J. H. COONS.

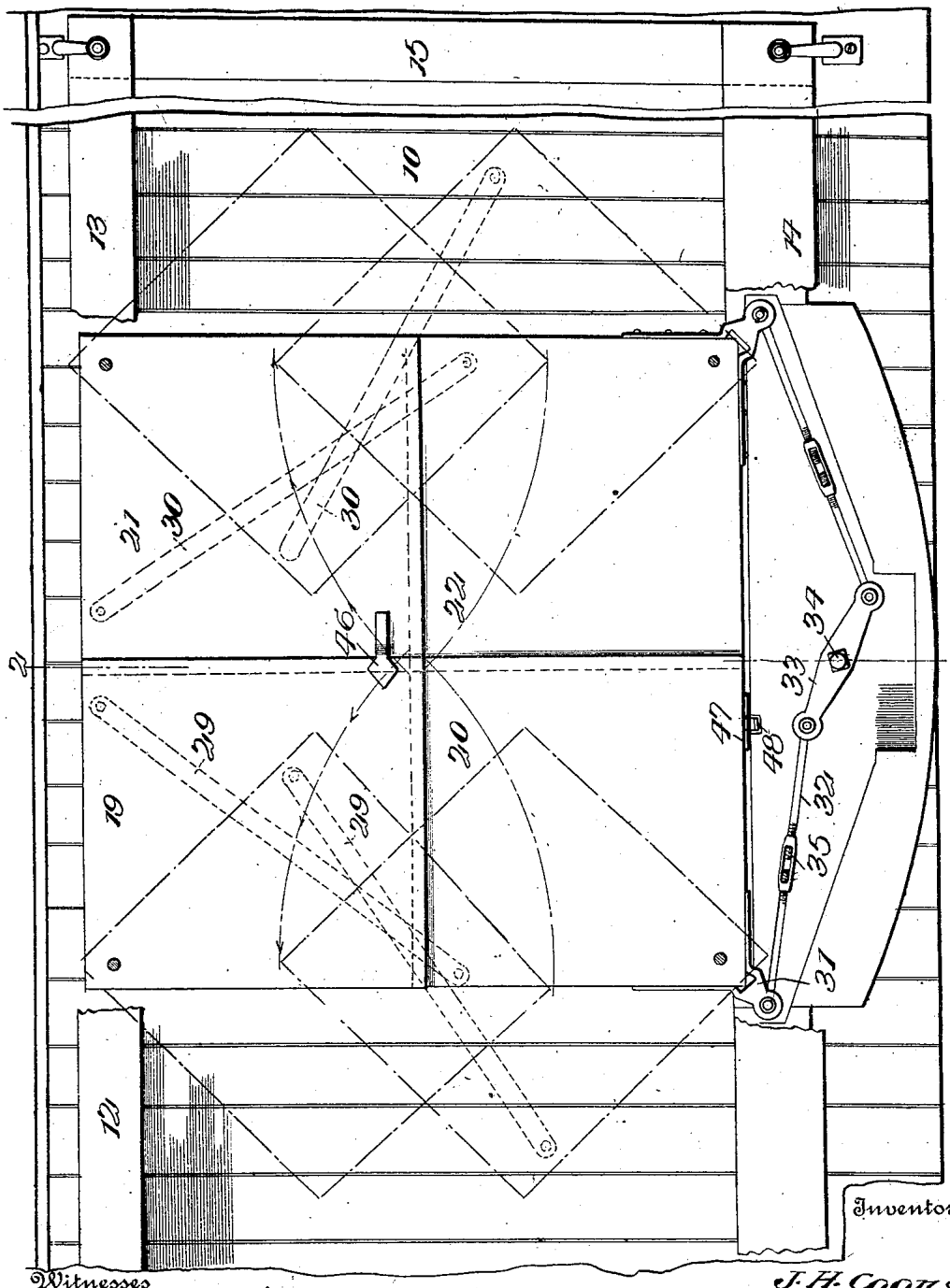
CAR DOOR.

APPLICATION FILED APR. 12, 1915.

1,258,194.

Patented Mar. 5, 1918.

2 SHEETS—SHEET 1.



Witnesses

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FIG. 1.

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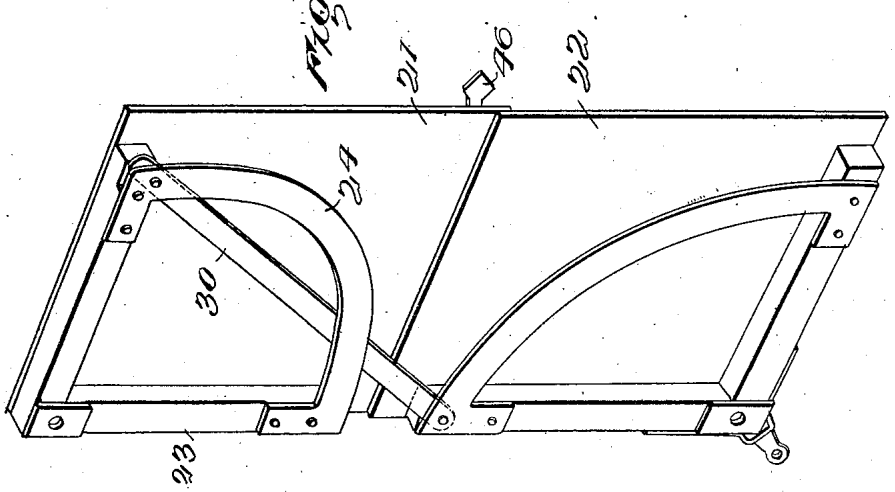
2 SHEETS—SHEET 2.

FIG. 3.



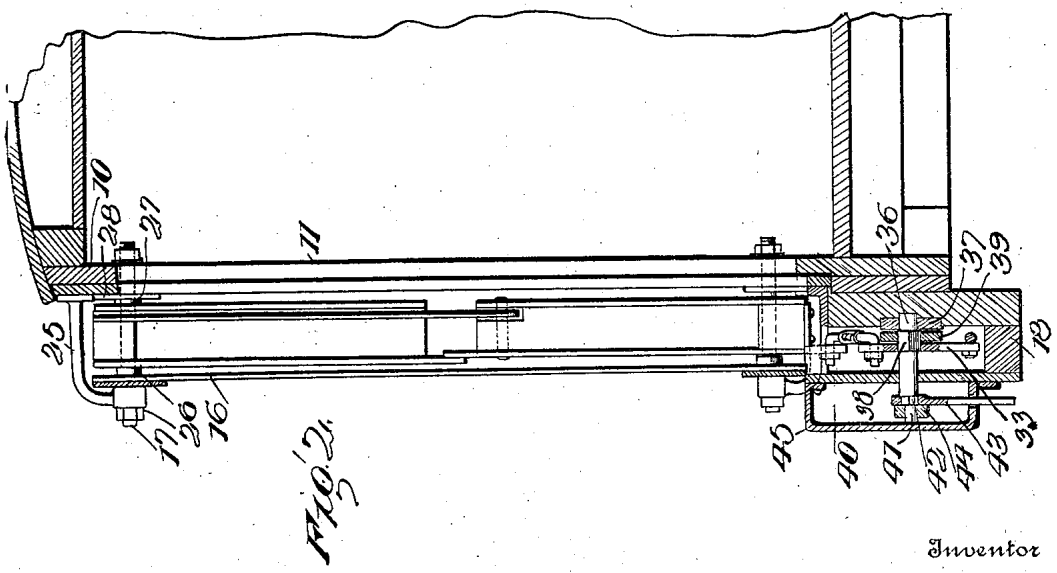


FIG. 2.

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UNITED STATES PATENT OFFICE.

JAMES H. COONS, OF BUSHNELL, ILLINOIS, ASSIGNOR OF ONE-HALF TO HARRY J. DRAKE, OF BUSHNELL, ILLINOIS.

CAR-DOOR.

1,258,194. Specification of Letters Patent. Patented Mar. 5, 1918.

Application filed April 12, 1915. Serial No. 20,822.

To all whom it may concern:

Be it known that I, JAMES H. COONS, a citizen of the United States, residing at Bushnell, in the county of McDonough and State of Illinois, have invented certain new and useful Improvements in Car-Doors, of which the following is a specification.

My invention relates to new and useful improvements in doors and particularly to car doors of the pivoted side tilt type, the primary object of my invention being the provision of a door which may be easily and quickly opened, very little force being required in the operation.

A further object of my invention consists in the provision of a car door including a plurality of sections linked in pairs in such a manner that any turning movement of either one of the sections of a pair of sections will be balanced by turning movement of the other, only such force as is necessary to overcome the inertia of the doors and the friction of the moving parts being necessary to operate the doors.

A still further object of my invention consists in a novel method of applying the doors to a car of any suitable type and includes a casing of simple construction applicable to the outer wall of the car about the door opening and forming a partial housing for the doors in either open or closed position.

With these and other objects in view, my invention will be more fully described, illustrated in the accompanying drawings, and then specifically pointed out in the claims which are attached to and form a part of this application.

In the drawings:

Figure 1 is a front elevation of my improved door applied to a car, the door being shown in closed position by full lines and in partially open position by dot and dash lines and the door casing being shown in section to permit illustration of the operating mechanism of the door;

Fig. 2 is a vertical sectional view taken on the line 2—2 of Fig. 1, also showing the doors in closed position;

Fig. 3 is a perspective view of one pair of door sections removed from the car, showing the manner in which they are linked together.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Although it will be understood that my improved door construction may be employed for other purposes, either with or without slight modifications, it is primarily intended for car doors and for this reason I have illustrated it in connection with a conventional form of car having a wall 10 provided with a door opening 11. My improved door construction includes a substantially rectangular shaped frame 12, preferably formed of metal strips, as shown in Fig. 2. This frame proper includes spaced upper and lower frame members 13 and 14 and end frame members 15. Furthermore, the frame, at either side of the door opening, is strengthened by vertical braces 16. This frame is secured to the outer wall of the car with the brace strips 16 extending vertically at the sides of the door opening, as shown in Figs. 1 and 2 of the drawings by bolts 17, certain of which also serve as pivots for the door sections. For this reason, the specific construction of the bolts will be explained in connection with the mounting of the door. A downwardly depending housing 18 is secured to the outer wall of the car immediately below the opening to support the door operating mechanism.

My improved car door includes upper and lower left hand door sections 19 and 20, respectively, and upper and lower right hand door sections 21 and 22, respectively. Each of these door sections is preferably made in the form of a rectangular or squared plate of heavy sheet metal and the sections are so proportioned that in closed position of the door, the left hand sections at their inner edges slightly overlap the other sections, while the upper sections at the lower edges slightly overlap the lower sections. Each of these plates forming a door section, is reinforced upon its inner side by an L-shaped brace 23, the angle of which forms the point of pivotal support of the door section, being located at the upper outer corner of an upper door section or at the lower outer corner of a lower door section. The free ends of the sides of the braces 23 are preferably further braced by an arcuate strip of sheet metal 24 which extends substantially diagonally of the door section.

Each of the bolts 17 passes through the car

wall 10, through the frame 12 and through an eye formed on the laterally directed end of a bracket 25 carried by the car wall, clamping nuts 26 being threaded upon the bolt to engage one against the outer face of the eye of the bracket 25 and the other against the inner face of the frame. The bolts are also clamped against movement through the car wall by spaced nuts 27 and those bolts which serve as pivots for door sections pass through bearing plates 28 which engage against the outer face of the car wall.

A link 29 is pivotally connected at one end to the upper inner corner of the door section 19 and at its lower end to the upper outer corner of the door section 20, while a similar link 30 is pivotally connected at one end to the upper inner corner of the door section 21 and at its lower end to the upper outer corner of the door section 22. It will, therefore, be clear that swinging movement of either lower door section will cause swinging movement of the corresponding upper door section, the door sections sliding freely over each other with their body portions passing beneath the arcuate braces 24 during opening and closing of the door as a whole, the direction of movement of the various door sections, upon opening of the door, being illustrated by arrows in Fig. 1.

As a means for operating the door, each lower door section is provided at its outer corner with a diagonally extending lever arm 31 and links 32 connect the free ends of these lever arms with the ends of a lever 33 carried by a shaft 34, each link, as shown, including in its length a turn buckle 35 by means of which it may be adjusted. The shaft 34 has a reduced cylindrical terminal 36 at its inner end which is journaled in a bearing 37 carried by the casing 18 and is formed adjacent such reduced terminal with a squared portion 38 which extends through a correspondingly formed opening in the intermediate portion of the lever 33, whereby turning of the shaft will turn the lever. A washer 39 is preferably interposed between the bearing 37 and lever 33 to properly space the latter from the bearing. The outer end of the shaft is journaled in a face plate 40 which, together with the casing 18, forms a housing for the entire door operating mechanism. The free end of this shaft is screw threaded, as shown at 41 and adjacent such portion is squared, as shown at 42, to receive the head of a crank handle 43 by means of which the shaft may be turned, the crank handle being held in place by a nut 44. Secured to the face plate 40, is a casing 45 which incloses the outer end of the shaft 34, this casing having its lower portion slotted for the passage of the crank handle 43 and one side also slotted for the lock operating lever, not yet described.

The door section 21, at its lower inner corner, is provided with a stop 46, the free end of which is spaced from the outer face of the door section to overlap the inner edge of the door section 19 when the door is closed to prevent over-movement of the door sections and to brace the door sections against lateral movement when the door is closed. Furthermore, the lower edge of the lower door section 20 preferably adjacent its inner corner, carries a bracket 47 having an outwardly extending locking tongue 48 which co-acts with a lock.

Referring more particularly to Fig. 1 of the drawings, it will be clear that the upper and lower door sections counterbalance each other. That is, during opening of the door, although a certain amount of force is required to swing the lower door section upwardly against gravity, depending upon the weight of such door section, the upper door section, because of its weight, is exerting a like force to swing it downwardly. Of course, when the door is half open, this balance is exactly reversed, the lower door section tending to move to fully open position by gravity and the upper door section offering a correspondingly great resistance to opening. Each pair of door sections, therefore, balances the other and only such force as is necessary to overcome the inertia of the door sections and the friction of the operating mechanism is required, the entire opening of the door requiring about the same force as would be necessary to turn a wheel of corresponding weight and size about a shaft or axle, assuming that the wheel was stationary at the beginning of the operation.

Although I have illustrated and described my invention in all its details of construction, it will be understood that I do not wish to be limited to such details, as various changes, within the scope of the appended claims, may be made at any time, without in the slightest degree departing from the spirit of my invention.

Having thus described the invention, what is claimed as new is:

1. A door construction including a pair of lower door sections pivoted at their lower outer corners, a pair of upper door sections pivoted at their upper outer corners, links connecting the upper inner corners of the upper door sections with the upper outer corners of the lower door sections, lever arms extending from the pivotal corners of the lower door section, a shaft, a lever carried by the shaft to turn therewith and having oppositely extending arms, links connecting the free ends of the arms with the lever arms of the door sections, and means for turning the shaft.

2. A door construction including a pair of lower door sections pivoted at their lower outer corners, a pair of upper door sections pivoted at their upper outer corners, links

connecting the upper inner corners of the upper door sections with the upper outer corners of the lower door sections, lever arms extending from the pivotal corners of the lower door sections, a shaft, a lever carried by the shaft to turn therewith and having oppositely extending arms, links connecting the free ends of the arms with the lever arms of the door sections, and means for t· ning the shaft, the door sections, in active position, being so arranged that the inner edges of one section and the corresponding lower door section overlap the inner edges of the other section and lower door section and that the lower edges of the upper door sections overlap the upper edges of the lower door sections.

3. A door construction including a plurality of door sections arranged in an upper pair and a lower pair, all of the sections being adapted together to form a single door and to close a single door opening, each section being mounted for pivotal movement toward and from the door opening, means connecting one section of each pair with a single section of the other pair, and means for pivotally operating the sections of the lower pair to simultaneously move all of the sections of both pairs to open or close said door opening.

4. A door including independently pivotally mounted upper sections and independently pivotally mounted lower sections, all of such sections together forming a door for a single door opening, means for simultaneously and similarly operating the lower sections to move said sections from or toward each other with respect to the door opening, and connections between each lower sections and one of the upper sections to compel a similar movement of the upper sections with respect to the door opening in the movement of the lower sections.

5. A door construction including four similar sections arranged in upper and lower pairs and adapted together to form a door for a single door opening, each section being pivotally supported, and means connecting the respectively alined upper and lower sections vertically of the door opening to compel opposite movements of said connected sections toward the transverse center of the door opening in a pivotal movement of the sections, whereby the weight of the sections balance each other in movement.

6. A door construction including an upper pair of pivotally mounted sections, a lower pair of pivotally mounted sections, all of said sections together forming a door for a single door opening, means for pivotally actuating the lower door sections in opposite directions with respect to each other, and connections between each lower door sections and an immediately adjacent upper door section to compel a movement of the upper door section toward and from the connected lower door section in movement of said lower door section to open or close the door opening.

7. A door construction including an upper pair of sections, a lower pair of sections, all of said sections together forming a door for a single door opening, pivotal supports for the upper sections at their remote upper corners, pivotal supports for the lower sections at their remote lower corners, means for moving the lower sections upwardly and outwardly on their pivots with respect to the door opening, and connections between the lower sections and upper sections to simultaneously move said upper sections downwardly and outwardly with respect to the door opening in the said movement of the lower sections.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES H. COONS. [L. S.]

Witnesses:

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JAMES N. MCCLANN.