole arrangement was unnecessarily cumbersome.

The present invention seeks to avoid this difficulty by so arranging the door operating mechanism that the force necessary to open and close the door is not impressed upon the means to withdraw the bolt. The operating means which transmit movements from the lever handle to the door are mounted with the floor of the vehicle and are so connected with the means to withdraw the bolt, which are carried with the door, that as soon as the bolt is withdrawn the operating means mounted with the floor abut against a stop on the door, whereby the force necessary to swing the door open is not impressed upon the bolt withdrawing means. Thus, the bolt withdrawing means, which are carried with the door, may be made lighter and the door itself much more compact than would be otherwise possible. The bolt is withdrawn and the door opened by a single continuous movement of the lever handle.

An arrangement for accomplishing the ends outlined above is illustrated in the accompanying drawings, in which:

Figure 1 is a somewhat schematic representation of an arrangement of links and levers whereby a door may be opened and closed according to the invention.

Figure 2 is a plan view showing a part of the operating mechanism mounted within a recess in a door.

Figure 3 is a vertical section of the same.

Figure 4 is a view of an alternate form of a link to connect the lower end of the lever handle with a bell crank constituting the part of the door actuating mechanism.

In the drawings a, a' represent a floor section and b, a door. A lever handle a^2 is pivotally mounted with the floor section a. When the lever handle a^2 is moved the arcuate motion of the lower end a^6 of the lever handle is transmitted to an arm a^8 of the bell crank a^7, also pivotally mounted with the floor section a, through the clevises a^{10}, a^{11}, and the link a^{12}. To the other end a^9 of the bell crank is pivoted the link a^{13}, which is pivoted at its other end to an arm a^{14} of a lever a^{15}. The lever a^{15} is also pivotally mounted upon the floor as at a' and has pivotally mounted thereon, at its other end a^{16}, a link a^{17}. The link a^{17} is also pivoted to the lever b' carried with the pintle b^2 mounted in the door. Upon the pintle b^2 is also mounted

a crank or lever b^3. At the end of the crank b^3 is carried a pin b^4, within the slot b^5, at the end of the link b^6. The other end of the link b^6 is pivoted to a lever b^7, pivotally mounted with the door as at b^8, and connected at its other end with the handle b^{10}, through the slot b^9, and the pin b^{11}. The handle b^{10} is operatively connected with the bolt b^{12} which is normally kept in an extended position by means of the spring b^{13}. Also carried with the door is the stop b^{14} proximate the end a^{18} of the link a^{17}.

Assuming the door to be closed, the operation of the mechanism is as follows: The lever handle a^2 is swung to the right, as indicated by the arrow. The motion of the lower end a^6 of the lever is transmitted to the arm a^8 of the bell crank a^7, and from the arm a^9 of the bell crank to the link a^{13}, and from the link a^{13} to the lever a^{15}. The movement of the lever a^{15} is transmitted to the pintle b^2 through the link a^{17}, and the lever b', and thus to the link b^6 through the crank b^3. The movement of the link b^6 is transmitted to the lever b^7, which forces the handle b^{10} to the right, thus withdrawing the bolt b^{12} against the action of the spring b^{13}. The distance between the end a^{18} of the link a^{17} and the stop b^{14} is such that, as soon as the bolt b^{12} has been completely withdrawn, the end a^{18} of the link a^{17} will abut against the stop b^{14}. Further movement of the lever handle a^2, therefore, will cause the door b to revolve about its hinge b^{15}.

To close the door, operations are reversed. Upon moving the lever handle a^2 to the left, the bolt b^{12} will be forced outwardly by the spring b^{13} and the pin b^4 will move to the extreme end of the slot b^5. Further movement of lever a^2 will revolve the door into closed position about its hinge b^{15}. The slot b^5 permits the bolt b^{12} to be momentarily withdrawn so as to permit it to pass by the usual catch in the door jamb, the slot b^5 being proportioned with regard to the relative lengths of the arms of the lever b^7.

Instead of the clevises a^{10}, a^{11}, and the link a^{12}, the end a^6 of the lever handle a^2 may be connected with the arm a^8 of the bell crank a^7, as by means of the link a^x, allowing for universal movements at the ends of the arms of the bell crank and the lever handle, as shown in Figure 4.

It will be observed that by the arrangement above described, movement of a lever handle in one plane is transmitted to links and levers mounted with the floor in a plane perpendicular thereto, and from these links and levers to door actuating mechanism is still a third plane, i. e., the plane of the door, which is perpendicular to the second named plane.

The arrangement herein described, mounted in a motor vehicle bus, for instance, permits the operator to conveniently open and close a door without leaving his seat, since the operating lever is placed conveniently within his reach. By a single movement of the operating lever, the bolt, which ordinarily holds the door in closed position, is withdrawn and the door opened. The door is closed by a single movement of the lever in the reverse direction.

The several features of the invention are set forth in my claim which follows, and nothing which has been said in the foregoing description is intended as a limitation, except as indicated in the claim.

What is claimed is:

In a door operating mechanism, in combination with a door and a floor, an arm on the door for unlatching the same, an arm mounted with the floor and adapted to push substantially perpendicularly to the plane of the closed door, a pivot mounted on the door, an arm on the pivot, means connecting the second arm with the said last named arm, a crank on the pivot at an angle to the last named arm and rotatable therewith, a link connecting the first named arm and the crank, and a stop on the door, the third arm abutting against the stop subsequent to actuation of the said first named arm to open the door.

This specification signed this 28th day of April, A. D. 1927.

GORDON M. SCHANTZ.