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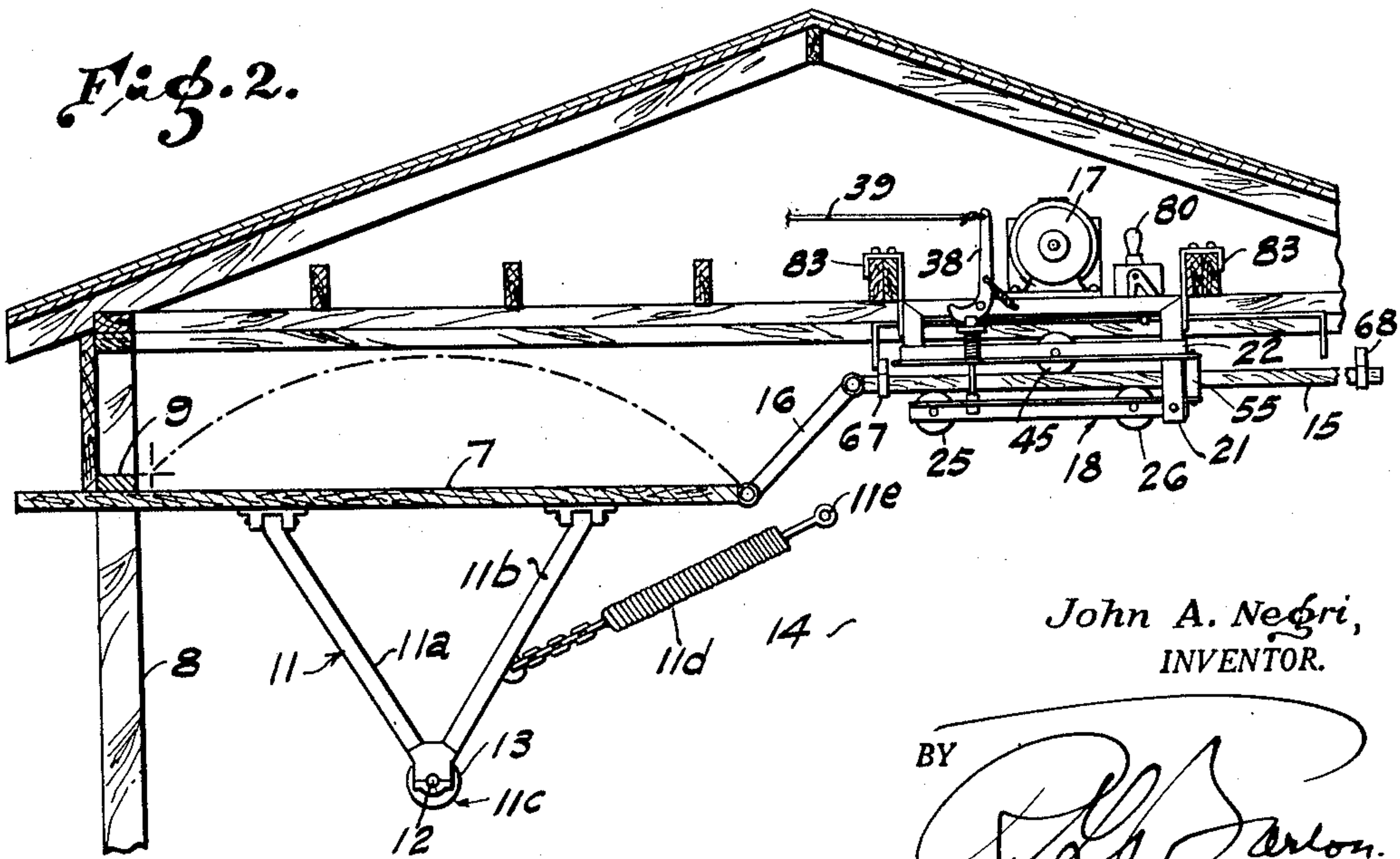
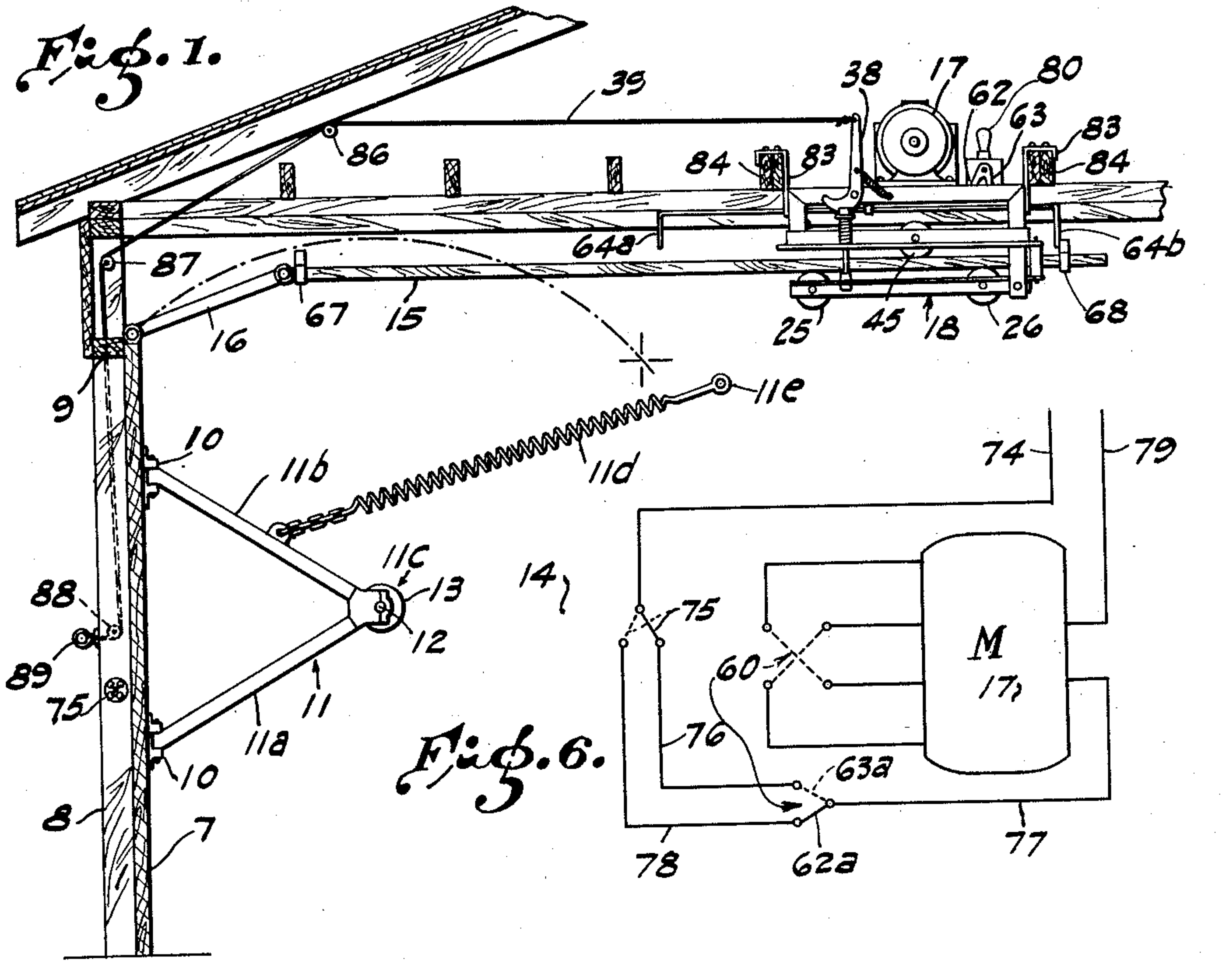
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GARAGE DOOR OPERATING MECHANISM

Filed July 17, 1944

2 Sheets-Sheet 1



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Fig. 3.

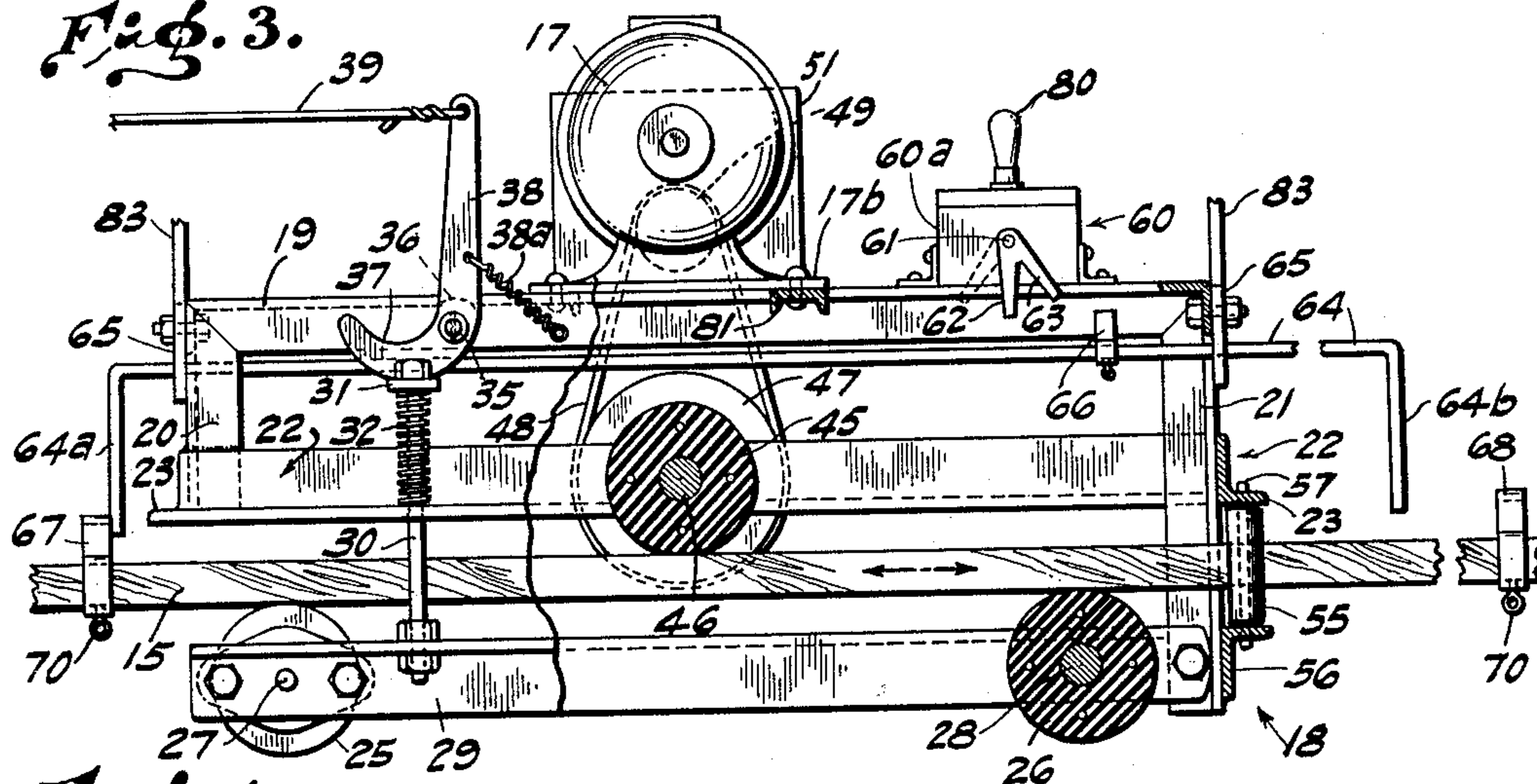


Fig. 4.

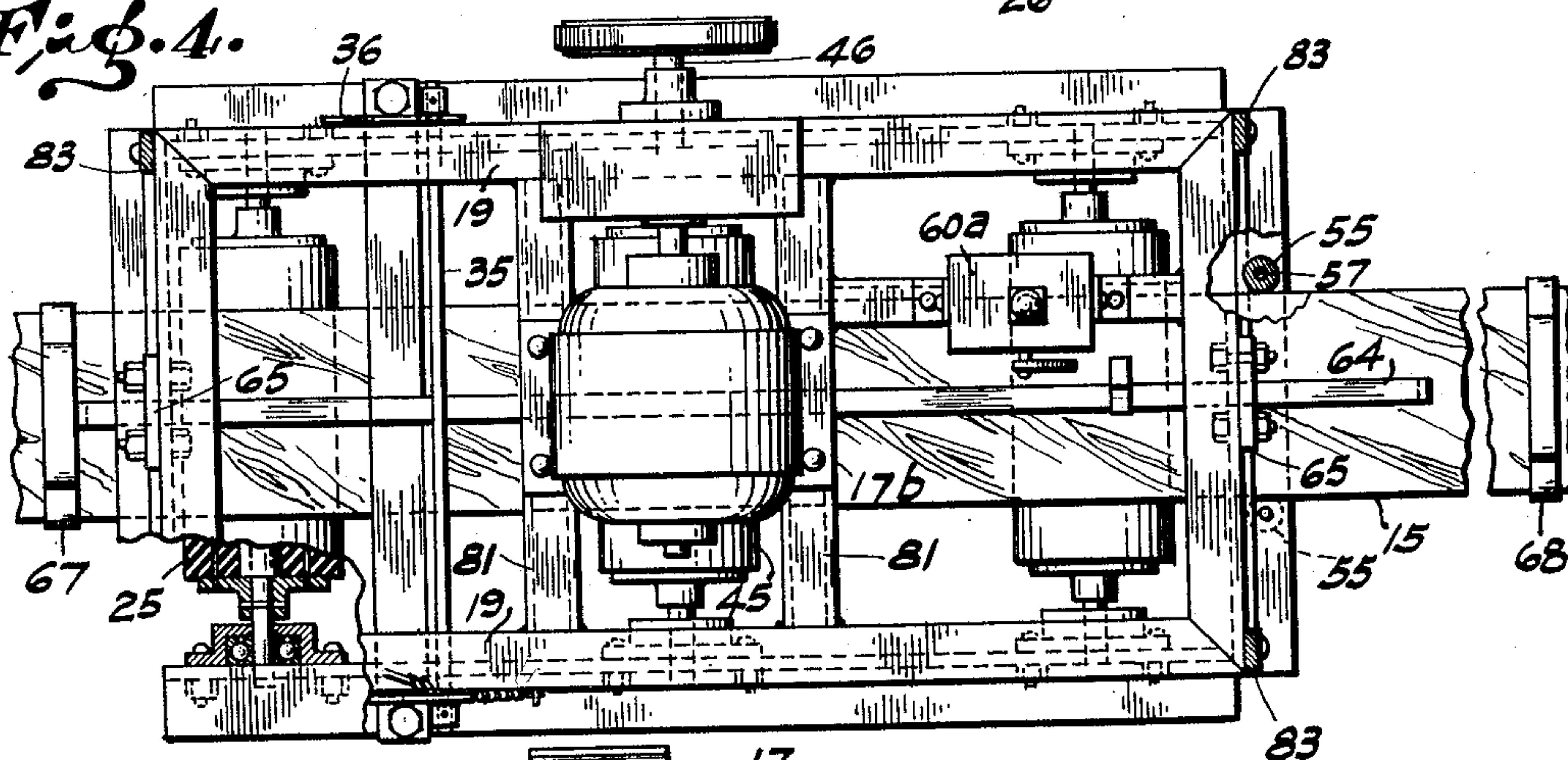
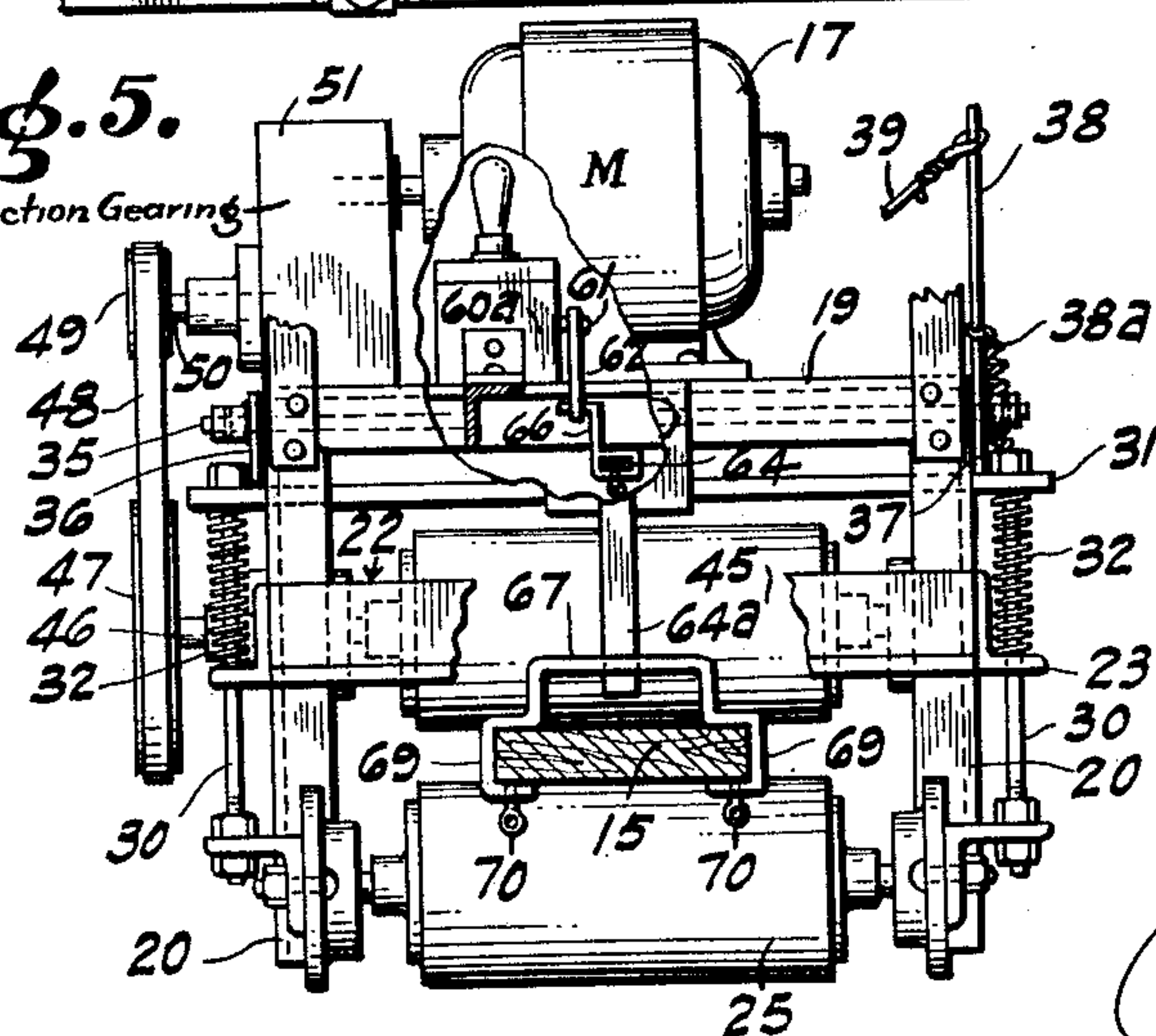


Fig. 5.

Reduction Gearing



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GARAGE DOOR OPERATING MECHANISM

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9 Claims. (Cl. 268—74)

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This invention relates to a garage door operating mechanism.

Hitherto, in the art to which this invention pertains, it has been a common practice to employ cog wheels intermeshing with racks as a part of the means for moving the door from its vertical closed position to its substantially horizontal overhead open position. This kind of a structure has certain disadvantages among which are, susceptibility to rust, the possibility of small objects interfering with the interaction between the gears and racks and thus causing breakage, or obstructing the operation of the device; and the further disadvantage of requiring the use of an undesirable number of special factory made mechanical parts.

Another disadvantage which has been commonly met with is that provision is not usually made for safeguarding the door-closing mechanism against breaking in case the door encounters an obstruction.

It is among the objects of the present invention to overcome the above mentioned defects by providing a door-operating mechanism wherein it is made possible to use boards or elongated wooden beams in place of metallic racks and wherein non-metallic rollers without teeth may be used instead of the cog wheels or gears above mentioned. Furthermore, in case the closing movement of the door becomes obstructed, as, for example, by reason of the automobile not having cleared the doorway, the toothless roller which acts frictionally upon the door-operating member will slip thereupon, thus preventing the device from being broken, and also not forcing the door against the car with so great a force as to damage the latter.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawings, which illustrate what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a side elevation showing the door closed, only the front portion of a garage in which the device is installed being shown.

Fig. 2 is a view similar to Fig. 1 but differs therefrom in that the door is shown in its overhead, open position.

Fig. 3 is a larger scale side elevation of certain overhead, door-operating parts, a part of the structure nearest to the observer being broken away to disclose parts that would otherwise be hidden, parts also being broken away to contract the length of the view.

Fig. 4 is a plan view of the structure shown in Fig. 3, a portion of one of the rollers and bearing structure therefor being shown in horizontal midsection.

Fig. 5 is a front end elevation of the structure shown in Figs. 3 and 4, looking at the left

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end of said views, part of one of the crosspieces being broken out to show structure therebehind, the door operating timber being shown in section.

Fig. 6 is a wiring diagram.

Referring in detail to the drawings, the garage door 7 is movable to and from the closed position in relation to a door opening at each side of which is a door post 8 and above which is a lintel 9. Considering the door in its closed position, the inner face of each edge portion thereof has attached to it a pair of vertically spaced apart hangers 10 and a V-shaped (as viewed in Fig. 2) bracket 11 which has the diverging end portions of its two arms fastened to said hangers. At the juncture of the arms 11a, 11b of said bracket is a bearing structure 11c which cooperates with a stud 12 that projects from a mounting plate or disk 13 secured to each side wall 14 of the garage. At each side of the garage a coiled tension spring 11d has one of its ends attached to the midlength portion of the upper bracket arm 11b and its opposite end anchored at 11e to the garage wall. This spring acts to facilitate the operation of the door by counterbalancing its weight.

Subjacent to the ceiling of the garage there is mounted the elongated horizontally extending, reciprocatory, door-operating member 15 the front end of which is operatively connected to the upper part of the middle portion of the door by means of a link 16, one end of said link being pivotally connected to said member and the opposite end thereof pivotally connected to the door. Said door-operating member 15 desirably consists of a board of the requisite length and sufficiently wide and thick so that it will not deflect materially when in the extended position shown in Fig. 1.

The means for supporting and guiding the member 15 during its operation, and for operatively relating the electric motor 17 thereto includes a rectangular skeletal frame 18 to the upper side of which said motor is secured, said frame having at each front corner a downwardly extending arm 20 and at each rear corner a longer downwardly extending arm 21. These four arms afford hanger means which support a horizontally disposed, rectangular lower angle iron frame 22 which is mounted on a level with the lower end portions of the arms 20. The basal flange 23 of this frame projects outwardly therefrom.

The door operating beam 15 is normally operatively supported by a front roller 25 and a rear roller 26, these rollers being respectively supported upon shafts 27 and 28 which bridge the space between and are carried by a swingable frame consisting of two angle iron supporting bars 29 each of which has its rear end pivotally attached to the lower part of the platform arm 21 at its side of the device. The front portion of

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said bars 29 are yieldingly supported by headed hanger rods 30 which pass very loosely through apertures provided for them in the basal flange 23 of the frame 22. Said rods 30 pass loosely through the apertured end portions of a flattened cross bar 31 which underlie the heads of said hanger rods to afford an abutment for the upper end of a coiled compression spring 32 the lower end of which rests upon the frame flange 23.

Through the upper portion of the front part of the upper frame 19, which as viewed in plan (Fig. 4) is a rectangular angle iron frame, passes horizontally a rockable shaft 35, the ends of which project beyond the sides of said frame, one shaft end having fixed to it an arcuate cam 36 and the other a like cam 37, except that the latter cam has an upwardly directed operating arm 38 to the free end of which is tied an operating cord 39 which is led to a point outside the garage. Said operating arm is retracted by a spring 38a. These two cams normally allow the springs 32 to hold the flattened bar 31 against the heads of the rods 30, but traction upon the cord 39 will rock the shaft 35 and two cams fixed thereto thus causing the latter to depress the bar 31 against the opposition of springs 32, whereupon the front end portions of the roller-carrying bars 29 will gravitate downwardly, thus disengaging the beam 15 from the means for reciprocating it, which will next be described.

Reciprocatory movement is imparted to the door-operating beam 15 by means of a rubber or rubber-like roller 45 which is concentrically fixed to a shaft 46 having its bearings in the side portions of the upper frame section 22, one end of said shaft projecting considerably from one side of said frame and having a pulley 47 fixed to its projecting portion. This pulley is driven by a belt 48 from the driving pulley 49 on shaft 50. Said shaft 50 is the power delivery shaft of a conventional reduction gearing 51 operatively related to the motor 17.

It is desirable that the rear part of the supporting framework be provided with an anti friction means for guarding against edgewise displacement of the board or beam 15 during its reciprocation. For this purpose a pair of rollers 55 is provided, said rollers rotating about vertical axes and engaging opposite edge portions of said beam. A horizontal angle iron bar 56 is secured to the rear sides of the lower end portions of the already mentioned frame arms 21 and the rollers 55 are provided with shafts 57 and have their bearings in said bar 56 while their upper ends have their bearings in the frame flange 23.

The current control means for the motor comprises a switch mechanism 60 which is of a conventional character adapted to start and stop the motor and to reverse the direction of its rotation, and therefore need not here be described in detail. This switch mechanism includes an operating shaft 61 to which are fixed two angularly related arms 62 and 63. A horizontal switch-operating bar 64 extends in an overhead, parallel relation to the door operating beam 15, said bar having downwardly directed end portions 64a and 64b and being slidably supported at the ends of the frame by means of hangers 65. Said bar has adjustably secured to it a switch-operating member 66 positioned to engage the outer end portion of the switch arm 62 when the bar 64 moves leftward from the position shown in Figs. 3 and 4, and to engage the arm 63 during the return movement of the bar 64.

Reciprocation of bar 64 is automatically ef-

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ected by means of abutment members 67 and 68 which are adjustably secured to and upstand from the door operating beam 15, the member 67 at times abutting the downwardly directed front portion 64a of bar 64 to shift said bar rearwardly, and the member 68 at times abutting the downwardly directed rear portion 64b of said bar 64 to shift it forwardly. These shifting movements of said bar 64 cause the aforesaid member 66 which it carries to operate the switch mechanism 60, in the manner already indicated, to start and stop the motor and to cause it to rotate reversely after each stopping.

Said abutment members 67 and 68 are shown as twin structures, each of which consists of a metal strap bent to resemble an inverted stirrup (see Fig. 5), said strap having at each end an angularly channel shaped limb 69. Said limbs 69 include between them the door operating beam 15, to which they are secured by eyeletted clamping screws 70.

In the wiring diagram in Fig. 6, which by way of illustration indicates how the motor starting, stopping and reversing is accomplished, therein is shown the motor 17 furnished with lead wires 74 and 79. The wire 74 conducts the current to a three-way switch 75 (shown in Fig. 1 at one side of the door opening), said switch 75 being adapted upon actuation from the full line to the dotted line position, to close the circuit to the motor through wires 74, 78, 77 and 79 and thereby energize the motor, which has previously been set for reverse rotation by reason of the dotted switch arm position 63a having been moved to position 62a to correspond with the operation resulting from the movement of limb 62 from the dotted line position to the full line position shown in Fig. 3. Vice versa, when the switch 75 is next moved from the dotted line to the full line position the circuit to the motor will be closed through wires 74, 76, 77 and 79 to move the door operating mechanism in a direction opposite to that which it last moved by reason of the fact that switch arm position 62a has been moved to position 63a to correspond with the operation of the movement of limb 62 from the full line position to the dotted line position in the manner described. Thus the opening and closing movements of the door 7 may be carried on ad infinitum.

In the diagram the numeral 60 designates the conventional motor reversing switch which is contained within the casing 60a (Fig. 1) along with the switch means for stopping and starting the motor. The motor reversing switch may either be contained in the motor itself or in a separate switch box.

A lamp 80 may be included in the circuit if desired and will always be lighted when the door is open and de-energized when the door is closed.

Describing additional structural details, the upper, rectangular angle-iron frame member 19 is shown having secured to its midlength portion a pair of transverse, spaced apart channel iron bars 81 to which, in turn, is bolted the base 17b of the motor 17. Each corner portion of said frame 19 is shown having secured to it an angularly hook-shaped hanger strap 83 which overlies double garage ceiling joists 84.

The cord 39, whereby the lever 38 may be manually operated to disconnect the door operating beam 15 from its operating means, is shown led over anti-friction rollers 86 and 87 attached to the roof, and wall portions of the garage, the lower end portion of said cord passing behind an anti-friction roller 88 and thence to the front

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side of the garage where it is provided with a pull ring 89.

The rollers 25, 26 and 45 are all shown made of elastic material, preferably of rubber or rubber-like substitute. It is not vital to the successful operation of the device that the lower rollers 25 and 26 be elastic, but it is important, when the upper roller 45 is made with a smooth periphery, that at least its tread portion be elastic.

In the operation of the device, assuming the parts to be in the position shown in Fig. 1, and it is desired to open the door the three-way switch 75, preferably mounted upon the wall of the garage so that it can be operated outside thereof, is actuated to close a circuit which starts the motor running and in turn, through the medium of the reduction gearing 51, pulley 49, belt 48 and pulley 47, starts rotating the wheel 45 which engages the upper surface of the door operating beam 15, thereby moving said beam backwardly causing it to pull upon the link 16 and thus swing said door to its open overhead position. As the door approaches its fully open position the bumper 67, secured to the front end portion of the beam 15, contacts the limb 64a of the switch actuating bar 64 causing the switch tripping member 66 carried by said bar to contact the limb 62 of the reversing switch mechanism, thereby moving said limb from the position shown in Fig. 1 to the position thereof shown in Fig. 2, thereby actuating the switch and setting its mechanism in the reversing position, so that when the manually operable switch 75 is again actuated, the motor will run in the reverse direction to impart a closing movement to the door.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What is claimed is:

1. In a garage door operating mechanism, an upper frame structure, an elongated swingable lower frame structure normally extending in a substantially horizontal plane and having one of its end portions pivotally connected with a part of said upper frame structure, rollers mounted upon said swingable frame structure at different points along its length, a door operating beam resting upon said rollers, a driving roller for said beam normally in contact with the upper surface of said beam, mechanical driving means operatively related to said driving roller, an upstanding rod having a head on its upper end and secured to said swingable frame, said rod extending loosely through an aperture in said upper frame structure, a compression spring surrounding said rod, said spring having a lower end portion resting upon the aforesaid apertured portion of said upper frame structure, a part loosely surrounding said rod and normally pressed against the head thereof by said spring to maintain in an upswung position said rod and swingable frame, and manually operable means to depress said part in opposition to said spring thereby to cause said swingable frame to gravitate to a downwardly swung position wherein it lowers said door operating beam to a disengaged relation to its driving roller, said door being manually operable independently of said motor when the driving roller is disengaged from the door operating beam, as aforesaid.

2. The subject matter of claim 1, and said manually operable means including a swingable lever having a cam portion which depresses said

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part in opposition to said spring, and a cord attached to said lever and affording a means for the remote operation thereof.

3. In a garage door operating mechanism, an upper frame structure, an elongated swingable lower frame structure normally extending in a substantially horizontal plane and having one of its end portions pivotally connected with a part of said upper frame structure, a roller mounted upon said swingable frame structure, a door operating beam resting upon said roller, a driving roller for said beam normally in contact with the upper surface of said beam, mechanical driving means operatively related to said driving roller, an upstanding rod having a head on its upper end and secured to said swingable frame, said rod extending loosely through an aperture in said upper frame structure, a coiled spring surrounding said rod, said spring having an end portion contacting the aforesaid apertured portion of said upper frame structure, a part loosely surrounding said rod and operatively connected to said spring to maintain in an upswung position said rod and swingable frame, and manually operable means to depress said part in opposition to said spring thereby to cause said swingable frame to gravitate to a downwardly swung position wherein it lowers said door operating beam to a disengaged relation to said driving roller, said door being manually operable independently of said motor when the driving roller is disengaged from the door operating beam, as aforesaid.

4. The subject matter of claim 3, and said manually operable means including a swingable lever having a cam portion which depresses said part in opposition to said spring.

5. The subject matter of claim 3, and said manually operable means including a swingable lever having a cam portion which depresses said part in opposition to said spring, and a cord attached to said lever and affording a means for the remote operation thereof.

6. In mechanism for operating a swingable closure, a support frame adapted to be mounted in an elevated position, a motor driven actuating roller rotatably mounted on said support frame, support roller means mounted on the support frame for movement transversely to the axis of said actuating roller, a beam having operating connection with the closure and supported for reciprocating movement on said support roller means, means tending to urge and hold said roller means in such position as to press the beam into operative contact with the actuating roller, means selectively operable to move and hold said roller means in such position that the beam is disengaged from the actuating roller and whereby the closure and beam are manually operable, and means for automatically controlling operation of the motor to effect reverse rotation of said actuating roller for imparting reciprocating movement to said beam.

7. Mechanism as claimed in claim 6 wherein said support roller means is pivotally connected with the support frame and is resiliently biased to press the beam into driving engagement with the driven roller, and wherein said support roller means are moved to disengage the beam from the driven roller by manually operative cam mechanism.

8. In mechanism for operating a closure, a support adapted to be mounted in an elevated position, a motor rotated drive roller mounted horizontally on said support, a vertically swinging frame having one end connected with said sup-

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port and carrying a plurality of beam supporting rollers, a beam connected to the closure and supported for substantially horizontal reciprocating movement on said support rollers, support elements attached to said swinging frame and movable through guides in said support, spring means yieldingly urging said elements to elevated positions wherein said beam is held in driving engagement with the drive roller for reciprocating the beam by reverse operation of the motor, swingable cam means operative to depress said supporting elements wherein to lower the beam to a position disengaged from the drive roller whereby the closure and beam are manually operative.

9. Mechanism as claimed in claim 8 wherein said motor is reversely operated to reciprocate the beam by switch means actuated through the medium of a horizontally slidable element operated by abutments fixed on the beam.

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