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DOOR OPERATING MECHANISM

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2 Sheets-Sheet 1

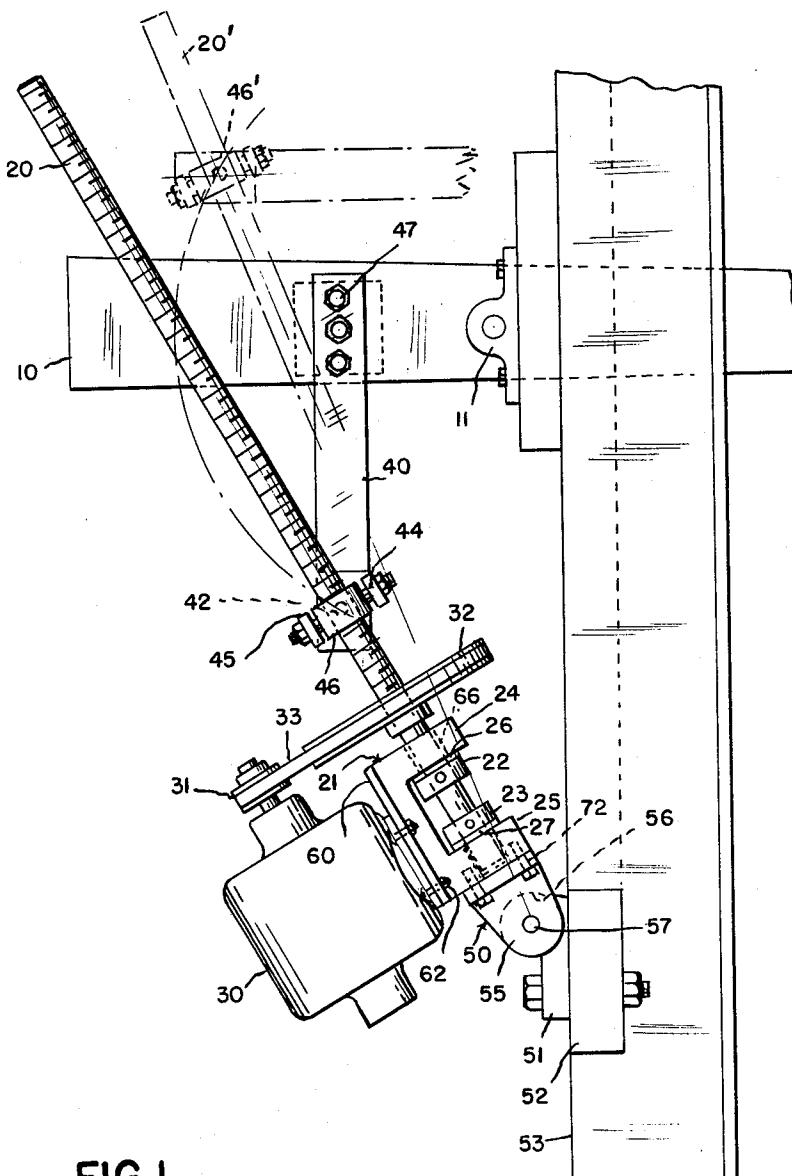


FIG. I.

INVENTOR.
MAHLON M. MATCHETT

BY

Whittemore, Hubbard & Belknap
ATTORNEYS

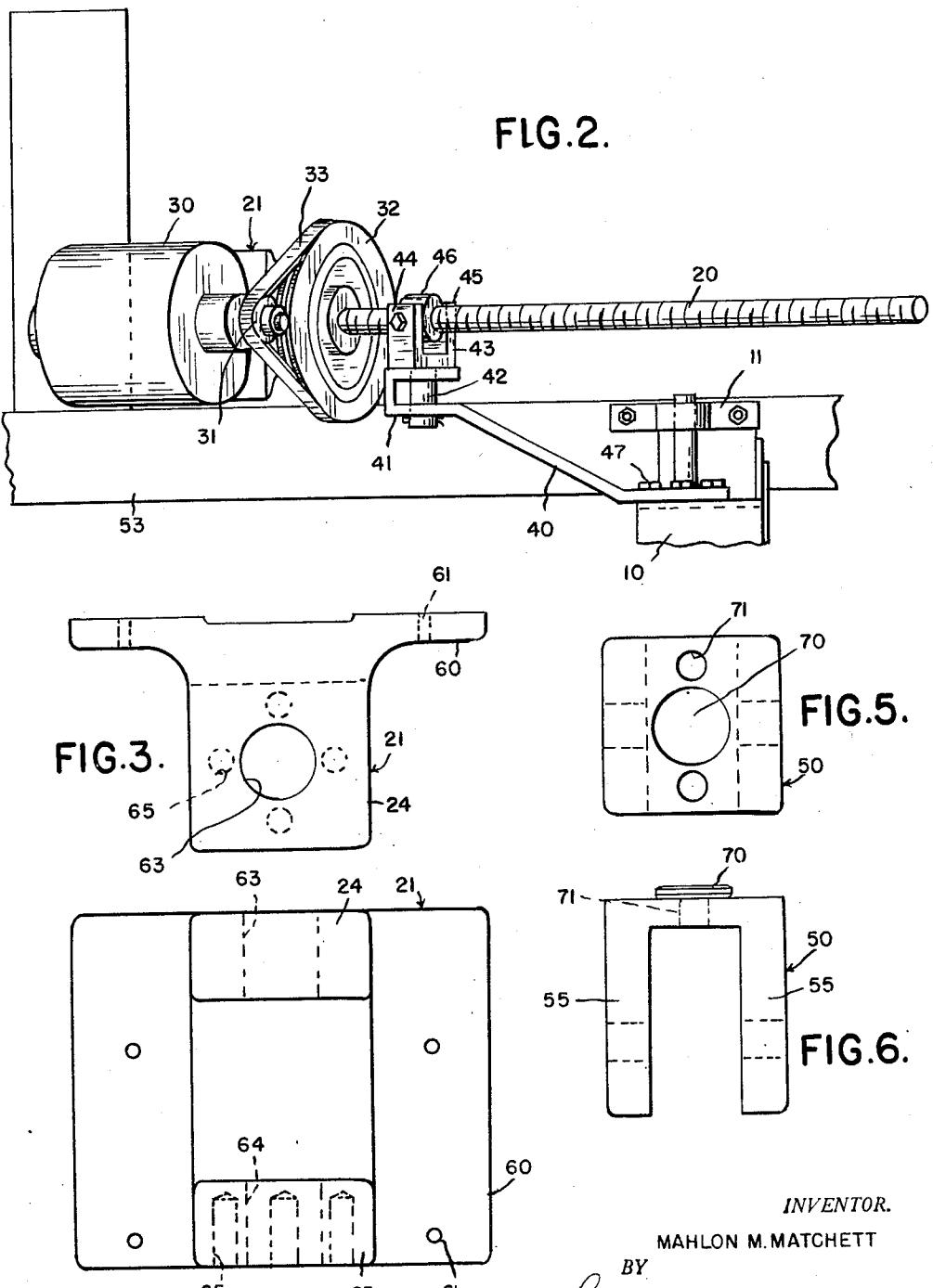
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INVENTOR.

MAHLON M. MATCHETT

BY

Whittemore, Heelink & Belknap
ATTORNEYS

UNITED STATES PATENT OFFICE

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DOOR OPERATING MECHANISM

Mahlon M. Matchett, Detroit, Mich., assignor, by
mesne assignments, to McKee Door Company,
Aurora, Ill., a corporation of Illinois

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7 Claims. (Cl. 268—74)

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The present invention relates to door operating mechanism and more particularly to mechanism adapted to operate an overhead tilting door of the type employed on garages.

In accordance with the present invention, motor means are mounted to a stationary part of the garage adjacent the door and are connected to an elongated screw. Secured to the door is a nut threaded to the screw. Upon rotation of this screw the nut is moved along the screw, thus imparting tilting motion to the door in an upward or downward direction depending upon the direction of rotation of the screw.

It is an object of the present invention to provide improved and simplified means for operating an overhead tilting door.

It is a further object of the present invention to provide screw actuated means for tilting an overhead door in a smooth positive manner.

It is a further object of the present invention to provide door operating mechanism including a motor and mounting means for the motor which permit its use at either side of the door opening.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a side elevation of the door operating mechanism;

Figure 2 is a plan view of the door operating mechanism;

Figure 3 is an end elevation of the screw housing;

Figure 4 is a front elevation of the screw housing;

Figure 5 is an end elevation of a pivotal housing support; and

Figure 6 is a front elevation of the pivotal housing support.

Referring now to the drawings, the overhead tilting garage door is indicated at 10 and is supported for tilting movement about a horizontal axis by a hinge support 11.

The operating mechanism for the door 10 comprises a screw 20 rotatably supported in a block 21, the screw 20 having thrust collars 22 and 23 mounted between arms 24 and 25 of the housing 21. Thrust washers 26 and 27 are provided between the thrust collars 22 and 23 and the cooperating arms 24 and 25, respectively. Mounted on the screw supporting block 21 is an electric motor 30 which drives a small pulley 31. Rigidly connected to the screw 20 is a large pulley 32 which is adapted to be driven from the motor pulley 31 by a V-belt or the like 33.

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Extending laterally from the door 10 and above the hinge 11 is an actuating arm 40.

As best seen in Figure 2, the arm 40 terminates at its free end in a reversely bent, U-shaped portion 41, the arms of which are provided with a pivot pin 42. Secured to the pivot pin 42 is a pivotal yoke 43 having arms 44 and 45. A nut 46 is pivotally supported between the arms 44 and 45 and is in threaded engagement with the screw 20. The actuating arm 40 is rigidly connected to the door 10 by a plurality of fastening elements indicated in Figure 1 at 47.

The block 21 is mounted for swinging movement in a vertical plane by a pivotal bracket 50 which is carried by a pivot support 51. The support 51 is rigidly secured to a suitable rigid part of the garage structure adjacent the side of the door. In the present instance the support is illustrated as secured to a 2 x 6 spacer 52 extending between upright studdings 53. It will be appreciated, however, that any suitable rigid support may be provided for the support 51. As illustrated, the bracket 50 is provided with a pair of arms 55 which span an outwardly projecting portion 56 of the support 51, and is pivotally connected thereto by a pivot pin 57.

With the foregoing description in mind, it will be observed that rotation of the screw 20 in a direction to feed the nut 46 upwardly along the screw will result in downward swinging motion of the garage door and corresponding upward swinging motion of its upper end and the actuating arm 40. The door 10 may be swung from a horizontal to a vertical position, or if preferred its closed position may be somewhat inclined from the vertical. Assuming, however, that the door 10 swings between horizontal and vertical positions, there are indicated at 20' and 46' the positions of the screw and nut, respectively, when the door is in closed position.

It is found that the screw and nut operating mechanism provides for rapid, smooth operation of the door and is particularly well adapted to perform its opening and closing function efficiently over a long period of time without attention.

In order that the mounting structure for the operating mechanism will be adaptable for mounting at either side of the door or between the door openings in the case of double garages, structure has been provided for mounting the motor 30 and the block 21 in different positions relative to the bracket 50. This structure is best illustrated in Figures 3, 4, 5 and 6 taken in conjunction with the assembly illustrated in Figure 1. The block 21 is provided with a flange 60 having

openings 61 therein to which the motor 30 is secured by fastening elements indicated at 62 in Figure 1. The arms 24 and 25 are provided with openings 63 and 64, respectively, in which the screw 20 is journalled, bushings 66 being provided in the openings. The arm 25 is in addition provided with four equally spaced tapped recesses 65.

The pivoted bracket 50 is provided with a short cylindrical stud 70 of a size to be received within the opening 64 in the arm 25. It will be appreciated that the lower end of the screw shaft 20 terminates short of the end of the opening 64 so as to leave room therein for the reception of the centering stud 10. The stud 70 thus serves as a centering and positioning means for assuring proper location of the motor 30 with respect to the pulley 32. The bracket 50 is in addition provided with a pair of openings 71 adapted to receive screws 72 for securing the screw housing 21 thereto. It will be observed that the openings 71 may be registered with any two opposite tapped openings 65 in the screw housing 21, and accordingly the block 21 may be rigidly secured to the bracket 50 in any one of four positions of adjustment stepped at 90° about the axis of the screw 20. This permits the motor to be positioned at any side of the screw 20 as circumstances require so that the entire structure may be mounted in a relatively restricted space.

The pulleys 31 and 32 are removable from the motor and screw 20, respectively, so that pulleys of different size may be substituted therefor to effect desired changes in driving ratio. Thus, for example, if the door is relatively heavy the driving ratio may be reduced so that its actuation will be relatively slow, whereas if the door 10 is of a relatively light construction the driving ratio may be increased so that actuation of the door is relatively rapid.

While there is illustrated and described a single preferred embodiment of the improved door operating mechanism, it will be understood that this full and complete illustration and description has been given merely to enable those skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What I claim as my invention is:

1. Door operating mechanism for use with a garage door of the type pivoted for outward swinging movement about a horizontal axis located a short distance below the top of the door, comprising a bracket extending inwardly from the door above the pivot axis thereof, a nut pivotally mounted on the free end of said bracket, a block mounted for swinging movement in a vertical plane at the side of the door, a screw mounted for rotation in said block, projecting upwardly therefrom, and in threaded engagement with said nut, a motor movable with said block, and drive means interconnecting said motor and said screw.

2. Door operating mechanism for use with a garage door of the type pivoted for outward swinging movement about a horizontal axis located a short distance below the top of the door, comprising a bracket extending inwardly from the door above the pivot axis thereof, a nut pivotally mounted on the free end of said bracket, a block mounted for swinging movement in a vertical plane at the side of the door, a screw mounted for rotation in said block, projecting upwardly therefrom, and in threaded engagement with said nut, a motor movable with said block, and drive means interconnecting said motor

and said screw, and mounting means for said motor providing for positioning of said motor in different positions of adjustment about the axis of said screw.

3. Door operating mechanism for use with a garage door of the type pivoted for outward swinging movement about a horizontal axis located a short distance below the top of the door, comprising a bracket extending inwardly from the door above the pivot axis thereof, a nut pivotally mounted on the free end of said bracket, a second bracket mounted for swinging movement in a vertical plane at the side of the door, a block secured to said second bracket, a screw mounted for rotation in said block, projecting upwardly therefrom, and in threaded engagement with said nut, a motor mounted on said block, driving connections between said motor and said screw, and mounting means between said block and said second bracket providing for location of said motor in different positions spaced about the axis of said screw.

4. Door operating mechanism for use with a garage door of the type pivoted for outward swinging movement about a horizontal axis located a short distance below the top of the door, comprising a bracket extending inwardly from the door above the pivot axis thereof, a nut pivotally mounted on the free end of said bracket, a second bracket mounted for swinging movement in a vertical plane at the side of the door, a block secured to said second bracket, a screw mounted for rotation in said block, projecting upwardly therefrom, and in threaded engagement with said nut, a motor mounted on said block, driving connections between said motor and said screw, and mounting means between said second bracket and said block providing for location of said motor in different positions spaced about the axis of said screw, said mounting means comprising abutting plates on said second bracket and block, one of said plates having a centering recess therein, the other of said plates having a stud received in said recess, said plates having fastening openings therein adapted to register with said block in different positions relative to said second bracket.

5. Adjustable motor and screw supporting structure for a power door actuator comprising a pivotably mounted bracket having a short centering stud projecting from one side thereof, a screw and motor supporting block having an opening extending therethrough for receiving one end of a screw shaft, the centering stud extending into the end of the opening opposite to the screw shaft, and fastening means for securing said block to said bracket in any one of a plurality of different positions of adjustment located about said stud.

6. Adjustable motor and screw supporting structure for a power door actuator comprising a pivotably mounted bracket having a short centering stud projecting from one side thereof, a screw and motor supporting block having a pair of spaced arms projecting from one side thereof, said arms provided with aligned apertures for the reception of one end of a screw shaft, the centering stud extending into the end of one of the openings opposite to the screw shaft, and fastening means for securing said block to said bracket in any one of a plurality of different positions of adjustment located about said stud.

7. Mounting and drive means for a door actuating screw designed to permit mounting of the screw at either side of single garage doors or

between double garage doors with a minimum of interference with door movement, comprising a bracket, means mounting said bracket for pivotal movement, a block having a seat thereon, a motor secured to said seat, a centering stud on said bracket, said block having an opening therein for receiving one end of a screw shaft at one end and the centering stud at the other end, and fastening means for securing said block to said bracket in different positions of adjustment about the axis of said stud.

MAHILON M. MATCHETT.

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