Sept. 6, 1927. 1,641,160

J. P. FREDRICK

GARAGE DOOR OPERATING AND SUPPORTING MECHANISM

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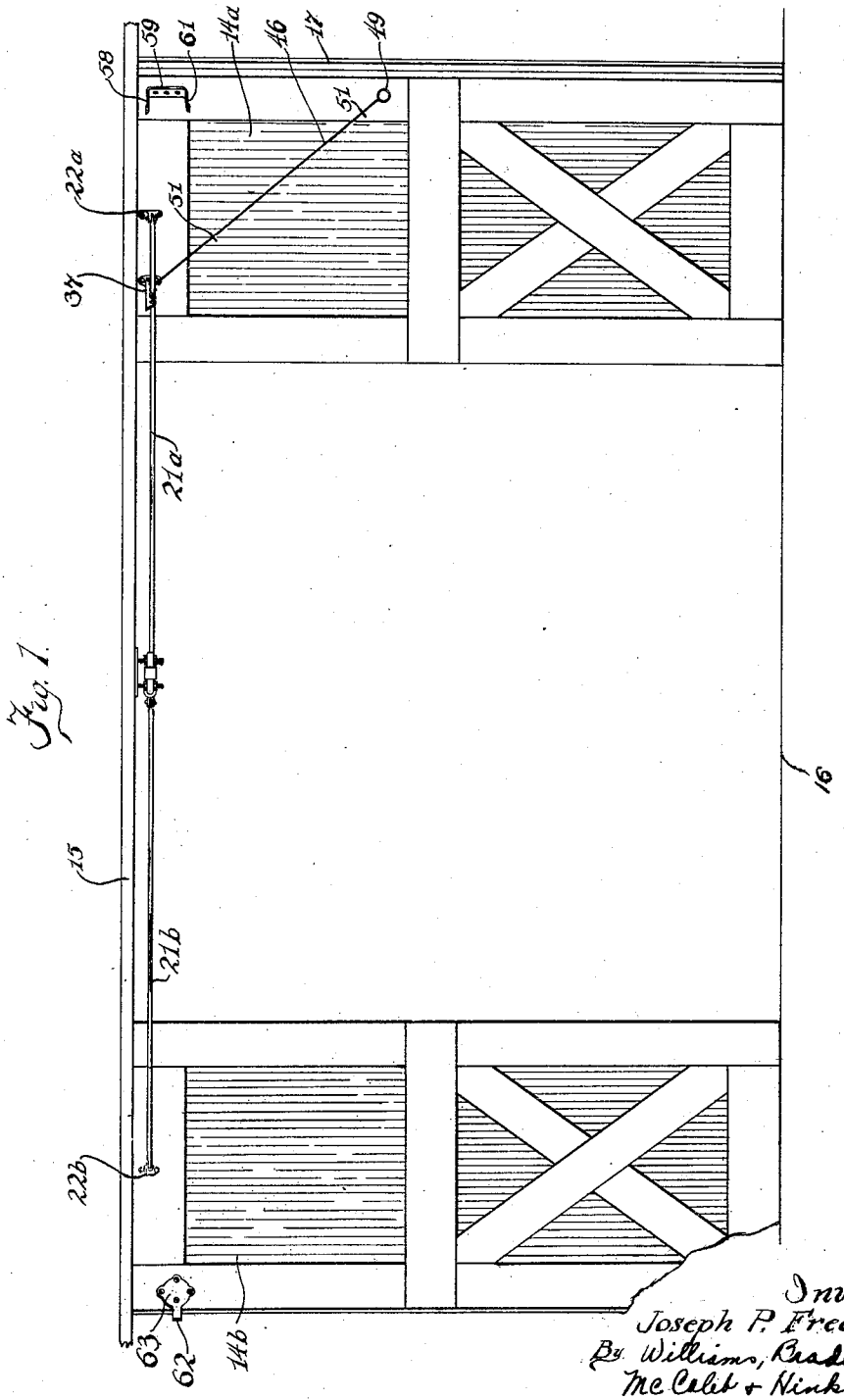


Fig. 1.

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Fig. 3.

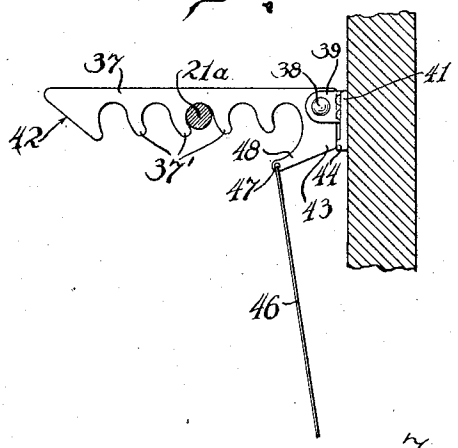


Fig. 4.

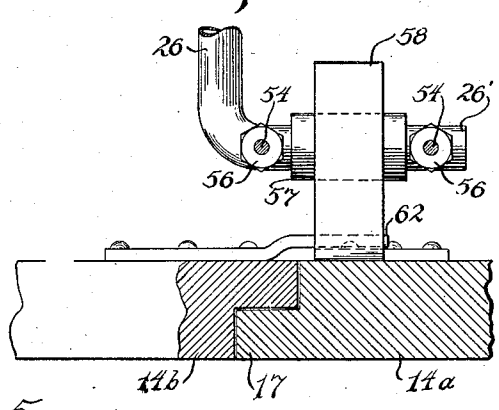


Fig. 5.

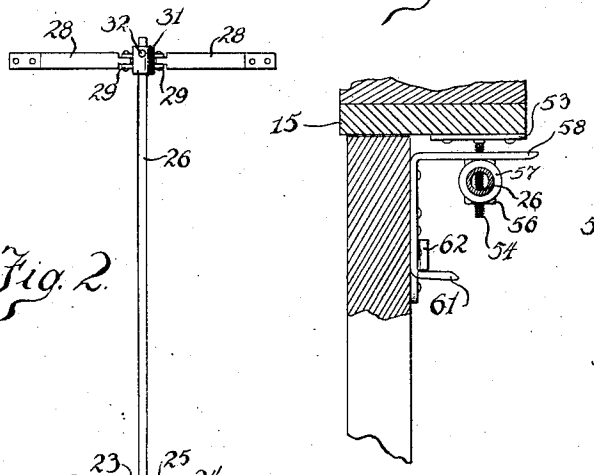


Fig. 6.

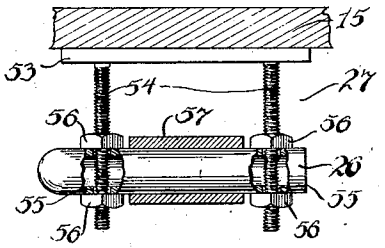


Fig. 2.

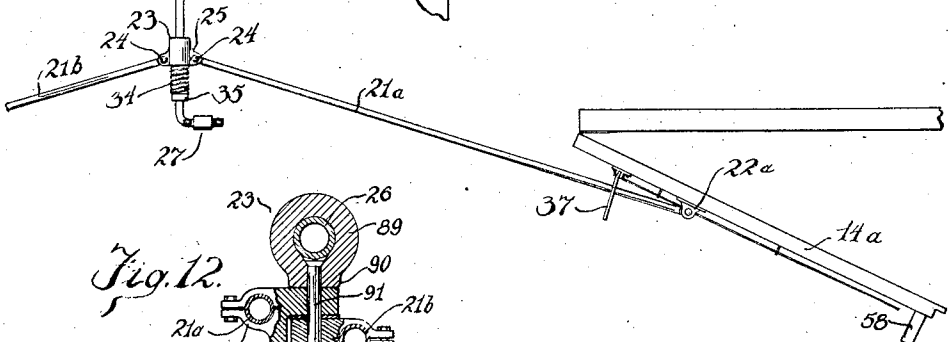


Fig. 12.

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Fig. 10.

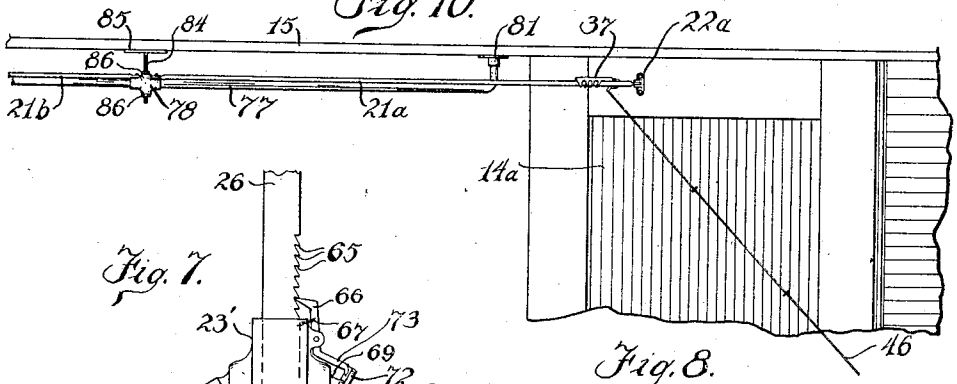
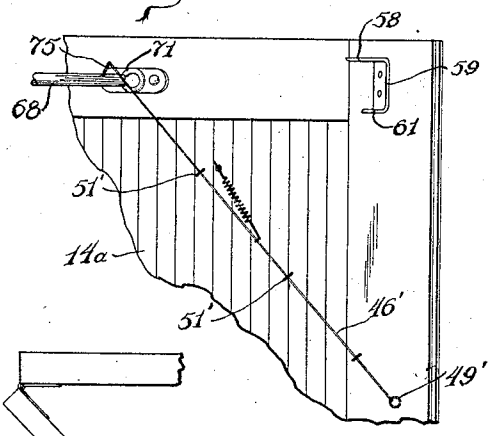


Fig. 7.

Fig. 8.



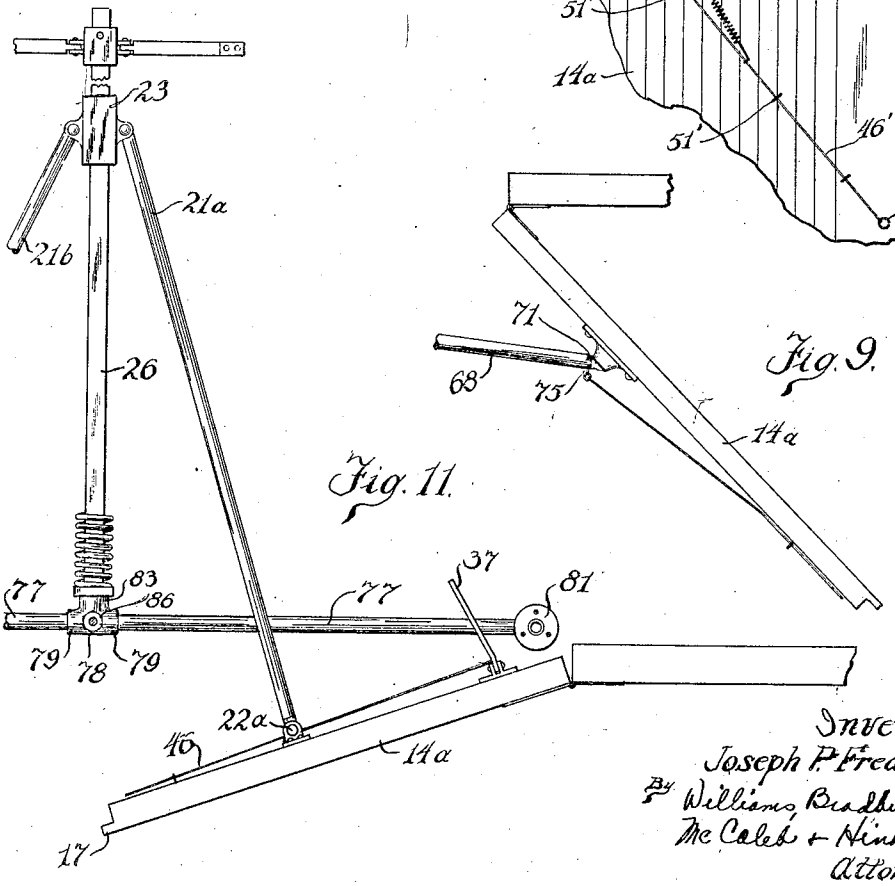


Fig. 9.

Fig. 11.

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UNITED STATES PATENT OFFICE.

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GARAGE-DOOR OPERATING AND SUPPORTING MECHANISM.

Application filed February 27, 1926. Serial No. 91,078.

The present invention relates to garage door operating and supporting mechanism. The invention has particular application to the swinging types of double doors most generally used on garages, although certain features of my invention have application to single doors as well.

One of the particular objects of the invention is to provide improved door operating mechanism which will secure simultaneous movement of both doors in the opening and closing movements thereof. One of the particular characteristics of this door operating mechanism is the provision of unique latching means for holding the doors in open position.

Another object of my invention pertains to the supporting or lifting mechanism for supporting or lifting the free edges of the door. One of the greatest objections to the swinging type of double door for garages is the tendency for the doors to sag from the hinge line, this allowing the lower edges of the doors to drag on the pavement or strike the lower sill of the doorway and thereby make difficult the closing of the doors, often necessitating the actual lifting of both doors. The present supporting or lifting mechanism operates to raise the free edges of both doors during the closing movement thereof, particularly if the doors have any tendency to sag, thereby avoiding the above objections.

My invention has its greatest field of utility in connection with garage doors and accordingly I have described the invention in this embodiment, but it will be understood that the invention may be adapted to double swinging types of doors or closure members in other situations.

Referring to the accompanying drawings illustrating a preferred embodiment of my invention:

Fig. 1 is an elevation view of the front of a double door garage with the doors swung open to illustrate the application of my invention thereto.

Fig. 2 is a fragmentary plan view of the door operating and lifting mechanism, only one door being shown.

Fig. 3 is a fragmentary view on a larger scale illustrating the latch bar.

Fig. 4 is a horizontal sectional view through the meeting edges of the doors, for illustrating the lifting mechanism.

Fig. 5 is a vertical sectional view to illustrate this same mechanism.

Fig. 6 is a fragmentary view partly in section, illustrating the hanger bracket.

Fig. 7 is a fragmentary plan view of a sliding collar and guide rod of an embodiment in which the latch mechanism is associated with the collar and guide rod.

Fig. 8 is a fragmentary view of the inner side of one of the doors, showing the unlatching connection in this embodiment.

Fig. 9 is a fragmentary plan view of the same.

Fig. 10 is a fragmentary view illustrating another embodiment of door lifting means.

Fig. 11 is a plan view of the embodiment shown in Fig. 10, and

Fig. 12 is a sectional view of a modified construction of sliding collar.

Referring to Fig. 1, the two swinging doors of a garage are indicated at 14^a and 14^b, the doorway which these doors are adapted to close being defined between the upper cross beam 15 and the lower sill level 16. The door 14^a is illustrated as being the outer closing door, having a batten strip 17 adapted to overlie or engage in a groove in the edge of the door 14^b for closing the joint between the edges of the doors.

The two doors are connected together for conjoint movement by links 21^a and 21^b, which links are pivoted at their outer ends to the doors by pivot brackets 22^a and 22^b secured to the inner sides of the doors near the upper edges. The inner ends of these links have pivotal attachment to a sliding collar or block 23, the ends of these links being pivoted to this collar by pivot pins 24 passing through lugs 25 projecting from the collar and through eyes in the ends of the links. This sliding collar or block is arranged for movement along an overhead guide bar 26 which extends back into the garage longitudinally thereof. The front end of this guide bar is fixedly suspended from the cross beam 15 by a hanger bracket 27 which disposes the bar substantially centrally of the doorway. The bar extends substantially horizontally back into the garage, and the rear end thereof is fixedly attached to any adjacent frame work of the garage by brackets or hangers 28—28 which may be secured to the rafters or roof of the garage. These brackets or hangers are preferably pivotally attached to lugs or ears 29 extend-

ing from a collar 31, which pivotal attachment permits the brackets 28 to be swung up or down to different angles of vertical inclination for making attachment to adjacent frame members of the garage. The supporting collar 31 can be shifted along the guide bar to any preferred point (as long as it does not interfere with the sliding collar 23) to bring the brackets 28 into the plane of an adjacent rafter or cross beam, the collar 31 thereupon being fixedly secured to the rod 26 by the set screw 32. If desired, each bracket 28 may be pivotally connected to an independent collar 31 so that these brackets may be shifted to different planes along the guide bar for making attachment to different parts of the frame work of the garage.

It will be evident that the linked connection of both doors to the sliding collar or block 23 will compel simultaneous movement of both doors. Thus, an opening or closing movement applied to one of the doors is transmitted through this operating linkage to the other door, whereby both doors will be opened or closed with a quick, positive movement.

To prevent the doors from being swung open too forcibly, and imposing an injurious strain on the hinges and on the door operating linkage, a compression spring 34 is placed on the guide rod at the front end thereof, this compression spring bearing at the front against a collar 35 secured to the guide rod and so positioned that the rear end of the spring will be engaged by the sliding collar 23 for resiliently checking the movement of the doors at the outer limits of their opening movement. This resilient checking means also avoids the possibility of a sudden gust of wind swinging the doors open forcibly and thereby injuring the same. Attention is directed to the fact that the present operating mechanism permits both doors to be swung back almost into parallelism with the front of the garage (see Fig. 2) which is a decided advantage in narrow alleys as it increases the space in which the car may be turned and backed.

I have provided very simple and efficacious latching means for holding both doors in open position. This comprises a latch bar which is pivotally supported on one of the doors for hooking over the operating link connected to that door. Referring to Fig. 3, this latch bar 37 is pivoted at 38 between pivot ears 39 of a bracket 41 secured to the door. This latch has a plurality of latching teeth 37′ formed in the underside thereof, which teeth drop over the adjacent link 21^a by gravity action of the latch. The outer end of the latch has a cam slope 42 for camming the latch up over the link 21^a when the link swings into the range of action of the latch in the opening movement of the door. The latch is normally held at a substantially horizontal angle so that this cam slope 42 will engage the link 21^a at this time. The latch is normally held in this horizontal position by the engagement of the lower heel or corner 43 thereof with the stop surface 44 of the bracket plate, the latch being free to swing upwardly to its engaging position around its pivot 38.

As best shown in Fig. 2, the latch is preferably extended slightly obliquely relative to the door 14^a so that it will lie at right angles to the link 21^a to facilitate its latching engagement with the link. The latch is released through actuation of an operating rod 46 which extends down obliquely across the inner side of the door 14^a to a convenient point of operation adjacent the edge of the door. The upper end of this rod has pivotal connection at 47 to an arm 48 extending down from the inner end of the latch. The lower end of the operating rod 46 has an eye or other handle means 49, whereby an upward thrusting movement can be given the rod for releasing the latch. The rod is guided in spaced guides 51 secured to the inner side of the door.

As both doors approach their open positions, the latch bar 37 slips over the link 21^a, the several latch teeth dropping over the link successively until the doors have been opened to the desired angle, when the latch locks both doors against closing movement. By the provision of the multiple latching teeth 37′, the doors are latched in different degrees of open position so that it is not necessary to move the doors back to wide open position to secure the latched engagement.

Attention is now directed to Figs. 4, 5 and 6 which illustrate the door lifting or supporting means. The guide bar 26 is preferably a length of stock piping, and the front end thereof is bent around at right angles to form the short lateral extension 26′. This lateral portion is attached to the supporting bracket 27, the latter consisting of a mounting plate 53 secured to the cross beam 15 and having two depending threaded studs 54—54. These threaded studs pass through openings 55 in the lateral extension 26′, and nuts 56 threading on these studs above and below the lateral extension 26′ support the front end of the guide rod 26. A roller or sleeve 57 is rotatably mounted on the lateral extension 26′ between the threaded studs 54—54. The height of this roller can be raised and lowered by adjustment of these nuts 56—56 up and down along their threaded studs 54.

The door 14^a, which door closes last to press its batten strip 17 over the edge of the other door 14^b, has an arm 58 projecting therefrom, adapted to ride up on the top of the roller 57 when the doors are swung to closed position. This arm constitutes part

of a bracket comprising a vertical attaching portion 59. A lower arm 61 extends out from the lower end of this bracket, the upper arm 58 having a slight upward slope at its outer end, and the lower end having a slight downward slope. The lower arm 61 is adapted to pass under and engage a stud or projection 62 projecting from the edge of the other door 14^b. This stud or projection extends from a bracket plate or other attaching portion 63 which is rigidly secured to the inner side of the other door. This projection 62 may have a plain bearing surface on its under side, or may be provided with a roller for rolling engagement with the arm 61. In the closing movement of the doors, the upper lifting arm 58, which is longer than the lower lifting arm, rides up on the roller 57 and thereby lifts the free edge of the door 14^a, relieving this door of its sagging weight and avoiding any tendency of the lower edge of the door to drag on the pavement or strike the lower sill in the closing of the door. When the arm 58 is riding up onto the roller 57 in the act of closing the doors, the lower lifting arm 61—which is now, or has been engaging in the projection 62—also lifts the edge of the other door 14^b whereby the camming action of the arm 58 riding up onto the roller 57 lifts both doors and thereby relieves the sagging weight of both doors. It is possible to construct the door operating linkage 21^a—21^b so that it will automatically time the closing of the doors to compel the inner door 14^b to precede the outer closing door 14^a to closed position, whereby the lifting arms 58 and 61 will engage the roller 57 and projection 62 in properly timed relation to raise both doors. Thus by simply applying closing pressure to the outer door 14^a both doors will be moved to closed position and both doors will be lifted or relieved of their sagging weight. By the manipulation of the adjusting nuts 56, the roller 57 may be raised or lowered to proportion the lift of the doors to the particular doorway, and, if desired, the height of the roller 57 may be adjusted so that no lifting action will occur until the doors actually develop a tendency to sag.

In Figs. 7, 8 and 9 I have shown a modified arrangement of latching mechanism. In this embodiment the latching function occurs between the sliding collar or block 23′ and the guide rod 26. In this form, it is particularly desirable that the sliding collar or block 23′ be held against any rotative movement on the guide rod 26 and to this end the rod may be formed of square or polygonal section with the sliding block provided with a correspondingly shaped bore; or an arrangement of splines or keyways may be provided between the sliding block and the guide bar. Adjacent the front end of the guide bar a plurality of ratchet teeth 65 are formed in one side of the bar. The sliding collar or block 23′ carries a pawl 66 adapted to engage in these teeth, the teeth being so located that this latching operation will occur in different degrees of open position of the doors, similarly to the latching operation disclosed in Fig. 1. The latch 66 which is normally urged into the teeth 65 by a spring 67 is adapted to be retracted from latching engagement through one of the operating links. To this end, one of the links 68 is arranged for axial rotation in addition to its pivotal motion relative to the sliding block. This axial rotation is preferably provided for by connecting the operating link to the sliding block 23′ through a ball and socket or other universal joint 69 and likewise connecting the other end of the link to the door by a similar joint 71. This ball and socket or other universal joint will permit axial rotation of the operating link 68 and still maintain pivotal connection between the sliding block 23′ and the door. The inner end of the link 68 has operative connection with the latch 66 through an arm 72 projecting from the operating link and an arm 73 projecting from the latch, which arms are adapted to transmit rotative movement of the link 68 to the latch 66 for releasing the latch. An operating rod 46′ has pivotal connection at 75 to the outer end of the operating link 68, whereby endwise movement applied to the rod 46′ will be operative to rotate the link 68 and thereby release the latch 66. This operating rod is guided in guides 51′ and has an operating handle 49′ similar to the embodiment shown in Fig. 1. The lifting roller 57 and lifting arms 58 and 61, previously described, are preferably associated with this modified embodiment of door operating and latching mechanism.

In the modified construction shown in Figs. 10 and 11 the operation of lifting or relieving the sagging weight of the door is performed through the links 21^a and 21^b. These links have pivotal attachment to a sliding collar or block 23 at their rear ends and are pivoted to the doors at their front ends, exactly as described of the construction shown in Figs. 1 and 2. If desired, the sliding block 23 may be held against rotation on the guide rod 26, by forming this guide rod of polygonal cross section or by providing a keyed or splined connection between the block and the guide rod.

Both operating rods 21^a and 21^b slide across the upper side of a supporting bar 77 which extends across the door way directly below the upper cross beam 15 of this doorway. This supporting bar preferably consists of two sections of pipe having their inner ends secured in bosses 79 extending from an adjustable supporting

bracket 78. The outer ends of these pipe sections are secured to the frame work of the garage in any suitable manner, such as by turning these ends upward and fastening them in mounting brackets 81 secured to the under side of the cross beam 15. The adjustable bracket 78 also supports the front end of the guide bar 26, this guide bar being suitably secured in a boss 83 projecting from the rear of the bracket. A supporting bolt 84 has its upper end secured to a mounting plate 85 which is fastened to the under side of the cross beam 15, this bolt 84 passing down through an opening extending entirely through the bracket 78. Adjusting nuts 86—86 screw onto this supporting bolt above and below the bracket 78 and by screwing these nuts up or down along the bolt 84 the height of this bracket can be adjusted through a considerable range.

It will be observed that in addition to operating the doors, the links 21^a—21^b in this embodiment function as rocker arms or levers having sliding points of fulcrum support intermediate their ends on the upper side of the supporting bar 77.

As the doors approach closed position the fulcrum point occurring between each link and the supporting bar 77 slides along the link towards the door and also moves along the supporting bar towards the central bracket 78. Thus by giving the inner ends of the supporting bar section 77 a slight upward inclination towards the bracket 78, the operating links, through their gradually rising fulcrum points, can be made to apply a lifting pressure to their respective doors for relieving the sagging weight thereof. By raising or lowering the adjustable bracket 78 the degree of lift thus imparted to the doors can be varied as desired. It will be observed that the raising of the adjustable bracket 78 merely raises the adjoining ends of the supporting bar sections and guide rail, leaving the outer ends of these three members in their original positions. This lifting of the doors might also be obtained by depressing the rear end of the guide bar 26 so that the sliding collar would be compelled to move downwardly in its rearward movement. Also, the supporting bar sections 77 may consist of short arms extending laterally from the bracket 78 and having downwardly sloping cam ends.

In the foregoing adaptation of my invention I preferably employ latching means of the type shown in Figs. 1 and 2. The latch bar 37 engages over the upper side of the link 21^a and is prevented, by the stop surfaces 43 and 44, from dropping down to a level where it might strike or interfere with the supporting bar 77.

In Fig. 12 I have shown a modified construction of sliding collar or block 23 for use in either of the embodiments shown in Figs. 1 and 2 or 10 and 11. In this construction the slider proper consists of a long sleeve or tube 89 mounted on the guide bar 26, this slider being held against rotation on the bar by keys or the like, if desired. A boss 90 is formed on the under side of this slider and rigidly secured in this boss and projecting therefrom is a stud 91. Pivotally supported on this stud are two clamping members 92 and 93 for making connection to the operating links 21^a and 21^b. One of these swiveled clamping members may be forked to embrace the other clamping member, the two members being held on the stud 91 by the nut 94 screwing over the lower end of the stud. The members 92 and 93 comprise split circular clamps 95 and 96 through which pass the rear ends of the links 21^a and 21^b. The clamping bolts enable these clamps to be drawn into rigid engagement with these links at any desired points along the lengths of the links, thus enabling the effective length of the links to be adjusted. It will be noted that the two clamps are offset vertically with respect to each other whereby the projecting rear ends of the links will not strike and interfere with the pivotal movement of the links.

Any suitable arrangement of springs or counterweights may be operatively connected to the sliding collars 23—23′ of any of the preceding embodiments, either for opening the doors automatically as soon as they are unlocked, or for closing the doors automatically as soon as they are unlatched.

Any preferred form of door locking mechanism key controlled or otherwise may be employed for locking the two doors in closed position, the form shown in my co-pending application, Serial #47,231, filed July 31, 1925, being typical of such locking means.

It will be apparent that numerous modifications and rearrangements of parts may be made without departing from the essential characteristics of the invention.

I claim:

1. In garage door operating mechanism, a guide rod extending longitudinally of the garage, a sliding member on said guide rod, links pivotally connected between said sliding member and each of the garage doors, and door holding means adapted to effect latching engagement between one of said links and its associated door.

2. In garage door operating mechanism guide means adapted to be extended longitudinally of the garage, a sliding member on said guide means, links adapted to have pivotal connection at their outer ends to the two garage doors and at their inner ends to said sliding member, and means adapted for mounting on one of said doors for cooperating with the adjacent link for holding said doors in predetermined position.

3. In garage door operating mechanism, guide means adapted to be mounted in the garage, a member adapted to have slidable support on said guide means, links adapted to be pivoted at their outer ends to the two garage doors and at their inner ends to said slidable member, means adapted to effect latching engagement between one of said links and its door, and releasing means adapted to be mounted on one of said doors for releasing said latch means.

4. In garage door operating mechanism, a guide rod extending longitudinally of the garage, a sliding collar on said guide rod, links pivotally connected to said sliding collar and to each of the garage doors, a latch pivotally mounted on one of the doors and adapted to effect latching engagement with the associated link, and releasing means mounted on said door for releasing said latch means.

5. In garage door operating mechanism, a guide member extending longitudinally of the garage, a sliding block on said guide member, links pivotally connected to said sliding block and to each of the garage doors, and a latch pivotally mounted on one of said doors adapted to engage with the adjacent link, said latch having a plurality of latching teeth for holding said doors in different degrees of open position.

6. In garage door operating mechanism, the combination of a guide rod, means for mounting said guide rod within the garage and extending longitudinally thereof, a sliding collar on said guide rod, two links pivotally connected at their inner ends to said sliding collar, pivot brackets for pivotally connecting the outer ends of said links to the two garage doors, a latch bar, a mounting bracket on which said latch bar is pivoted, said mounting bracket being adapted for mounting on one of the doors, said latch bar having a plurality of engaging teeth in its underside and having a cam slope at its outer end for camming itself up over the adjacent link, and a latch releasing rod operatively connected to said latch and adapted to be extended down along the inner side of the door to a convenient point of operating.

7. The combination with a double door garage, of means for lifting the sagging weight of one of said doors and means effective between both of said doors for lifting the sagging weight of the other door as said doors are moved to closed position.

8. The combination with a doorway and a pair of doors for closing the same, of means for transferring the sagging weight of one of said doors to the other during the closing movement thereof, and means effective between the latter door and said doorway for receiving and supporting the sagging weight of both doors.

9. The combination with a doorway having two doors for closing the same, of a supporting surface carried by the upper part of said doorway, an arm extending from one of said doors and adapted to ride upon said supporting surface for lifting the free edge of said door during the closing movement thereof, and cooperating engaging surfaces on said doors for transferring the sagging weight of the second door to said first door in the closing movement of said doors.

10. In garage door operating mechanism, a guide rod extending longitudinally of the garage, a sliding collar on said guide rod, links pivotally connected between said sliding collar and the two garage doors, and stationary supporting surfaces over which the intermediate portions of said links are adapted to slide in the inward and outward movements of the links, said stationary supporting surfaces acting as fulcrums to sustain part of the sagging weight of the doors.

11. In garage door operating mechanism, the combination of a guide rod extending longitudinally of the garage, a sliding collar on said guide rod, links pivotally connected to said sliding collar and to each of the garage doors, a pair of stationary supporting surfaces across which said links are adapted to slide in their door operating movement, said stationary supporting surfaces sustaining a part of the sagging weight of the doors, and means for adjusting the height of said stationary supporting surfaces.

12. In garage door operating mechanism, the combination of a guide rod adapted to extend longitudinally of the garage, a sliding block on said guide rod, links pivotally connected between said sliding block and each of the garage doors, a pair of supporting bars extending across the doorway below the upper cross beam, means for fixedly supporting the outer ends of said supporting bars, a bracket supporting the inner ends of said supporting bars and the front end of said guide rod, and means for adjusting the height of said bracket, said links sliding across said supporting bars and on which they have fulcrum support for lifting the free edges of the doors.

13. In a garage door apparatus, the combination of a guide carried by the garage, a link pivotally and slidably carried by said guide and operatively connected with one of the garage doors, and door-holding means adapted to effect latching engagement between said link and said door.

14. In a garage door apparatus, the combination of a guide carried by the garage, a link pivotally and slidably carried by said guide and operatively connected with one of the garage doors, and supporting means for said link intermediate its ends for preventing the sagging of said door.

15. In a garage door apparatus, the combination of a guide carried by the garage, a link pivotally and slidably carried by said guide and operatively connected with one of the garage doors, supporting means for said link intermediate its ends to lift the sagging weight of said door and means for adjusting the amount of lift.

16. In a garage door opening mechanism, a guide member carried by the garage, a pair of links each having an end slidably and pivotally mounted on said guide and the other end operatively connected with a garage door and supporting means for operating upon said links intermediate their ends to lift the sagging weight of the garage doors.

In witness whereof, I hereunto subscribe my name this 10th day of February, 1926.

JOSEPH P. FREDRICK.