M. N. GROOTTEN.

DOOR.

APPLICATION FILED FEB. 17, 1916.

1,189,250.

Patented July 4, 1916.

Fig. 1.

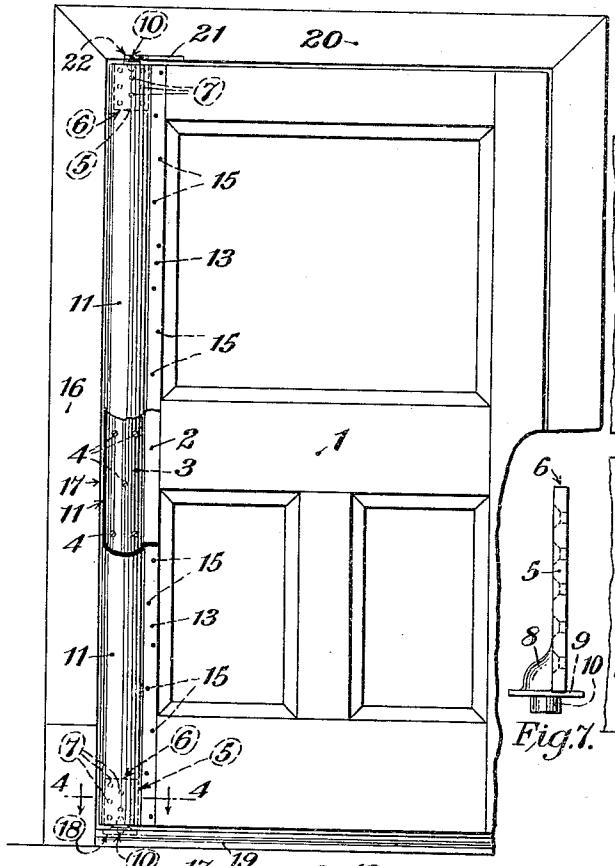

Fig. 2.

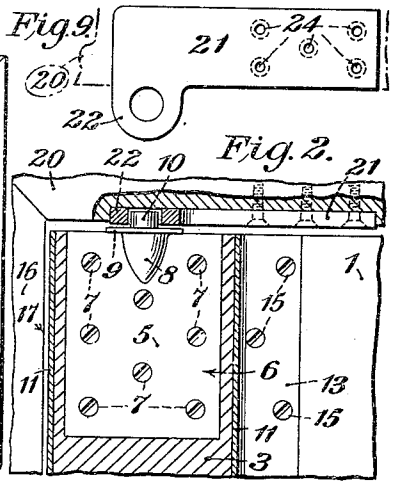

Fig. 7.

Fig. 3.

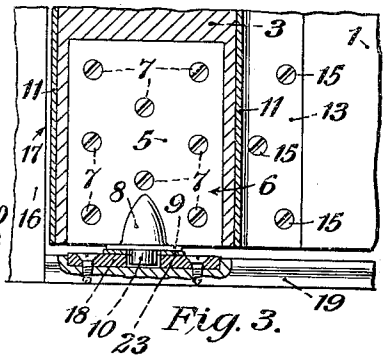

Fig. 4.

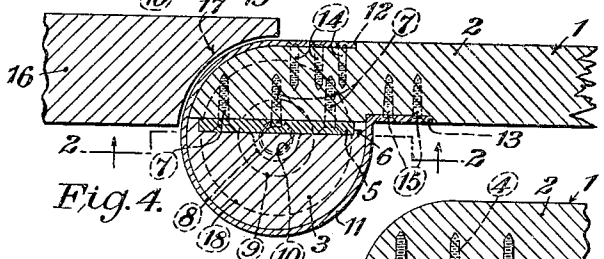

Fig. 5.

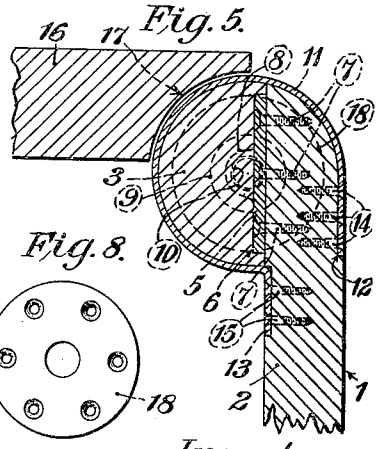

Fig. 6.

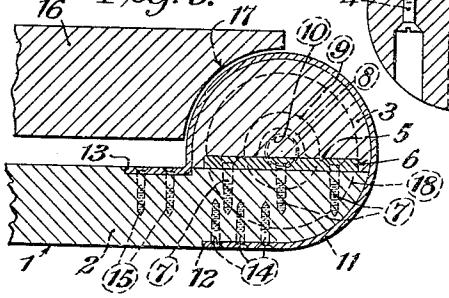

Fig. 10.

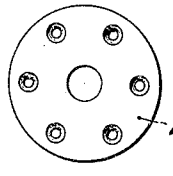

Fig. 8.

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UNITED STATES PATENT OFFICE.

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DOOR.

1,189,250. Specification of Letters Patent. Patented July 4, 1916.

Application filed February 17, 1916. Serial No. 78,887.

To all whom it may concern:

Be it known that I, MAXIMILIAN N. GROOTTEN, (Groten,) residing at Petrograd, Province of Petrograd, Russia, and being a subject of the Czar of Russia, have invented certain new and useful Improvements in Doors, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and to use the same, reference being had to the accompanying drawings, which illustrate the preferred form of the invention, though it is to be understood that the invention is not limited to the exact details of construction shown and described, as it is obvious that various modifications thereof will occur to persons skilled in the art.

In said drawings: Figure 1 is a side elevation of my improved door positioned within the door casing, parts being broken away. Fig. 2 is a fragmentary vertical section of the upper left hand corner portion of the door and door casing, shown in Fig. 1, the section being taken on the plane indicated by line 2—2 of Fig. 4. Fig. 3 is a similar view of the lower left hand corner of the door and its casing. Fig. 4 is a fragmentary horizontal section through a portion of the door and its casing, the section being on line 4—4 of Fig. 1 and the door being in closed position. Fig. 5 is a similar view, but with the door being opened 90° from its closed position. Fig. 6 is like view, but with the door opened 180°. Fig. 7 is a side elevation of one of the door pintle devices. Fig. 8 is a plan view of the threshold socket plate. Fig. 9 is a plan view of the lintel socket plate; and Fig. 10 is a fragmentary horizontal section, somewhat similar to Fig. 2, but illustrating a modified form of door.

The present invention relates to a type of door which is well suited for practically universal use, and it is equally efficient when it is constructed for use in dwellings and public buildings, when it has the massive proportions called for by impressive entrances and when used in railway cars and vessels. One of its striking characteristics is its anti-pinch quality, whereby when people permit their hands to come into proximity to the hinged edge of the door, no injury to them can result. Thus, adults escape the suffering and inconvenience so frequent and due to the inadvertent misplacing of a hand near the hinge edges of ordinary doors. Even to a greater extent, thoughtless children are protected by my improved door.

Not only is the construction simple, strong and economical of manufacture, but it is such that it places no restriction upon the operation of the door, and the latter may be swung from a closed position within the door casing to a wide open position where it extends in a directly opposite direction and parallel with a wall or partition.

Other advantages will appear hereinafter, and are all part of the present invention.

Referring to the drawings, 1 indicates a door, which may be of any proportions, and which is provided with a hinge stile or vertical perimetrical border 2. The edge of said stile or vertical door border portion is approximately quadrantal in horizontal section, blending said edge with one side of the door. On the opposite side of said stile 2, a vertically disposed substantially semi-cylindrical strip 3 is applied, as by screws 4 shown in Figs. 1 and 10. Strip 3 is so arranged that it coöperates with the quadrantal portion of stile 2 to form a door edge which is cylindrical except where the main portion of the door merges with it. Said cylindrical door portion is eccentric to that part of the door confined between its side faces for a purpose to be explained hereinafter.

It is preferred that semi-cylindrical strip 3 shall be co-extensive with the height of the door, and at its upper and lower ends it is recessed to receive the attachment plates 5 of pintle devices 6. Each attachment plate 5 has sufficient area to insure a strong and rigid connection of itself to the uncurved face of the stile or vertical door border portion 2. Such connection may be made by means of wood screws 7 passing through countersunk holes in attachment flange 5 of each pintle device 6, the heads of the screws occupying the countersunk portions of said holes, and screws 7 being threaded into the stile 2.

One edge of the attachment plate 5 of each of the pintle devices 6 is preferably flush with the top or bottom edge of the door, according to which pintle device is being considered. Adjacent said flush edge

of each attachment plate 5 and preferably centrally of the width thereof, is a protuberance 8 terminating in an annular flange or disk 9, one face of which lies against the top or bottom end of the substantially semi-cylindrical strip 3, depending upon which pintle device 6 is referred to. A pintle 10 projects outwardly from the annular flange or disk 9 of each pintle device.

For well finished doors, a sheathing 11 for the combined quadrantal stile portion and its associated strip 3 is provided. Said sheathing may also be co-extensive with the door height, is mostly cylindrical and is provided with flanges 12 and 13, which are spaced for the passage of the stile or vertical border door portion 2 between them. Flange 12 of sheathing 11 is secured to one face of stile 2 by screws 14 and flange 13 is fastened to the other face of said stile or vertical border door portion by screws 15.

Flange 12 and the portion of sheathing 11 which incloses the quadrantal part of stile 2 is inset in the latter, as is also flange 13 of sheathing 11 on the opposite side of the door. Hence, a perfectly smooth contour is given the sides of the stile 2 and the partially cylindrical door edge. The door casing member 16 coöperates with this edge and is provided with a vertical edge 17 having a curvature corresponding to that of sheathing 11, there being merely enough clearance between door casing edge 17 and sheathing 11 to permit the free turning of the door 1. This prevents the slightest tendency of anything being caught between the door edge and the casing 16, making the door of the anti-pinch type.

A threshold socket plate 18, best seen in Figs. 3 and 8, is mounted upon the threshold 19, and may be inset therein as shown in Fig. 3, in either case preferably being securely screwed in place. When inset it reduces the crack underneath the door. Pintle 10 of the lower pintle device 6 projects into an aperture in socket plate 18, making a swiveling connection between the door and the threshold 19.

Screwed to the under side of the door lintel 20 is a lintel socket plate 21, which may or may not be inset in the lintel, as desired. Lintel socket plate 21 has an offset ear 22 perforated for the projection thereinto of pintle 10 of the upper pintle device 6, and thereby establishing a swiveling connection between the door and the lintel 20.

In mounting the door, the pintle 10 of the lower pintle device 6 is first inserted into threshold socket plate 18, and if, by chance, the door is not quite of the appropriate height, a washer or washers 23 are slipped over said pintle 10 before its insertion into plate 18.

Lintel socket plate 21 is slipped over pintle 10 of the upper pintle device 6 and the door is pushed to its normally closed position, after which it is revolved to partly open. Screws are then passed through holes 24 in socket plate 21 and are screwed into the lintel 20.

The door may now be opened or closed at will and because of the hereinbefore referred to eccentricity of the cylindrical edge portion of the door, and the consequent positioning of the pintles 10 and their socket plates 18 and 21, said door is capable of revolving through an arc of at least 180°, as indicated in Figs. 4, 5, and 6.

It is apparent that lower socket plate 18 may be positioned transversely of the threshold, or of the door casing when mounted directly on the floor boards, easily establishing the axis of rotation for a door of any thickness and in a manner to allow the eccentricity of the cylindrical edge portion of the door. The offset ear 22 of lintel socket plate 21 permits the main portion of said plate to be attached to the lintel over the top edge of the door, at the same time locating the socket perforation of that plate in alinement with that of the lower socket plate 18. The attachment part of lintel socket plate 21 being between the top of the door and the lintel adds burglar-proof qualities to the door.

In the drawings, the eccentricity of the cylindrical edge portion of the door is shown to bring the axis of rotation thereof outside the door and the door casing, but such eccentricity may be of any degree that will permit the door to be swung from a closed position to an open position parallel with said closed position, as shown in Figs. 4, 5 and 6, for example.

The curvatures of the concaved face of said door casing member 16 and of the convex face of said cylindrical door edge being struck from the axis of the latter, which is also the axis of the door rotation, and said faces being maintained in constantly closed relationship, and the method of merging said cylindrical door edge with the rest of the door, produces a perfectly anti-pinch door.

When sheathing or shield 11 is of the proper thickness and rigidity, the filler strip 3 may be dispensed with without in any way lessening the desirability of the door.

A modified form of door is illustrated in Fig. 10, in which the sheathing is entirely eliminated, suiting it to such constructions that require a minimum of cost. The cylindrical door edge comprises a stile or vertical door border portion having the previously described quadrantal part and the substantially semi-cylindrical strip 3 secured thereto by screws 4. Strip 3 is provided with comparatively deep holes for the pas-

sage of the heads of screws 4, which holes may, if desired, be plugged after the insertion of the screws.

What I claim is:—

1. In combination, a door casing, a door having a portion provided with a sectoral cylinder edge and a flat side, a shield having a curvature corresponding to that of said edge connected with said flat side and forming a cylindrical door edge having an axis disposed eccentrically of the door width and outside of said casing, the latter having a concaved face closely paralleling the curvature of said shield, hinge members secured to the door within said shield and so disposed that the door may move from a closed position to an open position substantially parallel with said closed position without creating an open space between door casing and cylindrical door edge.

2. In combination, a door casing having a concaved face, a door, a shield having a cylindrically formed portion inclosing an edge portion of said door and connected to both sides of the door, swiveling hinged members secured to said door edge portion, the concaved face of said casing and the outer face of said cylindrically formed shield portion having closely paralleling curvatures struck from the center of rotation of the door, said center of rotation being disposed eccentrically of the width of the door and outside of said concaved door casing, so that the door may be swung from a closed position to an open position substantially parallel with said closed position without forming an open space between said casing and the hinged edge of the door.

3. In combination, a door casing having a concaved face, a door having a portion provided with a curved edge and a flat side, a strip continuing the curvature of said edge to said flat side and secured to the latter, a shield inclosing said door edge and strip and swiveling means for said door having portions sandwiched between said strip and flat door side, the center of swiveling being eccentric to the width of said door and casing, said concave face and shield having closely paralleling curvatures struck from the center of swiveling, so that the door may be swung from a closed position to an open position, substantially parallel with the closed position without forming an open space between said casing and the hinged edge of the door.

4. In combination, a door having an eccentrically disposed cylindrical edge, door swiveling means concentric with the circumference of said cylindrical edge and a door casing having a concave face, said face and the circumference of said cylindrical edge having closely paralleling curvatures struck from the center of swiveling, the latter being outside said casing, whereby the door may be swung from a closed position to an open position substantially parallel with said closed position without forming an open space between said casing and the door edge adjacent said swiveling means.

5. In combination, a door casing and a door having an edge, a portion of said casing and said edge being in continuously intimate relation to each other and so formed that said door may be swung from a closed position to an open position substantially parallel with said closed position without forming an open space between said casing and said door edge.

6. In combination, a door casing, a door having an edge, a portion of said casing and said edge being in continuously intimate relation to each other and so formed that said door may be swung from a closed position to an open position substantially parallel with said closed position without forming an open space between said casing and said door edge, hinge members for said door each comprising an attachment plate secured to the side of the door and a pintle integrally formed therewith and projecting from another door edge and pintle retaining members secured to stationary elements opposing said pintles.

7. In combination, a door casing, a door having an edge, a portion of said casing and said edge being in continuously intimate relation to each other and so formed that said door may be swung from a closed position to an open position substantially parallel with said closed position without forming an open space between said casing and said door edge, hinge members for said door each comprising an attachment plate secured to the side of the door and a pintle integrally formed therewith and projecting from another door edge and perforated socket plates for said pintles secured to stationary elements opposing said pintles.

8. In combination, a door casing, a door having an edge, a portion of said casing and said edge being in continuously intimate relation to each other and so formed that said door may be swung from a closed position to an open position substantially parallel with said closed position without forming an open space between said casing and said door edge, hinge members for said door each comprising an attachment plate secured to the side of the door and a pintle integrally formed therewith and projecting from another door edge and perforated socket plates for said pintles secured to stationary elements opposing said pintles, one of said socket plates being disposed eccentrically of the width of the door and the other having a portion more nearly alined with a door edge and another portion extending from the first portion and contain-

ing the perforation, the perforations of both socket plates being alined.

9. In combination, a door casing, a door having a portion provided with a sectoral cylinder edge and a flat side, a segmental cylinder strip secured to said flat side and continuing the convex face of said sectoral cylinder edge substantially to said flat side, whereby said door is provided with an approximately cylindrical edge the axis of which is so disposed as to permit the door to swing from a closed position to an open position substantially parallel with the closed position, said door casing and said cylindrical door edge having closely paralleling faces struck from the center of rotation of the door, and swiveling means for said door, the arrangement of the parts being such that no space will be generated between the door edge nearest and parallel with the axis of door rotation and the adjacent portion of said door casing when said door is moved.

10. In combination, a rabbeted door frame, a door provided with a convex edge comprising a sheet metal shield secured to an edge portion of the door, the axis of curvature of which is approximately coincident with the axis of revolution of said door, a hinge member carried by the door within said shield and so disposed that the door may move from a closed position to an open position substantially parallel with said closed position, and the parts being so arranged that no open space exists between said rabbet and said door when said door is open.

11. In combination, a door having a portion provided with a sectoral cylinder edge and a side having a plane border portion, a segmental cylinder strip secured to said plane border door portion continuing the convex face of said sectoral cylinder door edge to said plane border door side portion, hinge members each comprising an attachment member sandwiched between said plane door side portion and said strip, a disk portion parallel with another door edge and a pintle, a door casing including a lintel and a threshold and socket plates secured to each and adapted to receive the pintles of said hinge members, said door casing also being provided with a member having a concaved edge fitted to the convex faces of said door edge and strip.

12. In combination, a door having a portion provided with a sectoral cylinder edge and a side having a plane border portion, a segmental cylinder strip projecting from and secured to said plane border door portion, the curvatures of the faces of said door edge and strip forming a cylinder-like door edge the axis of which is outside a face of the door, hinge members provided with attachment members retained between said plane door border portion and strip and having pintles on the axis of said cylinder-like door edge, a door casing comprising a member with a concaved edge fitted to the latter, a lintel and a threshold, socket devices secured to said lintel and threshold into which said pintles project and adapted to permit the door to swing to point in opposite directions.

13. In combination, a door having a portion provided with a sectoral cylinder edge and a flat side, a segmental cylinder strip coöperating with said sectoral cylinder edge to provide the door with a cylinder-like edge the axis of which is to one side of the door, whereby the door may swing to point in opposite directions, hinge members secured to the flat side of said door portion and each comprising a perforated attachment plate, a disk adapted to lie against another door edge, a pintle extending therefrom and centered on the axis of said cylinder-like door edge, and a reinforcement connecting said disk and plate, a door casing comprising a member concaved to closely fit said cylinder-like door edge, a lintel and a threshold and socket devices secured to the last two mentioned elements into which said pintles project.

14. In combination, a door having a cylinder-like door edge the axis of which is disposed eccentrically of the center of the width of the door and the circumferential surface of which is tangential with one side of the door and projects beyond the opposite side thereof, whereby the door may swing to point in opposite directions, hinge members secured to the door at the upper and lower portions of said cylinder-like edge and having pintles projecting above and below the door and centered on the axis of said cylindrical door edge, a door casing comprising a member concaved to closely fit said cylinder-like door edge, a lintel and a threshold and socket plates secured to the last two mentioned elements, the one secured to the lintel having a perforated ear, one of said pintles projecting thereinto and one into the threshold socket plate.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

MAXIMILIAN N. GROOTTEN.

Witnesses:
S. W. TUTTLE,
CHARLES L. BELCHER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."