July 4, 1939. W. D. FERRIS 2,164,648

GARAGE DOOR CONSTRUCTION

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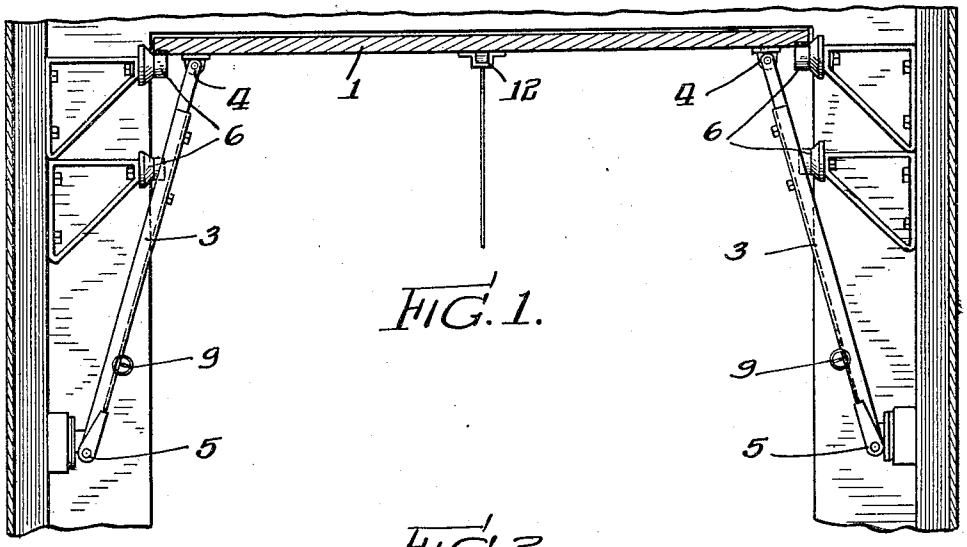

FIG. 1.

FIG. 2.

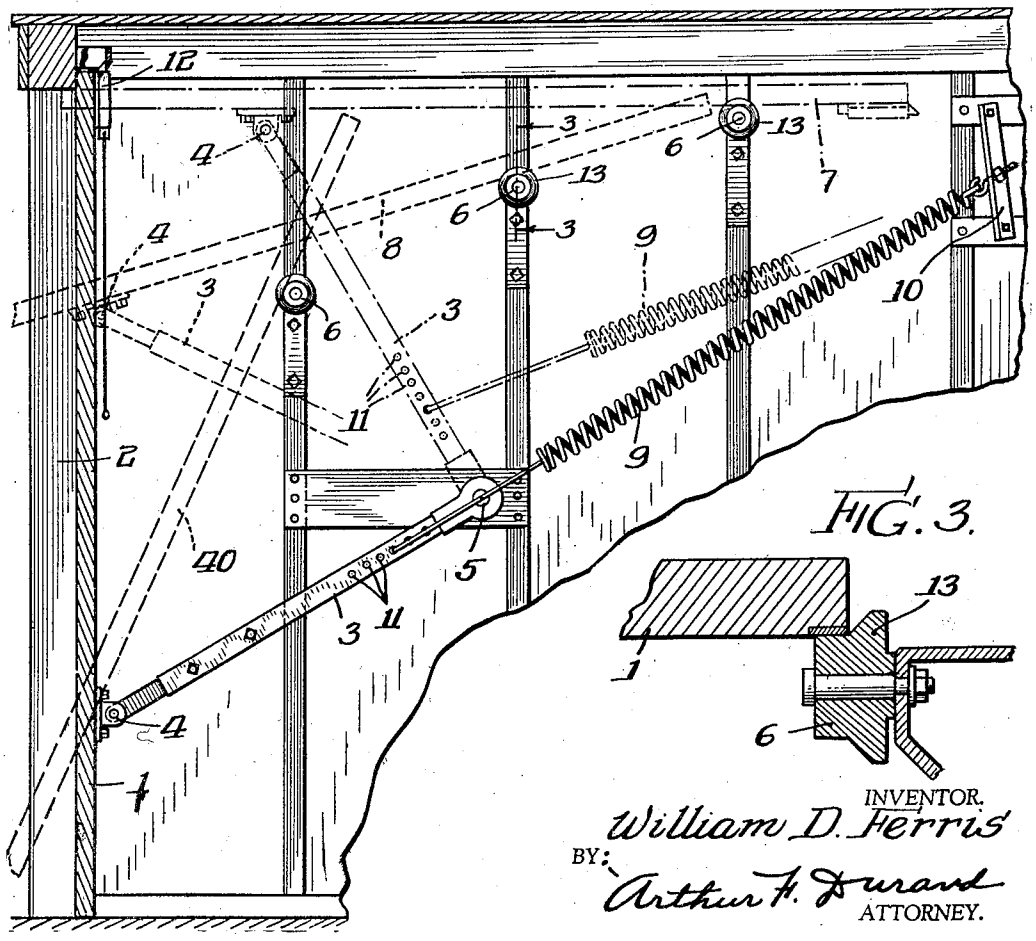

FIG. 3.

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FIG. 4.

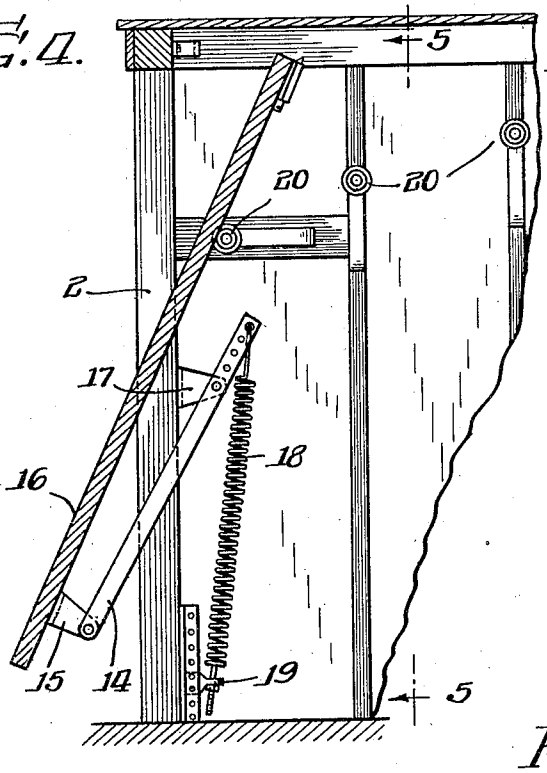

FIG. 5.

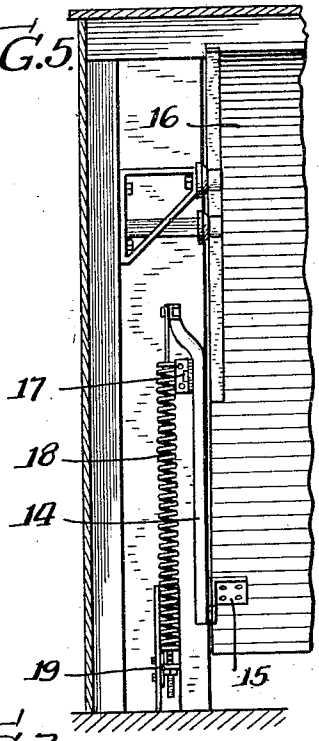

FIG. 7.

FIG. 6.

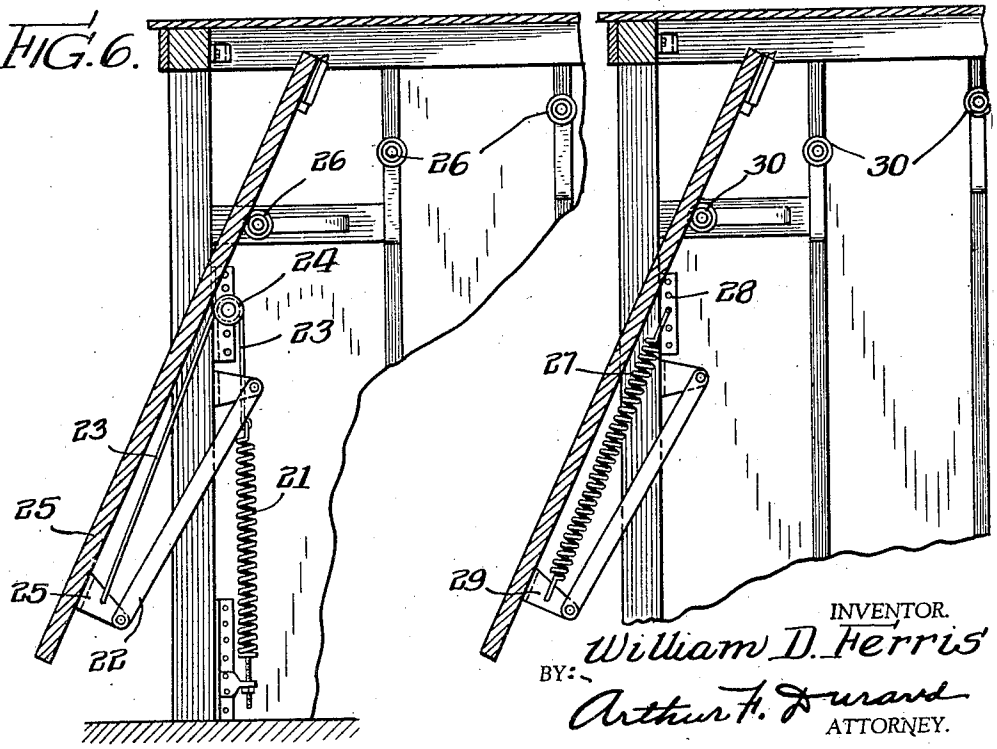

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FIG. 8.

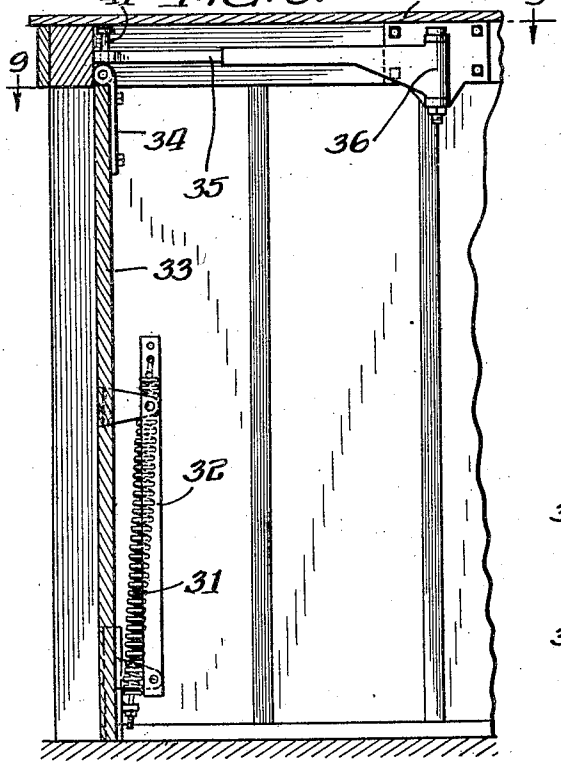


FIG. 9.

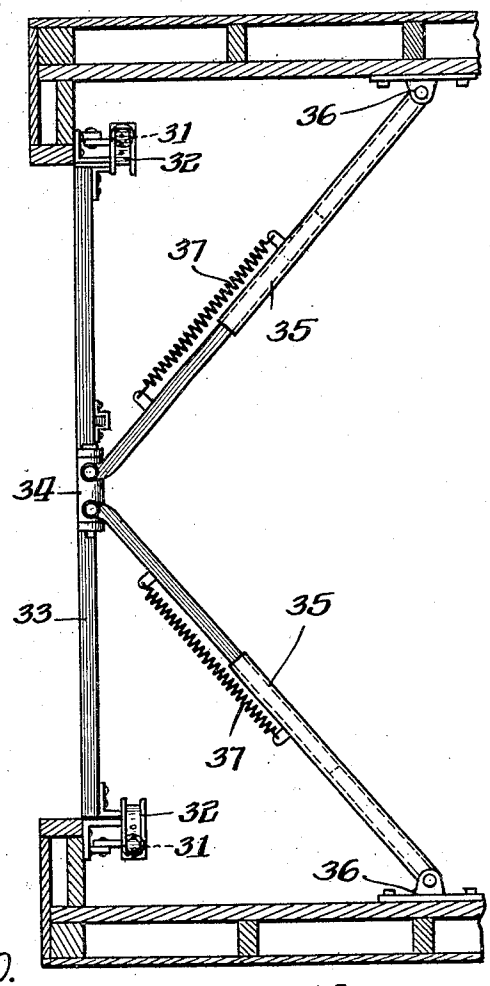


FIG. 11.

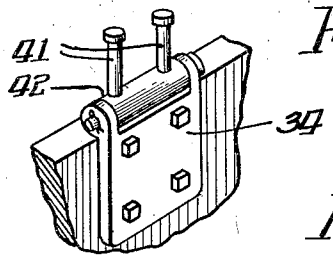
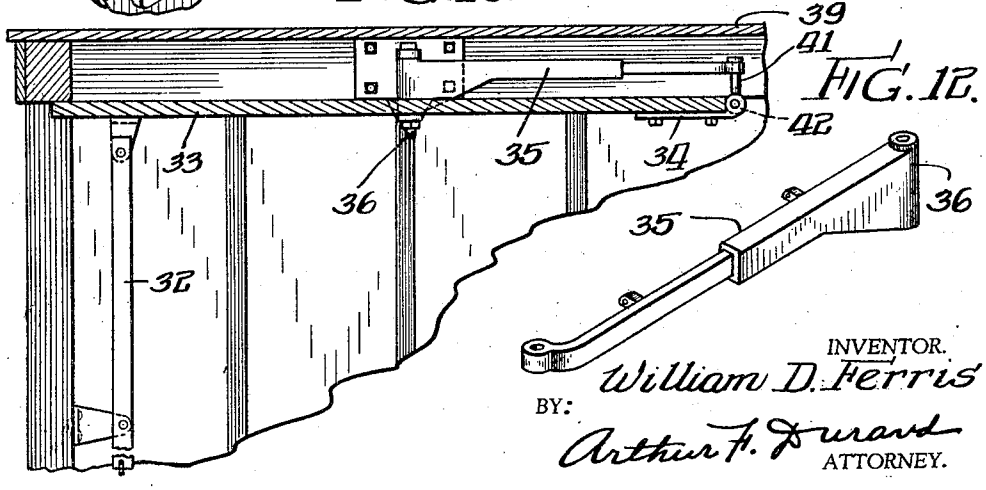


FIG. 10.

FIG. 12.



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UNITED STATES PATENT OFFICE

2,164,648

GARAGE DOOR CONSTRUCTION

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Application June 13, 1938, Serial No. 213,307

21 Claims. (Cl. 20—16)

This invention relates to garage doors, and more particularly to those that are made in one rigid section, and mounted in such a manner that the door has a vertical closed position in the doorway, and a substantially horizontal overhead position when it is open.

Generally stated, the object of the invention is to provide a novel and improved construction and arrangement whereby a garage door of this type is mounted to open and close, in a satisfactory manner, without using overhead tracks and other more or less expensive equipment, in a manner also obviating the necessity of a fixed axis of tilting movement below the upper end of the door, for the initial opening motion of the latter, and whereby, in a door of this character, a pair of springs are employed that assist in opening the door, and that serve to cushion the downward or closing movement of the door, and which are so relatively arranged that the door does not need to move between them, these springs being at all times entirely below the plane of the door, when the latter is in its overhead or horizontal open position, and being at all times more or less remote from the top portion of the doorway and the upper end of the door.

It is also an object to provide certain details and features of construction and combinations tending to increase the general efficiency and the desirability of a garage door of this particular construction.

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 door in its open or overhead position, transversely thereof, showing adjacent portions of the building and the apparatus by which the door is supported.

Fig. 2 is a vertical section of the door in its closed or vertical position, showing adjacent portions of the building and other parts in elevation.

Fig. 3 is an enlarged detail fragmentary section on line 3—3 in Fig. 2 of the drawings.

Fig. 4 is a view similar to Fig. 2, showing a different form of the invention.

Fig. 5 is a vertical section on line 5—5 in Fig. 4 of the drawings.

Fig. 6 is a view similar to Fig. 4, showing a different form of the invention.

Fig. 7 is a view similar to Fig. 6, showing a different form of the invention.

Fig. 8 is a view similar to Fig. 6, showing a different form of the invention.

Fig. 9 is a horizontal section on line 9—9 in Fig. 8 of the drawings.

Fig. 10 is a view similar to Fig. 8, but showing the door in open or overhead horizontal position.

Fig. 11 is a perspective of a portion of the structure shown in Fig. 9 of the drawings.

Fig. 12 is also a perspective of a portion of the structure shown in Fig. 9 of the drawings.

As thus illustrated, referring to Figs. 1 to 3 of the drawings, the invention comprises a rigid single door section 1, adapted to have a vertical closed position in the doorway 2, as shown in Fig. 2 of the drawings, and a horizontal overhead position as shown in Fig. 1 of the drawings. For this purpose, the door is provided with a pair of arms 3, disposed at opposite sides of the doorway, which have double pivots 4 on the door, and double pivots 5 on the building, so that each arm can, in effect, be adjusted toward the other, and so that each arm swings about two axes on the door, and swings about two axes on the building, the two double pivots 5 providing a horizontal axis about which the arms 3 swing up and down when the door is opened and closed. Rollers 6 are mounted on the sides of the building, at each side of the door way, as shown, and it is upon these rollers that the door moves upwardly and inwardly to its overhead horizontal position. The door will first fulcrum against the first roller, and then successively engage the other two rollers at each side of the doorway, so that ultimately the door will assume a horizontal position indicated by the dotted lines 7 in Fig. 2 of the drawings, but will have an intermediate inclined position indicated by the dotted lines 8 in said Fig. 2 of the drawings. A pair of springs 9 are connected between supports 10, one at each side of the building, and the arms 3, as shown. When the door is in its vertical or closed position, as shown in Fig. 2, these springs are practically on center, so to speak, but with the slightest inward and upward movement of the door, these springs begin to exert a pull on the arms 3, and this pull serves to assist in raising the door 1 into its said overhead or horizontal open position. When the door is entirely open, as indicated by the dotted lines 7 in Fig. 2, the arms 3 are inclined toward the door, and the springs 9 have contracted somewhat, but are nevertheless pulling with a greater fulcrum advantage, and hence the pull of the springs is sufficient to keep the lower end portion of the door tight against the under side of the upper jamb or top portion of the door frame, and this limits the opening movement of the door. Holes 11 in the arms 3 can be pro-

vided for adjustment of the springs 9, to regulate the spring fulcrumage or leverage thereof. When the door is closed, it is preferably latched at its upper end by a suitable latching device 12, and the door is opened by unlatching this device and pulling the top portion of the door inwardly, so that the springs then exert their tension to raise the door into its horizontal or overhead open position. In such overhead open position, the door is supported entirely by the arms 3 and the two rollers 6 that are farthest from the door, and a weight is about evenly distributed between said arms and said pair of rollers, and the tension of the springs at such time is sufficient to hold the door in its open position. At no time, it will be observed, does the door swing or move between the springs 9, as the arrangement is such that this is not necessary and is impossible with the construction shown and described. It will also be observed that the rollers 6 have beveled flanges 13 that engage the outer side edges of the door, thus preventing the latter from having any lateral displacement in the plane thereof, when in its overhead open position. These rollers are thus the only means provided to prevent such lateral displacement of the door and hence the opening and closing movements of the door are free from friction and interference that might result from the use of guiding devices of various kinds, as, for example, no overhead tracks are necessary. To close the door, all that is necessary is to reach up and grasp the lower end portion of the door, or a handle thereon, and pull it down, and the springs will cushion the downward or opening movement of the door.

With the foregoing construction, it will be seen that very little head room is necessary above the door, inasmuch as the upper end of the door does not extend very much, if any, above the plane of the door in its open position, while the door is being opened and closed, and hence that economy is possible in the construction of the door.

In Figs. 4 and 5, the construction is similar to that previously described, but in this case the door is supported by arms 14 that are pivoted at their lower ends on the brackets 15 on the door 16, and they are pivoted near their upper ends on brackets 17 mounted on the building at opposite sides of the doorway. A pair of springs 18 connect the shorter or upper ends of these arms 14 with adjustable hitching devices 19 secured to the lower portion of the doorway, so that these springs assist in opening the door, and serve to cushion the closing movement of the door. It will be seen that, in this case also, the springs are more or less remote from the top of the doorway and the top of the door frame, and are so arranged that the door never moves between the two springs. Rollers 20 support the door in its opening and closing movements, as previously described, and thus give the upper portion of the door a sort of floating action. In other words, the upper portion of the door is not held down positively to a predetermined path of travel, but is only held down by gravity, as otherwise the upper portion of the door is free to rise from the said rollers.

In Fig. 6, the construction is similar to that shown in Fig. 4, but in this case the springs 21 are not connected to the lever arms 22, but are connected by cords 23 running over sheaves 24, at each side of the doorway, to the brackets 25 on the bottom portion of the door. In this case, the rollers 26 are similar to those previously described, and give the upper portion of the door the so-called floating support or action previously described.

In Fig. 7, the construction is similar to that shown in Fig. 6, but in this case the springs 27 are connected between the fixed brackets 28 on the building, at their upper ends, and the brackets 29 on the bottom portion of the door. The rollers 30 in this construction are similar to those previously described.

In Figs. 8 to 12 inclusive, the construction is similar to that shown in Fig. 4 of the drawings, so far as the springs 31 and the lever arms 32 are concerned, for supporting the lower portion of the door 33, but in this case the previously described rollers are not employed. Instead of said rollers, the upper portion of the door is provided with a bracket 34, to which are pivoted the telescoping arms 35, which latter converge from their vertical pivots 36 on the sides of the building to said bracket 34 on the top portion of the door. Each telescoping arm is provided with a spring 37, tending to keep the two sections of the arm in shortened condition, but these springs are stretched and put under tension when the door is swung into its open or vertical position, as when that is done, the two arms are in effect lengthened. When the door is moved into its closed or overhead horizontal position, the arms 35 are lengthened, and have a sort of toggle action, and this toggle construction then assumes the position shown in Fig. 10 of the drawings, as it will then be disposed horizontally between the door 33 and the upper wall 39 of the building, to support the bottom end of the door. Thus, in the opening and closing movements of the door, the telescoping arms 35 are each shortened and then lengthened again, and the two springs 37 counterbalance each other and hold the door against lateral displacement in the plane thereof. The pivots 41 for the arms 35 are on the rotatable support 42 to permit the arm 35 to move into the position shown in Fig. 10 of the drawings. Thus, in this construction, the necessity for head room, above the door, is reduced to a minimum, as the top portion of the door practically never rises above the horizontal plane of the door in its open position.

In each form of the invention, therefore, the same broad ideas are embodied, to obviate the use of overhead tracks, and it is obvious that the construction may be changed or varied, more or less, without departing from the spirit of the invention.

In each form of the invention, as illustrated in Figs. 1 to 7, it will be seen that the first rollers are disposed a substantial distance from the inner side of the door, so that the latter must tilt inwardly a distance before engaging these first rollers, as indicated by the dotted lines 40 in Fig. 2 of the drawings. The door fulcrums on these first rollers, and then successively engages the other rollers, in the opening movement of the door.

In each form of the invention, from Fig. 1 to Fig. 12 inclusive, the door supporting means, or the instrumentalities that support the door for its opening and closing movements, comprise devices having fixed or stationary pivotal points associated with the upper end portion of the door, and disposed overhead, more or less, above the arms and springs that are associated with the lower portion of the door.

In Fig. 1, for example, the fixed or stationary pivots of the rollers 6 serve to control the move-

ment of the upper portion of the door, while in Figs. 8 to 12 inclusive the fixed or stationary pivots 36 perform the function of controlling the movement of the upper end portion of the door.

Also, in each form of the invention, the door is opened by pushing in the upper end portion thereof, initially, and thereafter the door is lifted manually and by the springs into its overhead or horizontal position.

Thus the initial opening movement of the door is not about a fixed axis below the door, as the construction, in each form of the invention, obviates the necessity of any such axis, and in each form of the invention no overhead tracks are necessary.

What I claim as my invention is:

1. In a garage door construction, a rigid section forming the door, a doorway in which the door has a vertical closed position, and instrumentalities obviating the necessity of overhead tracks, for mounting the door to swing upwardly into an overhead and more or less horizontal position, by inward opening movement of the door at its upper end, said instrumentalities comprising pivoted arms for supporting the lower portion of the door, pivoted on the door and also on a stationary axis, so that the lower end of the door has a predetermined path of travel, a pair of springs for assisting in the opening of the door, and for cushioning the closing movement thereof, said springs arranged in position to prevent the door from having any opening or closing movement between them, and said instrumentalities also obviating the necessity of a fixed axis of tilting motion below the upper end of the door, for the initial opening motion of the latter, comprising devices having a plurality of fixed or stationary overhead pivotal points above said arms and springs, to control said movement of the upper end of the door.

2. A structure as specified in claim 1, said devices comprising beveled rollers mounted in fixed position on the building to engage the side edges of the door.

3. A structure as specified in claim 1, said devices comprising a telescoping toggle connection between the upper portion of the door and the building.

4. A structure as specified in claim 1, said devices comprising rollers fixed in position on the building to form the sole means for holding the door against lateral displacement in the plane thereof.

5. A structure as specified in claim 1, said devices comprising rollers disposed in fixed position on the building to engage the side edges of the door, so that when the latter is in horizontal open position, it is supported at the upper end thereof by a single pair of rollers, and is supported at the lower end by said arms.

6. A structure as specified in claim 1, said springs having sufficient tension to hold the lower end portion of the door against the under side of the top portion of the door frame, when the door is in open position.

7. A structure as specified in claim 1, said springs being disposed more or less remote from the upper end of the door, and from the top portion of the door frame, so that the top portion of the door is never adjacent said springs.

8. A structure as specified in claim 1, said devices comprising a plurality of rollers at each side of the doorway, fixed on the building, with the first roller at each side disposed a distance from the door, when the latter is in its vertical or closed position, so that the door can swing inward a distance and fulcrum on these first rollers.

9. In a garage door construction, the combination of a single rigid door section, a plurality of rollers at each side of the doorway, with the first roller at each side disposed a distance from the door when the latter is in its vertical or closed position, and means including springs and pivoted arms for moving the door into an overhead horizontal position, by successive engagement with the rollers at each side of the doorway, it being necessary for the door to swing inwardly a substantial distance at its upper end, before engaging said first rollers, on which latter the door then fulcrums to tilt toward its overhead horizontal position.

10. A structure as specified in claim 9, said rollers being beveled to hold the door against lateral displacement in the plane thereof.

11. In a garage door construction, the combination of a door comprising a single rigid section having a vertical closed position in the doorway, and a substantially horizontal overhead open position, pivoted arms and springs for controlling the movement of the lower portion of the door, and instrumentalities obviating the necessity of using overhead tracks for the upper portion of the door, or of using a fixed axis of tilting movement below the upper end of the door, for the initial opening motion of the latter, comprising fixed or stationary pivotal points associated with the upper portion of the door, disposed in more or less overhead positions above the said arms and springs.

12. A structure as specified in claim 11, said pivotal points having rollers mounted thereon to engage the lateral edge portions of the door.

13. A structure as specified in claim 11, said pivotal points having arms mounted to swing horizontally thereon.

14. A structure as specified in claim 11, said pivotal points having arms mounted to swing horizontally thereon, each arm comprising two telescoping portions, with a spring tending to contract the sections of each arm, and the two arms converging to the top portion of the door.

15. A structure as specified in claim 11, said springs being disposed in position to obviate any necessity of the door having any movement between them, and said pivotal points having rollers mounted thereon to engage the lateral edge portions of the door.

16. A structure as specified in claim 11, said pivotal points having rollers mounted thereon to engage the lateral edge portions of the door, the first rollers being mounted a distance inside of the door, so that the latter tilts inward at its upper end to engage and fulcrum upon these first rollers, before moving upward and inward on the other rollers.

17. In a garage door constuction, a rigid section forming the door, a doorway in which the door has a vertical closed position, and instrumentalities for mounting the door to swing upwardly into an overhead and more or less horizontal position, said instrumentalities comprising pivoted arms for supporting the lower portion of the door, so that the lower end of the door has a predetermined path of travel, a pair of springs for assisting in the opening of the door, and for cushioning the closing movement thereof, said springs arranged to prevent the door from having any opening or closing movement between them, and said instrumentalities also comprising devices having a plurality of fixed or

stationary overhead pivotal points above said arms and springs, to control the opening movement of the upper end of the door, said devices comprising a telescoping toggle connection between the upper portion of the door and the building.

18. In a garage door construction, a rigid section forming the door, a doorway in which the door has a vertical closed position, and instrumentalities for mounting the door to swing upwardly into an overhead and more or less horizontal position, said instrumentalities comprising pivoted arms for supporting the lower portion of the door, so that the lower end of the door has a predetermined path of travel, a pair of springs for assisting in the opening of the door, and for cushioning the closing movement thereof, said springs arranged to prevent the door from having any opening or closing movement between them, and said instrumentalities also comprising devices having a plurality of fixed or stationary overhead pivotal points above said arms and springs, to control the movement of the upper end of the door, said devices comprising a plurality of rollers at each side of the doorway, fixed on the building, with the first roller at each side disposed a distance from the door, when the latter is in its vertical or closed position, so that the door can swing inward a distance and fulcrum on these first rollers.

19. In a garage door construction, the combination of a door comprising a single rigid section having a vertical closed position in the doorway, and a substantially horizontal overhead open position, pivoted arms and springs for controlling the movement of the lower portion of the door, and instrumentalities obviating the necessity of using overhead tracks for the upper portion of the door, comprising fixed or stationary pivotal points associated with the upper portion of the door, disposed in more or less overhead positions above the said arms and springs, said pivotal points having arms mounted to swing horizontally thereon.

20. In a garage door construction, the combination of a door comprising a single rigid section having a vertical closed position in the doorway, and a substantially horizontal overhead open position, pivoted arms and springs for controlling the movement of the lower portion of the door, and instrumentalities obviating the necessity of using overhead tracks for the upper portion of the door, comprising fixed or stationary pivotal points associated with the upper portion of the door, disposed in more or less overhead positions above the said arms and springs, said pivotal points having arms mounted to swing horizontally thereon, each arm comprising two telescoping portions, with a spring tending to contract the sections of each arm, and the two arms converging to the top portion of the door.

21. In a garage door construction, the combination of a door comprising a single rigid section having a vertical closed position in the doorway, and a substantially horizontal overhead open position, pivoted arms and springs for controlling the movement of the lower portion of the door, and instrumentalities obviating the necessity of using overhead tracks for the upper portion of the door, comprising fixed or stationary pivotal points associated with the upper portion of the door, disposed in more or less overhead positions above the said arms and springs, said pivotal points having rollers mounted thereon to engage the lateral edge portions of the door, the first rollers being mounted a distance inside of the door, so that the latter tilts inward at its upper end to engage and fulcrum upon these first rollers, before moving upward and inward on the other rollers.

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