

May 26, 1936.

R. L. McKINNEY

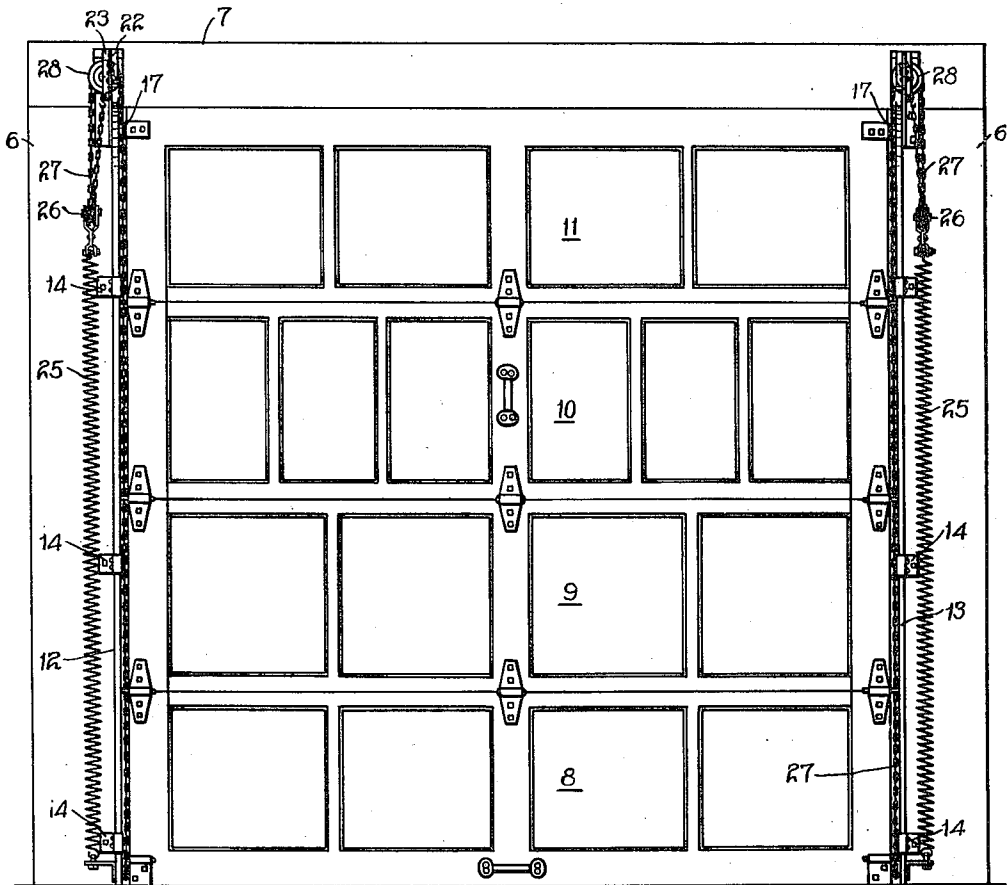
2,042,158

DOOR

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2 Sheets-Sheet 1

Fig. 1.



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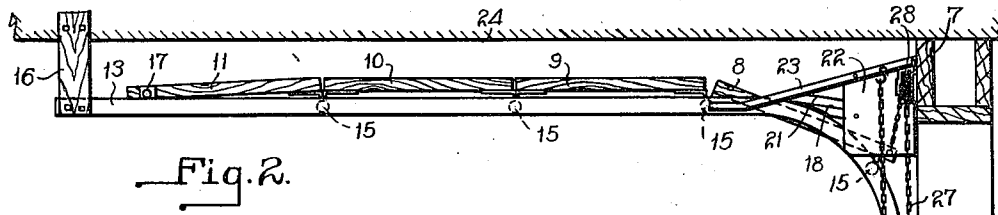


Fig. 2.

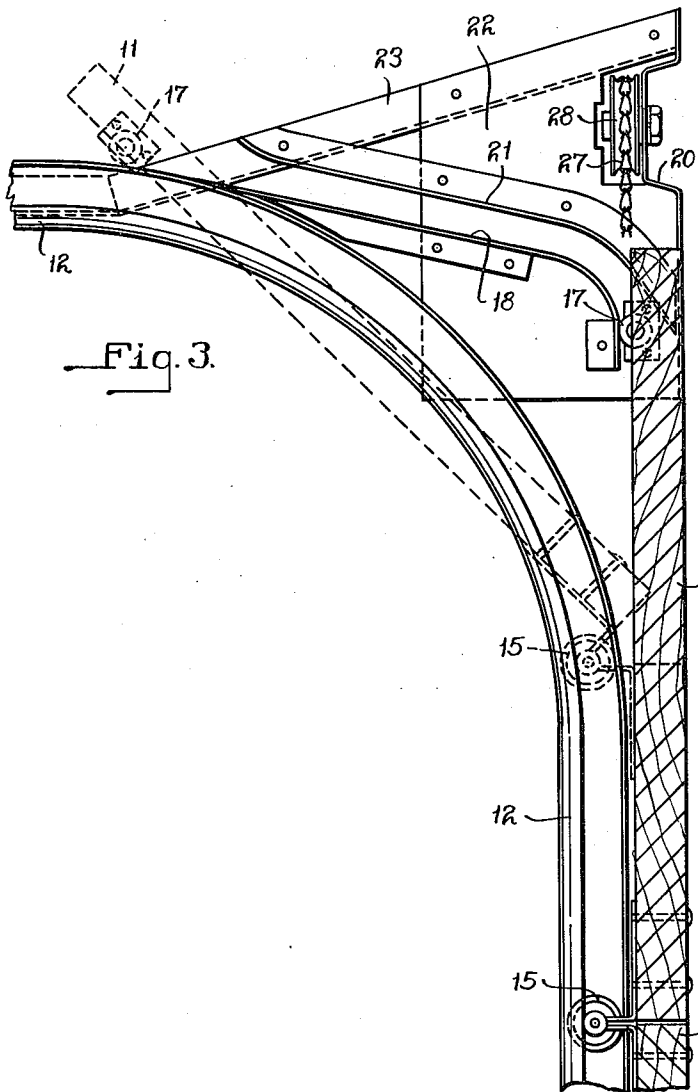


Fig. 3.

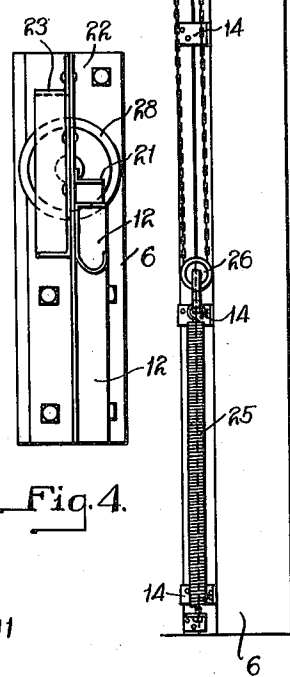


Fig. 4.

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UNITED STATES PATENT OFFICE

2,042,158

DOOR

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10 Claims. (Cl. 20—20)

My invention relates to doors, and more particularly to doors of the sectional type wherein the sections are movable as a unit, but have hinged connection with one another.

5 One object of my invention is to provide a door which can be conveniently operated within a restricted area, as in the case of doors of the sliding type, and which when closed will fit snugly against its frame to provide a weather-proof closure therewith.

10 Another object of my invention is to provide a sectional door that can be moved from a vertical plane to a horizontal plane within a smaller clearance space than is required in various types of doors heretofore employed.

15 Still another object of my invention is to simplify and improve generally door and closure structures of the type referred to.

20 One form which my invention may take is shown in the accompanying drawings wherein Figure 1 is an inside view of the door in closed position; Fig. 2 is an elevational sectional view thereof, but with the door in open position; Fig. 3 is a view, on an enlarged scale, of a portion of the apparatus of Fig. 2, and Fig. 4 is an elevational sectional view of a portion of the apparatus of Fig. 3, looking from the left hand side thereof.

25 The door is shown as mounted on a frame composed of side members 6 and a top member 7, and as comprising sections 8, 9, 10 and 11 that are connected together by hinges.

30 Main tracks 12 and 13, which are conveniently formed integrally and shown as consisting of the flanges of a channel iron, are secured to the side frame members 6 by means of angle brackets 14. At their outer ends they are supported from the roof of the building by means of brackets or hangers 16. The tracks 12 and 13 serve to respectively support and guide rollers 15 which are secured to the door sections 8, 9 and 10, the rollers being disposed between the tracks. The door section 11 carries rollers 17 which, when the door sections occupy the positions shown in Fig. 2, will rest upon the track 13. These rollers 17 are disposed at some distance inwardly from the free edge of the section 11 and are of such size that the outer edge of this section will lie either in line with or somewhat below the planes of the sections 9 and 10, as shown in Fig. 2, when the door is opened.

50 Auxiliary tracks 18 are disposed tangentially of the curved portions of the tracks 13 and have close-fitting engagement therewith so that when the door is being moved to lowered or closed position, the rollers 17 will pass from the tracks 13

to the tracks 18 and be directed in a path that is angular to the vertical path of the rollers 15, the inner ends of the tracks 18 being curved so as to effect an outward throw or movement of the upper edge of the section 11, thus moving it into engagement with a face plate 20 that is carried by the door frame, and making a tight seal. In opening the door, the rollers 17 are guided from their vertical paths to generally horizontal paths by the flanges of angle bars 21. The tracks 18 and bars 21 are connected to a gusset plate 22, which has connection with a brace bar 23.

It will be seen that the size of the rollers 17 and their position with respect to the door section 11 are such as to effect the required throw of the upper edge of the section 11 in making snug fit with the face plate 20, while at the same time, excessive head room beneath the roof or ceiling 24 of the building is not required in order to permit this panel to pass from its position as shown in full lines in Fig. 3 to that shown in dotted lines therein. Furthermore, when in opened position, less head room is required than if the free edge of the section 11 were in elevated position above the track 13.

35 Counter-balancing of the door in order to facilitate the opening and closing of the same is secured by means of counter-balancing springs 25 whose lower ends are anchored to the frames 6 and whose upper ends are connected to pulleys 26. Chains or cables 27 pass around the pulleys 26 and are each connected at one end to one of the brace bars 23 and at the other end to the lower edge of the door section 8, each chain passing over a guide sheave 28 that is secured to the upper frame member 7.

40 The springs 25 are of such strength that they will approximately counter-balance the weight of the door when the door is in closed position and the springs distended as shown in Fig. 1. The manual force required to open the door is therefore comparatively small, since as the door sections move toward horizontal or open position and the springs 25 contract, the loss of pulling power exerted by the springs is at least partially compensated for by the fact that the door sections approach horizontal position where less power is required to move them. Similarly, when the door is being closed, the opposition of the springs to gravitational force on the door sections as they move to vertical position is increased through the gradual extension of the springs.

55 In order to avoid the employment of springs

of excessive length, the chains 27 pass around the guide sheaves 28 that are interposed between the pulleys 26 and the connection with section 8, so that for a given length of spring travel, the door sections will be moved through twice such distance.

While I have herein shown and described my invention as particularly suitable for garage doors of the overhead type, it will be understood that it may be used in various other relations, and that while a present preferred embodiment of the invention has been made the basis of such showing and description, the invention is not limited thereto, but may be otherwise variously embodied within the scope of the following claims.

I claim as my invention:—

1. The combination with a door frame, of a door composed of hinged sections, generally vertically and horizontally-disposed tracks comprising upper and lower reaches, and track-engaging members carried by said door sections, the track-engaging members of the sections normally engaging the lower track reach, the track-engaging member of the outermost section, however, engaging the upper track reach while permitting the outer edge of such section to lie in a plane no higher with respect to the track than the plane occupied by the other sections.

2. The combination with a door frame, of a door composed of hinged sections, generally vertically and horizontally-disposed diverging tracks, and track-engaging members carried by said door sections, the track-engaging members of the sections normally engaging one of said diverging tracks, the track-engaging member of the outermost section, however, engaging the other of said diverging tracks and permitting the outer edge of such section to lie in a plane no higher with respect to the track than the plane occupied by the other sections and said member being disposed at a point intermediate the inner and outer edges of said section.

3. The combination with a door frame, of a door composed of hinged sections, vertically and horizontally-disposed tracks, and track-engaging members carried by said door sections, the track-engaging member of the outermost section permitting the outer edge of such section to lie in a plane closer to the track than the plane occupied by the other sections, and an auxiliary track section in position to be engaged only by said track-engaging member of the outer door section when the door approaches closed position, the said auxiliary track being positioned to effect swinging movement of the upper section relative to the other sections at points adjacent to the inward or closing limit of movement of the door sections.

4. Door structure comprising a main track member having substantially straight portions disposed at approximately right angles to one another and connected by a curved portion, a door having track-engaging members whereby the door is supported and guided by said track member, and an auxiliary track connected with the main track member intermediate its extremities, and positioned to be engaged by one of said track-engaging members, said main track member having a door guiding portion which is continuous adjacent the connection of the main track member and auxiliary track.

5. Door structure comprising a door, a jamb, a guide device for directing the said door through a path having portions disposed at approximate-

ly right angles to one another, and means branching from and operatively connected with said guide device for positively effecting movement of a portion of the door in a direction transversely of the path of movement, during travel of the door toward closed position adjacent the jamb, said guide device having a door guiding portion which is continuous adjacent the point at which said means branches from the guide device.

6. Door structure comprising a track of channel form having straight portions connected by a curved portion, a door, guide devices carried by said door and extending into the channel of said track, a guide device carried by the door and disposed against the exterior surface of one flange of said channel, and a track positioned to receive the last-named guide device during movement of the door and to direct said device in a path transversely of the path of travel along said channel.

7. Door structure comprising a door, guide devices carried by said door, tracks for receiving said guide devices and positioned to direct the door from vertical to horizontal positions, a tension spring, means for anchoring one end of said spring to a fixed point, a guiding sheave mounted on a fixed axis, a pulley connected to the free end of the spring, and a chain extending around said pulley and sheave and having one end connected to the door and its other end connected to a fixed member, the axis of said sheave being at all times substantially higher than the axis of said pulley.

8. Door structure comprising a door composed of hinged sections, a vertically and horizontally-disposed track, track-engaging members carried by certain of said sections and engaging said track, a second track disposed in approximate parallelism with the horizontally-extending portion of the first-named track, and a track-engaging member carried by one of said sections and engaging the second-named track, the second-named track extending to a point above the vertical portion of the first-named track.

9. Door structure comprising a door composed of hinged sections, a vertically and horizontally-disposed track, track-engaging members carried by certain of said sections and engaging said track, a second track disposed in approximate parallelism with the horizontally-extending portion of the first-named track, and a track-engaging member carried by one of said sections and engaging the second-named track, the second-named track extending to a point above the vertical portion of the first-named track, and being angularly deflected at said point.

10. In a door adapted to move from its closed position in a doorway to an overhead open position at an angle to said doorway, said door comprising a plurality of superposed folding panels, the combination of guide rollers mounted on the lower panels adjacent to the sides thereof with each series of said rollers disposed in a common plane transverse of the door, guide rollers for the top panel spaced laterally from the planes of the rollers on the lower panels, tracks for said lower guide rollers comprising sections extending upwardly adjacent to the sides of the doorway, curved sections extending from said first sections and curving rearwardly away from the plane of the doorway, said curved sections starting their rearward curvature at a point below the top of the doorway, overhead sections extending rearwardly from the inner ends of said curved sections, each of said overhead sections comprising

two substantially parallel guideways, one for the rollers on the lower panels and one for the corresponding side roller on the top panel, and deflecting track surfaces leading from each of said
5 latter guideways and extending downwardly and forwardly to guide the rollers on the top panel

in a path such as will close the upper portion of the top panel against the upper portion of the doorway when the door is moved to closed position.

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