No. 712,511. Patented Nov. 4, 1902.

J. C. DUNER.

DOOR OPENING OR CLOSING MECHANISM.

(Application filed Apr. 29, 1899.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 2.

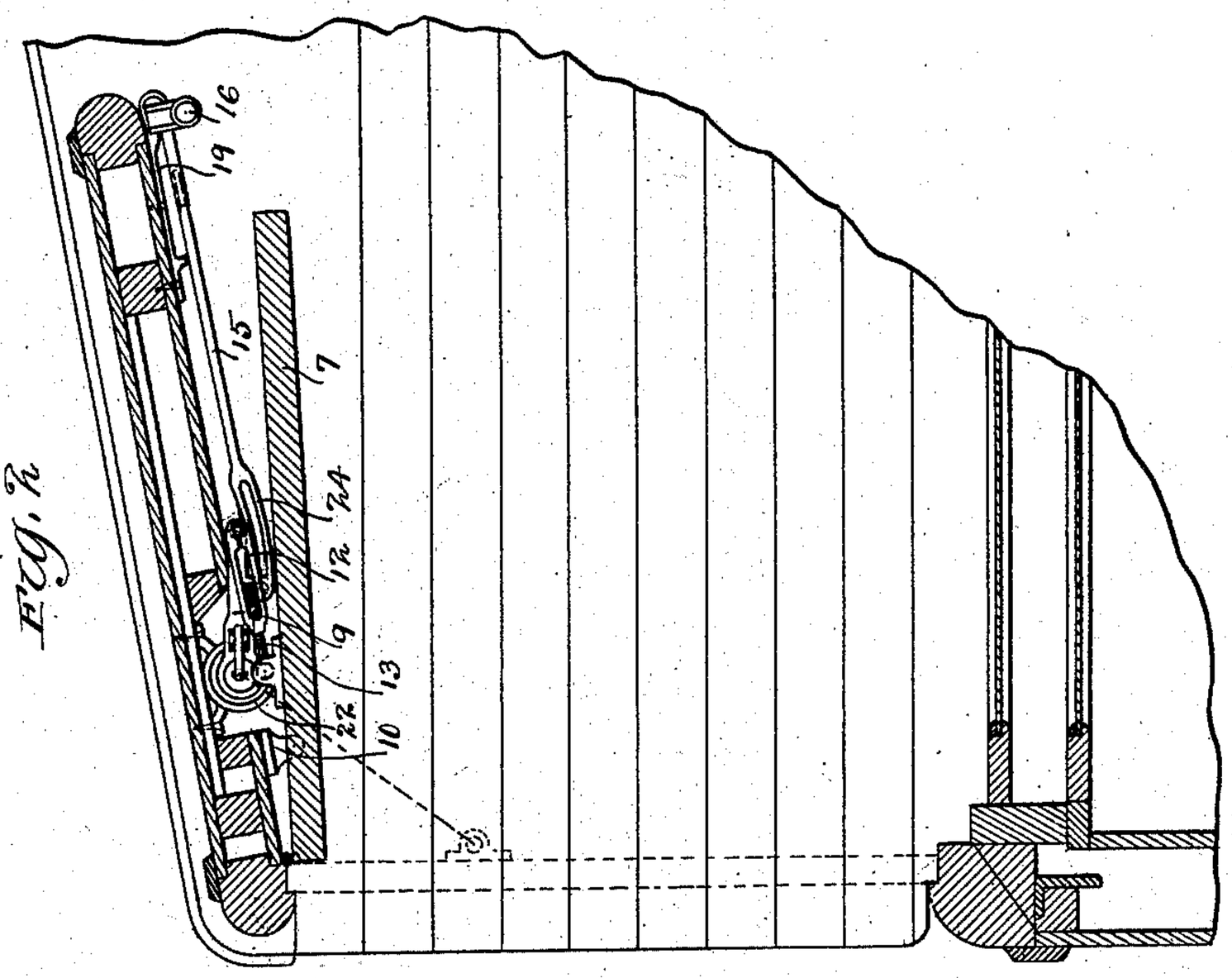
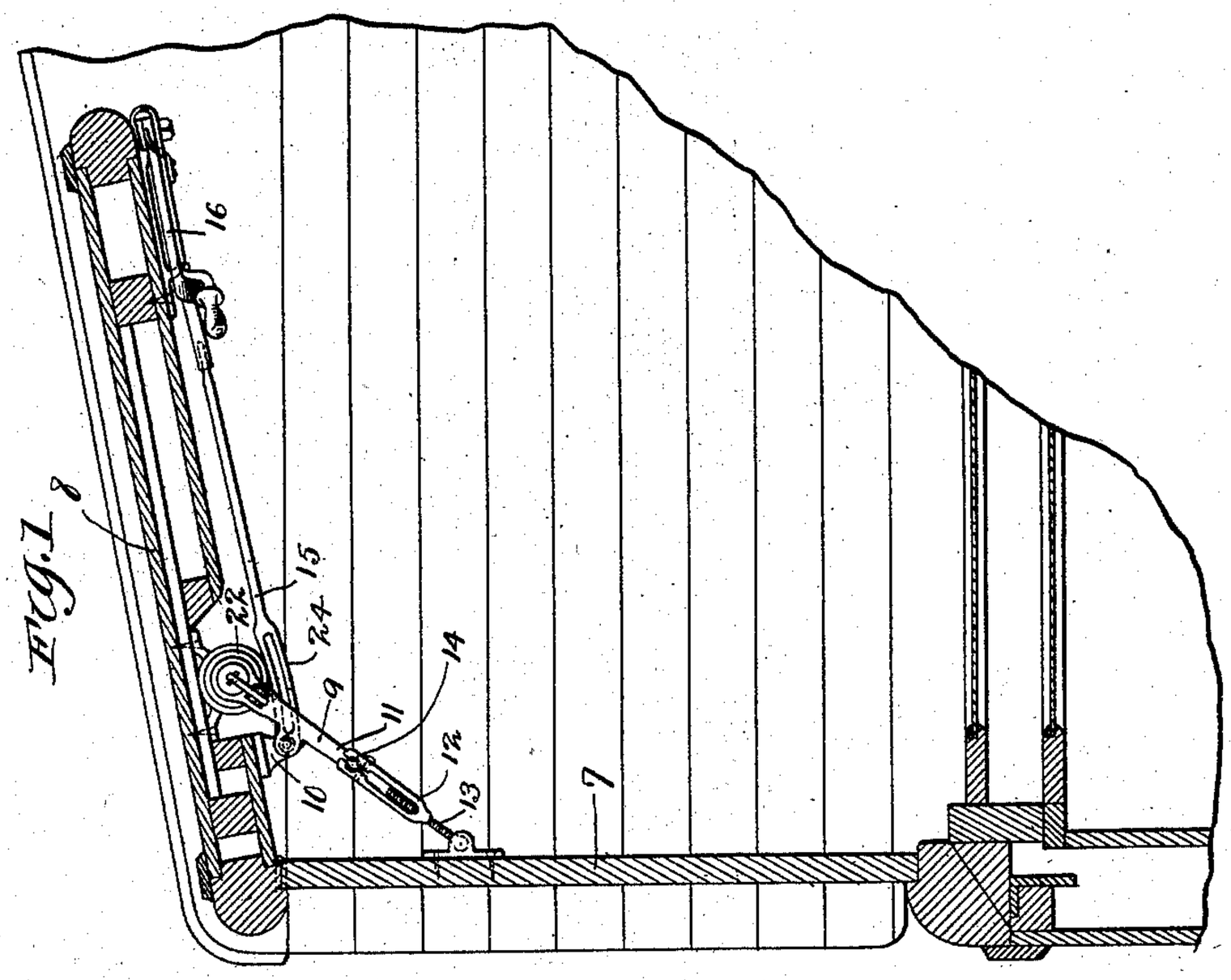


FIG. 1.



Witnesses
Harold G. Barrett.
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John C. Duner Inventor.
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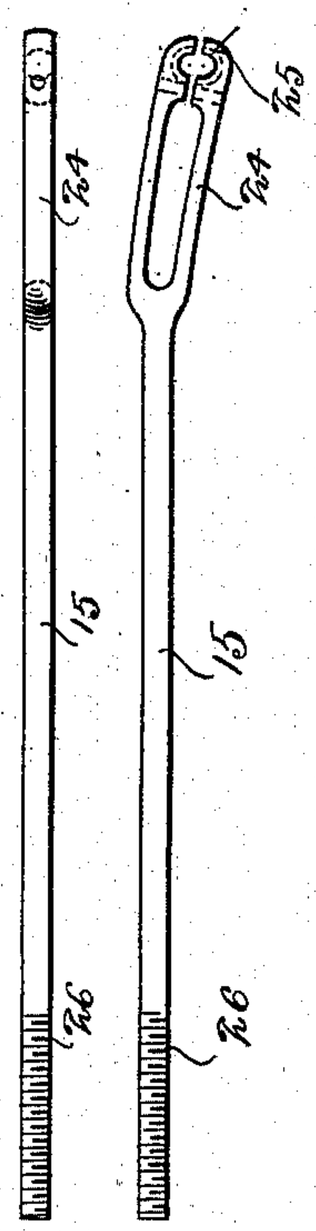


FIG. 4.

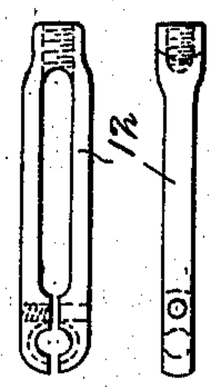


FIG. 5.

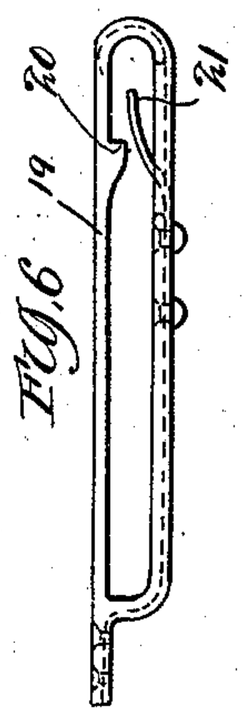
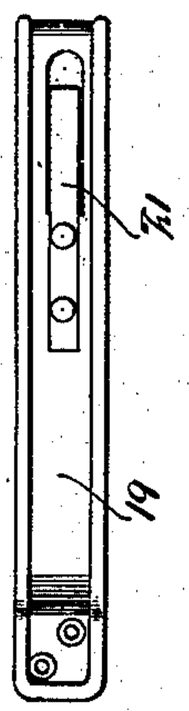


FIG. 6.



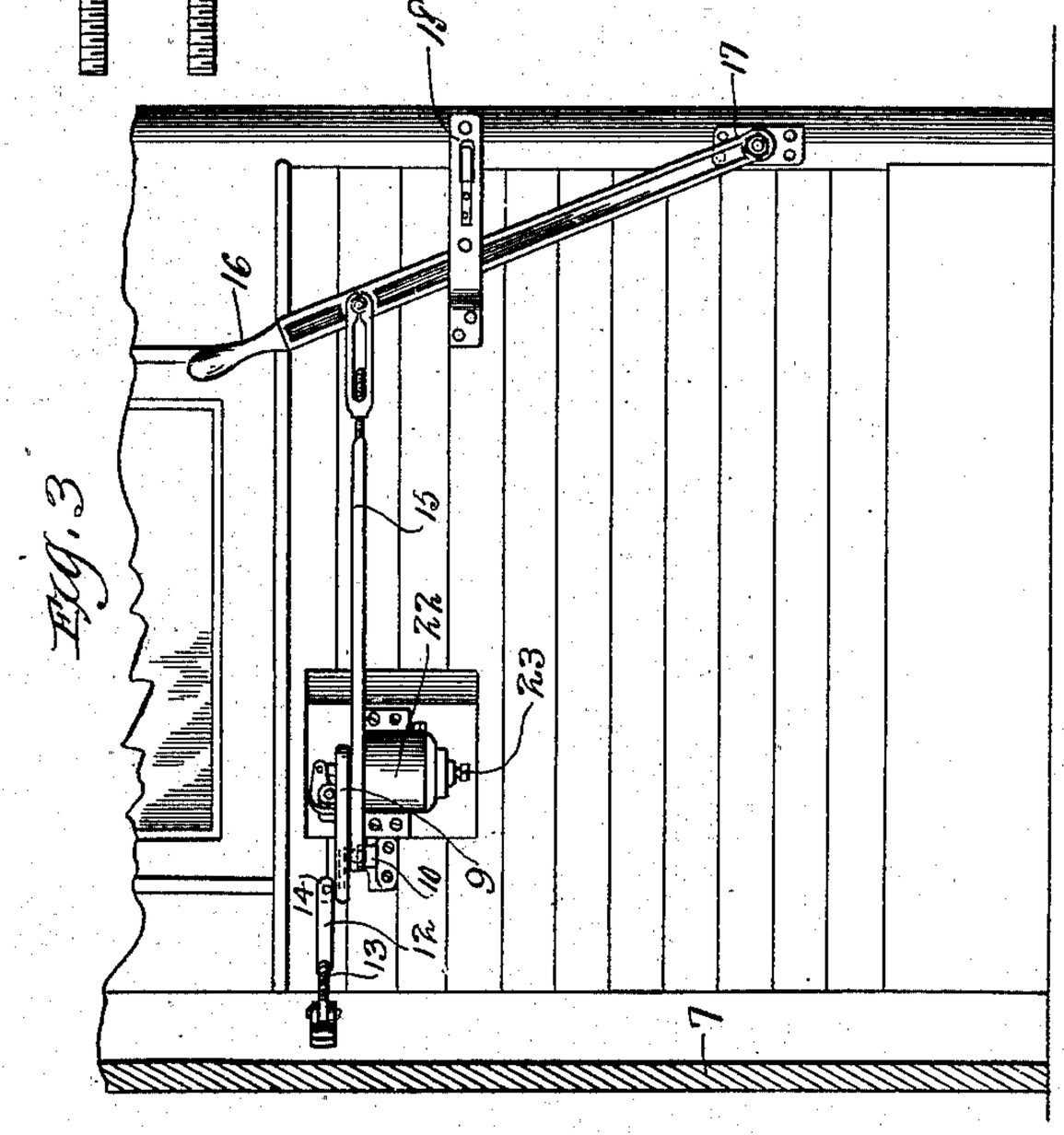


FIG. 3.

Witnesses
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UNITED STATES PATENT OFFICE.

JOHN C. DUNER, OF CHICAGO, ILLINOIS.

DOOR OPENING OR CLOSING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 712,511, dated November 4, 1902.

Application filed April 29, 1899. Serial No. 714,950. (No model.)

To all whom it may concern:

Be it known that I, JOHN CHARLES DUNER, a citizen of the United States, residing in Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Door Opening or Closing Mechanism, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention contemplates the construction of a door and frame having a toggle connection between them and the combination therewith of an automatic closing device for the door, the toggle connection between the door and frame forming a brace when the door is closed, and a hand-operated device connected with the closing device whereby the door may be opened.

Together with the above-described apparatus I also provide a locking device for holding the door in open position, this being preferably in the form of a spring-catch.

In the preferred construction of my invention the arms of the toggle are hinged at the door and frame, but have no pivotal connection additional to the hinge, the necessity for this being avoided by arranging the mechanism so that the door and toggle both swing in the same plane, whereby the movement of the one accommodates itself to the movement of the other without any universal or combined hinge and pivot joint, such as has been required in constructions heretofore proposed, in which the door swung in one plane of motion and the toggle-arms moved in another.

In the practice of my invention I prefer also to make the means for closing the door automatic in its action, and use for such purpose a spring-actuated door-check of some suitable construction.

In order to stop the movement of the toggle which connects the door with the frame at a position in which it will form practically a straight line and act as a brace when the door is closed, I also provide a novel construction of stop against which the toggle abuts when the door is shut and which at the same time extends under the toggle in a manner to support the same against downward pressure.

The construction above briefly indicated I have illustrated in preferred form in the accompanying drawings, in which—

Figure 1 is a view in section showing a part of the vestibule-platform of an elevated car with my invention applied to the door thereof. Fig. 2 is a similar view with the door shown in open position. Fig. 3 is a side elevation of my improved construction, the door being in closed position. Fig. 4 shows two views of the rod which connects the toggle with the hand-operated lever. Fig. 5 shows a detail of ball-joint connection which I use, and Fig. 6 gives two views of the spring-catch which I employ for locking the door in open position.

Referring now more particularly to Figs. 1 and 2, it will be seen that between the door 7 and the frame 8 I have arranged a toggle 9, which when the door is closed abuts against and also rests upon the stop 10 in a position such that the arms 11 and 12 of the toggle form practically a straight line, acting as a brace to hold the door shut. The arm 12 of the toggle is adjustable by means of the screw 13 and connected to the arm 11 by the ball-joint 14. To the toggle 9 is secured a rod 15, leading to a hand opening device comprising a lever 16. (See Fig. 3.) The lever 16 being fulcrumed on a bracket 17 when the upper end of it is moved outwardly pulls upon the rod 15, so as to break the toggle and open the door, the whole being secured in open position as long as desired by means of the locking device 18, which comprises, essentially, a guide-frame 19 and projection 20 and a spring 21. (See Fig. 6.)

In the practice of my invention I prefer to use an automatic device for closing the door, and for this purpose I have shown an ordinary door spring and check 22, the checking operation being controlled by the small adjustable part 23 in the usual manner. Any suitable form of spring and check could be employed, as desired. It will be understood, however, that if necessary the door may be closed by the lever 16, as there is a positive connection between the lever and the toggle 9. While such closing movement by hand is possible, I prefer to use the automatic closer and check device, depending on the hand operating mechanism to supplement the action of the automatic device when necessary. Furthermore, there is a further advantage due to the positive connection of the rod 15

to the toggle 9 in that the lever must necessarily move coincident with the movement of the toggle to a closing position, and hence is always in position for quick action when necessary. Where the connection is not a positive one, there is a constant tendency of the lever to be out of its proper position, and, furthermore, when mounted on a car, where there is a constant swaying, such movement may be communicated to the operating-lever, with the result of accidentally breaking the toggle and permitting the door to swing open, a result not possible with a positive connection, as the straight toggle prevents the swinging of the lever.

By the term "hinge" as I have employed it herein I refer particularly to a straight-line-hinge connection, as contradistinguished from the combined hinge-and-pivot construction sometimes called a "universal joint."

The operation of my invention is as follows: The door being in closed position, as shown in Fig. 1, the toggle forms a straight line, acting as a brace to hold the door shut, the spring or automatic closing means 22 having brought the parts to this position and the stop 10 having arrested the movement at the proper point. To open the door, the operator pulls upon the handle of the lever 16 and draws the arm of the toggle to the right, bringing the parts to the position shown in Fig. 2, in which when the door is fully opened they are locked by means of the spring-catch 18.

As shown, the toggle members are free to swing on their pivot connection in either direction, the "straight-line" position being secured by the presence of the stop 10. By this construction I dispense with the necessity of having separate castings for right and left hand operating doors as well as the necessity of selection of such parts.

The rod 15 is slightly bent at the end, as shown at 24, in order not to interfere with the automatic closing device 22, and the end of the rod at 25 is formed with a ball-joint and the other end 26 with an adjusting-screw, the ball-joint being necessitated by the movement of the rod in two different planes, due to the movement of the toggle in a horizontal plane and the hand-operated lever in a vertical plane.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In door-operating mechanism, the combination with a frame and a door hingedly connected thereto; of a toggle connection between said door and frame; lever mechanism positively connected to said toggle connection for manually imparting movement thereto and to said door; and door closing and checking mechanism connected to said toggle connection.

2. In door-operating mechanism, the combination with a frame and a door hingedly connected thereto; of a toggle connection between said door and frame; lever mechanism positively connected to said toggle connection for manually imparting movement thereto and to said door; door closing and checking mechanism connected to said toggle connection; and means, located in the path of movement of the lever mechanism, for holding the door in an open position until released.

3. The combination with a door and the frame which carries it, of a toggle, a straight-line hinge connecting one arm of the said toggle to the frame, a straight-line hinge connecting the other arm of the toggle to the door, a stop independent of and located in the path of movement of the toggle to hold the toggle, when the door is closed in an approximately straight-line position, automatic means for closing the door, and hand-operated mechanism positively connected with the toggle for opening the door, substantially as described.

4. The combination with a door, and the frame which carries it, of a toggle, a hinge connecting one end of the toggle to the frame, a hinge connecting the other end of the toggle to the door, a stop independent of and located in the path of movement of the toggle to hold it when the door is closed in approximately straight-line position, a spring closing and checking device connected to the toggle, and hand-operated mechanism connected with the toggle for opening the door, the toggle and the door both swinging horizontally.

5. A door opening and closing mechanism comprising the combination of a door, a frame carrying said door, a toggle constructed to move in a horizontal plane, a straight-line hinge connecting one arm of said toggle to said frame, and a straight-line hinge connecting the other arm of said toggle to the door, a stop independent of and located in the path of movement of the toggle to hold it when the door is closed in approximately straight-line position, automatic means for closing said door, and hand-operated mechanism positively connected with the toggle for opening the door by moving the toggle to break the joint thereof in a horizontal direction, substantially as described.

6. A door opening and closing mechanism comprising the combination of a door, a frame carrying said door, a toggle constructed to move in a horizontal plane, and having connections to said door, and to said frame respectively, a stop independent of and located in the path of movement of the toggle to hold it when the door is closed in approximately straight-line position, automatic means for closing said door, and hand-operated mechanism positively connected with said toggle for breaking the joint thereof in a horizontal plane to effect the opening of said door, substantially as shown and described.

JOHN C. DUNER.

Witnesses:
PAUL SYNNESTVEDT,
PAUL CARPENTER.