Feb. 16, 1954 C. B. EATON ET AL 2,668,980

GARAGE DOOR OPENING MEANS

Filed Oct. 2, 1950 2 Sheets-Sheet 1

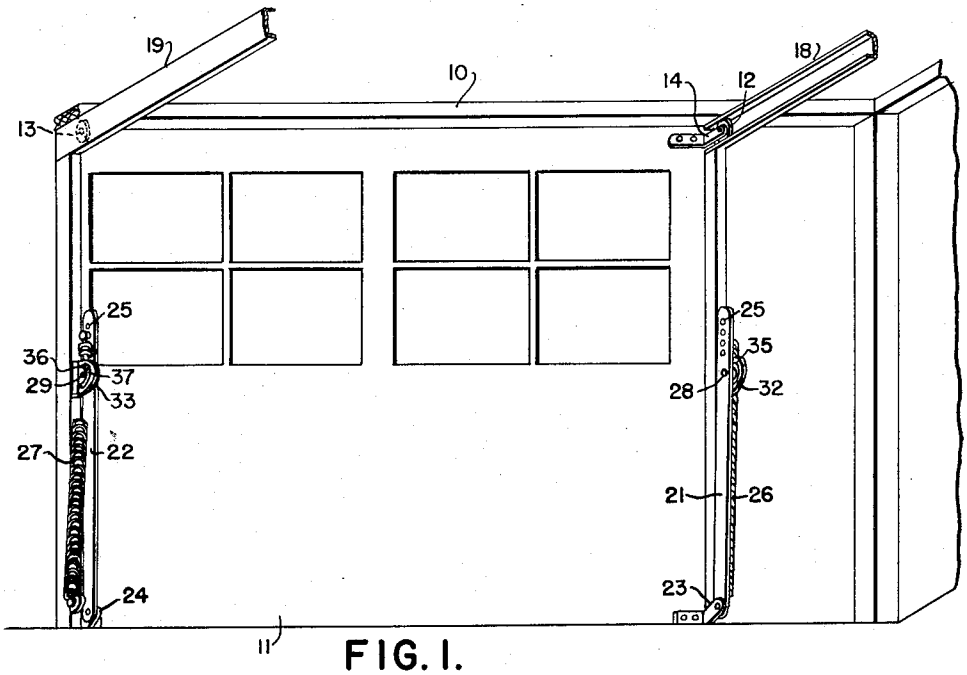


FIG. 1.

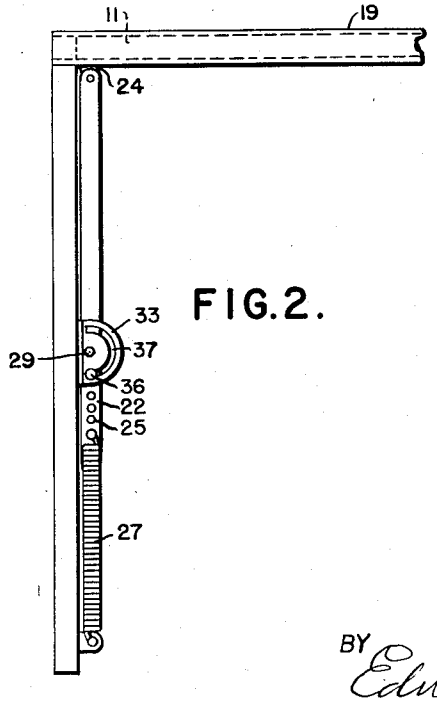


FIG. 2.

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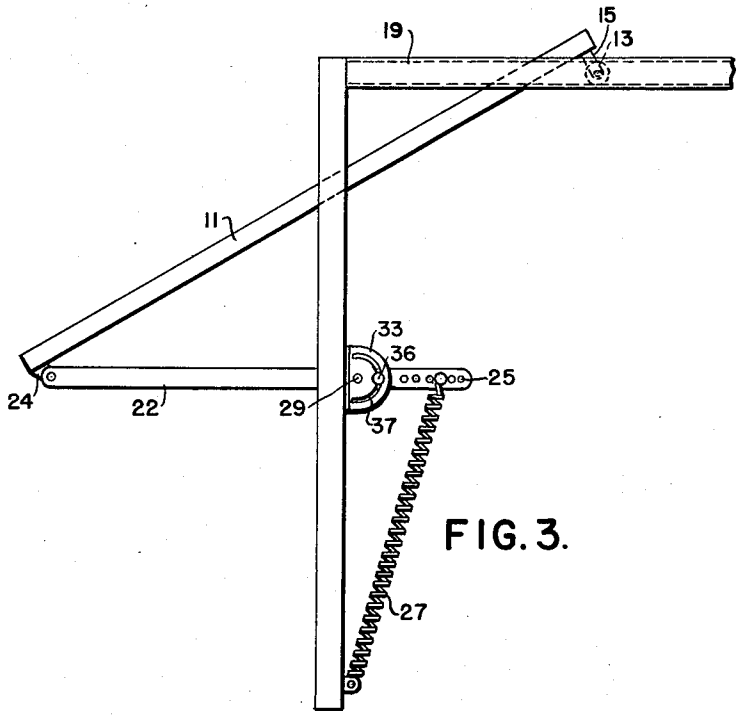


FIG. 3.

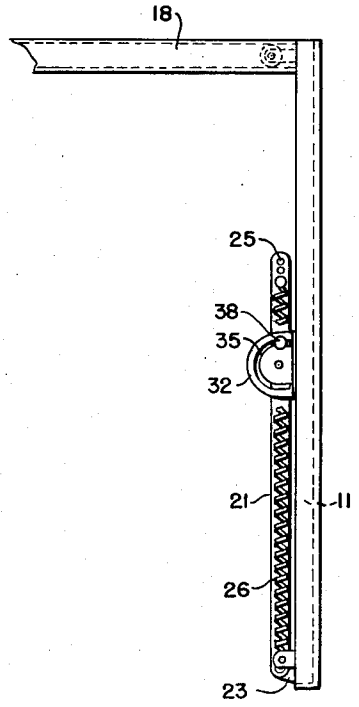


FIG. 4.

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Patented Feb. 16, 1954 2,668,980

UNITED STATES PATENT OFFICE

2,668,980

GARAGE DOOR OPENING MEANS

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Application October 2, 1950, Serial No. 188,052

2 Claims. (Cl. 16—1)

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This invention relates to an apparatus and arrangement for hanging or mounting a garage door of the overhead type. While various ways and means have been provided in the past for hanging and mounting and operating garage doors, previously known systems have all left something to be desired in the way of ease of operation, convenience and utilization of space at the upper part of the garage.

This invention provides an arrangement wherein little or no clearance need be provided between the upper support of the garage door and the top of the garage. At the same time the arrangement provides for maximum ease of operation and particularly it insures positiveness of operation without side sway or side motion of the garage door and without binding or jamming of any parts.

The mounting and operating arrangement comprises a guide track and rollers for horizontal movement of the garage door at the top of the garage with operating levers pivoted at the sides of the garage door, the levers being themselves pivoted to the door jambs at the sides of the door midway between the top and the bottom of the garage. The operating levers are attached at one end to the lower part of the garage door and the other ends of the operating levers are attached to adjustable tension springs, the tension of which can be adjusted so that the greater part of the force necessary for operating the door is provided by the tension springs. The invention features, particularly, semi-circular guides mounted at the sides of the garage door cooperating with guide rollers carried by the operating levers at points spaced from the pivot of the operating levers. This guiding structure serves the surpose of carrying part of the load involved in the operating of the door particularly at certain points of heavy loading in the operation and, furthermore, these guides restrain the motion of the operating levers to a single plane thereby eliminating any possible side sway or motion of the garage door with resultant jamming, binding or other malfunction. The guides perform the further function of acting as stops for the door when it is opened or closed, so that there is no necessity for providing stops on the guide rails as is commonly done with present day types of door openers.

In accordance with the foregoing it is a primary object of our invention to provide an apparatus and means for mounting and operating a garage door providing for a maximum in the way of ease of operation and utilization of space.

Another object of the invention is to provide

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a garage door operating arrangement comprising rollers at the top of the garage door, cooperating horizontal guide rails in the top of the garage and pivoted operating levers pivoted at the sides of the garage door substantially midway between the top and bottom of the garage, the operating levers having semi-circular guides and means cooperating therewith adapted to carry part of the load placed on the operating levers and constraining the motion of the levers to a vertical plane.

Still another object of the invention is to provide a garage door mounting and operating means comprising rollers at the upper part of the garage cooperating with horizontal guide rails at the top of the garage, operating levers pivoted at the sides of the garage door substantially midway between the top and bottom of the garage and attached at one end to the lower part of the garage door and having adjustable tension springs attached at the other ends of the operating levers.

Yet another object of the present invention is to provide a device of the character described which is simple in construction, highly efficient and reliable in operation and which is economical to manufacture.

With the above and other objects in view as will appear as the description proceeds, the invention resides in the novel construction, combination and arrangement of parts, as hereinafter more specifically set forth, claimed and shown in the accompanying drawings which form a part of this application for Letters Patent.

In the accompanying drawings are illustrated several preferred and practical embodiments of the invention, it being understood, however, that the drawings are merely illustrative and that the inventive concept is susceptible of other embodiments and utilizations, and that the illustrated embodiments likewise are susceptible of a wide range of variation and modification without departing from the spirit of the invention or the scope of the appended claims.

In these drawings which accompany and form a part of this specification, and in which like reference numerals are used to designate the same or like parts throughout the several figures:

Fig. 1 is a perspective view of a garage having the improved door and mounting mechanism of the present invention;

Fig. 2 is a side elevation view of the improved mechanism of the invention in fully open position;

Fig. 3 is a side elevation view of the improved

mechanism of the invention in partially open position; and,

Fig. 4 is a side elevation view of the improved mechanism of the invention in fully closed position.

Referring now in detail to the drawings the reference numeral 10 has been used to indicate generally a garage. Reference numeral 11 indicates the garage door and, as shown at the upper part of the door 11 at each side are rollers 12 and 13 which are rotatably mounted on shafts or pivots 14 and 15 which extend outwardly from the sides of the door 11. The rollers 12 and 13 operate in horizontal channel-shaped guide rails or tracks 18 and 19 which are horizontally disposed at the upper part of the garage. It will be noted that these guide rails 18 and 19 are positioned near the top of the garage there being little or no clearance between these guide rails and the top of the garage and consequently no wasted space.

As shown in Fig. 1 the garage door is shown in substantially closed position. As may be observed in Fig. 1 there are provided at opposite sides of the garage door opening, operating levers 21 and 22. These levers 21 and 22 are pivoted intermediate their lengths to the jambs at the sides of the garage door opening between the top and bottom of the garage door opening. The lower end of the operating levers 21 and 22 are pivotally secured to the garage door 11 by any suitable means, such as, for example, the mounting brackets 23 and 24. The upper ends of the operating levers 21 and 22 are provided with a series of openings as shown at 25. Spring members 26 and 27 are secured to the openings 25 of the operating levers 21 and 22, the other end of the springs 26 and 27 being secured near the bottom of the side jambs of the garage door opening. If desired, suitable means, well known to those skilled in the art to which this invention pertains, may be used to adjust the tension on the spring members 26 and 27 to provide suitable power to assist in opening and closing the garage door 11. The series of openings 25 in the operating levers 21 and 22 provide additional means for varying the power exercised by the spring members 26 and 27 by providing means for varying the leverage exerted by the operating levers 21 and 22 as well as the tension of the spring members 26 and 27. The result being a smoothly operating door which requires very little effort to open or close, as well as providing means for operating various weights of garage doors without making substantial changes in the door operating mechanism.

Guide members or brackets indicated by the reference numerals 32 and 33 are provided at opposite sides of the garage door opening and are secured to the door jambs by any suitable means. The guide members or brackets 32 and 33 are semi-circular in shape and serve the dual purpose of guiding the movement of the operating levers 21 and 22 and also acting as stop means at the end of travel for the garage door 11 when it is opened or closed. The door operating levers 21 and 22 are pivotally secured to the guide members or brackets 32 and 33 respectively by suitable means, such as, for example, the pivot pins 28 and 29 respectively. Each of the guide members or brackets 32 and 33 has a semi-circular groove or slot 35 and 37 respectively forming a semi-circular slot forming a guide track for a roller 36 attached to a respective one of the operating levers. The operating lever 22 carries a roller 36 which is mounted on a pivot extending from lever 22 in a position such that the roller 36 moves in the guide track 37 when the lever 22 moves about its pivot 29. Similarly, the guide member 32 has a similar semi-circular slot 35 forming a guide track for a similar roller 38 mounted on the operating lever 21.

From the various figures of the drawings which show various positions of the garage door between open and closed positions, its operation will be readily understood by those skilled in the art to which this invention pertains. It will be observed that when the door is operated from open to closed position the rollers 12 and 13 roll outwardly in their respective guide tracks 18 and 19 with the top of the door moving parallel with the guiding tracks. Movement of the door towards closed position can be started by means of a cord or handle attached adjacent the midpoint of the outer edge of the door in a position to be grasped by the operator.

As the door moves toward closed position, the operating levers 21 and 22 move in a counterclockwise direction about their pivots with their rollers 38 and 36 moving similarly in their respective guide tracks in the members 32 and 33.

It will be observed that when the door 11 is in fully open position the major portion of the load is carried on the rollers 12 and 13 and as the door moves towards closed position the load tends to be transferred to the pivots of the operating arms or levers 21 and 22 to the brackets 23 and 24. In order to relieve the load on these pivots the guide members 32 and 33 are provided, and as will be observed, as the door moves towards closed position part of the load will be carried by the rollers 38 and 36 operating in their respective guide members 32 and 33. Additionally, the guide members 32 and 33 provide the important function of constraining the motion of the operating levers 21 and 22 to a vertical plane thereby eliminating any twisting side motion or side sway of door 11 such as might cause it to bind or jam against the side jambs of the garage doorway. The result is that the door is constrained to an easy uniform motion along the same line or in the same path both in opening and closing. The guide members 32 and 33 further provide stops, at the end of travel of the door in opening or closing, as the rollers 38 and 36 reach the ends of the semi-circular slots 35 and 37.

In the closing operation of the door and, of course, in the opening operation as well, the tension springs 26 and 27 control and regulate the movement of the operating levers 21 and 22. When the door is moving in closing direction with the levers 21 and 22 operating in the counterclockwise direction the tension of the springs 26 and 27 is increased, that is, they are stretched and thus the tendency of the door to slam downwardly under its own weight is resisted and retarded, the tension of the springs being so adjusted that the door moves downwardly with a smooth motion requiring but little effort on the part of the operator.

Fig. 4 shows the position of the door in fully closed position. In this position the operating levers 21 and 22 are vertical with the springs 26 and 27 similarly in a vertical position. If desired, suitable weather stripping means may be applied to the bottom of the door to provide a tight fitting door and keep out wind, cold, dust, snow etc.

When the door is moved in opening, it will be

observed, that the tension springs 26 and 27 provide the major portion of the force necessary to lift the door towards open position since the springs pull the inner ends of the operating levers 21 and 22 in a clockwise direction. As the door moves in opening direction a part of its weight is supported by the rollers 12 and 13 at the upper part of the door. The portion of the weight of the door which is not so supported is substantially counter-balanced throughout the movement by the tension in the springs 26 and 27 so that the movement is practically effortless requiring but little strength on the part of the operator.

Also, in the closing motion the guide members 32 and 33 carry a part of the load of the door and thus relieve the brackets 23 and 24 from carrying the full load; the result is an easy, uniform and practically effortless motion of the door between its closed and open position without side sway and/or side motion and possible jamming at the sides of the door.

From the foregoing those skilled in the art will observe that we have provided a useful apparatus and arrangement for mounting and supporting and operating garage doors or similar doors for other types of enclosures. The mounting of the door at the upper part is such as to utilize a minimum amount of space without necessitating that there be clearance between the upper mounting of the door and the top of the garage. The operating means for the door are of simple but very effective and rugged construction providing for the upmost in ease of operation and having the qualities of positiveness of operation and assuring satisfactory service over long periods of operation.

It is to be understood that the forms of the invention herein shown and described are to be taken as preferred and practical embodiments of the same, and that various changes may be made in the shape, size and arrangement of parts without departing from the spirit of the invention as indicated by the scope of the appended claims.

Having thus described the invention, what we claim and desire to secure by Letters Patent is:

1. Mechanism for controlling the movement of a vertically swinging garage door provided with a frame and having a horizontally guided upper edge, said mechanism including a segmental bracket adapted to be fixed to a side of a frame below the frame top, a lever pivoted intermediate its ends centrally of the bracket so as to form two arms, said bracket having a slot concentric to the pivot of the lever and extending substantially 180°, a roller mounted on the lever and traveling in said slot, means for securing one arm of the lever to a side of the door adjacent its lower edge, and a coiled tension spring having one end adapted to be secured to a side of the door frame below the bracket, said spring having its remaining end attached to the other arm of said lever.

2. Mechanism for controlling the movement of a vertically swinging garage door provided with a frame and having a horizontally guided upper edge, said mechanism including a segmental bracket adapted to be fixed to a side of a frame below the frame top, a lever pivoted intermediate its ends centrally of the bracket so as to form two arms, said bracket having a slot concentric to the pivot of the lever and extending substantially 180°, a roller mounted on the lever and traveling in said slot, means for securing one arm of the lever to a side of the door adjacent its lower edge, and a coiled tension spring having one end adapted to be secured to a side of the door frame below the bracket, said lever having its remaining arm provided with a series of longitudinally spaced openings, said spring having its remaining end secured to the last mentioned arm by means extending into a selected one of the openings.

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