Oct. 21, 1941. V. L. HOLMES 2,259,819

DOOR CONSTRUCTION

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Fig. 1.

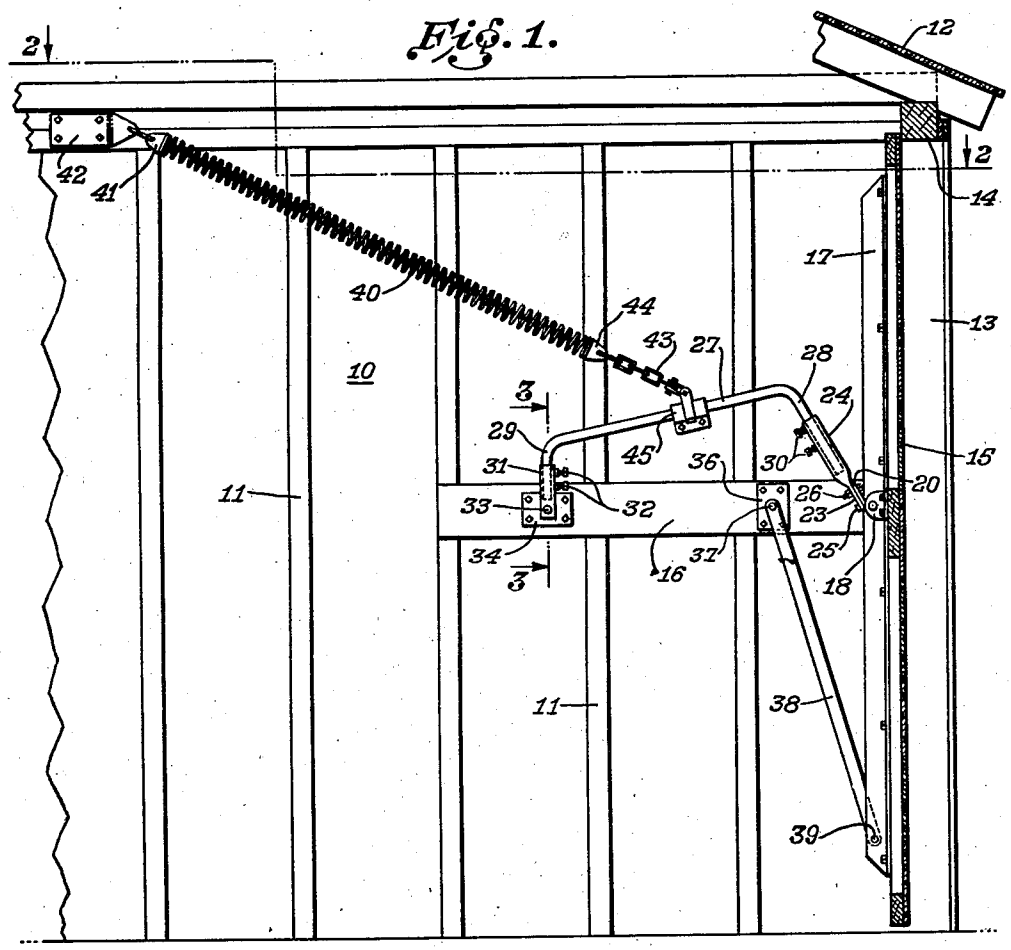



Fig. 2.

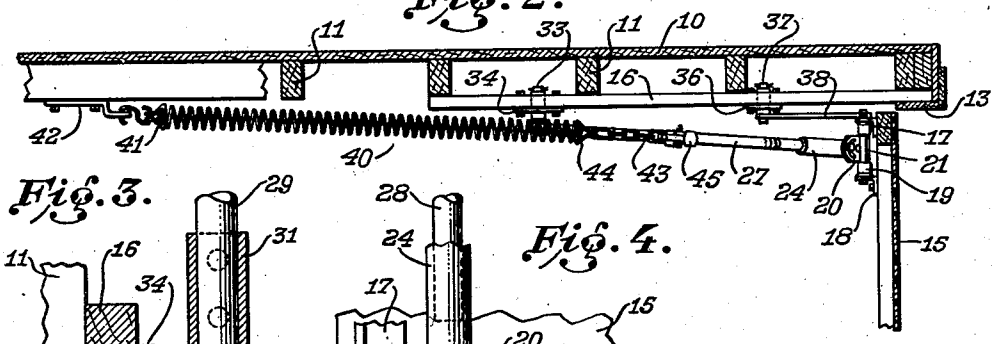



Fig. 3.

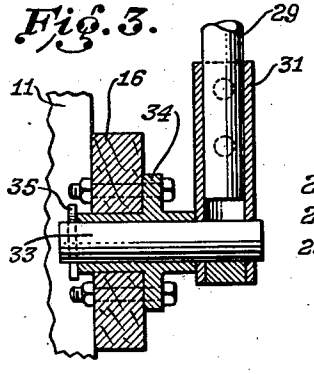
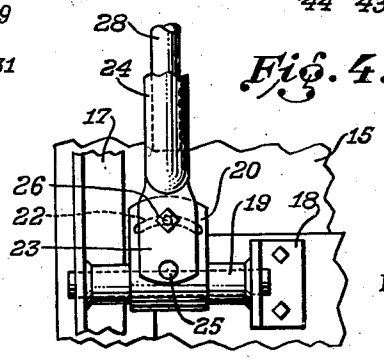



Fig. 4.




INVENTOR.
VERNE L. HOLMES
BY Joseph F. Westall
ATTORNEY.

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Fig. 5.

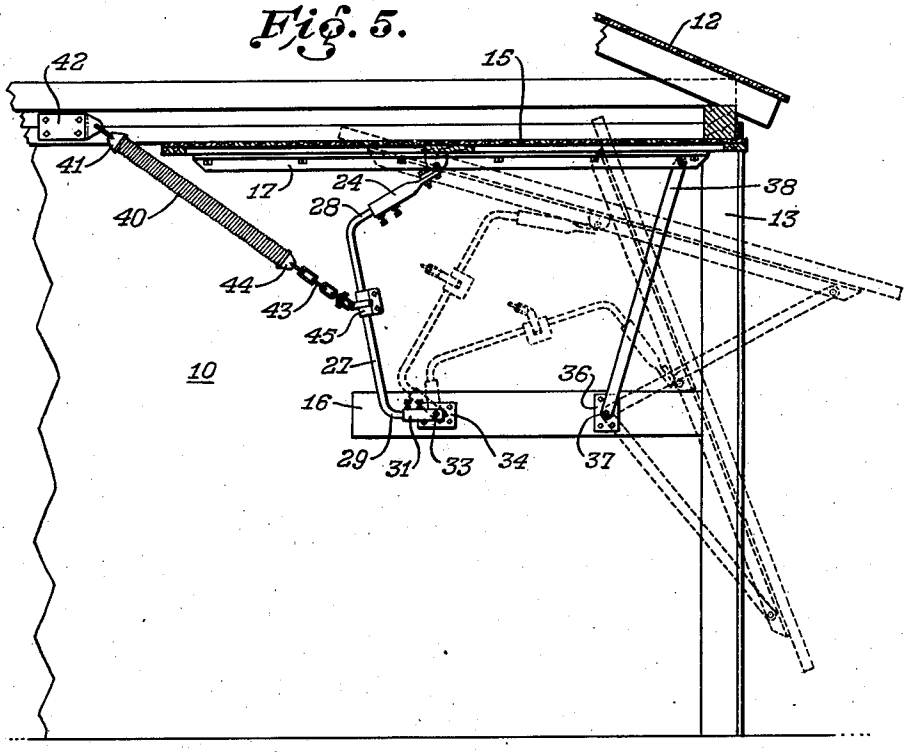



Fig. 7.

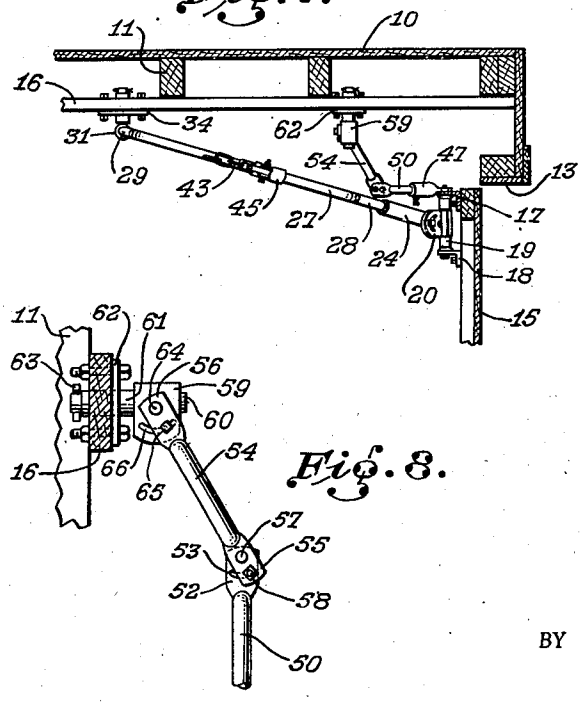
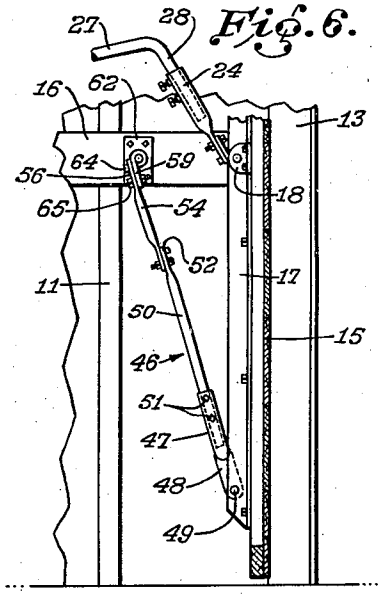



Fig. 8.




Fig. 6.




INVENTOR.
VERNE L. HOLMES

BY Joseph F. Westall

ATTORNEY.

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# UNITED STATES PATENT OFFICE

2,259,819

## DOOR CONSTRUCTION

Verne L. Holmes, Los Angeles, Calif.

Application November 26, 1938, Serial No. 242,494

9 Claims. (Cl. 20—16)

This invention relates to balanced doors, and particularly contemplates novel supporting apparatus for garage doors of the type disposed, when closed, in a vertical position, but movable into the garage upon being opened, to a horizontal position substantially at the level of the lintel of the doorway.

It is usually desirable in overhead doors of the character here contemplated to mount the door supports on the opposite side walls of the garage. However, due to the variations in the width of the garages with respect to the doorways thereof, each set of supporting structure for a door of this type must, in accordance with the prior art, be specially constructed for each installation if the side walls of the garage are to be used as a mounting. The supporting arms are usually bent laterally to reach the opposite walls on which they are pivoted. Accordingly, each installation requires specially designed hardware, the manufacture of which is not only expensive, but cannot be commenced until the particular requirements are determined. If straight supporting arms are used, wall blocks must be employed to build out the sides of the walls to provide the mounting for the points of pivoting of the supporting arms which must lie in the same vertical plane, transverse to the door, as the points of attachment, respectively, of said supporting arms to the door. As the arms necessarily extend into the garage and are pivoted on their stationary mounting at a level substantially intermediate the upper and lower extremities of the doorway, they will, if so constructed, greatly restrict the useful area of the garage.

It is a principal object to obviate the aforementioned deficiencies of the prior art by the provision of a door construction embodying adjustable supporting mechanism readily adapted for installation in garages having considerable variation in the disposition of the walls relative to the respective door jambs.

Another object is to provide supporting mechanism to swing the door on a pivot at the middle of the door in a fixed arc in combination with means to simultaneously swing a lower portion of the door which is spaced from the point of pivoting of the supporting mechanism to the door, a distance equal to the radius of the aforesaid arc, in an arc having a center spaced from the center of the first-named arc.

Another object is the provision of a pair of supporting arms for each side of the door pivoted at vertically spaced points thereon, said arms having their opposite ends pivoted at different horizontally-aligned points on a stationary support disposed laterally and at right angles to the door.

Another object is to provide a door supporting structure adapted to swing the upper end of a door in a flat arc and thereby reduce the overhead clearance necessary for movement of the door to its horizontal open position.

Other objects and corresponding advantages such as economy of construction, ease of installation, simplicity of design, positive operation, and durability, will be apparent to those of skill in this art from an examination of the following description read in the light of the accompanying drawings, in which:

Fig. 1 is an elevation of the apparatus of my invention for supporting one side of the door, illustrating the relative position of the parts with the door closed;

Fig. 2 is a section taken on lines 2—2 of Fig. 1;

Fig. 3 is an enlarged sectional view taken on lines 3—3 of Fig. 1;

Fig. 4 is an enlarged broken plan view of the pivotal and adjustable connection of the supporting arm to the door;

Fig. 5 is a reduced elevation similar to Fig. 1 depicting in solid lines the disposition of the parts with the door in open position, and in dotted lines several intermediate positions of the mechanism;

Fig. 6 is an elevation of the modified form of my invention;

Fig. 7 is a plan view of the modification illustrated in Fig. 6;

Fig. 8 is an elevation partly broken away of the composite supporting arm of the modified embodiment hereof.

Referring to the drawings in detail, the numerals of which indicate similar parts throughout the several views, 10 designates an inner surface of the side wall of a garage, and 11 the studding therefor. The roof of the garage is shown in broken section as at 12. The door jamb and lintel of the garage doorway are indicated by numerals 13 and 14, respectively.

In the following description of my invention, the supporting structure for only one of the sides of the garage door will be described, it being understood that similar apparatus is provided at the opposite side of the garage to carry and balance the door throughout its opening and closing movements.

To support the overhead door 15 which may be of any conventional design, throughout its normal opening movement from the position illus-

trated in Fig. 1 to that shown in Fig. 5, a wall board 16 is secured in horizontal position to studs 11 of the wall 10 of the garage. On the adjacent vertical edge of the inner surface of the door 15 an angle iron 17 is bolted or otherwise secured, which braces the door and provides a means of attachment for a supporting arm about to be described.

Referring particularly to the embodiment of my invention illustrated in Fig. 1: An angle bracket 18 is secured to the rear surface of the door substantially intermediate its upper and lower extremities and spaced laterally of the angle iron 17. Horizontally aligned bearings are carried by the angle iron 17 and bracket 18, respectively, in which the ends of a spindle 19 are journalled. A lug 20 has integral portions 21 thereof turned around spindle 19 and is provided with an arcuate slot 22. The flattened end 23 of a tubular member 24 is pivoted to lug 20 by means of a pin 25, the axis of which comprises the center of the arc of the slot 22. A bolt 26 extends through arcuate slot 22 and the flattened end 23 of member 24 to hold the member and lug in any desired adjusted angular relation.

A supporting arm 27 is provided, having its ends 28 and 29 bent in the same direction. One of said ends 28 is extended into the tubular member 24 and is secured therein by means of set screws 30. The opposite end 29 of the supporting arm 27 is received in a pipe 31 and secured in a like manner by set screws 32. A horizontal shaft 33 extends transversely through a hole in the opposite end of pipe 31 to which the pipe is welded or otherwise immovably secured. Shaft 33 is journalled in a bearing fitting 34 secured to the wall board 16 which is secured to the studs 11 of the side 10 of the garage as above noted. A cotter key 35 in the end of shaft 33 opposite to the end on which the pipe 31 is secured prevents displacement of the shaft from fitting 34.

Between the fitting and the garage door a plate 36 is secured to the wall board, which plate carries a pin 37 in horizontal alignment with shaft 33. One end of bar 38 is journalled on pin 37 and the opposite lower end of bar 38 is pivoted to angle iron 17 adjacent the lower end of the door by means of a pin 39.

It will thus be observed that by the elevation of the door toward its open horizontal position, the middle of the door will be swung on an arc having a center on the axis of spindle 19 while the bar 38, due to the advance location of the pin 37 on the wall board with respect to shaft 33, will simultaneously tilt the door on spindle 19 toward a horizontal position and swing the lower end of the door to a position adjacent the lintel. As a result of pivoting the bar 38 to the wall 10 in advance of shaft 33, the upper end of the door will move in a flat arc requiring very little vertical clearance above the level of the lintel 14.

To facilitate this operation, a helical spring 40 is provided having one end connected by means of a clip 41 to a bracket 42 secured to the wall 10 of the garage at a point rearwardly of the shaft 33 and substantially level with the upper end of the door. The opposite end of spring 40 is hooked in a chain 43 attached to a clip 44 which is, in turn, carried by a clamp 45 of any conventional construction fastened to the supporting arm 27. Spring 40 thus exerts an upward pull on arm 27 tending to swing the door to open position. Tension of the spring, as well as its leverage on the door supporting structure, may be increased or decreased by moving the clamp 45 toward or further away from, respectively, the end of supporting arm 27 which is attached to the tubular member. The tension of the spring, irrespective of its leverage on the supporting arm, may be varied by hooking the spring in different links of the chain 43.

The embodiment of Figs. 6, 7, and 8 is adapted for installation in garages wherein the distances between the door jamb 13 and the wall 10 or other available mounting for the ends of the door supporting members is different, by providing for lateral adjustment in both supporting members at each side of the door. The supporting arm 27 of this embodiment is identical with that of the embodiment of Figs. 1 to 5, the effective length of which arm may be extended or contracted by reason of its telescopic reception of its ends by the sockets afforded by the bores of the tubular members 24 and pipe 31, so as to compensate for wide variations in the relative lateral disposition of the wall board 16 and door 15. The bar 38, however, is substituted by a composite supporting arm 46 comprising a tubular member 47 having a flattened lower end 48 which is pivoted on a pin 49. One end of a pipe 50 extends into the bore of the tubular member and is secured therein by set screws 51. The upper opposite end of the pipe 50 is flattened as at 52 and is provided with an arcuate slot 53 for a purpose about to be described. Another section of the composite arm 46 comprises a pipe 54 having flattened ends 55 and 56. One of said ends 55 is secured to the upper end of pipe 50 by means of a pin 57 coaxial with the arc of said slot 53 and a bolt 58 extending through the arcuate slot whereby pipe 54 may be turned on the pin 57 laterally relative to pipe 50 and held in any angular relation thereto by the bolt 58. For attachment of the upper end of the pipe 54 a foot 59 is mounted rigidly on a spindle 60 which extends through a bearing 61 carried by a face plate 62 bolted to the wall board. 63 indicates a cotter key through the end of spindle 60 to retain the latter in bearing 61 in an obvious manner. The face plate 62 is positioned to support spindle 60 in horizontal and parallel alignment with the shaft 33. The upper end 56 of the pipe 54 is pivoted to the foot 59 by a pin 64 and is secured in any pivotal adjusted position by a bolt 65 extending through the flattened end 56 of the pipe and through an arcuate slot 66 in the foot, said slot having its center on the axis of the pin 64.

The apparatus described is quickly and easily installed in garages having doorways of different widths with respect to the distances between the walls, without any of the parts thereof being specially built, by reason of the many adjustments provided. It will be observed that the distance between the spindle 19 and shaft 33 will depend upon both the height of the door (it being desirable to pivot the supporting arm in the middle of the door to permit balancing) and the lateral offset relationship of the spindle 19 and shaft 33. The length of the composite supporting arms may be quickly altered to meet the requirements of a particular job by varying the degree of telescopic extension of the ends of the supporting arm 27 in the tubular member 24 and pipe 31 respectively. Variations, in different garages, in the angle between the plane of the door and a line through door spindle 19 and shaft 33 due to differences in the proximity of the wall of the garage with respect to the

side edge of the door, may be compensated by the angular adjustment of the tubular member 24 on pin 25. Adjustments for length and angular relationship of the composite arm 46 may be made in a similar manner as will be obvious from the above.

While I have described but two embodiments of my invention, it will be understood that numerous changes in size, number, proportion and shape of the various parts may be made without departing from the spirit of my invention as defined in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In a door construction, an arm having its ends bent to extend parallel to the same vertical plane, a pipe pivoted to a mounting, a tubular member pivoted to the door, the ends of said arm being telescopically received by said pipe and tubular member, respectively, means to secure said arm ends within said pipe and member at any degree of telescopic extension of said arm within said pipe and tubular member, and a spring having one end secured to a mounting rearwardly of the door and its opposite end secured to said arm with the spring substantially axially aligned with the point of pivoting of said member to the door.

2. In a door construction, a supporting arm, means to pivot one end of said arm to the door to swing laterally and vertically of the door, and means to pivot the other end of said arm to a mounting to permit the arm to swing laterally and vertically of the mounting, said arm comprising an end section pivoted to the door and a second opposite end section pivoted to a mounting and an intermediate portion, means to secure said end sections to said intermediate portion at different points along the length of said portion to vary the length of said arm, a second arm having one end pivoted to a mounting at a point spaced from the point of pivoting of said first-named arm to its mounting, and means to pivotally connect the opposite end of said arm to the door.

3. In a door construction, a pair of arms pivoted to said door at different points thereon and to stationary mountings spaced from one another, each of said arms comprising a pair of members pivotally joined by a pin to permit angular adjustment between said members, and means to secure said members against movement with respect to one another on said pin.

4. In a door construction, a stationary mounting piece, an arm having its ends bent in the same plane, means to pivotally attach one end of said arm to said stationary mounting piece in a position with both ends and the portion of the arm therebetween lying in the same vertical plane, a member pivotally connected to the door, and means to secure said member to the end of said arm opposite to the end thereof which is attached to said mounting piece for relative rotation between said arm and member.

5. In a door construction, a stationary mounting piece, an arm having its ends bent in the same plane, means to pivotally attach one end of said arm to said stationary mounting piece in a position with both ends and the portion of the arm therebetween lying in the same vertical plane, and means to connect the opposite end of said arm to the door with said last-named end rotatably adjustable on its own axis, said last-named means including a horizontal pivot for movement of the arm in a vertical arc with respect to the door.

6. In a door construction, a stationary mounting piece, an arm comprising a pair of sections connected for variable angular adjustment therebetween, means to pivotally connect opposite ends of said arm to said mounting piece and door, respectively, a second arm comprising a pair of sections connected for variable angular adjustment therebetween, means to pivotally connect one end of said last-named arm to the mounting piece in horizontal alignment with the point of connection of the first-named arm thereto but at a point spaced therefrom, and to the door below the point of connection of the first-named arm of the door.

7. In a door construction, a stationary mounting piece, an arm comprising a pair of sections connected for variable angular adjustment therebetween, means to pivotally connect opposite ends of said arm to said mounting piece and door, respectively, a second arm comprising a pair of sections connected for variable angular adjustment therebetween, means to pivotally connect one end of said last-named arm to the mounting piece at a point spaced from the point of connection thereto of said first-named arm, and to the door below the point of connection of the first-named arm to the door.

8. In a door construction, a door, a stationary mounting, an arm having one end pivoted to said mounting and its opposite end pivoted to the door, resilient means contractible and extensible along its longitudinal axis, means to secure said resilient means to said stationary mounting rearwardly of said door, and means carried by said arm and disposed in alignment with the points of attachment of said resilient means to the mounting and of said arm to the door, respectively, when the door is in closed position, for attachment of the opposite end of said resilient means.

9. In a door construction, an arm having one end pivoted to the door at a point thereon slightly above the middle of the door and its opposite end pivoted to a mounting in horizontal alignment with said last-named point of pivoting, said arm being of a length substantially equal to the distance vertically between the point of pivoting of said arm to the door when the latter is closed and the horizontal plane in which said last-named point of pivoting lies when the door is open, and a second arm having one end pivoted to the door at a point below said point of pivoting of the first arm to the door when the latter is closed, and having its opposite end pivoted to the mounting intermediate and in horizontal alignment, when the door is closed, with the points of pivoting of said first arm to the mounting and door, respectively.

VERNÉ L. HOLMES.