Aug. 24, 1943. W. D. FERRIS ET AL 2,327,778

GARAGE DOOR

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FIG. 1.

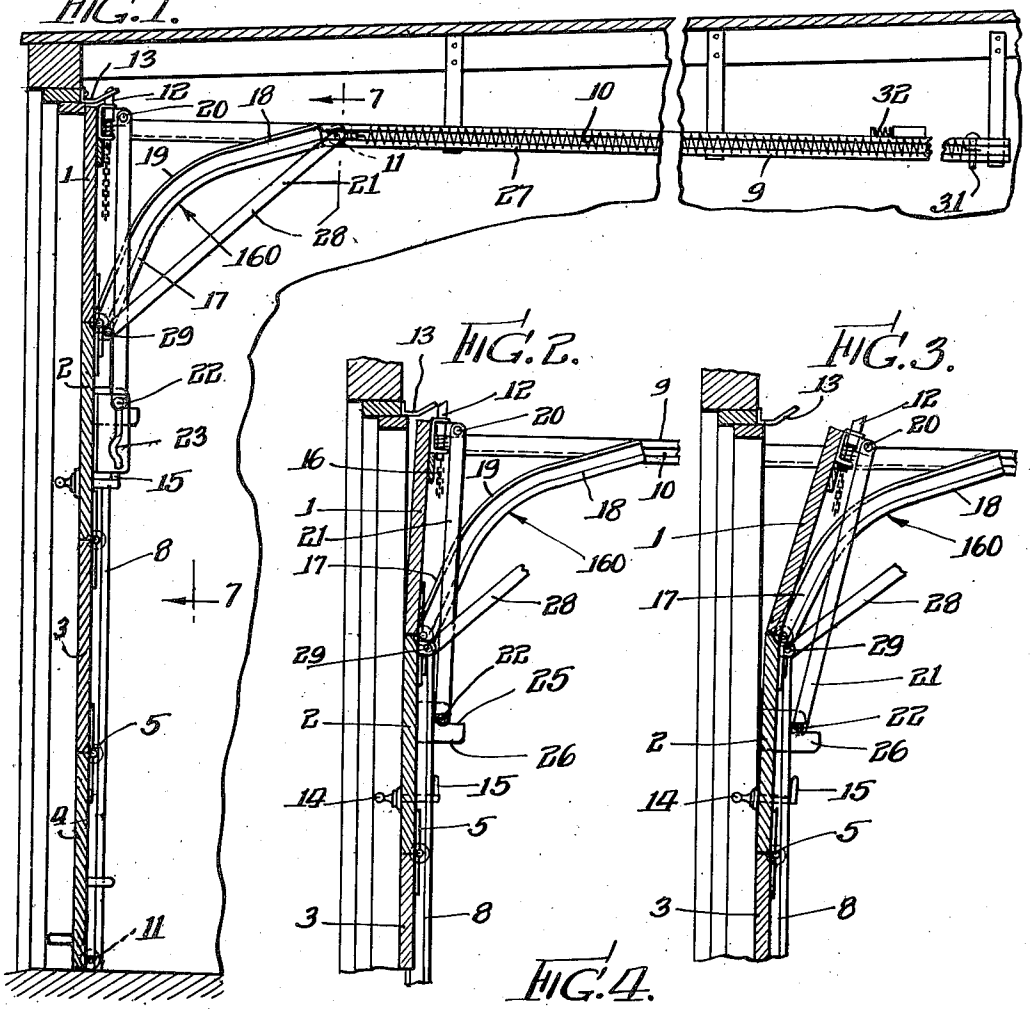


FIG. 2.

FIG. 3.

FIG. 4.

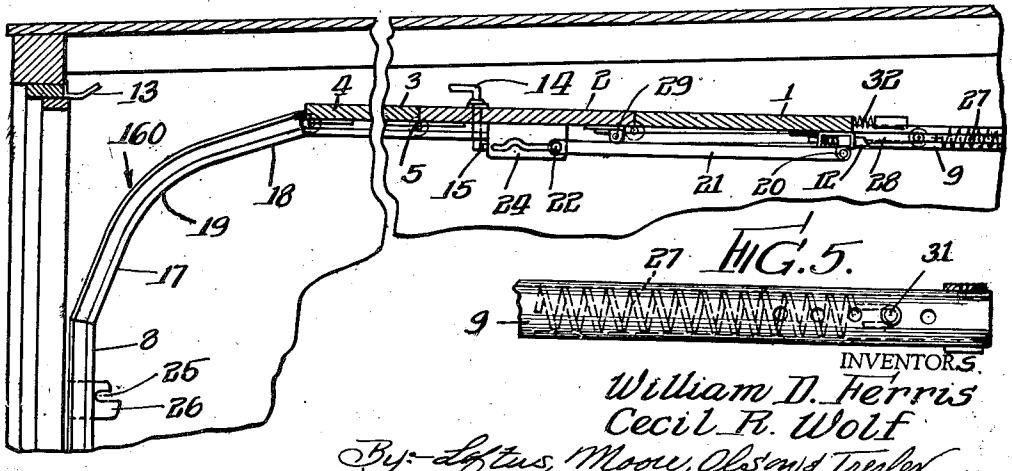


FIG. 5.

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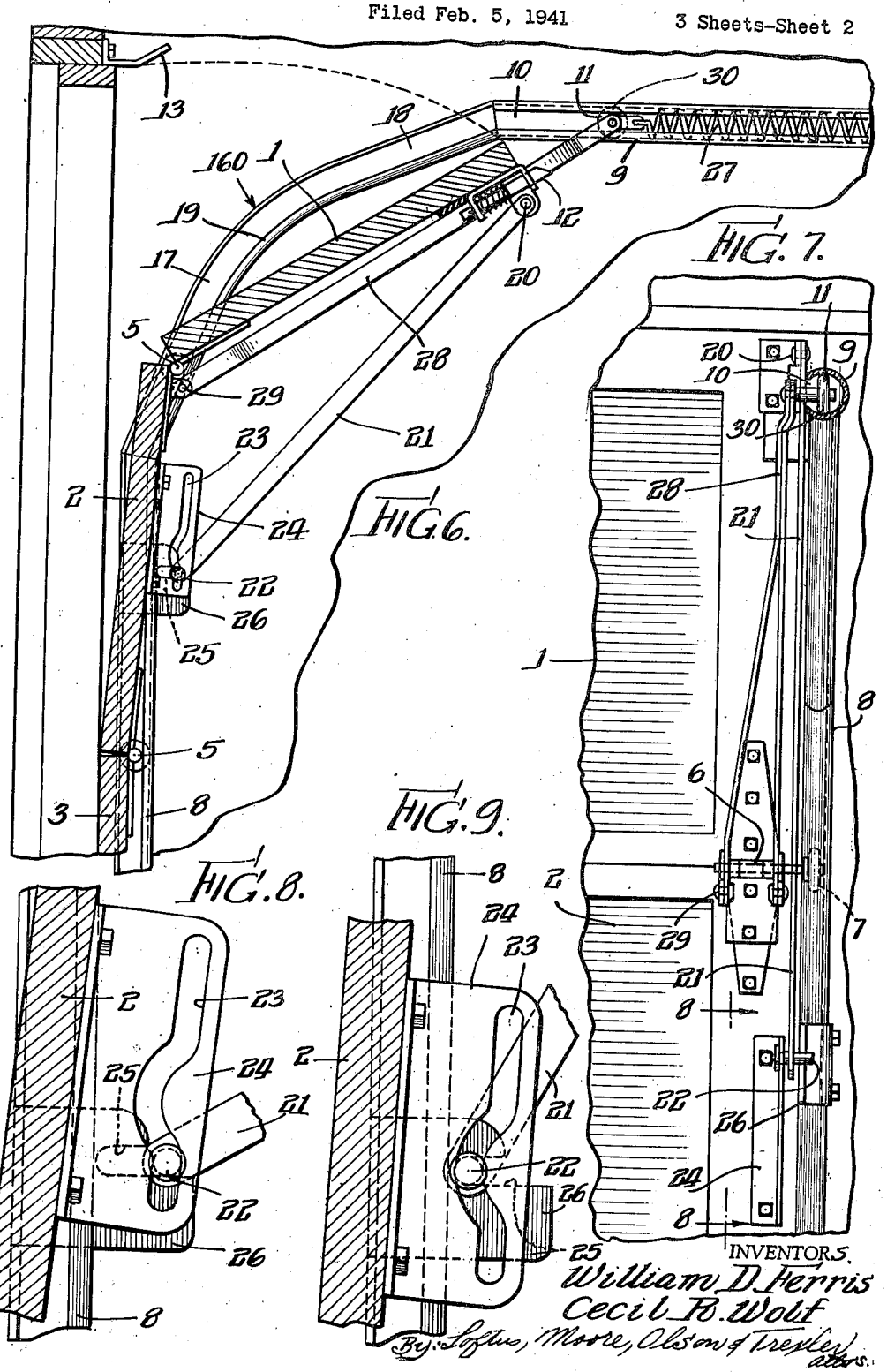


FIG. 6.

FIG. 8.

FIG. 9.

FIG. 7.

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GARAGE DOOR

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FIG. 10.

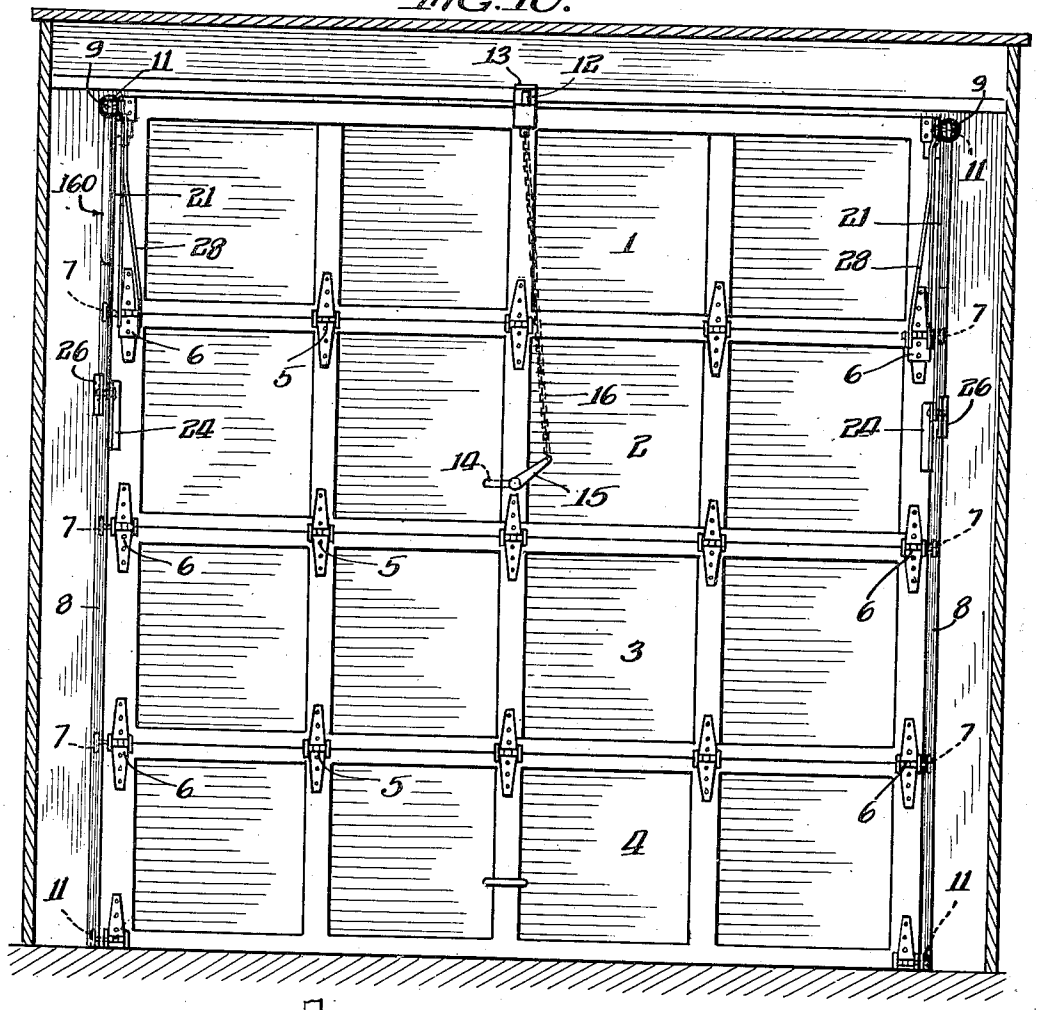


FIG. 11.

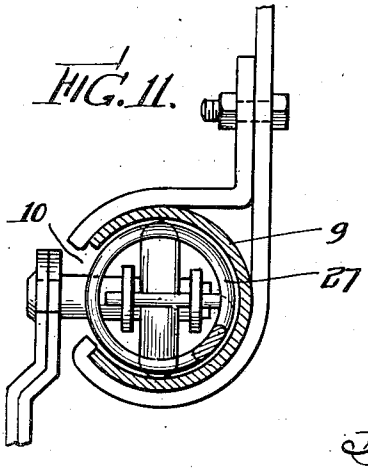
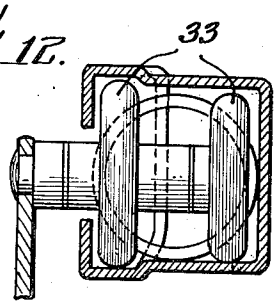


FIG. 12.



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UNITED STATES PATENT OFFICE

2,327,778

GARAGE DOOR

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Application February 5, 1941, Serial No. 377,498

11 Claims. (Cl. 160—209)

This invention relates to garage doors, and more particularly to those that are composed of horizontal sections which are hinged together at their meeting edges and which move upwardly in unison and then horizontally overhead to the open position of the door.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby a door of this particular character is more easily operated and is more free from any action that would cause jolting and jarring in the opening and closing thereof.

Yet another object of the present invention is to provide a door construction wherein the doors are in hinged sections and include means operating along a track under the impulsion of a spring for opening the door, wherein the track mechanism is of tubular construction and the spring is housed within the track mechanism whereby the tubular track serves a plurality of functions, such as serving as a guard for the spring, as well as supplying an anchor for the spring, thereby eliminating the necessity of brackets and other spring accessories which tend to clutter up the garage or other housing chamber. Furthermore, by means of this construction the spring is supported along its entire length whereby as the door is opened the weight of the spring is not added to the pull of the spring which ordinarily would result in too much power being applied near the final opening movement. Furthermore, by the utilization of this construction the spring acts as a check or brake upon the door, to stop its forward movement without imparting a rebound as the door reaches its fully open position.

Another object is to provide an improved form of track section between the vertical tracks at the sides of the doorway and the horizontal or overhead tracks, in order to improve the action of the door in the opening and closing movement thereof.

In addition, one object of the invention is to provide an improved form of overhead or horizontally disposed tracks for supporting the weight of the door in its open position and which are adapted to enclose the coil springs that assist in the opening of the door.

Yet another object of the invention resides in providing a tubular track along which roller means on the door sections are adapted to roll, in combination with an elongated spring housed within the tubular track and connected to the door sections so as to cause the door sections to be guided by and rolled along said track.

Yet another object of the invention resides in the details of construction of the tubular track whereby it forms not only a guideway for the rollers carried by the door sections, but also whereby it provides a housing for the spring means which raises the door sections.

Yet another object of the invention resides in the construction of the tubular track so as to not only house the elongated power spring means for the door, but also whereby the track provides means for anchoring the spring means adjustably thereto, and also provides means for mounting the door buffer means thereon.

To the foregoing and other useful ends, the invention consists in matters hereinafter set forth and claimed and shown in the accompanying drawings, in which—

Fig. 1 is a vertical section of a garage door embodying the principles of the invention, showing the same in its vertical or closed position and showing portions of the garage building also in section.

Fig. 2 is a similar view showing the uppermost section of the door unlatched and moving into an inclined position inside the building.

Fig. 3 is a similar view showing the uppermost section open to a greater degree.

Fig. 4 is a similar view showing the door in its raised and overhead open position.

Fig. 5 is a longitudinal section of the tubular track in which each lifting spring is enclosed, showing a portion of the spring thus contained in the track.

Fig. 6 is a view similar to Figs. 1, 2 and 3, but showing the uppermost section of the door tilted entirely over into its inclined position within the building.

Fig. 7 is an inside elevation of the portions shown in Fig. 6 of the drawings, being in the nature of an enlarged section on line 7—7 in Fig. 1 of the drawings.

Fig. 8 is an enlarged detail fragmentary view, being in the nature of a section on line 8—8 in Fig. 7 of the drawings.

Fig. 9 is a similar view, but showing the parts in different positions.

Fig. 10 is an inside view or elevation of the complete door, showing portions of the garage building in vertical section.

Fig. 11 is a detail cross section, on a larger scale, of one of the overhead tubular tracks in which the springs are enclosed.

Fig. 12 is a view similar to Fig. 11, but showing a different form of the invention.

As thus illustrated, the door comprises the four sections 1, 2, 3 and 4 that are hinged together by hinges 5 at their horizontal meeting edges. The outermost hinges 6 have wheels or rollers 7 that travel in the vertical tracks 8 that are provided at opposite sides of the doorway and that also travel in the overhead tracks 9 that are arranged horizontally, these overhead tracks being preferably cylindrical in form as shown in Fig. 11 of the drawings, but each cylindrical track having a longitudinal slot 10 at its inner side. The upper and lower ends of the doors are provided with wheels or rollers 11 that also travel in said tracks, being carried by brackets mounted on the door.

The uppermost section 1 of the door is, as previously explained, hinged to the section 2 of the door, so that the upper edge portion of this section 1 is free to swing outwardly into vertical or closed position and is free to swing inwardly into an inclined position, as shown more clearly in Fig. 6 of the drawings. Preferably, the upper edge of the section 1 is provided with a latch-bolt 12 for engagement with a bracket 13 fastened to the top of the doorway, so that when the door is closed, this uppermost section 1 of the door will automatically be latched in closed position. To unlatch the uppermost section of the door, a handle 14 is swiveled on the section 2 of the door, and the inner end portion of the said handle is provided with a crank-arm 15 which is connected by a chain 16 with the lower end of the said latch-bolt. In this way, by rotating the handle 14, the latch-bolt is disengaged from the bracket or strike-piece 13 and the door will then automatically move to substantially horizontal open position.

Between the upper ends of the track sections 8 and the outer ends of the track sections 9, there are track sections 160 that are formed in a special manner, as more clearly shown in Figs. 1, 2, 3 and 4 of the drawings. Each track section 160 is composed of two straight portions 17 and 18 and an intermediate curved portion 19 and it will be observed that the straight portion 18 is preferably the same length as the straight portion 17, and the ends of these two sections 160, one at each side of the doorway, can be welded or otherwise suitably fastened to the ends of the vertical and horizontal tracks. The special form thus provided for the two sections 160, it is found by actual experience, insures a smoother and easier and better motion or movement of the door into its open position, and thereafter into its closed position. The door is shown in its open position in Fig. 4 of the drawings, where it will be seen that it occupies a horizontal plane vertically at the tops of the horizontal tracks. In other words, the action of the wheels or rollers on the door is much improved by the provision of these track sections 160 in the form shown and described, and the action is much better than would be the case if these sections 160 were formed with one curve from end to end with a single radius.

Another feature which is of special importance is the manner in which the uppermost section 1 of the door is automatically controlled in its opening and closing movements. For this purpose, there is a pivot 20 on each upper corner of the door, that is connected by a link 21 with a pivot 22, which latter works up and down in a slot 23 in a bracket-plate 24 fastened to the section 2 of the door. In addition, this pivot 22, of each link 21, works into and out of the notch 25 in the bracket 26 fastened to the doorway. It will be seen that the notch 25 of each bracket-plate, there being one at each side of the doorway, is longer on its lower edge so that the notch is shorter on its upper edge than at its lower edge. Preferably the slot 23 of each plate 24 bulges toward the door near its lower end as it is found that this formation has a beneficial action in cushioning the opening and closing of the door. The bulge in the slot 23 positions the pivot 22 at the inner end of the notch 25, as shown in Fig. 9, while the straight lower portion of the slot 23 pulls the pivot out of engagement with said notch, as shown in Fig. 8, whereby the door is then ready to go up into its overhead open position. This construction eases the action, so to speak, and prevents the uppermost section 1 from closing violently with a jerk or a slam when it moves outwardly laterally toward the door frame. When the door is latched in vertical or closed position, the notch 25 of the two plates 26 holds the door rigidly against any upward movement.

For automatically opening the door when unlatched, and for pulling the door into its open overhead position, a pair of coil springs are used, one in each of the overhead tracks 9. The ends of these springs 27 are connected by a pair of links 28 with the pivots 29 on the door section 2, as shown in the drawings. Each link 28 is made double, as it is composed of two bars that are spread apart at their lower ends and bent together at their upper ends. The upper ends of these links 28 are connected to wheels or rollers 30 that travel in the overhead tracks and that are in turn connected to the said springs 27 contained in said tracks. The innermost ends of said springs may be fastened in place in any suitable or desired manner, as by bolts 31 inserted through spaced holes in the overhead tracks. This provides adjustment for the spring. Thus, these springs are always inside of said overhead tracks and are never extended therefrom, and hence these springs cannot sag or move up and down, but can only have extension endwise and horizontally inside of said tracks. The springs are stretched to their full capacity when the door is in closed position, as shown in Fig. 1 of the drawings, but the stretch is practically all out of the springs when the door assumes its overhead open position, against the bumper springs 32, and in this way there is no jolting or jarring or violent action when the door reaches its final open position.

It will be seen that the door starts moving upward practically as soon as the upper section thereof is unlatched and that such movement causes the first wheels or rollers on the door to enter the straight portions 17 of the specially formed track sections 160, as indicated in Figs. 2 and 3 of the drawings, and this action causes the links 21 to pull the section 1 over into an inclined position, as the pivots 22 are at such time not out of the notches 25 of the two bracket-plates fastened to the door frame. However, as soon as the section 1 reaches the position shown in Fig. 6 of the drawings, the springs 27 then exert a pull that raises the door to an extent that the slots 23 move the pivots 22 out of the notches 25, so that the door is then free to move upwardly and into its horizontal overhead open position. But the bulge or curve shown in each slot 23 holds the pivots 22 back in the notches 25,

as shown in Fig. 9 of the drawings, at a moment when it is important that this be done to insure the proper and desired action of the door.

In Fig. 12, the modification shows a different form of overhead track which is substantially or practically rectangular in cross section, instead of being cylindrical, and in which the door has two rollers 33 instead of the one roller shown in Fig. 11 of the drawings. Thus, in any form of the invention, the pivots 22 are at the tops of the slots 23 when the door is in closed position, as shown in Fig. 1 of the drawings, and the said pivots are at the same ends of the said slots when the door is in open position, as shown in Fig. 4 of the drawings. This is true, of course, regardless of the form of the overhead tracks, for in each case the same control devices are employed for controlling the action of the uppermost section of the door, in the opening and closing of the latter.

What we claim as our invention is:

1. In a garage door construction in which the door is of the sectional form in which the horizontal sections are hinged together at their horizontal meeting edges, vertical tracks for the sides of the doorway, horizontally disposed tracks overhead, and intermediate track sections connecting the upper ends of the vertical tracks with the outer ends of the horizontally disposed tracks, each intermediate track section having a middle curved portion and having straight end portions, together with means on the door for engaging said tracks and track sections.

2. A structure as specified in claim 1, the upper straight portion being longer than the lower straight portion.

3. In a garage or other door construction in which the door is of sections hinged together at their horizontal meeting edges, a vertical track and a horizontal overhead track interconnected with said vertical track, said overhead track being tubular, means carried by certain of the door sections adapted to travel in said tubular track to guide the door sections from vertical closed position to substantially horizontal overhead open position, and spring means housed within the tubular overhead track and connected to the door and contracting within said tubular track to lift the door.

4. In a garage or other door in which the door is composed of sections hinged together at their horizontal meeting edges, a vertical track and a tubular horizontal track having interconnecting track portions, means carried by certain of the door sections to travel on the internal wall of said tubular track to guide the door sections from vertically closed position to substantially horizontal overhead open position, elongated spring means housed in said tubular horizontal track in advance of said means and having one end anchored in said tubular track and having its opposite portion connected to one of the door sections.

5. In a garage or other door in which the door is composed of sections hinged together at their horizontal meeting edges, vertical and horizontal tracks having interconnecting track portions, said horizontal tracks being tubular in cross section and open at one side, an elongated spring housed within the tracks and having one end thereof anchored adjacent one end of the tracks, the opposite end of the spring being connected with a door section, and means carried by certain of the door sections, including lateral extensions passing through the openings of the tracks, and rollers on said extensions rolling within said tracks as said elongated spring contracts in lifting the door sections to substantially horizontal open position.

6. In a garage or other door in which the door is composed of sections hinged together at horizontal meeting edges, vertical and horizontal tracks for interconnecting track portions, said horizontal tracks being tubular in cross section and provided at their outer ends with spaced registering holes adapted to receive an anchorage bolt, an elongated spring housed within said tubular tracks and having one end connected to said bolt, and means connecting the other end of the spring to a door section.

7. In a garage or other door in which the door is composed of sections hinged together at horizontal meeting edges, vertical and horizontal tracks for interconnecting track portions, said horizontal tracks being tubular in cross section, an elongated spring housed within said tubular tracks and having one end connected to anchorage means, and means connecting the other end of the spring to a door section, and resilient bumper means mounted on the exterior wall of said tubular tracks and adapted to be contacted by the leading end of the foremost door section when the doors are moved to open position.

8. In a garage or other door in which the door is composed of sections hinged together at horizontal meeting edges, vertical and horizontal tracks for interconnecting track portions, said overhead track being tubular except for a longitudinal opening in the side thereof, and an elongated coil spring housed in said tubular track which spring when released, in cross section is substantially of the same cross section, but slightly smaller, than the inner cross section of the tubular track, said spring having one end anchored in said tubular track and the other end connected to a door section, and roller means carried by certain of the door sections and passing through the side lots in the tubular track and rolling along an inner surface of said track, said rollers in diameter corresponding substantially to the inner diameter of the tubular track.

9. In a garage or other door in which the door is composed of sections hinged together at horizontal meeting edges, vertical and horizontal tracks for interconnecting track portions, said horizontal tracks being tubular in cross section, said tubular tracks being substantially rectangular in cross section and provided with a longitudinal opening along one side, the inner walls of said tubular tracks providing spaced horizontally disposed tracks, means carried by certain of the door sections extending therefrom and passing through the longitudinal opening in the side of said track, and spaced rollers on said extensions, said rollers rolling on the bottom wall portions of said tracks, and elongated spring means enclosed within said tubular tracks, one end of the spring means being anchored therein and the other end of the spring means being connected to a door section.

10. In a garage door having horizontally hinged sections, the combination of a door frame, track means affixed thereto having vertical and horizontal sections and an interconnecting section along which the door is adapted to move, bearing means carried by certain of the door sections adapted to run in said track means, spring means mounted in the horizontal track section and interconnected with the door, for

pulling the door upwardly to open position along said track.

11. In a garage or other door construction wherein the door is composed of horizontally hinged sections, a door frame including vertical and horizontal tracks having interconnected track portions, certain of the door sections having bearing means adapted to run in said tracks, power spring means disposed in the horizontal track, said spring means having one end anchored, another portion of the spring means being connected by means of a link to one of the door sections, the uppermost door section being free to swing from a vertical closed position to an inwardly inclined position during the upward movement of the door sections by the spring.

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