

(No Model.)

C. A. WRIGHT.  
VEHICLE DOOR.

No. 529,226.

Patented Nov. 13, 1894.

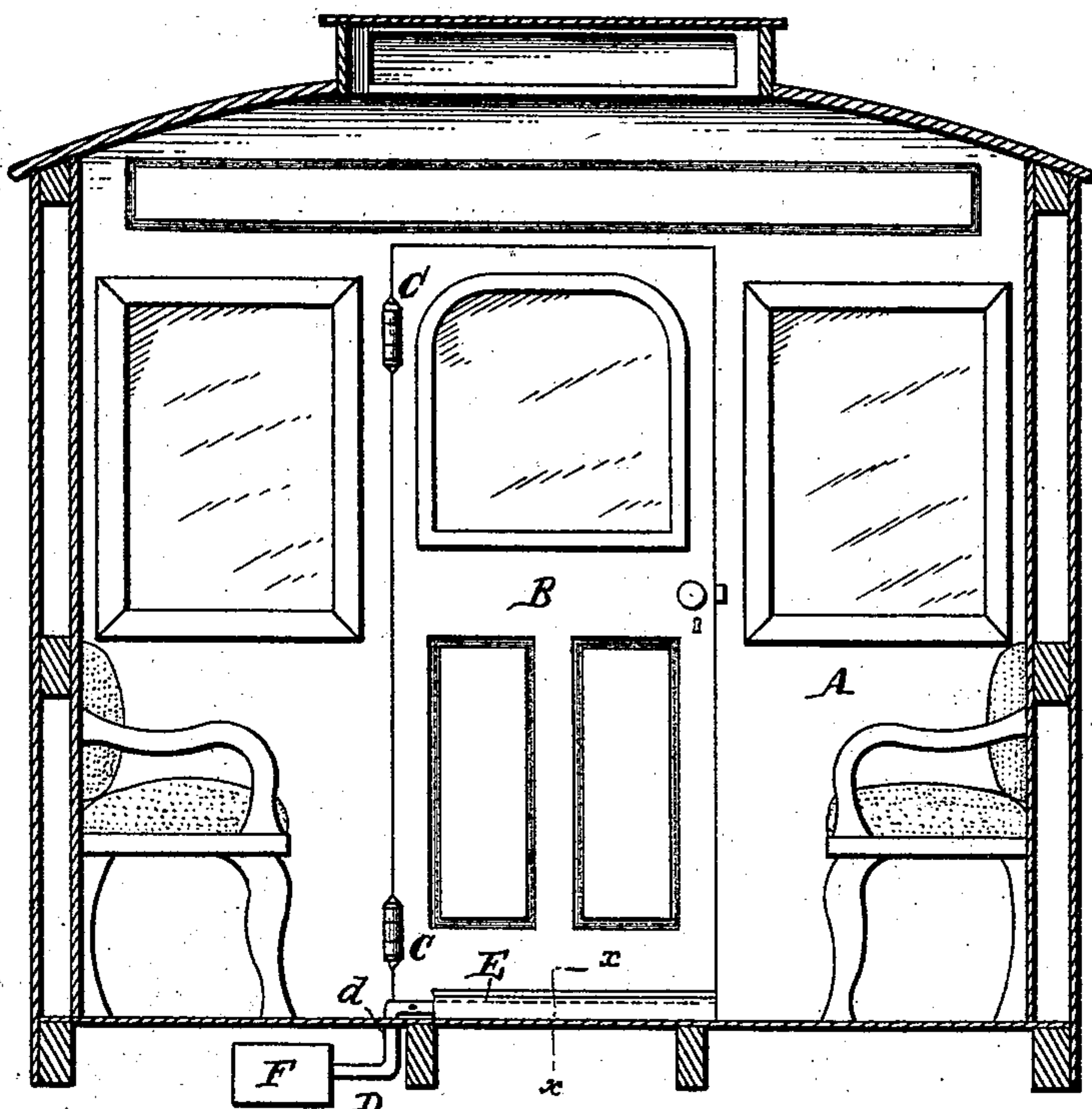


FIG. 1

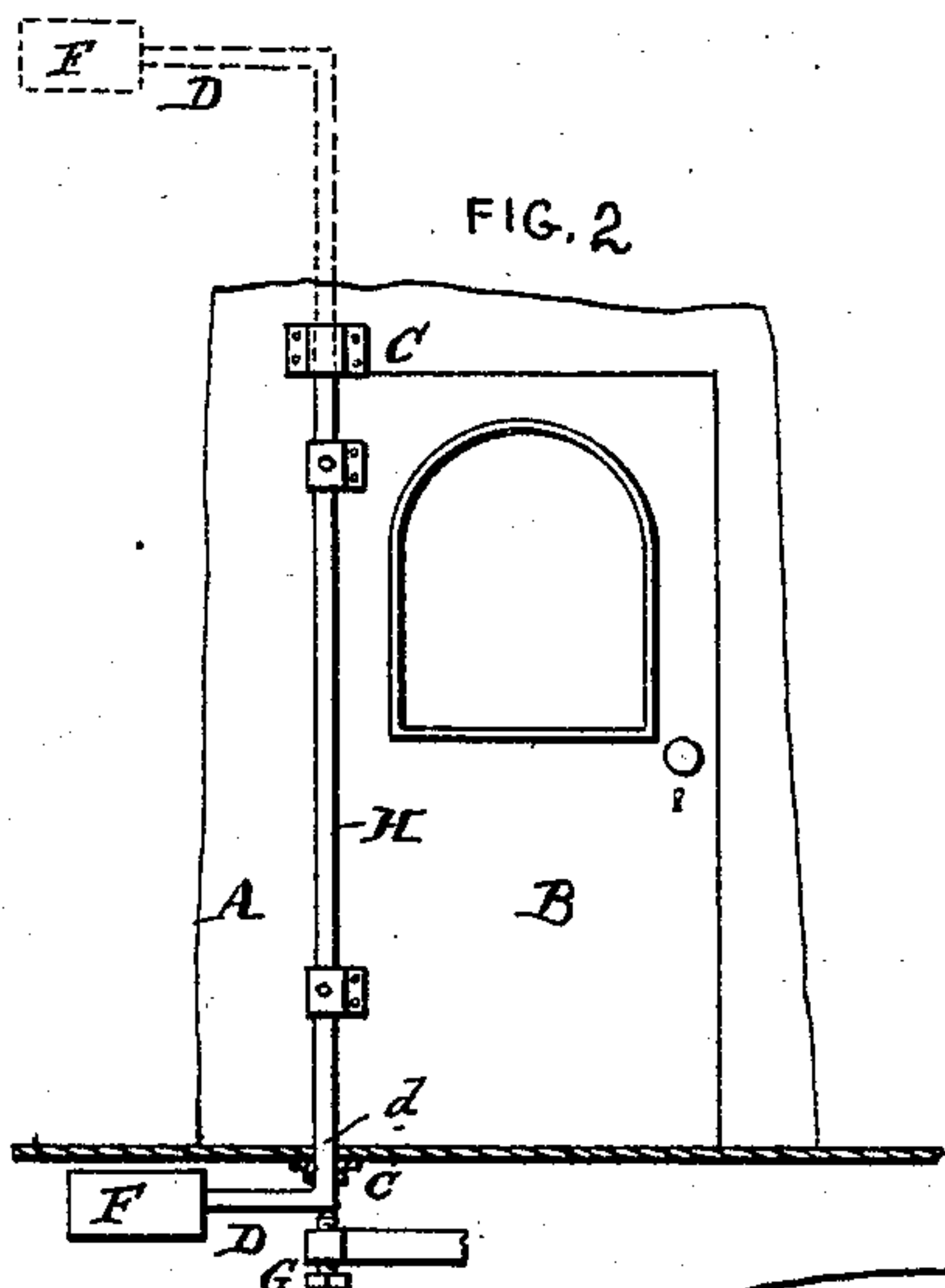


FIG. 2

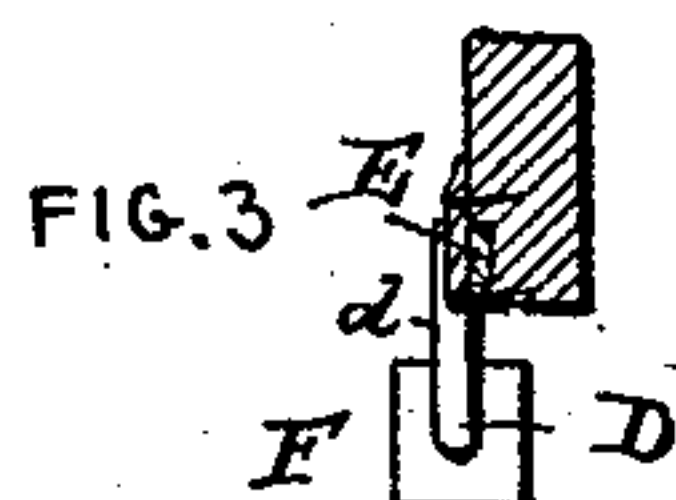


FIG. 3

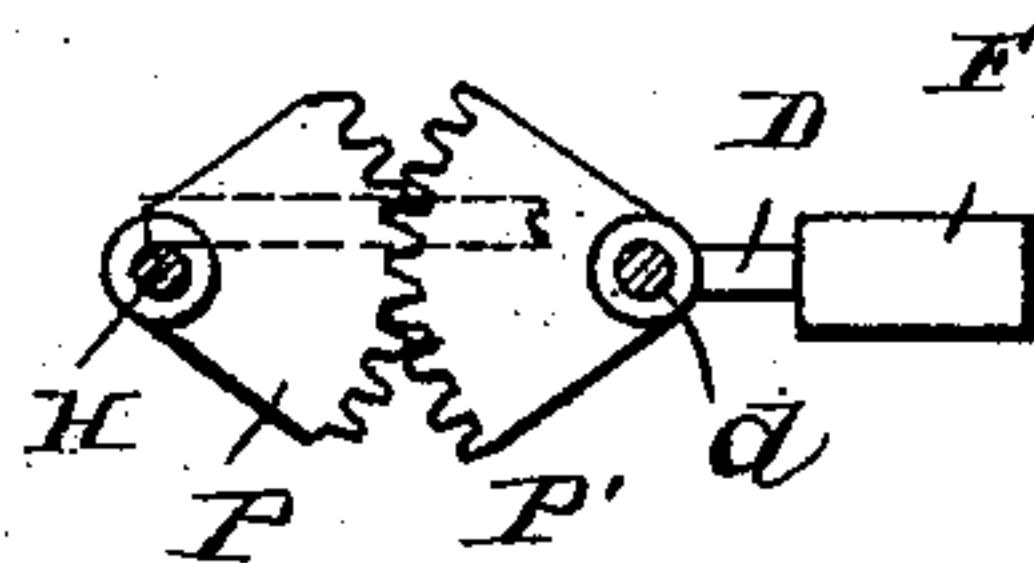


FIG. 5

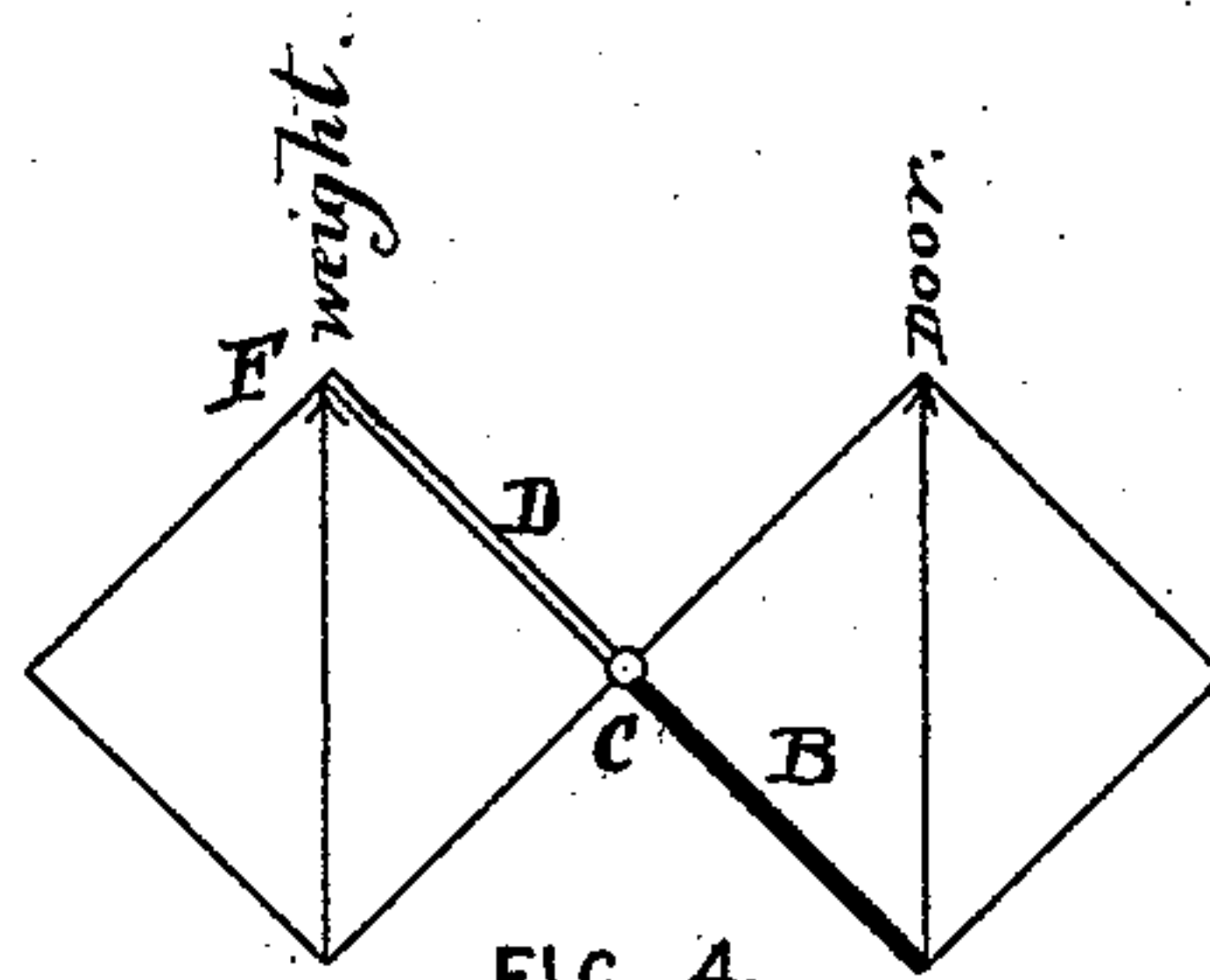
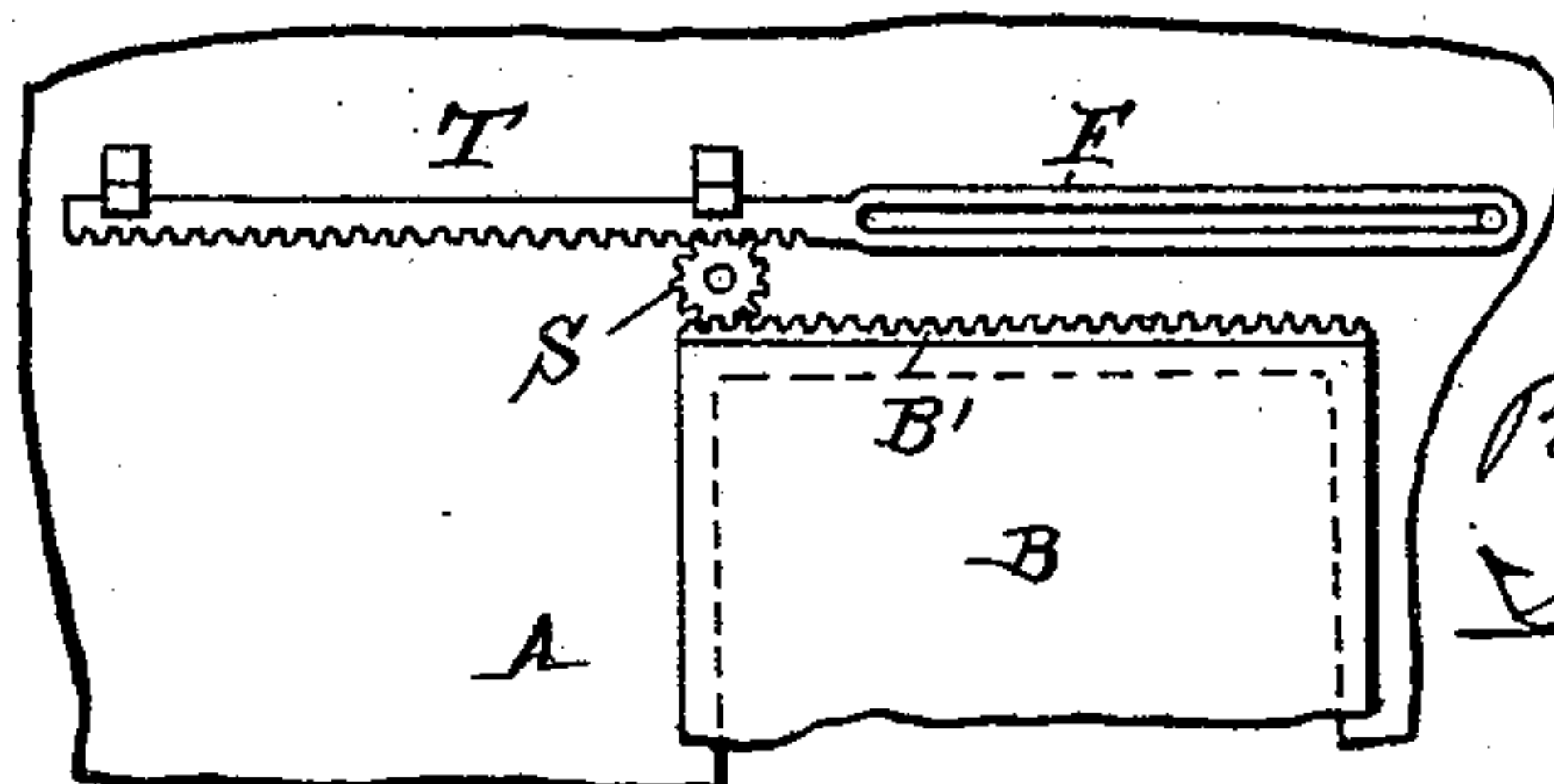


FIG. 4

Fig. 6.



Witnesses:

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# UNITED STATES PATENT OFFICE.

CHARLES A. WRIGHT, OF PHILADELPHIA, PENNSYLVANIA.

## VEHICLE-DOOR.

SPECIFICATION forming part of Letters Patent No. 529,226, dated November 13, 1894.

Application filed October 26, 1893. Serial No. 489,173. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. WRIGHT, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Vehicle-Doors, of which the following is a specification.

My invention has reference to vehicle doors, and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings.

Heretofore in vehicles such as railway cars, it has been customary to hinge the door to the end of the car loosely so that it may be readily opened and closed. The combination has been such however that if the door is partly open, so that the plane of its surface is diagonal to the length of the car, the sudden jarring of the car such as in stopping or starting, attaching the locomotive, or connecting one or more additional cars, causes the said door to slam or shut violently with considerable force, often causing injury to persons who are standing against the door and whose hands or fingers are resting upon the door frame.

The object of my invention is to overcome the objection to this construction as heretofore employed, and in carrying out my invention I so connect the door with a weighted arm that the same tendency which tends to close the door by the action upon the door directly will tend to open the door to the same or substantially the same degree by the action upon a weighted arm. The door is thus weighted against the action due to its inertia and thereby prevents it from slamming or moving under excessive jarring of the door frame, but at all times under the manipulation of a passenger being perfectly free to be moved upon its vertical hinges.

In the construction employed by me the door is free to be moved at all times by the direct application of power to the door just as heretofore has been the case, but at the same time the door is so balanced against the effect of inertia that any sudden movement of its hinges cannot cause the door to slam upon the frame.

My improvement is only adapted to those cases where the door frame and the hinges are moved with sudden changes of velocity, or

suddenly moved from a state of rest, and is not to be confounded with the counterbalancing of the weight of a door which is effective only under the action of gravity.

In carrying out my invention I pivot the door upon an upright or vertical axis about which it is free to swing, and in connection with such door I arrange a counter weight which is mechanically connected with the door so as to be moved with it, and so proportioned and arranged that the inertia action which affects the door shall also affect the said weight under the sudden changes of movement of the hinges of the door and the door frame, whereby whatever tendency the door has to close with force upon the door frame is overcome by the sudden action of the weighted arm in its equivalent tendency to move the door from the door frame and about its hinges.

My improvements may be applied in a variety of ways and is not confined to a door which is pivoted, as it may be applied to a sliding door such as found upon baggage cars which is combined with a suitable moving weight which shall operate under the action of the inertia in case of sudden jarring or change of movement of the car body so that the danger of the door to jam is counteracted by the tendency of the weight to open the door.

My invention will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a transverse section through a car body showing the door at the end of the aisle having my invention applied thereto. Fig. 2 is an elevation of a modified means for supporting the door embodying my invention. Fig. 3 is a transverse section on line  $x-x$  of Fig. 1 showing the lower part of the door. Fig. 4 is a diagram indicating the action of the forces brought into play when my invention is in operation. Fig. 5 is a plan view indicating a modification of my invention; and Fig. 6 is an elevation showing still further modification of my invention adapted to sliding doors.

A is the car body or vehicle frame. B is a door closing the passageway thereto and is hinged at C in the ordinary manner. Se-



cured to the bottom of the door is an arm D having a downwardly projecting portion  $d$  arranged substantially below the hinges C and so as to bring the lower part of the arm D below the floor of the car body. The arm D projects rearwardly, substantially in the plane of the door and is weighted at F. The portion of the arm D where it is secured to the door B may be covered or hidden by a piece of wooden molding in any well known manner. It will now be understood that if the door B is swung open upon its hinges C, the weighted arm D swings beneath the car floor and does not in the least interfere with the free movement of the door. If the door however is partly open any sudden jarring or change of movement of the car body in the direction of its length due to any of the causes hereinbefore mentioned will cause the hinges C and the door frame to be suddenly moved, and as the inertia of the door B cannot be overcome so quickly there will be a tendency of the frame of the doorway to slam against the door, or vice versa. This tendency is overcome by a counter tendency due to the weighted arm D, F which to the same extent tends to have a relative movement with respect to the vehicle frame A, and this reacts upon the door B and tends to move it away from the door frame with the same rapidity as it tends to approach the door frame so that no matter how sudden the jarring of the car frame is, the door remains in any oblique position in which it may be placed. The inertia of the door and inertia of the weighted arm D, F counterbalance each other so that any action of the door frame does not cause any relative movement between the door and itself, and hence all slamming is overcome. The forces brought into play are clearly indicated in the diagram of forces illustrated in Fig. 4. It will be seen that the resultant of the forces of the door shown as diagonal of the parallelogram of forces exactly equals the diagonal of the parallelogram of forces due to the weighted arm D, F, and as these forces tend to move the door B in opposite directions about the pivot C, it is self evident that the door will remain wherever placed. It will further be seen that where the force acting on the door decreases, the force acting on the weighted arm decreases in the same ratio, and consequently the same ultimate result takes place with respect to the door in all positions and under all conditions which it may assume.

In the construction shown in Fig. 2 the door is connected to a vertical rod H and this rod is pivoted to the vehicle frame A in suitable bearings C and may be supported below upon a pivot G to permit more easy movement.

There is no material difference between the construction shown in Fig. 2 and the construction shown in Fig. 1 except as to the particular way of adjusting the weighted arm D, F to the door B. The dotted portion of

Fig. 2 indicates that the weighted arm D, F might be placed above the doorway in place of below it if desired, and it is possible in this construction to arrange it out of sight by locating it above the roof of a car or within a box frame as is self evident to any one skilled in the art of car building.

In the construction shown in Fig. 5 we have the door B provided with a segmental gear P which meshes with a second segmental gear P' connected to the vertical parts  $d$  of the weighted arm D, F. The object of this construction is to enable the weighted arm D, F to project in the same direction as the door where the width is not available beyond substantially the width of the door; but the operation is substantially the same as in the other cases.

In the construction shown in Fig. 6 the door B is made to slide in the plane of its surface such as is the case with the door of a baggage car. The door may be hung in any well known manner. Secured to the door is a rack B' with which engages a pinion S pivoted to the frame of the car body. T is a second rack also meshing with the pinion S but upon the opposite side thereof with respect to the rack B'. The rack T is supported in suitable guides and together with a part F constitutes a weight, which under the action of inertia will not move with the sudden jars or changes of movement of the car body. As the same resistance to sudden movement also takes place with the sliding door B the said parts T, F and B, the door will be locked against movement relatively to the car body through their connection with the pinion S which is pivoted to the car body. In all of these types of my invention the same principles are involved, that is to say, the same forces which tend to cause the door to slam against the door frame or move so as to jam are made to act upon an auxiliary part which produces the same general effects but in the reverse direction, and these are transmitted directly to the door and cause it to move simultaneously with all the movements of the vehicle frame.

My invention is shown as applied to a railway car but it is also evident that it is equally applicable to the rear doors of omnibuses, and also to boats and other vehicles where sudden jars or changes of motion are liable to take place. I therefore do not limit myself to the minor details of construction as they will be modified more or less to suit the particular application of the invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a vehicle frame having a doorway or opening, with a movable door proper adapted to open or close the said passage or doorway, and a weighted device independent of the door proper operating by its inertia to oppose all movement of the door relatively to the vehicle frame occasioned by movements of said vehicle.



2. The combination of a vehicle frame having a doorway or opening, with a movable door adapted to open or close the said passage or doorway, and a weighted device operating by its inertia to oppose all movement of the door relatively to the vehicle frame occasioned by movements of said vehicle and consisting of a weighted arm mechanically connected to the door and movable about a vertical axis.

3. The combination of a vehicle frame having a doorway, a door pivoted thereto and movable about a vertical axis, and a weighted arm mechanically connected with the door and operating under the influence of its inertia to hold the door upon the vehicle frame in any position in which it may be placed, irrespective of the jarring or sudden change of motion to which the said vehicle frame may be subjected.

4. The combination of a vehicle frame having a doorway, a door pivoted thereto and movable about a vertical axis, and a weighted arm having a vertical part mechanically connected with the door and extending downwardly through the floor of the vehicle so as to support the weighted arm to one side of the door pivot and beneath the floor, whereby the said weighted arm operates under the influence of its inertia to hold the door upon the vehicle frame in any position in which it may be placed irrespective of the jarring or sudden

changes of motion to which the said vehicle frame may be subjected.

5. The combination of a car or vehicle having a doorway, with a hinged door to open or close the doorway, and a movable counter weight located outside of the doorway and having a connection with the door, whereby the counter weight is adapted to operate under the action of inertia and the tendency of the door and counter weight to move relatively to the vehicle frame counteract one another and all of the parts thereby move with and in the direction of movement of the vehicle frame.

6. The combination of a car or vehicle having a doorway, a door secured to a vertical shaft pivoted in bearings secured to the vehicle frame, and a laterally projecting weighted arm secured to the said vertical shaft in a horizontal plane different from that occupied of the door whereby the inertia of the weighted arm overcomes the inertia of the door and causes all of the parts to move with the vehicle body under excessive jarring or sudden change of motion.

In testimony of which invention I have hereunto set my hand.

CHARLES A. WRIGHT.

Witnesses:

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