No. 848,731. PATENTED APR. 2, 1907.

O. M. EDWARDS.

DOOR OPENING DEVICE.

APPLICATION FILED APR. 9, 1904.

2 SHEETS—SHEET 1.

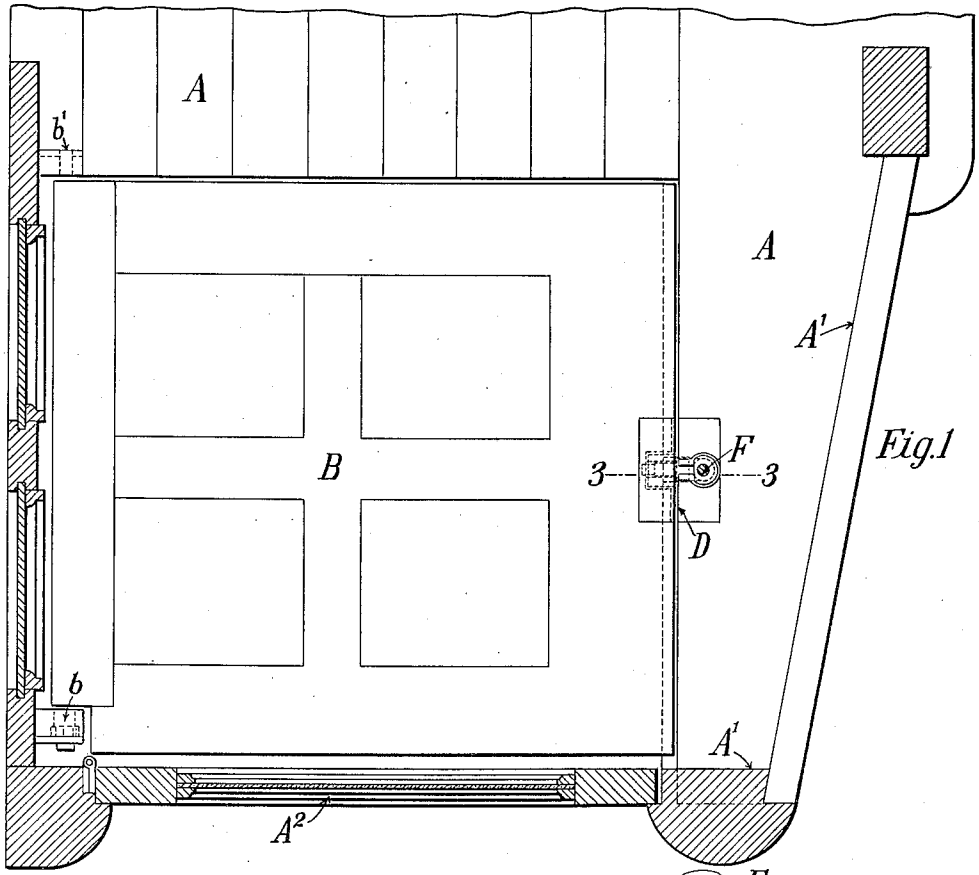
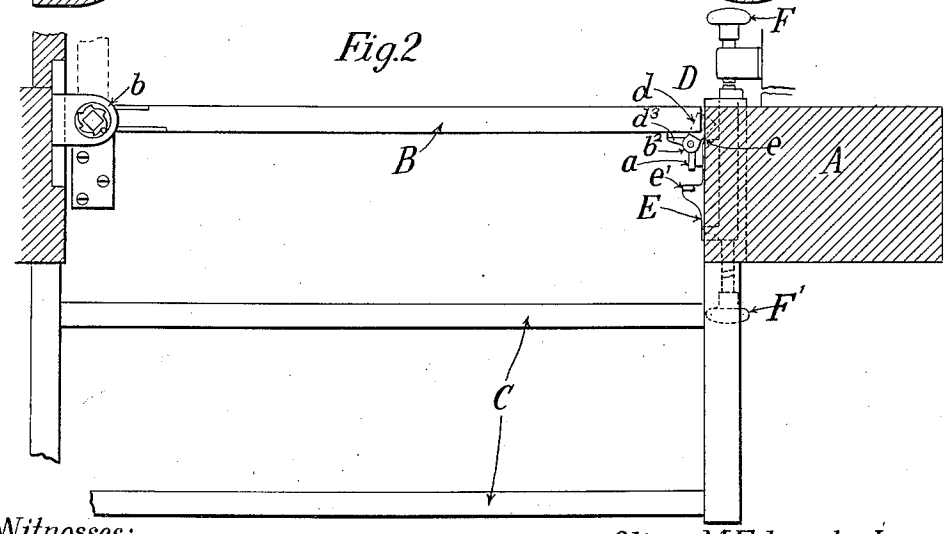


Fig.1

Fig.2



Witnesses:
Raphael Netter
C. D. Morrill

Oliver M. Edwards, Inventor
by H. T. Newbury Atty.

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2 SHEETS—SHEET 2.

Fig.3

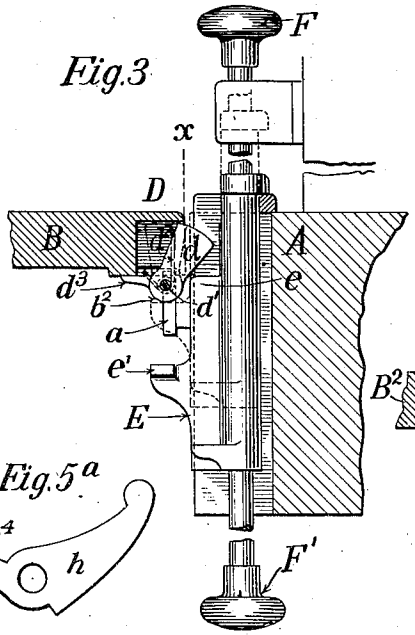


Fig.4

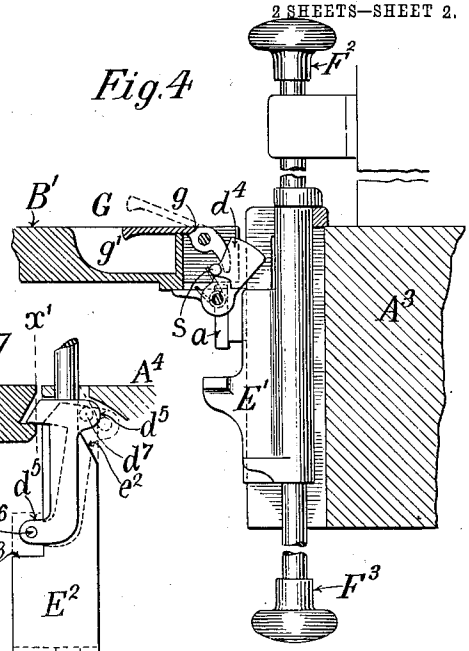


Fig.5ª

Fig.7

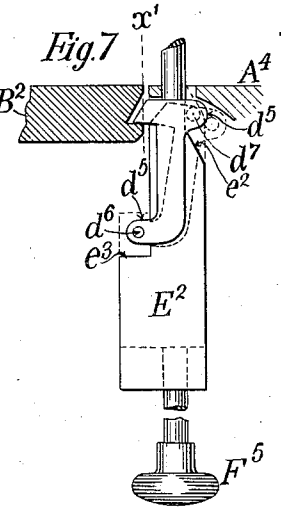


Fig.5ᵇ



Fig.5

Fig.6

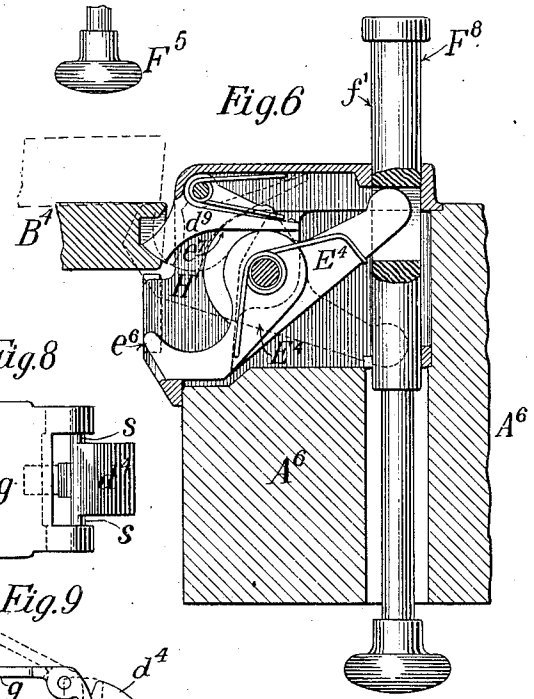
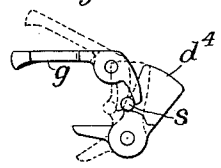


Fig.8

Fig.9



Witnesses:
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C. D. Morrill

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UNITED STATES PATENT OFFICE.

OLIVER M. EDWARDS, OF SYRACUSE, NEW YORK.

DOOR-OPENING DEVICE.

No. 848,731. Specification of Letters Patent. Patented April 2, 1907.

Application filed April 9, 1904. Serial No. 202,324.

To all whom it may concern:

Be it known that I, OLIVER M. EDWARDS, a citizen of the United States, residing at Syracuse, in the county of Onondaga, State of New York, have invented certain new and useful Improvements in Door-Opening Devices, of which the following is a full, clear, and exact description, reference being had to the drawings accompanying and forming a part of the same.

My invention relates generally to improvements in the class of devices to which those set forth in Patent No. 748,178, dated December 29, 1903, belong; and it has for its objects generally to provide a device or devices adapted to occupy a less space, to have a less number of parts than heretofore, and in some forms to give the door a percussive blow, and also to provide a device which is better adapted to withstand the hard usage to which such devices are necessarily subjected in use; and it consists in the combinations of parts or devices hereinafter set forth, and particularly pointed out in the claims, which form a part of this specification.

I have shown in the drawings different embodiments of my invention; but it is to be understood that the invention may take on other forms or embodiments than those shown.

Like letters of reference wherever they occur indicate corresponding parts in the several figures of the drawings.

Figure 1 is a plan view of a portion of a car-platform and a trap-door, having one form of my improvement applied thereto, including my improved locking means, the vestibule inclosing the same being in section, as seen. Fig. 2 is a side elevation of the trap-door and two steps of a car, over which the door forms a continuing portion of the platform or flooring on which passengers may tread as on other portions of the platform. This door may be turned upwardly into nearly a vertical position, as indicated by short dotted lines. Fig. 3 is a vertical sectional view, on an enlarged scale, of that portion of the platform and door to which my improvement may be applied on line 3 3 of Fig. 1, the working parts being shown in full lines in their normal positions and ready to be actuated and in dotted lines when fully actuated ready for the door to be moved into nearly a vertical position by other means. Fig. 4 shows a similar sectional view of the trap-door alone, with means added by which the locking means seen in Fig. 3 may be actuated separately from the means which aid in partially opening the door. Fig. 5 is a vertical sectional view of a platform and trap-door where the improved locking means are mounted on the platform instead of on the door, and such means are differently actuated than is the case in Figs. 1 to 4. Figs. 5^a and 5^b show details of what is seen in Fig. 5. Fig. 6 is a vertical sectional view of a construction somewhat different from that seen in Fig. 5, by which the locking means may be actuated and the door partially opened. Fig. 7 is a vertical sectional view of a construction somewhat modified from that seen in Figs. 3 and 4. Fig. 8 shows in plan view, on somewhat enlarged scale and separated from the other parts, the locking-detent and actuating-lever seen in Fig. 4. Fig. 9 shows in side elevation this same locking-detent and actuating-lever separated, as in Fig. 8, which detent and lever are seen in full lines in the positions they occupy when the trap-door is closed and locked and in the dotted lines when such door is unlocked and ready to be opened by the use of such actuating-lever.

In Figs. 1 to 3, inclusive, A represents the platform, B the platform trap-door, covering the steps C of the car when closed, and which is opened by moving it into nearly vertical position, as indicated in short dotted lines at the left of Fig. 2. This platform and trap-door may be inclosed by any suitable means, and they may then form the floor of a vestibule of the car, if desired, as is well known. Inclosing walls A′ are shown in section in Fig. 1, by which a vestibule is formed, the door A^2 giving access thereto. This trap-door B may be connected with or hinged to the platform or car in any desired way and by any desired means, and, as shown, it is hinged, as seen at the left of Figs. 1 and 2, to a portion of the car by hinges *b* and *b′*. As here seen, a particular form of hinged connection is employed; but, if desired, any other form of hinges may be used for this purpose. Any suitable means may be employed to support the trap-door when in the closed position, a bar *a* being shown herein for this purpose, which is attached to the platform in any suitable manner. Means to aid in opening the trap-door, consisting of springs, &c., which counterbalance the weight of the door, more or less, or which may, if desired, open the door after it is released or partially opened, and whose force

has to be overcome or neutralized when the door is closed, may be employed.

D indicates my improvement in one form as the same is here shown applied to a platform and trap-door of a car. As thus shown there is a locking-detent *d*, which is pivotally mounted on the trap-door, a movable part E, which is provided with a portion *e*, adapted to engage with locking-detent *d* as part E is moved upward, and another portion *e'*, which is adapted to engage with the under portions of the part b^2, attached to the door B and in which detent *d* is pivotally mounted by pivot *d'*, as in Fig. 3. As here shown, the part E is loosely mounted on the platform and it moves bodily in substantially right lines, and all portions move to substantially the same extent, and it is adapted to be moved quickly and strike a percussive blow of considerable extent as the portion *e'* strikes the part b^2, attached to the door B, and thus cause the door to be jarred loose when stuck in its closed position, as such doors many times stick when used in platforms of cars, as is well known. Of course the percussive force of the blow struck by the movable part E is dependent upon the speed with which it is actuated and the weight of such movable part. As this movable part E is readily moved by hand back and forth with considerable speed, repeated blows can be struck by such part in quick succession, and hence if the first blow does not release and partially open the door others can be caused to be struck without much if any delay. If the door is not stuck or bound, it is only necessary to move the movable part E upwardly with a comparatively slow and steady motion to release the door from the locking action of the locking-detent *d* and partially open it, so that it may be fully opened by hand or other means, as desired. The portion *e* of movable part E engages with the locking-detent *d* before the portion *e'* engages with the part b^2, and hence whenever a percussive blow is struck against the door the locking-detent *d* is out of locking position, and the door, so far as the detent *d* is concerned, is free to be opened the same as if such locking-detent were not present. This form of movable part E may be employed, if desired, without the locking-detent being present.

A suitable handhold, as F, is connected with the movable part E by a rod, as shown, or otherwise, by which such part is readily operated, and forms operating means for such part by which it may be actuated whenever the trap-door is to be opened. If desired, a suitable handhold F' may be added by which the movable part E may be actuated from underneath the car and give access thereto from this position—as, for instance, to employees, who can enter between the steps and vestibule-door when the trap-door has been unlocked and opened. Any desired means may be employed by which such movable part E may be actuated, and such means will be arranged as desired to give ready access thereto by the person or persons who are to open the trap-doors.

The locking-detent is preferably yieldingly held in the locking position by a spring—as, for instance, d^2, Fig. 3—and the movement of such detent into the locking position may be limited by any suitable means—as by projection d^3, for instance—which is attached thereto and abuts against the under side of the door or a piece attached thereto.

The locking-detent *d*, as shown in Figs. 1 to 3, inclusive, is pivotally mounted on the door with its pivot *d'* on one side of the dotted line *x*, Fig. 3, and with its portion which engages with the platform A on the other or opposite side of such line. These two portions are also arranged near to or adjacent to such line, so that when the door is closing quickly the locking-detent is moved out of locking position with an easy movement, owing to the position its engaging or locking portion bears to the pivot *d'*, on which such detent turns, there being substantially no friction to retard or interfere with the backward movement of such detent, as would be the case if such detent was pressed against a fixed surface at or near the point where the detent is struck in the act of closing the trap-door—as, for instance, when beveled sliding bolts or detents are employed. These platform trap-doors are many times closed very quickly, so that they may acquire sufficient momentum to fully close, when such doors bind in the openings of the platform and the locking-detents become fully engaged or in their locking positions to securely lock such doors in the closed position. Again, sometimes when the trap-door does not fully close or the person closing the same is not sure that it is securely locked he will jump upon the door to force it into the fully-closed position, and if the locking-detent is frictionally held against backward movement it is liable to become damaged and rendered unfit for use. With the forms of pivoted locking-detents herein shown the force exerted in holding the door locked is substantially in line with the length of that portion between the pivot and the engaging end of the detent, and hence there is substantially no side friction on the detent and comparatively little, if any, friction on its pivot as the detent moves backward out of the locking position to permit the door to close, whether such door moves quickly or slowly. Also a line drawn through the pivot and engaging end or portion of each of the forms of locking-detent herein shown forms, with the upper surface or plane of the door, an obtuse angle, and hence the line of strain in holding the door closed is substan-

tially lengthwise of such line and there is substantially no side friction on the locking-detent as it is forced backward out of its locking position by the slamming of the door into the closed position.

Experience has demonstrated that pivotally-mounted locking-detents which are substantially without sidewise friction when the door is slammed shut and are free to move backward out of the locking position, as those are which are shown in the drawings herein, are less liable to give trouble to the users and are more durable and satisfactory than those susceptible to sidewise friction, as before explained.

At times it may be desirable to open the trap-door without the use of the movable part, as E, Fig. 3, and to provide for this actuating means, as G, Figs. 4, 7, and 8, may be employed, if desired, the locking-detent d^4 being provided with projections s s, arranged substantially parallel with the pivot by which such detent is pivotally mounted on the door. This locking-detent d^4 is otherwise the same as the locking-detent d. (Seen in Fig. 3.) The movable part E′ of Fig. 4 and also the part E of preceding figures is preferably mounted so as to move in right lines back and forth; but these parts may be otherwise mounted, if desired, and yet be capable of striking the door a percussive blow, as is done when mounted as here shown. The movable part E′ and operating means for such part, as shown in this Fig. 4, are substantially the same in construction as the corresponding parts seen in Fig. 3.

The actuating means G consist of the pivoted lever g and projections s s. The lever g, as seen in Fig. 8, is pivotally mounted on the door in position for its lowermost portions, as seen in Fig. 9, to engage with the projections s s and move the locking-detent d^4 from the position seen in full lines in Fig. 9 to the position seen in dotted lines, when the door is released from the locking action of such detent and the door is ready to be opened. This lever g is normally in the position seen in full lines in Figs. 4 and 9—that is, with its upper surface preferably flush with the upper surface of the trap-door—and a recess, as g', is preferably made in the door of any suitable dimensions to permit of such lever being readily raised by the hand of the person who desires to open such door.

If desired, the pivot and the engaging portion or end of the locking-detent may both be arranged near to or adjacent to a line described by the edge of the door as it moves in opening and closing, but with both on one side of such line, as shown in Fig. 7, instead of on opposite sides, as seen in preceding figures.

As here seen, the locking-detent d^5 is pivotally attached to the platform A^4 at d^6, and instead of there being a compressing action upon the detent in holding the door closed, as in preceding figures, there is a pulling action, as will be seen. As here seen, the movable part E^2 is loosely mounted in the platform A^4 and adapted for use as in preceding figures, as before explained, and it is movable back and forth in a vertical direction at one side of the locking-detent d^5, as shown, so that the portion e^3 strikes directly against the under side of the door B^2 as such part is quickly moved upward by the operating means F^4 or F^5, as desired. The locking-detent d^5 is provided with a pin or projection d^7, (seen in dotted lines in Fig. 7,) which extends rearwardly from detent d^5 so as to engage with the portion e^2 formed on movable part E^2. This portion e^2 is on the opposite edge of the part E^2 from what is the case in preceding figures, such part E^2 being suitably mounted and guided to permit of this construction.

Instead of the movable part being constructed and mounted as in the preceding figures it may be constructed and mounted as seen in Figs. 5, 5^a, and 5^b. As here seen, the movable part is pivotally attached to the platform, and instead of being in a single piece it is in two pieces of material, and it is not adapted to strike a percussive blow on the door, as is struck in the construction seen in preceding figures. This movable part E^3 has two parts or pieces h h', each of which is pivotally mounted on stud H, which is in turn attached to the platform A^5. The part or piece h of this movable part E^3 can move independently of the piece h' until the space at t is closed up, when the two pieces h and h' move as one piece would move by reason of that portion of the piece h adjacent to the point t abutting against that portion of the piece h' which is adjacent to the same point t. As a result the portion e^4 of the piece h engages with tailpiece t' of the locking-detent d and moves such detent or dog out of the locking position as the plunger f of the operating means F^6 is moved downward to the extent seen in dotted lines in Fig. 5, when the piece h abuts against the piece h' at the point t and the door is freed from the locking action of such detent. Upon continuing the downward movement of the plunger f the two pieces h and h' move as one piece and the portion e^5 of this movable part E^3 engages with the under side of the door or a piece attached thereto and forces the door in the opening direction for a short distance until the downward movement of the plunger is arrested.

The operating means F^6, as shown, are intended to be operated by the foot of the person desiring to open door B^3, but may be operated in any desired way—as, for instance, by the hand pressing thereon or from underneath, as by means F^7 or otherwise.

Instead of constructing the movable part,

as E^3, in two pieces, as shown in Figs. 5, 5^a, and 5^b, it may be constructed in one piece, as shown in Fig. 6. When constructed as shown in Fig. 6, a larger space is required to enable the portion which engages with the under side of the door to move far enough away therefrom for the locking-detent to be disengaged from the door before pressure is brought against such door to partially open it, as is apparent from an inspection of the two constructions seen in Figs. 5 and 6.

In Fig. 6 the pivotally-mounted locking-detent d^9 is attached to the platform A^6, as in Fig. 5, as is also the movable part E^4, which is pivotally attached to the platform by the stud H'. This movable part E^4 is in the form of a lever, one portion e^6 or end of which is arranged to engage with the under side of the door B^4, the other end of such lever connecting with the plunger f' of operating means F^8, as seen. This movable part or lever E^4 has a portion e^7, which is adapted to engage with the under side of the tailpiece t^2 of locking-detent d^9 and moves such tailpiece and locking detent or dog from the position seen in full lines in Fig. 6 to that seen in dotted lines upon the downward movement of the plunger f' of the operating means F^8 to the extent shown. This movable part E^4 may be actuated by the means as shown in Fig. 6, or it may be, if desired, otherwise operable.

I have herein shown different forms or embodiments of my invention and which are the preferable forms as now known to me; but I do not wish to limit the invention to these particular forms, because these will naturally suggest to those skilled in the art to which this invention relates other forms or embodiments which will have the same mode of operation as is herein set forth. Therefore I desire to include all those forms or embodiments that contain the spirit or gist of my invention.

What I claim as new is—

1. In a door-opening device the combination, substantially as set forth, of a pivotally-mounted locking-detent arranged with its pivot and engaging portion both near to a line described by the edge of the door in opening and closing, a movable part, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion is adapted to engage with the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

2. In a door-opening device the combination, substantially as set forth, of a pivotally-mounted locking-detent arranged with its pivot and engaging portion in a line, which, with the plane of the trap-door, forms an obtuse angle, a movable part, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion is adapted to engage with the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

3. In a door-operating device the combination, substantially as set forth, of a pivotally-mounted locking-detent arranged with its pivot adjacent to the line described by the edge of the door in opening and closing, a movable part, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

4. In a door-opening device the combination, substantially as set forth, of a movable part loosely mounted adjacent to the door and adapted to strike the door a percussive blow, and operating means connected with such part and adapted to move the same quickly in one direction and partially open the door.

5. In a door-opening device the combination, substantially as set forth, of a movable part loosely mounted adjacent to the door, all parts of which are movable to substantially the same extent, and adapted to strike the door a percussive blow, and operating means connected with such part and adapted to move the same quickly in one direction and partially open the door.

6. In a door-opening device the combination, substantially as set forth, of a movable part loosely mounted adjacent to the door and adapted to strike the door a percussive blow, and operating means connected directly to and movable with such part and adapted to move the same quickly in one direction and partially open the door.

7. In a door-opening device the combination, substantially as set forth of a movable locking-detent, a part loosely mounted and bodily movable, adapted by its weight to strike the door a percussive blow, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage with the door and deliver a blow thereon to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

8. In a door-opening device the combination, substantially as set forth, of a pivotally-mounted locking-detent, a part loosely mounted and bodily movable, adapted by its weight to strike the door a percussive blow, a portion of which is adapted to engage

with the locking-detent and actuate it in one direction and another portion to engage with the door and deliver a blow thereon to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

9. In a door-opening device the combination, substantially as set forth, of a pivotally-mounted locking-detent mounted on the platform and adapted to engage with the door, a movable part, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

10. In a door-opening device the combination, substantially as set forth, of a movable locking-detent, a part movable in substantially right lines, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage with the door and deliver a percussive blow thereon to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

11. In a door-opening device the combination, substantially as set forth, of a movable locking-detent, a part movable in substantially right lines, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage with the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

12. In a door-opening device the combination, substantially as set forth, of a pivotally-mounted locking-detent arranged with its pivot on one side of the line described by the edge of the door in opening and closing and its engaging portion on the other side of such line, a movable part, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent and partially opened by actuating the operating means.

13. In a door-opening device the combination, substantially as set forth, of a movable locking-detent actuating means therefor mounted upon the door, a movable part mounted on the platform, a portion of which is adapted to engage with the locking-detent and actuate it in one direction and another portion adapted to engage with the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent by either the actuating or operating means and it is partially opened by actuating the operating means.

14. In a door-opening device the combination, substantially as set forth, of a movable locking-detent, actuating means therefor, a movable part, a portion of which is adapted to engage with the locking-detent and actuate it independently of its actuating means and another portion adapted to engage the door to partially open the same, and operating means adapted to actuate such part, whereby the door is released from the locking-detent by either the actuating or operating means and it is partially opened by actuating the operating means.

15. In a door-opening device the combination, substantially as set forth, of a pivotally-mounted locking-detent arranged with its pivot and engaging portion in a line, which, with the plane of the trap-door, forms an obtuse angle, and operating means engageable with the detent in only one direction of movement and adapted to actuate such detent when moving in that direction.

16. In a door-opening device the combination, substantially as set forth, of a locking-detent pivotally mounted on the door, and operating means adapted to engage with the detent and actuate it in one direction and permit such detent to be actuated by other means in the same direction without disturbing such operating means.

17. In a door-opening device the combination, substantially as set forth, of a locking-detent pivotally mounted on the door, means adapted to actuate such detent also mounted on the door, and operating means mounted on the structure adapted to actuate such detent and release the door.

18. In a door-opening device the combination, substantially as set forth, of a locking-detent pivotally mounted in position to hold the door closed and to release the same, and operating means of different kinds, each adapted to engage with such detent and move it in one direction and one of which means is mounted separately from the door.

19. In a door-opening device the combination, substantially as set forth, of a locking-detent pivotally mounted in position to hold the door closed and to release the same, and differently-acting operating means, one adapted to move such detent in one direction and the other to move it in the other direction, the detent and operating means being mounted separately from the door.

20. In a door-opening device the combination, substantially as set forth, of a locking-

detent pivotally mounted in position to hold the door closed and to release the same, and different operating means, each of which is adapted to engage with such detent independently of the other to actuate it and release the door from its holding action.

21. In a door-opening device the combination, substantially as set forth, of a locking-detent pivotally mounted in position to hold the door closed and to release the same, and different operating means, each of which is adapted to engage with such detent independently of the other to actuate it and release the door, and each is also adapted to remain immovable upon the operation of the other.

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GEORGE G. NORRIS.