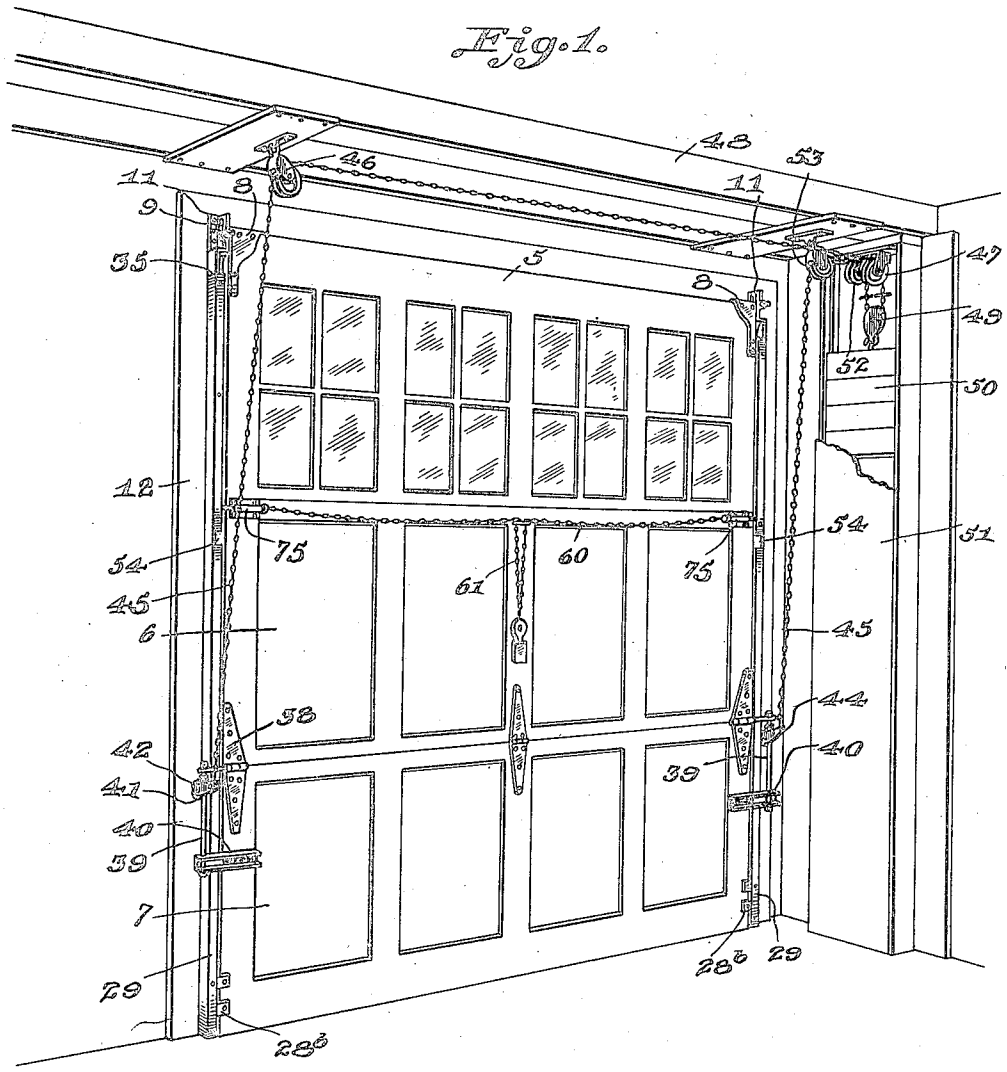
Sept. 13, 1932. B. J. TRILLER 1,876,798

FOLDING GARAGE DOOR OR THE LIKE

Filed July 29, 1930 3 Sheets-Sheet 1

Fig. 1.



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Sept. 13, 1932. B. J. TRILLER 1,876,798

FOLDING GARAGE DOOR OR THE LIKE

Filed July 29, 1930 3 Sheets-Sheet 2

Fig. 4.

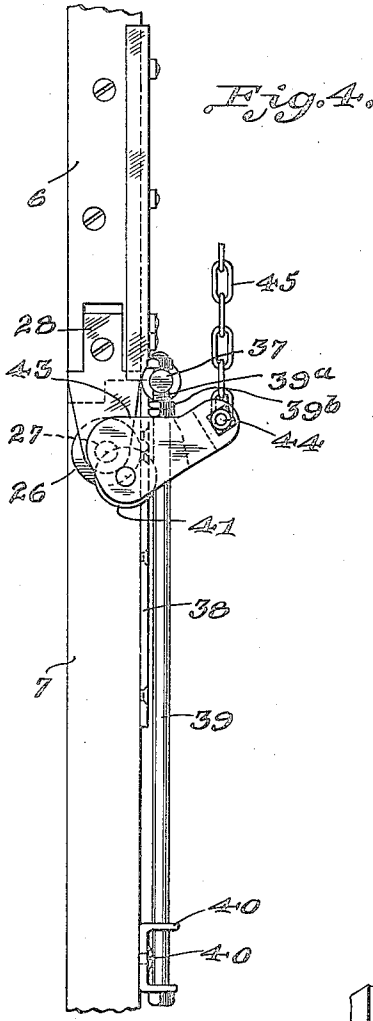


Fig. 3.

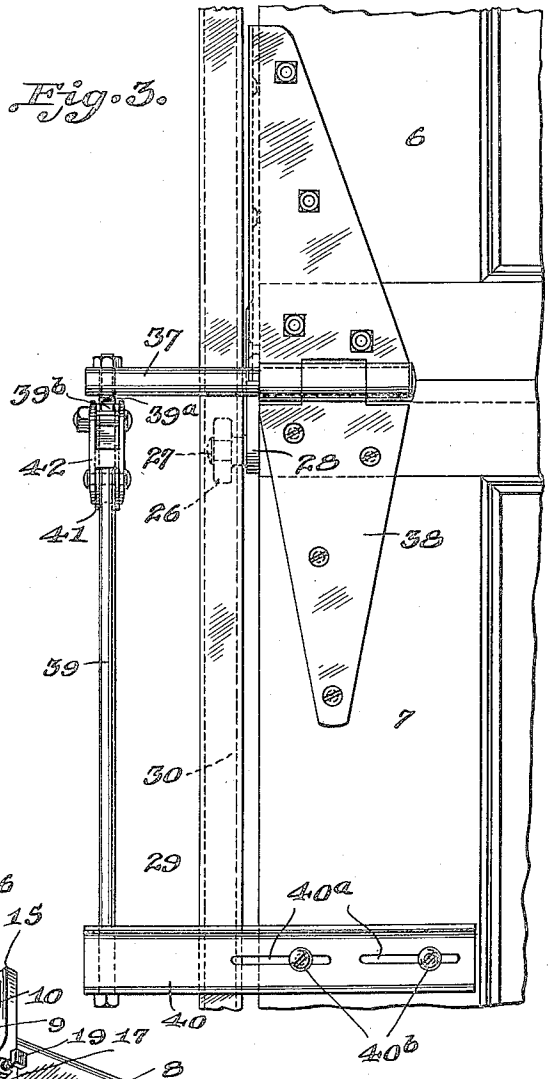
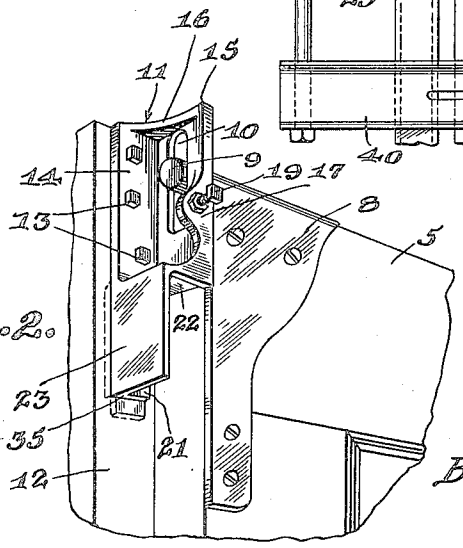


Fig. 2.



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Filed July 29, 1930 3 Sheets-Sheet 3

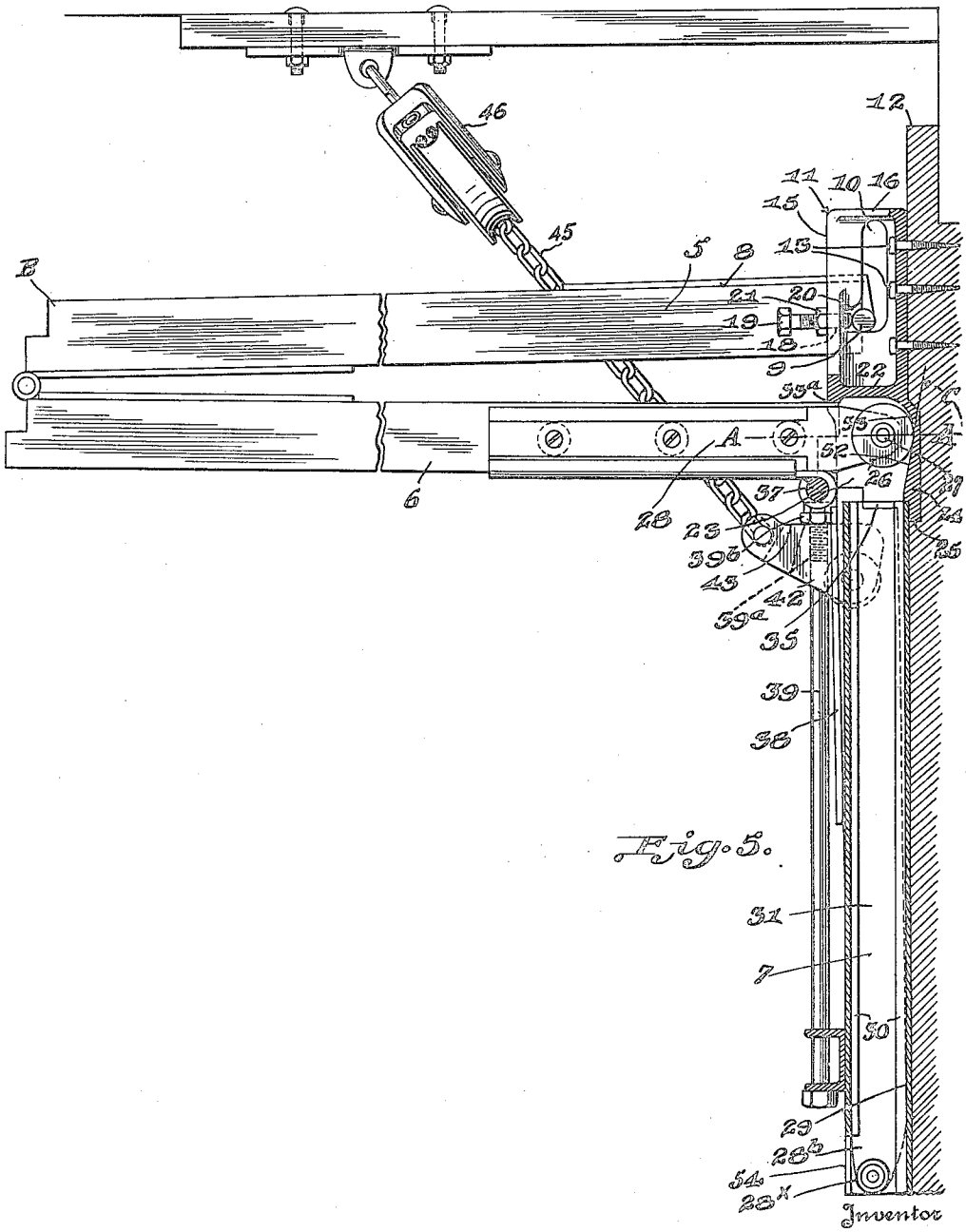


Fig. 5.

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UNITED STATES PATENT OFFICE

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FOLDING GARAGE DOOR OR THE LIKE

Application filed July 29, 1930. Serial No. 471,486.

This invention pertains to folding garage doors or the like, of the type disclosed in my prior application Serial No. 364,780, filed May 21, 1929. Such doors are made up of superposed sections connected by horizontal hinges to permit the sections to be folded upwardly into zig-zag formation under the influence of a counter-weight or the like.

Doors of this type are especially constructed to compensate for vertical warping, as well as for upheaval of the floor or ground on which the lower edge of the door rests when closed.

One of the salient objects of the present invention is to provide special means for connecting pintles at the upper end of the door to novel hanger brackets mounted on the frame and furnished with elongated slots. The elongated slot in each bracket not only makes possible the first temporary break in the two top sections of the door in folding the latter for opening purposes, thus placing the door in position so it can be raised, but also takes care of any expansion due either to the swelling of the door itself, or heaving of the floor by frost.

A further object is to furnish a bracket of this character, the slot of which is L-shaped to permit adjustment of the pintle by a set screw forward or backward. This adjustment enables one to maintain the top section when in open position, approximately level. Due to the long leverage involved in a door of this kind, a few turns of the set screw will very materially lower or raise the free end of the top section of the door, when the latter is in open position, and change the angularity between the folded top sections of the door.

A further object is to provide such a bracket having an inclined plane at the back thereof. The principle of the inclined plane utilized in the lower back portion of this hanger bracket serves to hold a roller bracket attached to the lower corner of the middle section when the door is being opened, and thus assists in maintaining the sections in folded condition.

A further object is to provide the door with an adjustable pulley bracket which, during shipment of the door, may be secured in one position, and which, during the installing of the door, may be secured in a different position.

This bracket cooperates with a pulley of a counterweight elevating mechanism, and the bracket has an adjustable stop to limit the movement of said pulley along the bracket.

A still further object is to provide improved counterbalancing means to relieve the operator of material effort in opening the door.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

Referring to the drawings,

Fig. 1 is a perspective view of the door and its operating mechanism, a portion of said mechanism being broken away to facilitate illustration.

Fig. 2 is a perspective view of one of my improved hanger brackets and one of the guide brackets which operates in connection therewith.

Fig. 3 is an elevation illustrating one of the pulley brackets, and showing how it is adjustably connected to the lower section of the door.

Fig. 4 is an end elevation of the pulley bracket and illustrating the manner in which it is combined with one of the guide pulleys of the elevating mechanism.

Fig. 5 is an enlarged vertical section through the right hand track, as one faces the door from the inside.

In the drawings, 5, 6 and 7 designate the superposed sections of my improved door, the sections of which are hinged together to allow them to be folded into ziz-zag formation. To this end, the upper section 5 is provided at the upper portions of its side edges with guide brackets 8, each having a laterally projecting guide element or pintle 9. These pintles operate in L-shaped guideways or slots 10 formed in special hanger

brackets 11. It will be noted that these brackets are secured to the door frame 12 by means of lag screws 13, and are so located relatively to the door that the upper ends of the slots are normally spaced an inch or more from the pintles 9 when the door is in closed position. This permits the door to expand upwardly or to move upwardly under floor upheaval.

The upper portion of each bracket 11 consists of a pair of wings 14 and 15, the former lying against the door frame, and the latter being arranged at an angle thereto and provided with the slot 10. In other words, the wing 15 lies parallel to the side edge of the door, so as to receive the pintle 9.

A reinforcing flange or web 16, forming part of the casting, joins the upper ends of the two wings, and the wing 15 is provided with a flange 17 that is positioned parallel to the wing 14, and has a threaded aperture 18 which has screw threaded engagement with a screw 19 that may be moved parallel to the horizontal portion 20 of the slot, and function as a stop for the pintle 9. It will be obvious that the adjustment of this screw may be used to adjust the pintle 9, and when the pintle has been adjusted to proper position, the screw may be secured by a lock nut 21.

A horizontal floor 22 separates the upper portion of the bracket from the lower portion thereof, and the latter portion also has a pair of wings 23 and 24. The latter is substantially parallel with the wing 14, but is offset somewhat and embedded in the wood of the frame, as shown at 25. Of course, the frame will have to be cut away to accommodate this offset portion.

The wing 23 is parallel with the wing 15, but is offset relatively thereto to receive the roller 26 (Fig. 5), which is mounted on an axle 27 projecting laterally from the extension of a roller bracket 28 that is secured to the lower part of the side edge portion of the intermediate panel or section 6.

From my above mentioned patent application, it will be understood that one of these roller brackets is secured to the lower portion of each side edge of the middle section of the door, and that the rollers 26 thereof, when the door is closed, are positioned below the lower edge of the section 6, (see Fig. 4).

Similar rollers, 28*a* are mounted on brackets 28*b* that are secured to the side edges of the bottom section 7 of the door, near the lower edge of the latter.

These rollers are guided by the flange 30 of vertical tracks 29 that are secured to the door frame, and each of these tracks is of substantially U-shape in horizontal section, with the edges of the arms of the U turned inwardly to provide the flanges 30 that project toward one another, but are spaced apart by the vertical slot 31 which receives the axles 27 of the rollers of brackets 28 and 28*b*.

In accordance with the present invention, the outer surface of the wing 24 of each bracket is inclined upwardly and rearwardly as shown at 32, and when the roller 26 moves up into the bracket during the opening movement of the door, said roller will travel up this inclined surface until it reaches the depression 33, at which time the lower edge portion of the panel 6 will come into contact with the shelf 22, as indicated at 33*a*. The roller 26 will then tend to remain in this position, due to the force of the lifting means, as well as the force exerted by the door section 6 upon said roller.

In other words, it will be noted from Fig. 5, that when the panel 6 is in its uppermost position, the plane of said panel indicated by the dotted line A, A, will be at an angle of about 86 degrees relatively to the inclined pane 32. The fact that this angle is less than 90 degrees, naturally holds the roller in the position shown, as the edge of the roller bracket strikes the shelf of the hanger bracket, as indicated at 33*a* and comes to rest. If this angle was 90 degrees or more, the roller would naturally drop down from the position shown, unless manually held by lifting on the bottom panel. This would seriously interfere with the ease of operation.

To facilitate assemblage of the parts in installing the door, the offsetting of the wing 24 provides an angular or abutment surface 35 against which the upper end of the track abuts.

Referring again to the set screw 19, it will be noted that the adjustment forward or backward of the pintle 9, readily permits the plane of the vertical section of the top panel 5 being maintained in an approximately level position when the door is opened. This adjustment is essential to compensate for slight variations in positioning the roller brackets or the hinges, as they are applied to the doors, also to compensate for the natural sagging at the point B, due to slight wear of the metal parts after years of service. Furthermore, as the set screws 19 are turned inward, the point B is raised, and conversely, when the set screw is turned outward, the point B lowers. Therefore, the degree of the angle at C is controlled by the set screw. Furthermore, if it develops at the time the doors are installed, that a slight pull downward on the handle (not shown) attached to the bottom panel fails to start roller brackets 28 on their downward movement, a few turns inward of the set screws will widen the angle at C, and overcome the difficulty. Conversely, if roller brackets 28 have a tendency to drop from the position shown in Fig. 5, a few turns outward of the set screws reduces the angle at C. Thus it will be seen that the holding power of the rollers 26 are entirely controlled by the set screws.

The present door has also been improved

by the use of combined pulley brackets and hinges. It will be noted that the pintles 37 of the hinges 38 which connect the lowermost and middle panels, are axially adjustable so that they may be held in one position for shipping purposes, and in another position when the door has been installed. Each of these pintles is provided at its outer end with an aperture to receive the upper end of a rod 39, which rod is threaded as shown at 39*a* to accommodate adjustable nuts 39*b* which function as a stop, for a purpose hereinafter described. Each rod may be in the form of a bolt with its lower end secured to an adjustable channel-iron 40 having longitudinal slots 40*a* through which screws 40*b* pass for the purpose of adjustably securing the channel-iron to the inner side of the door. It will be seen that the adjustment of the channel-iron will cause the hinge pintle to slide inwardly or outwardly for the purpose of moving the guide rod 39 toward or away from the side edge of the door.

Each guide rod 39 functions as a track for the roller 41 of a pulley 42. The casing of this pulley is of substantially triangular shape, as shown in Fig. 5, and the upper edge 43 of the pulley casing cooperates with the stop nuts 39*b*.

At the points 44, the pulleys are connected to the ends of a chain 45 which passes from one of the pulleys first over a guide pulley 46, and then over a guide pulley 47, both of which are suspended from the ceiling 48. From the pulley 47, the chain passes about a pulley 49 which carries a weight 50 that moves upwardly and downwardly in a guideway 51 arranged to one side of the door. The chain passes from the pulley 49, over two more pulleys 52 and 53, suspended from the ceiling, and finally back to the other one of the pulleys 42.

With this construction, it will be understood that when pressure is brought to bear against the outer side of the upper portion of the section 6 of the door, after the latter has been unlocked, or by pulling the lock chain 60 at the point 61, if operating the door from the inside, the pintles 9 will drop to the bottom of slots 10, causing the two top panels 5, 6 to break inward, and the weight 50 will then immediately commence to raise the lower section 7 of the door, and to simultaneously fold the sections 5 and 6 inwardly, until those sections come into substantially the horizontal positions shown in Fig. 5. Then, if the lower edge of the section 7 is pushed inwardly, the weight 50 will function to fold the section 7 upwardly against the folded sections 5 and 6 of the door. To allow for this, the tracks 29 are provided with notches 54 to allow the rollers 28*a*, of the brackets 28*b* to disengage such tracks. This operation may be more clearly understood from a consideration of my above mentionel application.

Any tendency of the bottom panel slapping, as it is pulled down from horizontal to vertical position in closing, is readily overcome by adjusting the nuts 39*b* downwardly, to cause said nuts to come into contact with the edge 43 when the panel 7 is moved from open to closed position.

My improved hanger brackets and the parts which cooperate therewith enable me to dispense with the shock absorbing and retaining springs employed in the construction disclosed in my prior application.

There is another feature in connection with the operation of this door that is of great importance. In explanation, it may be noted that an ordinary set of the sections 5, 6 and 7 for an 8 x 8 opening, weighs, with the hardware that is attached thereto, about 230 pounds. One's first impression might be that it necessarily would take 230 pounds to perfectly counter-balance such a door, so that it will glide overhead without effort. This, however, is not the case, as it requires only about one-half, or in other words, a counter-balance weight of 115 pounds functions perfectly. The reason for this is that when the first temporary break of the top panel of the door is initiated, over 100 pounds of the weight is immediately transferred to the hanger brackets 11. Accordingly, it may be seen that when the door is fully closed, there is plenty of surplus weight to at all times keep the door perfectly tight at the bottom. This, of course, is not true of other types of overhead garage doors, where the doors travel in a vertical position, and then along the ceiling. As a result, their locking device involves bolts entering positive fixed keepers at the sides of the doors, so as to prevent the doors being opened until the bolts are drawn.

On the other hand, in accordance with my invention, even though the door is unlocked, it will not tend to fold up until pressure has been brought to bear, either on the upper portion of the medial section 6, or the lower portion of the section 5, for the purpose of initiating the temporary break which is required to set the counter-weight in action.

Furthermore, a door in accordance with my construction may include bolts 75 which enter the slots 31 of the tracks, for locking purposes, and if the door should expand, or snow or ice should work itself under the door to the extent of a one to one and one-half inch depth, the bolts could still be readily locked or unlocked, and there will be no liability of damaging the door frame or the bolts, due to expansion or upheaval.

From the foregoing it is believed that the construction, operation and advantages of the invention may be readily understood, and I am aware that changes may be made in the

details disclosed, without departing from the spirit of the invention, as expressed in the claims.

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

1. A garage door structure or the like, including a frame having a door opening therein, a door closing said opening and formed of hingedly connected superposed sections, a hanger bracket at each side of the frame provided with an angular slot, pintles on the door extending into and adapted to move along said slots, and an adjustable member mounted on each bracket and engageable with the pintle for adjusting the latter along the slot.

2. A garage door structure or the like, including a frame having a door opening therein, a door closing said opening and formed of hingedly connected superposed sections, a hanger bracket at each side of the frame, provided with an angular slot, pintles on the door extending into and adapted to move along said slots, each of said slots having a horizontal portion at the lower end thereof, and an adjustable member mounted on each bracket and engageable with the pintle for adjusting the latter along the slot.

3. A garage door structure or the like, including a frame having a door opening therein, a door closing said opening and formed of hingedly connected superposed sections, a hanger bracket at each side of the frame, provided with a slot, and pintles on the door extending into and adapted to move along said slots, each of said slots having a horizontal portion at the lower end thereof, and a screw having threaded engagement with each bracket and adapted to engage the pintle for adjusting the latter along the slot.

4. In a structure of the character described, a frame having an opening therein, hanger brackets secured to the frame at the upper portion thereof, each hanger bracket provided with a slot, vertical guides secured to the frame and arranged below said brackets, a door closing said opening and consisting of superposed hingedly connected sections adapted to fold upwardly into zig-zag formation, certain of said sections being guided by the guides during the folding operation, pintles projecting from the opposite side edges of the upper section of the door and extending into said slots, and adjustable means for limiting the movement of the pintles in said slots.

5. In a structure of the character described, a frame, hanger brackets secured to the upper portion of the frame, each hanger bracket having a substantially vertical guideway, a door adapted to close the opening of the frame and consisting of superposed hingedly connected sections capable of folding upwardly into zig-zag formation, the upper section being provided with elements guided by the guideways of the brackets, adjustable stops for limiting the movement of said elements in the guideways, and means for automatically folding the door sections upwardly when the upper section of the door and the section immediately below the same are moved into a position at an angle relatively to one another.

6. In a structure of the character described, a frame, hanger brackets rigidly mounted on the upper portion thereof, each hanger bracket being provided with a guideway, a folding door designed to close said opening and comprising superposed hingedly connected sections, projecting guide elements on the upper section extending into the guideways of the brackets, tracks mounted on the frame at opposite sides of the opening, each bracket being provided with an upwardly and inwardly inclined surface, and brackets projecting downwardly from the lower end of the medial section of the door, and provided with rollers which roll in said tracks, each of the last mentioned rollers being designed to roll on said inclined surfaces when the medial section moves into substantially parallel relation with the top section when the door is folded.

7. In a structure of the character described, a door frame, hanger brackets secured to the upper portion of the same, a door having its upper end pivotally connected to said hanger brackets and comprising superposed hingedly connected sections adapted to be folded upwardly into zig-zag formation, each hanger bracket having an outwardly projecting portion and an inclined surface, tracks secured to the door frame below said brackets and having their upper ends abutting against the lower ends of the brackets, brackets secured to the lower end of the medial section of the door and projecting downwardly, rollers carried by the projecting portions of the last mentioned brackets and adapted to engage the inclined surfaces of the hanger brackets when the door is folded, the medial section of the door engaging the projecting portions of the brackets when the rollers come to rest on said inclined surfaces.

8. In a structure of the character described, a door frame, hanger brackets rigidly secured to the upper end portion of said frame, a door having its upper end pivotally connected to said hanger brackets, said door comprising superposed hingedly connected sections, tracks secured to the door frame below the hanger brackets, roller brackets secured to the lower end of the medial section of the door and having downwardly projecting extensions, rollers carried by the extension portions of the roller brackets, and cooperating with said tracks, the hinges connecting the sections of the door permitting said sections to be folded upwardly into zig-zag formation, each of the hanger brackets having an

inclined surface to be engaged by one of the rollers when the door is in folded position.

9. In a structure of the character described, a door frame, hanger brackets secured to the upper end portion of said frame, each hanger bracket comprising a wing arranged parallel to the door frame, and another wing arranged at right angles thereto, the last mentioned wing having a substantially L-shaped slot therein, a folding door having oppositely projecting pintles at its upper end projecting into said slots, and adjustable means for limiting the movement of the pintles in said slots.

10. In a structure of the character described, a door frame, hanger brackets rigidly secured to the upper end portion of the door frame, a door consisting of upwardly folding sections, each hanger bracket being provided with a guideway extending upwardly above the door as well as outwardly from the door frame, pintles projecting from the door into said guideways, and adjustable means for limiting the movement of the pintles in said guideways.

11. In a structure of the character described, a door frame, hanger brackets rigidly secured to the upper end portion of the door frame, the upper end portion of each hanger bracket comprising a pair of wings arranged at angles to one another, one of said wings being provided with a substantially L-shaped slot, an upwardly folding door having pintles projecting into said slots, the lower portion of each bracket also comprising wings arranged at angles to one another, one of the last mentioned wings being positioned parallel to the slotted wing of the upper portion of the bracket, and the other wing of the lower portion of the bracket having an inclined surface, vertical tracks secured to the door frame and having their upper ends abutting against the lower ends of the hanger brackets, roller brackets secured to the lower end of the medial section of the door and having portions extending downwardly below the lower end of said section, rollers carried by the extension portions of the roller brackets and guided by said tracks, the rollers being designed to engage the inclined surfaces of the hanger brackets when the door is folded.

12. In a structure of the character described, a door frame, hanger brackets secured to the upper end portion of said frame, a door consisting of upwardly folding sections, each hanger bracket being provided with a substantially vertical guideway and a substantially horizontal guideway, the guideways of each bracket merging into one another, pintles projecting from the upper end of the door into said guideways, and adjustable means for limiting the movement of the pintles in the substantially horizontal guideways.

13. In a structure of the character described, a door frame, hanger brackets secured to the upper end portion of said frame, a door consisting of upwardly folding sections, each hanger bracket being provided with a substantially vertical guideway and a substantially horizontal guideway, the guideways of each bracket merging into one another, pintles projecting from the upper end of the door into said guideways, and adjustable means for limiting the movement of the pintles in the substantially horizontal guideways, the adjustable means including screws threaded into said hanger brackets.

14. In a structure of the character described, a door frame, hanger brackets rigidly secured to the upper end portion of the door frame, each bracket being provided with a substantially L-shaped slot and having an abutment surface and an upwardly and rearwardly extending inclined surface arranged below its slot, a door cooperating with said frame and consisting of hingedly connected upwardly folding sections, pintles projecting from the upper end of the door into said slots, means including a counterweight for lifting the door sections into folded position, a medial section of the door having brackets at its lower end provided with rollers adapted to roll on said inclined surfaces when the door is folded and to bring a portion of said medial section into engagement with the abutment surfaces, and adjustable means for shifting the pintles in said slots, whereby the angularity between said medial door section and said inclined surfaces may be varied.

15. In a door of the character described, arms projecting laterally from a side edge of the door and adjustable toward and away from the door, means for securing said arms in various positions of adjustment, a guide rod carried by the arms, and door lifting and folding means including a pulley slidably mounted on said guide rod.

16. In a door of the character described, arms projecting laterally from a side edge of the door and adjustable toward and away from the door, means for securing said arms in various positions of adjustment, a guide rod carried by the arms, door lifting and folding means including a pulley slidably mounted on said guide rod, and adjustable means on the guide rod functioning as a stop for said pulley.

17. In a door of the character described, arms projecting laterally from a side edge of the door and adjustable toward and away from the door, means for securing said arms in various positions of adjustment, a guide rod carried by the arms, and door lifting and folding means including a pulley slidably mounted on said guide rod, one of said arms forming a hinge pintle for the door.

18. In a structure of the character described, an upwardly folding door consisting of hingedly connected sections, one of the door hinges including an axially movable pintle forming a supporting arm, another supporting arm adjustably connected to the door, both arms projecting outwardly beyond a side edge of the door, a guide rod fixed to said arms, an adjustable nut on said guide rod, and means for raising and folding the door, including a pulley mounted on said rod and adapted to engage said abutment nut.

In testimony whereof I affix my signature.

BENJAMIN J. TRILLER.