

No. 774,493.

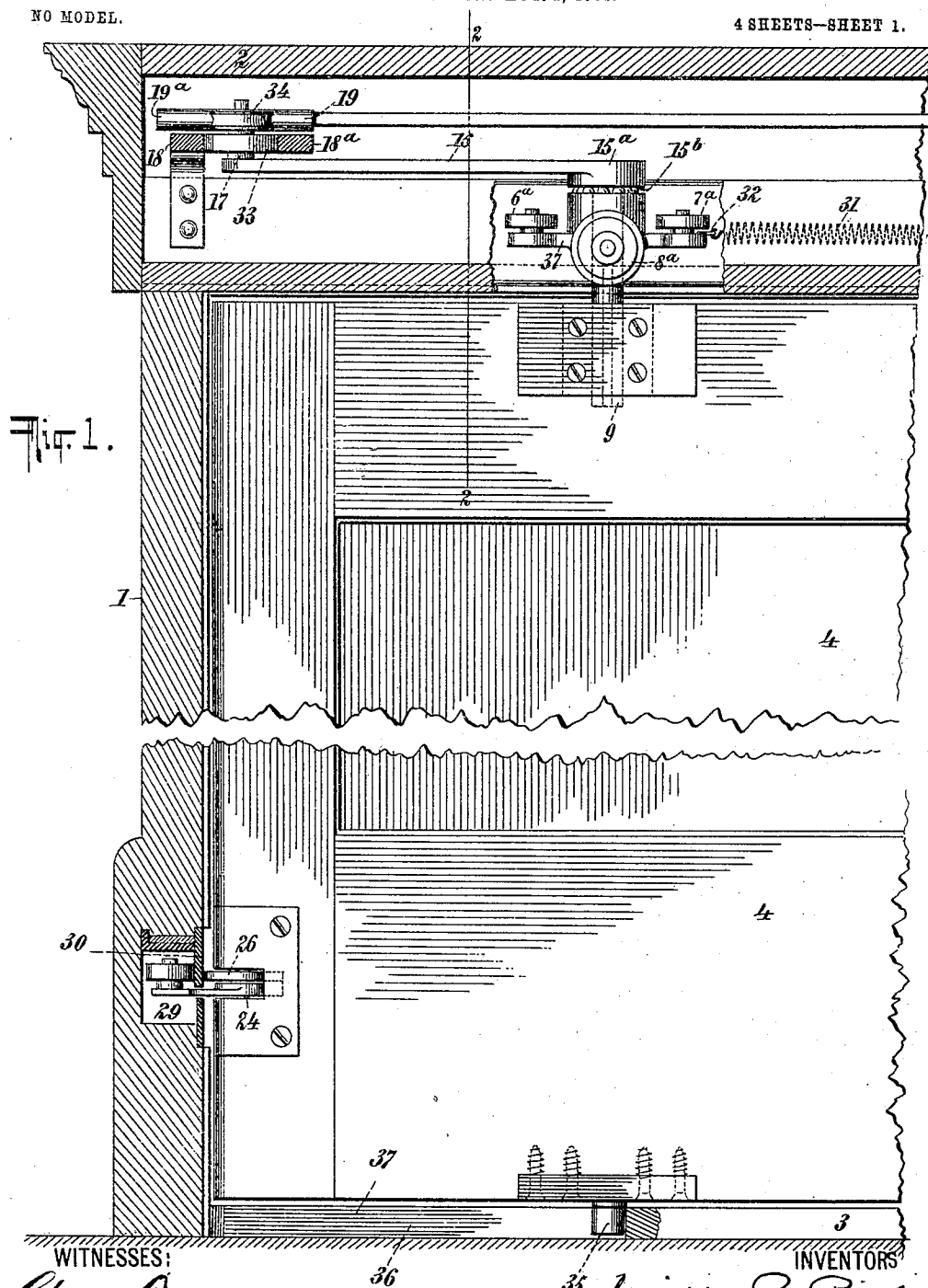
PATENTED NOV. 8, 1904.

W. R. & R. PITT.
DOOR, GATE, OR LIKE STRUCTURE.

APPLICATION FILED AUG. 2, 1904.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:
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Edwin H. Dietrich

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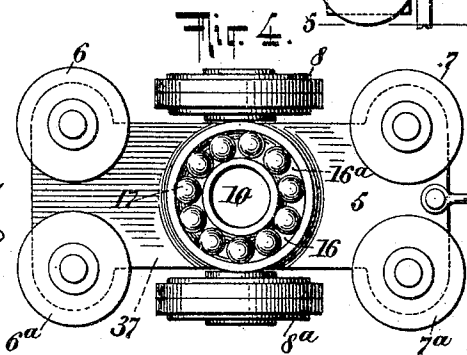
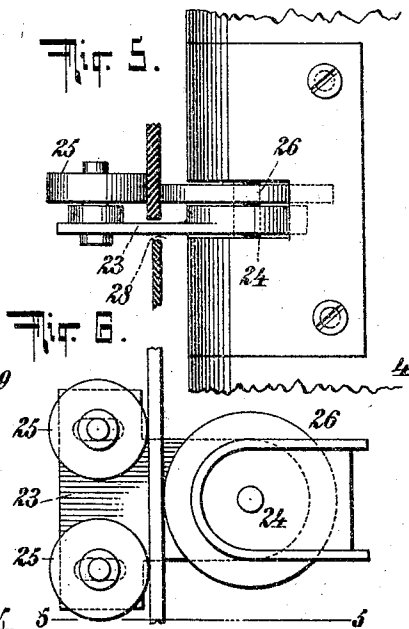
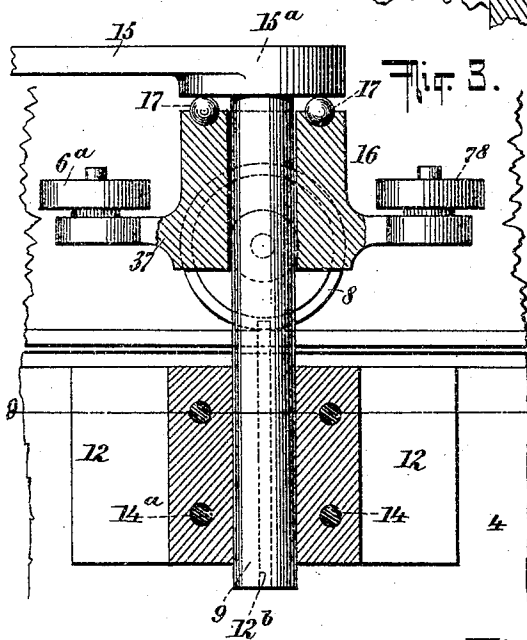
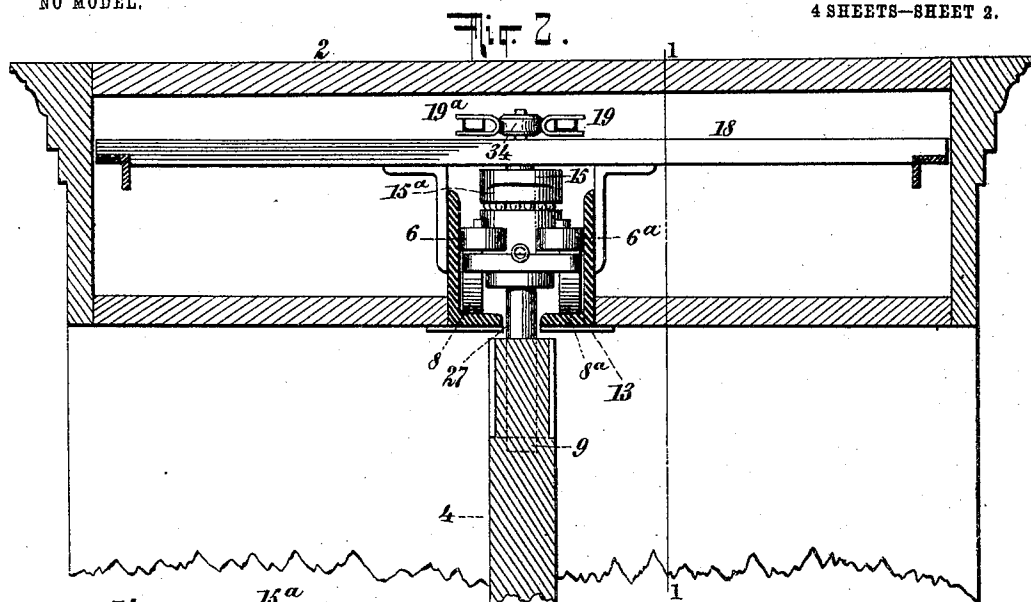
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4 SHEETS—SHEET 2.



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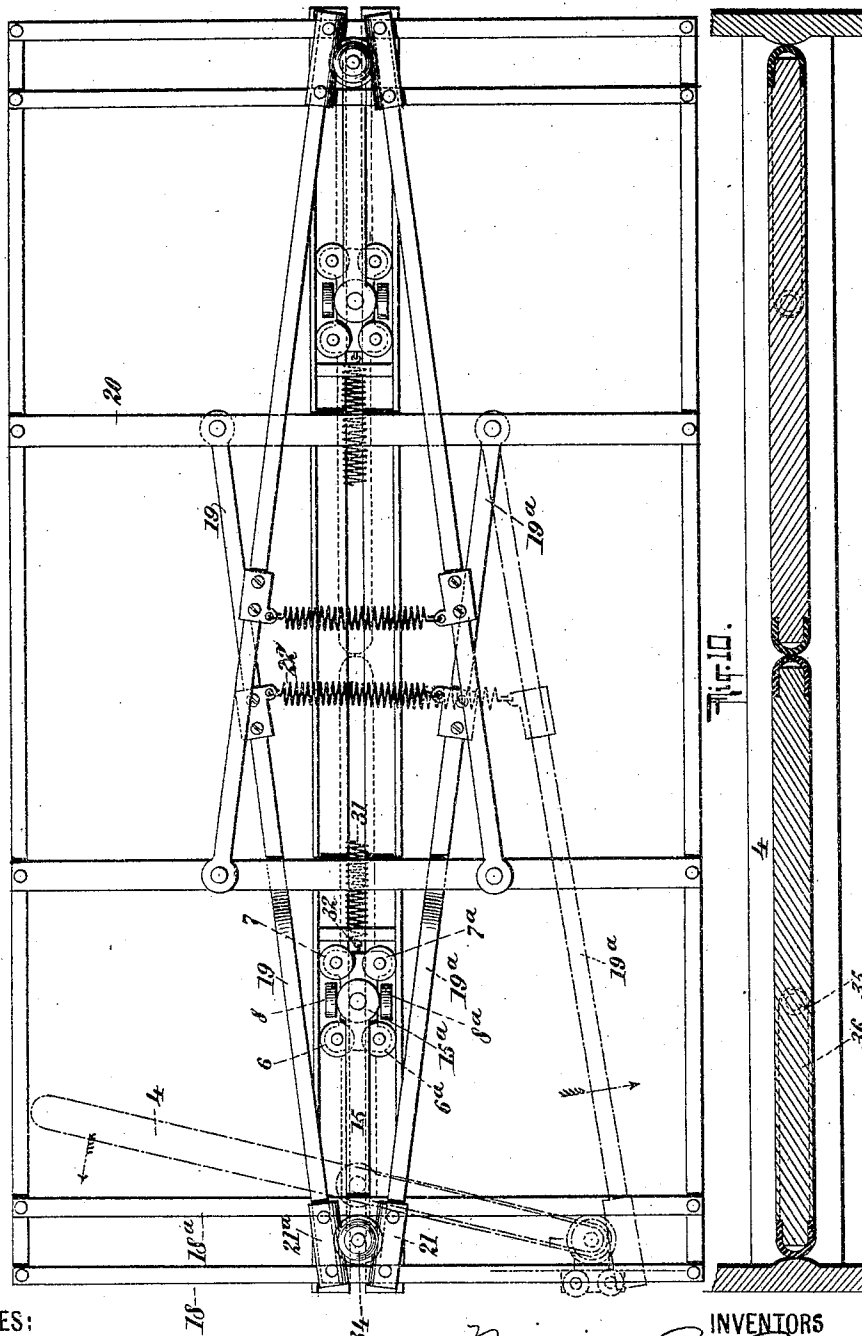
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4 SHEETS—SHEET 3.

Fig. 7.



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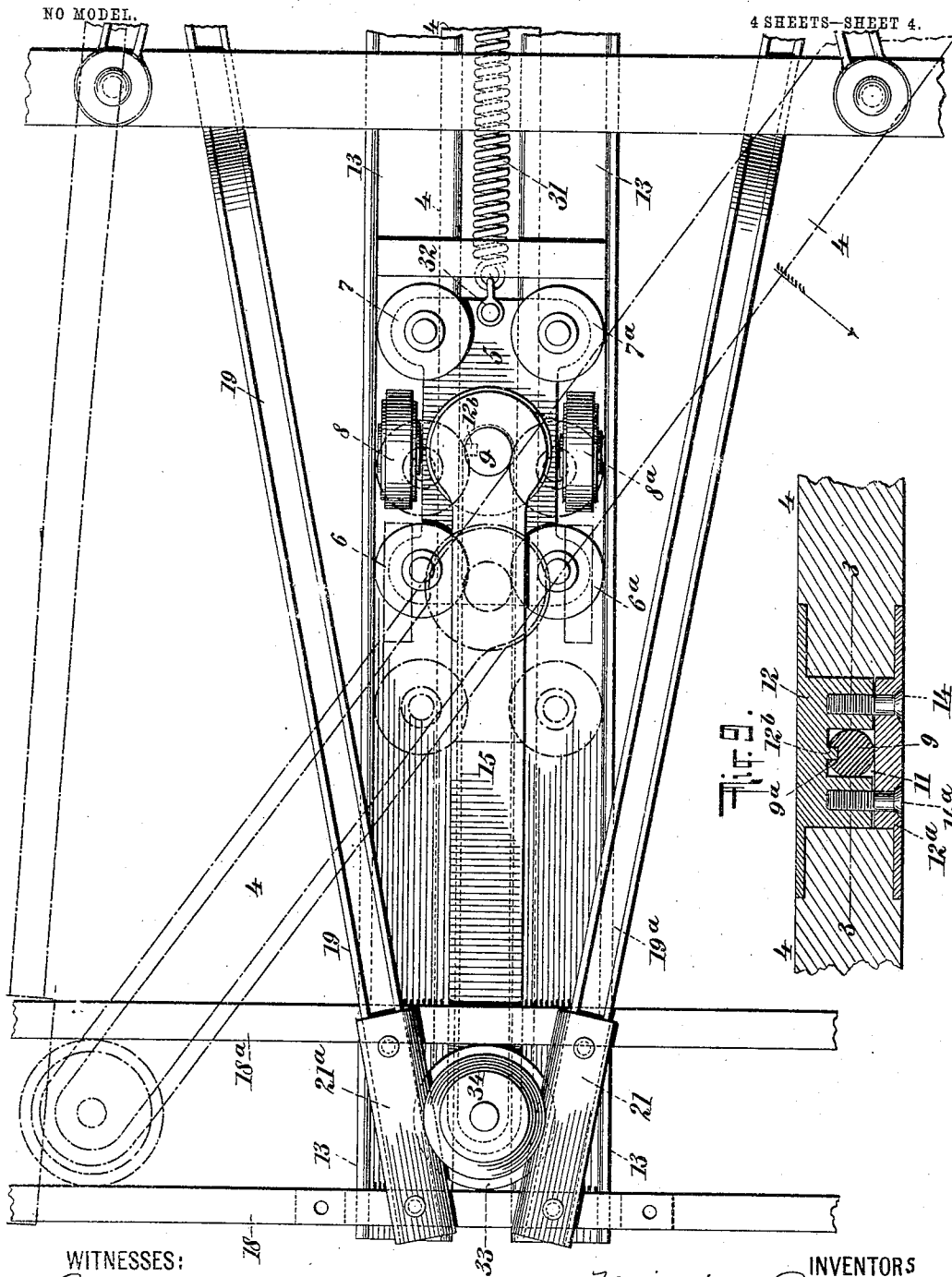
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Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM R. PITT AND RAFFORD PITT, OF NEW ROCHELLE, NEW YORK.

DOOR, GATE, OR LIKE STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 774,493, dated November 8, 1904.

Application filed August 2, 1904. Serial No. 219,249. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM R. PITT and RAFFORD PITT, citizens of the United States, residing at New Rochelle, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Doors, Gates, or Like Structures, of which the following is a full, clear, and exact specification.

10 The invention herein described constitutes an improvement upon the invention shown and described in Letters Patent No. 731,407, granted to the said William R. Pitt June 16, 1903, and relates to improved means for supporting swinging doors, gates, and similar structures and for guiding the same when opening and closing and for bringing the same automatically to a closed position when released after being opened.

20 The objects of our invention are to provide a door pivoted on a vertical axis located intermediate between the vertical edges thereof, which when pushed upon by the user to open the same will require less space to swing in than if the door were pivoted at one of its vertical edges to stop the door or gate in its closed position and maintain it there and at the same time to have it free or unlocked, so that it can be readily swung open.

30 In general terms our invention comprises a swinging door or gate suspended at a point between its vertical edges by a suspension device which is rigidly attached to said door or gate and bears on a movable carriage supported on a track in the door-frame or other elevated structure, said suspension device, carriage, and track and spring mechanism, acting upon said carriage, tending to draw it back to the position which it normally occupies when the door is closed, and an arm rigidly attached to said suspension device and extending therefrom, in combination with a door-frame or similar structure provided with overhead beams so placed as to intersect the plane of the door or gate when closed, bars pivoted on one of said beams and engaging with a suitable antifriction device attached to the arm extending from the suspension device and adapted to swing with said arm in a reciprocating motion as the door opens and closes,

spring mechanism acting on said bars and tending to restore them to a position where the door will be normally closed, and a suitable horizontally-reciprocating device suitably mounted on a carrier pivoted to the inner edge of the door and engaging with a recess in the wall.

More particularly, our invention comprises a swinging door suspended on a vertical axis at a point in its upper edge between its vertical edges by a suspension-spindle which is rigidly attached to said door and bears with ball-bearings on a wheeled carriage supported on an overhead track in the door-frame or other like structure, the said door being adapted to swing in either direction upon said vertical axis, said carriage having vertical and horizontal antifriction-rollers, the overhead track for said carriage extending transverse the doorway, the suspension-spindle bearing on said carriage and provided with an arm rigidly attached to the spindle projecting horizontally over and parallel to the upper edge of the door, said arm being provided at its outer end with antifriction-rollers, and a spring acting upon said carriage tending to draw it back into the position which it normally occupied when the door is closed in combination with a door-frame or similar structure provided with horizontal overhead beams placed substantially at right angles to the plane of the door when closed, two of said beams being placed so as to engage with one of the antifriction-rollers of the projecting arm, bars pivoted on one of said beams and engaging with the other antifriction-roller on the projecting arm, said bars being adapted to swing with said beam in a reciprocating motion as the door opens and closes, a spring acting on said bars and tending to restore them to a position where the door will be normally closed, a carrier pivoted to the inner edge of the door provided with suitable antifriction-rollers, a horizontal recess in the door-frame or wall extending at right angles to the door when the same is in its normal closed position, and a horizontal slot in front of said recess through which the carrier passes, whereby the antifriction-rollers of the carrier may engage with the front wall of the

said recess with a reciprocating motion as the door swings.

Our invention is fully shown in the accompanying drawings, in which similar figures refer to similar parts.

Figure 1 in the drawings is a front elevation of a door embodying our improvement and shown as standing in full closed position, part of the door being broken away and the upper part of the drawing showing a vertical sectional view of the overhead portion of the door-frame and the parts therein inclosed, the plane of the section being indicated by the line 1 1 in Fig. 2. Fig. 2 is a vertical sectional view of the same, the plane of the section being indicated by the line 2 2, Fig. 1. Fig. 3 is a vertical sectional view of the suspension-spindle and carriage, the plane of the section being indicated by the line 3 3 in Fig. 9. Fig. 4 is a plan view of the carriage looking from above. Fig. 5 is a vertical sectional view of the carrier attached to the edge of the door and the parts with which it engages. Fig. 6 is a plan view of the carrier and its antifriction-rollers. Fig. 7 is a plan view of the horizontal cross-beams in the overhead portion of the door-frame and of the bars which come into contact with the arms projecting from the suspension-spindle. This view shows also the overhead track, carriage, and projecting arm and other parts adjacent thereto, the whole being represented in duplicate as used with double doors. Fig. 8 is a detailed plan drawing of a part of Fig. 7, showing the reciprocating bars, track, and carriage with the projecting arm and other connecting parts. Fig. 9 is a horizontal sectional view through the line 9 9 in Fig. 3. Fig. 10 is a horizontal sectional view of the doors in their closed position when double doors are used.

In the drawings, 1 and 2 indicate, respectively, the side wall or side of the door-frame, and the upper part of the door-frame.

In Figs. 7 and 10 a second door is partially shown in order to show how the invention may be applied to double doors; but this arrangement is not necessary, since the invention in all its parts may be applied to a single door, in which case the door-frame may be completed by a vertical portion corresponding to the part along the wall 1 and constructed at the opposite side of the door therefrom.

3 is the floor.

4 is the door or gate, which is suspended on a vertical axis, preferably at a point in its vertical edge and intermediate between the two edges of the door and said axis preferably dividing the door into two parts approximately equal in area.

5 is a carriage having vertical wheels or rollers 8 8^a pivoted horizontally on the edges of the platform 37 of the carriage 5 and supported by and running on a track 13, formed

in the upper part of the door-frame 2, said track having a slot 27 preferably extending the entire length of the top 2 of the door-frame. The carriage 5 also has horizontal antifriction-rollers arranged in pairs 6 6^a and 7 7^a, which are pivoted vertically on the upper surface of the platform 37 of the carriage 5 in such relative positions that the wheels of each pair are respectively in loose contact with the opposite sides of the track 13, so that the antifriction-rollers may revolve freely as the carriage is moved along the tracks. The track 13 consists, preferably, of two angle-irons having a right-angular cross-section and the vertical member of each portion of the track being wide enough to overlap the antifriction-rollers 6 6^a and 7 7^a on the carriage 5.

9 is a suspension-spindle passing downward through an orifice 10 in the carriage 5 and engaging rigidly with the door by means of a socket 11, into which the lower portion of the spindle enters, which socket is formed by the two plates 12 12^a, one of which is recessed on the inner face of the plate 12. Within the recess is a feather or rib 12^b, projecting inward, which engages with a vertical slot 9^a in the side of the spindle 9, so as to prevent the spindle from turning in the socket 11.

14 14^a are screws which hold together the two plates 12 12^a, surrounding and forming the recess 11. The plates are so proportioned that when the screws are driven home the spindle, having first been inserted in the socket, will be held tightly by the friction and will support the weight of the door suspended from it. Rigidly attached to the upper end of the spindle is a horizontal arm 15, having a circular portion 15^a of approximately the same diameter as a bearing 16 formed on the upper face of the platform 37 of the carriage 5. The bearing 16 contains an annular groove 16^a, and there is a corresponding annular groove 15^b in the lower face of the portion 15^a of the arm 15. The grooves 15^b and 16^a are symmetrically placed and of equal width and diameter, so as to be adapted to receive balls 17 or other antifriction devices. We prefer to use ordinary steel balls for this purpose, as in the ordinary ball-bearing. With this arrangement the weight of the door rests directly upon the balls in the ball-bearing, and the door revolves freely with the spindle and with the arm 15 upon the said bearing. The arm 15 extends horizontally over and substantially parallel with the upper edge of the door to a point nearly over the inner edge of the door, where the arm supports antifriction-rollers 33 34, pivoted upon the arm at 17, there being preferably two such rollers. The lower of the two rollers 33 is of such diameter and is pivoted at such point on the arm that when the door is in a closed position the periphery of the roller 33 at the point in the said periphery most dis-

tant from the axis of the spindle 9 is in loose contact with the horizontal overhead beam 18 in the door-frame, preferably so placed that its inner face is substantially in the same vertical line with the inner face of the wall or door-frame 1. The upper friction-roller 34 has a grooved periphery and is in loose contact with the leather-covered ends of the reciprocating bars 19 19^a, hereinafter described.

In the upper door-frame are supported horizontal beams 20, 18, and 18^a. These beams are preferably of channel-irons. Pivoted loosely on the beam 20 are two bars 19 19^a, which extend to and over the upper surface of the grooved beams 18 18^a, over which the ends of the bars 19 19^a may move freely, said ends resting loosely upon the said beams. The bars 19 19^a are formed of angle-irons, and the free end portions are covered with leather at 21 21^a and are of such shape and dimensions as to fit into the grooved periphery of the roller 34 of the arm 15.

22 is a spring attached to the inner sides of the bars 19 19^a at such points and being of such tension as normally to hold the bars 19 19^a in a position symmetrical as to each other and such that the door will be in a normally closed position. The tension of the spring is sufficient to keep the covered ends 21 21^a of the bars 19 19^a snugly though not rigidly engaged with the roller 34.

The parts in Fig. 7 corresponding to those just described, but not separately numbered, are intended to operate with a second door in the same way and for the same purposes as the parts just described in relation to a single door.

23 is a carrier pivoted upon the edge of the door at the point 24 and carrying antifriction-rollers 25 26. The carrier projects through the slot 28, which is formed in front of the recess 29, and the roller 25 and its supporting-pivot are wholly within said recess. The slot 28 is formed in the front wall 30 of the recess, which wall consists, preferably, of metal plates of suitable thickness. The recess 29 is formed in the side wall or side door-frame and extends horizontally to a distance somewhat greater than the width of the door. When the door is swung to or fro, the carrier 23 slides back and forth in engagement with the recess 29, this arrangement serving to guide the lower part of the door and to keep it from binding as the door moves.

A spiral spring 31 of suitable tension is fastened at one end to the carriage 5 by a fixed pin 32 and extends along the track 13 in the top of the door-frame to or near that portion of the same which is over the outer edge of the door when the same is fully closed, where the spring 31 is fastened at its other end by a similar fixed pin either to the vertical member of the door-frame in the case of a single door, as shown in Letters Patent No. 752,413, granted to us February 16, 1904, or in the

case of double doors to a pin projecting downward from the top of the door-frame.

The general operation of the improved means for hanging, guiding, and closing a door or gate as shown herein is very similar to the operation of the door described in the said Letters Patent No. 752,413 and need here only be referred to generally. The door being supported intermediate between its vertical edges, as already stated, the free or outer edge of the door when pushed in the direction of the arrow in Fig. 7 describes a line in the horizontal, which line makes a very sharp turn inwardly toward the side wall owing to the fact that when the door is pushed open the inner edge of the door recedes rapidly from the position which it occupies when the door is closed. The dotted-line positions of the door shown in Fig. 2 of said Letters Patent are intermediate positions of the door when being swung open. The full open position is the same as shown in dotted lines in Fig. 2 of said Letters Patent No. 752,413, being shown as lying well in toward the side wall 1. In swinging the door open in the manner described the rapid recession of the free edge of the door which the operator is soon to pass leaves him a free passage-way, and swinging the door in this manner requires comparatively little effort. A similar action takes place when the door is opened in the contrary direction. As the door is pushed open the carriage 5 travels along the track 13 in a straight line toward the side wall 1, while the spindle 9, with the arm 15, turns freely on the bearing 16 as the angle of the door to the door-frame changes. At the same time the covered ends 21 21^a of the bars 19 19^a, moving freely with the antifriction-rollers 33 34, assume the position shown in dotted lines in Fig. 7, the position of the door being also shown in the said Fig. 7 by dotted lines and the carriage 5 stopping immediately over the side of the door-frame nearest the side wall 1.

In order to prevent the door being pushed or blown out of a vertical plane, we preferably employ a guide-roller 35, pivoted on the spindle 36, which is rigidly attached to the lower edge of the door. In the floor in the plane of the door when closed is a guide-channel 36, having in its upper surface a slot 37, which slot 37 is of such width that the spindle 36 moves freely along it, while the guide-roller 35, whose diameter is preferably smaller than the width of the slot, is in loose contact with the sides of the guide-channel 36, so that as the door is opened the roller 35, which turns freely against the sides of the guide-channel 36, enables the spindle to move freely along the sides of the slots without friction. The axes of the spindle 36 and of the spindle 9 are preferably in the same vertical lines, as are also the pivotal axes of the pivot-joints 17 and 24.

Our improvements while here shown as ap-

plied to a swinging door are not necessarily limited to that application, as they may be employed in connection with a gate, shutter, or similar structure, and we desire this specification and the claims here following to be treated as if in terms made to apply to all such structures.

We have described the invention as applied to a single door; but by duplicating the construction described with reference to a single door and placing it in proper position a double swinging door may be provided, as indicated in Fig. 7 and in Fig. 10. The same advantages in the use of the device herein described exist as are described in our said Letters Patent No. 752,413 in relation to the doors supported and guided as therein described.

We do not confine ourselves to the precise construction of parts herein shown, as many suitable equivalents for certain of the parts can be used without affecting the general operation of our invention.

What we claim, and desire to secure by Letters Patent, is—

1. A swinging door or gate suspended at a point between its vertical edges by a suspension device which is rigidly attached to said door or gate and bears on a movable carriage supported on a track in the door-frame or other elevated structure; said suspension device, carriage and track, and spring mechanism acting upon said carriage tending to draw it back to the position which it normally occupies when the door is closed, and an arm rigidly attached to said suspension device and extending therefrom; in combination with a door-frame or similar structure provided with overhead beams so placed as to intersect the plane of the door or gate when closed; bars pivoted on one of said beams and engaging with a suitable antifriction device attached to the arm extending from the suspension device, and adapted to swing with said arm in a reciprocating motion as the door opens and closes; spring mechanism acting on said bars and tending to restore them to a position where the door will be normally closed; and a suitable horizontally-reciprocating device suitably mounted on a carrier pivoted to the inner edge of the door and engaging with a recess in the wall, substantially as and for the purposes set forth.

2. A swinging door or gate suspended at a point in its upper edge and between its vertical edges by a suspension device which is rigidly attached to said door or gate and bears on a wheeled carriage supported on an elevated track in the door-frame or other like structure and extending transverse the doorway; the said suspension device, carriage and track, and spring mechanism acting upon said carriage tending to draw it back to the position which it normally occupies when the door is closed; an arm rigidly attached to said suspension device and extending horizontally there-

from over and substantially parallel with the upper edge of the door; in combination with a door-frame or similar structure with horizontal overhead beams placed substantially at right angles to the plane of the door or gate when closed; bars pivoted on one of said beams and engaging movably with an antifriction-roller pivoted to the arm extending from the suspension device and adapted to swing with said arm in a reciprocating motion as the door opens and closes; spring mechanism acting on said bars tending to restore them to a position where the door will be normally closed; a carrier pivoted to the inner edge of the door, provided with suitable antifriction-rollers; a horizontal recess in the door-frame or wall extending at right angles to the door when the same is in its normal closed position and a horizontal slot in front of said recess through which the carrier passes, whereby the antifriction-rollers of the carrier may engage with the front wall of the said recess and travel back and forth in the recess with a reciprocating motion as the door swings; substantially as and for the purposes set forth.

3. A swinging door suspended on a vertical axis at a point in its upper edge between its vertical edges by a suspension-spindle, which is rigidly attached to said door and bears with ball-bearings on a wheeled carriage supported on an overhead track in the door-frame or other like structure, the said door being adapted to swing in either direction upon said vertical axis; said carriage having vertical and horizontal antifriction-rollers, the overhead track for said carriage extending transverse the doorway, the suspension-spindle bearing on said carriage and provided with an arm rigidly attached to the spindle projecting horizontally over and parallel to the upper edge of the door, said arm being provided at its outer end with antifriction-rollers; and a spring acting upon said carriage tending to draw it back into the position which it normally occupies when the door is closed; in combination with a door-frame or similar structure provided with horizontal overhead beams placed substantially at right angles to the plane of the door when closed, two of said beams being placed so as to engage with one of the antifriction-rollers on the projecting arm; bars pivoted on one of the said beams and engaging with the other antifriction-roller on the projecting arm, said bars being adapted to swing with said arm in a reciprocating motion as the door opens and closes; a spring acting on said bars and tending to restore them to a position where the door will be normally closed; a carrier pivoted to the inner edge of the door, provided with suitable antifriction-rollers; a horizontal recess in the door-frame or wall extending at right angles to the door when the same is in its normal closed position, and a horizontal slot in front of said recess through which the carrier passes, whereby the antifriction-rollers

ers of the carrier may engage with the front of the said recess and travel back and forth in the recess with a reciprocating motion as the door swings, substantially as and for the purposes set forth.

4. A swinging door suspended on a vertical axis at a point in its upper edge approximately midway between its vertical edges by a suspension-spindle, which is rigidly attached to said door and bears with ball-bearings on a wheeled carriage supported on an overhead track in the door-frame or other like structure, the said door being adapted to swing in either direction upon said vertical axis; said carriage having vertical and horizontal anti-friction-rollers, the overhead track for said carriage extending transverse the doorway, the suspension-spindle bearing on said carriage by means of a ball-bearing, cones for said bearing being formed on the bearing-surfaces of the spindle and carriage respectively; balls or other antifriction devices in said bearing; an arm rigidly attached to the spindle and projecting horizontally therefrom over and parallel to the upper edge of the door, said arm being provided at its outer end with superposed concentric antifriction-rollers; and a spring acting upon said carriage tending to draw it back into the position which it normally occupies when the door is closed; in combination with a door-frame or similar structure provided with horizontal beams placed above the door and substantially at right angles to the plane of the door when closed, two of said beams being placed so as to engage with the lower antifriction-roller on the projecting arm; bars pivoted on

one of said beams and engaging loosely with the upper antifriction-roller on the projecting arm, said bars being adapted to swing with said arm in a reciprocating motion as the door opens and closes; a spiral spring of suitable tension connecting said bars and holding them in snug engagement with the grooved periphery of the upper antifriction-roller on the projecting arm, said spring tending to restore the bars to a position where the door will be normally closed; a carrier pivoted to the inner edge of the door and provided with suitable horizontal antifriction-rollers; a horizontal recess in the door-frame or wall extending at right angles to the door or wall when the door is in its normal closed position, a horizontal slot in front of said recess through which the carrier passes, the antifriction-rollers on the carrier being so placed that they are in loose contact with the opposite sides of the front wall of said recess, whereby the carrier may engage with the front of the said recess and travel back and forth in the slot in a reciprocating motion as the door swings; an antifriction-roller pivoted on a spindle depending from the lower end of the door, and a guide-channel in the floor through which the said antifriction-roller moves, the axis of said spindle being in the same vertical line with the axis of the suspension-spindle which supports the door, substantially as and for the purposes set forth.

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