June 4, 1957 C. C. BRAGG 2,794,634

MECHANICAL DOOR OPERATOR

Filed April 14, 1955 3 Sheets-Sheet 1

Fig. 1

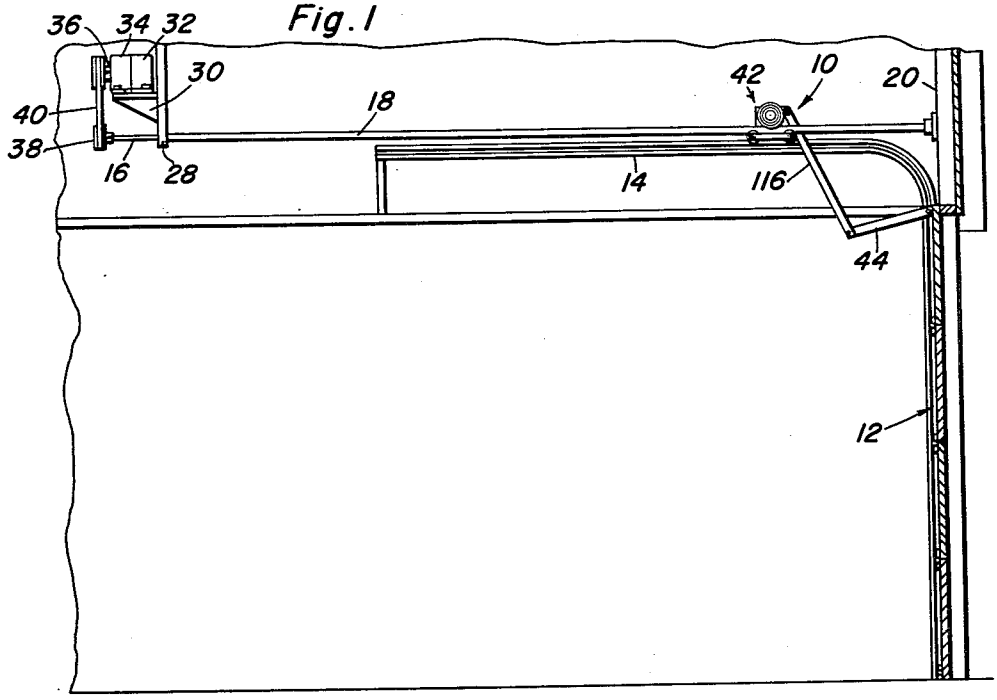
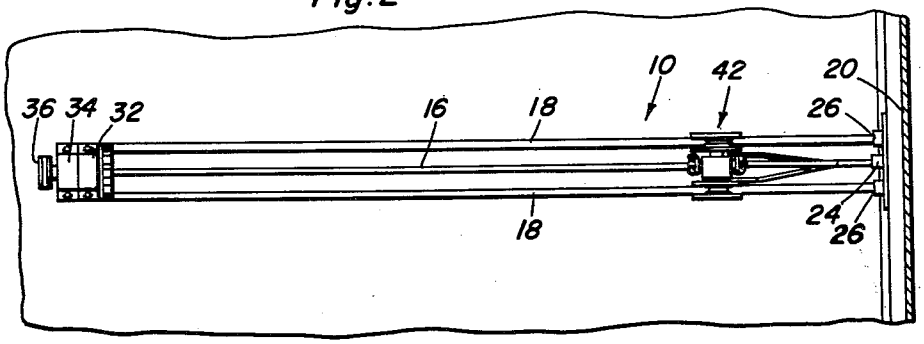


Fig. 2



Clarence C. Bragg
INVENTOR.

BY Thomas A. O'Brien and Harvey B. Jacobson
Attorneys

June 4, 1957 C. C. BRAGG 2,794,634

MECHANICAL DOOR OPERATOR

Filed April 14, 1955 3 Sheets-Sheet 2

Fig. 3

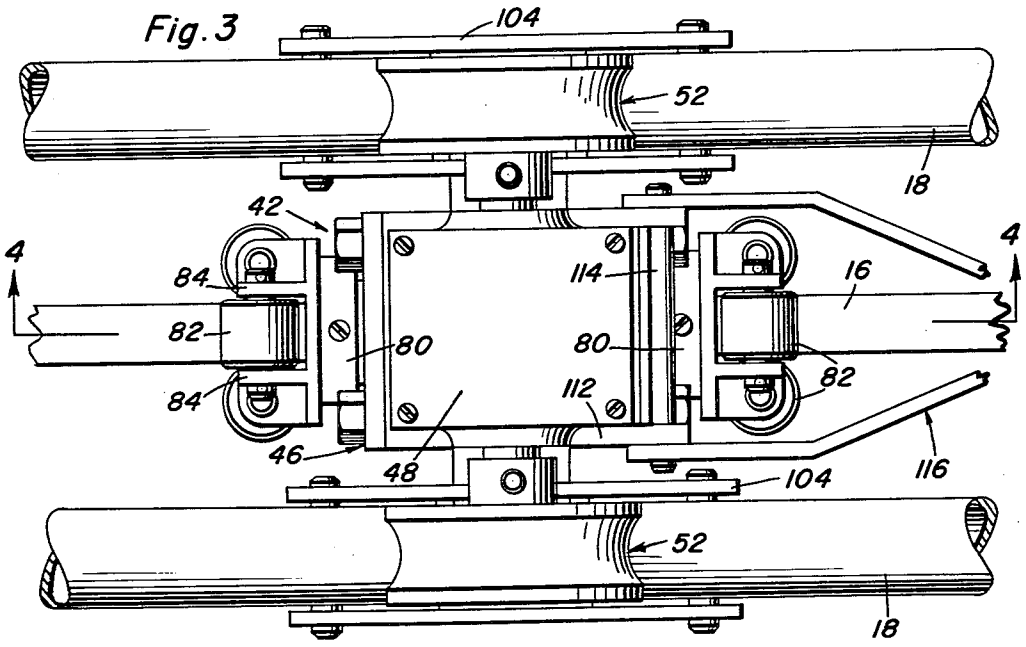
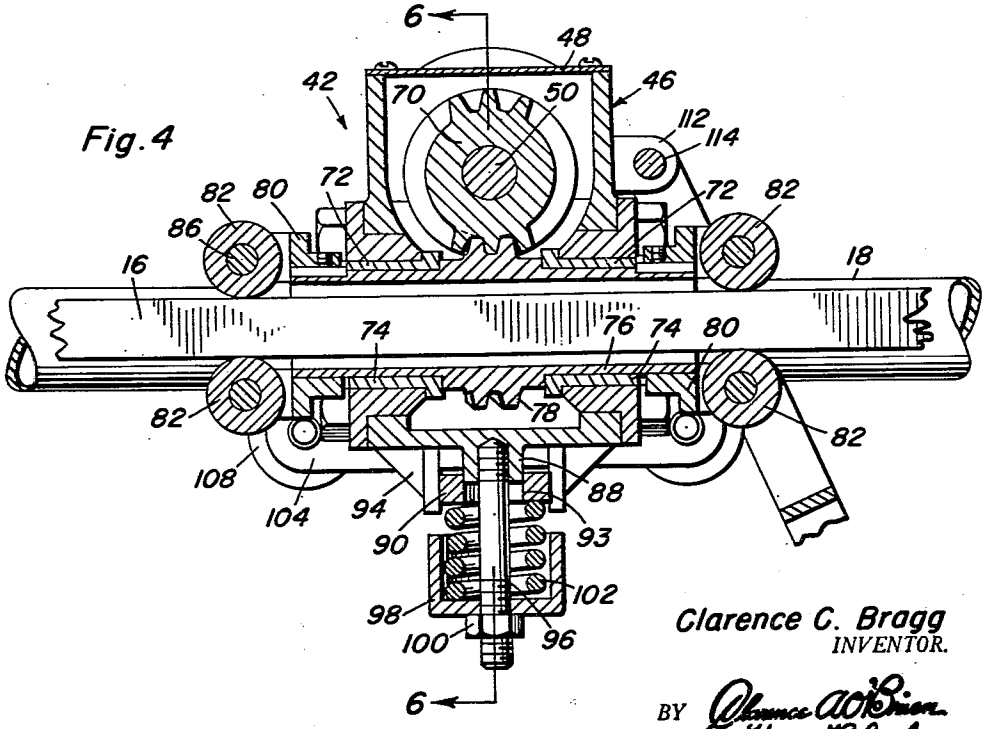


Fig. 4



Clarence C. Bragg
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

June 4, 1957 C. C. BRAGG 2,794,634

MECHANICAL DOOR OPERATOR

Filed April 14, 1955 3 Sheets-Sheet 3

Fig. 5

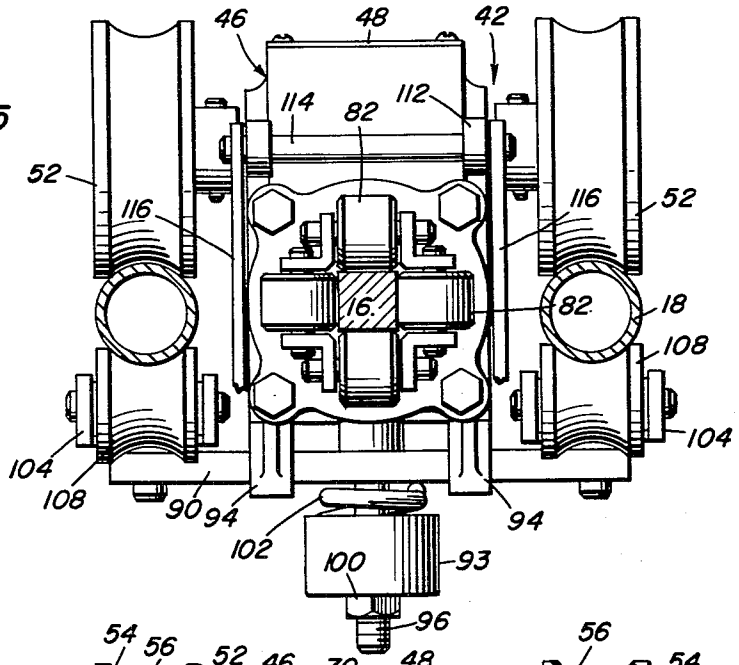
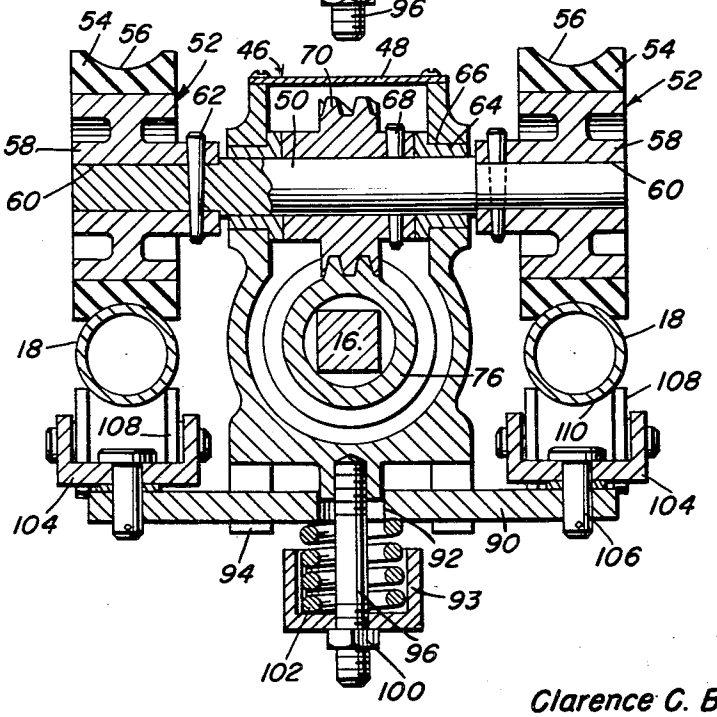


Fig. 6



Clarence C. Bragg
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

United States Patent Office 2,794,634 Patented June 4, 1957

2,794,634

MECHANICAL DOOR OPERATOR

Clarence C. Bragg, Oswego, Oreg.

Application April 14, 1955, Serial No. 501,361

5 Claims. (Cl. 268—59)

This invention relates to a mechanical door operator for mechanically opening and closing doors, being particularly directed to an apparatus for opening and closing overhead doors, but not being limited to such use.

The primary object of the present invention is in the provision of a novel moving carriage construction.

A very important object of the present invention is in the provision of a carriage having propelling wheels for moving the carriage along a track, which propelling wheels are driven in response to rotation of a shaft along which the carriage moves.

A further object of the invention is in the provision of a carriage adapted to be freely movably mounted upon a drive shaft and being propelled along the shaft through the medium of propelling wheels carried by the carriage, the propelling wheels being turned to move the carriage in response to rotation of the shaft.

A further object of the invention is in the provision of a novel drive means carried by the carriage freely slidably interconnecting the carriage to the drive shaft and drivingly interconnected with driven means operatively connected to the propelling wheels and also carried by the carriage.

A highly important object of the present invention is in the provision of a carriage of the aforegoing character wherein the frictional engagement of the propelling wheels with the track may be adjustably varied in accordance with the load to be moved by the carriage.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a side elevational view of the mechanical door operator constituting the present invention utilized in conjunction with an overhead sliding door to open and close the same;

Figure 2 is a top elevational view of the construction shown in Figure 1;

Figure 3 is an enlarged top elevational view disclosing the carriage, drive shaft and track of the door operator;

Figure 4 is a longitudinal cross-sectional view through the carriage taken substantially along the plane of section line 4—4 of Figure 3;

Figure 5 is a front elevational view of the carriage; and

Figure 6 is a transverse cross-sectional view through the carriage taken substantially along the plane of section line 6—6 of Figure 4.

Referring now to the drawings in detail, attention is first directed to Figures 1 and 2 wherein the mechanical operator assembly constituting the present invention is designated by the numeral 10 and is shown in an operative assembly for raising and lowering an overhead door 12 such as is utilized in conventional garages, warehouses and the like.

The door 12 is comprised of a plurality of hingedly connected panels which slide upwardly and rearwardly along the guide track 14 as the door is opened and forwardly and downwardly to the position shown in Figure 1 as the door is closed.

The assembly 10 constituting the present invention is shown as a means for mechanically raising and lowering the door. Noting particularly Figures 1 and 2, the operating assembly 10 is seen to consist of an elongated drive shaft 16 flanked by a pair of cylindrical rails 18, which rails form a guide track. The forward ends of the drive shaft 16 and rails 18 forming the track are attached to the building frame 20 above the door 12 by means of suitable bearings 24 and 26, respectively. Bearing 24 rotatably journals the forward end of the drive shaft 16 therein whereas bearings 26 may simply mount the ends of the rails 18 therein without rotation.

From a portion of the building not shown, spaced rearwardly from the door 12, depends a suspended bracket 28. The rearward ends of the rails 18 are fixed to the bracket 28 adjacent the lower end thereof and the rearward end portion of the drive shaft 16 extends rotatably through the bracket 28.

Mounted on the bracket 28 above the drive shaft 16 on the suitable platform 30 is a conventional motor 32 and speed reducer 34 for drivingly revolving a pulley wheel 36. A second pulley wheel 38 is fixedly mounted on the rearward end of the drive shaft 16 and belt 40 interconnects the pulleys 36 and 38 whereby in response to operation of the motor 32, the drive shaft 16 is rotated. Obviously, other gearing arrangements than the pulley and belt drive could be utilized as desired.

Freely movable along the drive shaft 16 is a carriage 42 which, in conjunction with the drive shaft 16 and the track formed by the rails 18, constitutes the present invention. A link 44 is pivotally connected at its opposite ends to the upper end of the overhead sliding door 12 and the carriage 42 whereby the door 12 is raised and lowered in response to movement of the carriage along the track.

With reference to Figures 3 through 6 of the drawings, the construction and operation of the carriage relative to the drive shaft 16 and track rails 18 will become apparent.

The carriage 42 comprises a hollow housing 46, preferably discerptible as shown in the drawings. A removable cap 48 closes the top of the housing and provides an access opening for packing the interior of the housing with a lubricant or the like. Axle 50 extends transversely through the upper portion of the housing and projects exteriorly of the housing on the opposite sides thereof. On the exteriorly projecting end portions of the axle 50 are mounted propelling wheels 52 having non-slip tread surfaces 54. Each of the tread surfaces 54 is formed of rubber or similar material having a grooved periphery 56 curved to seat snugly on the track rails 18 to provide a good traction surface. The hubs 58 of the wheels 52 are fixed to the reduced end portion 60 of the axle 50 by means of suitable pins 62. Bearings 64 disposed in the side wall apertures 66 of the housing 46 rotatably journal the axle 50 through these apertures.

Pinned as at 68 or otherwise fixedly secured to the central portion of the axle 50 within the housing 46 is a helical gear 70 which constitutes a driven means for rotating the axle 50 and consequently the propelling wheels 52.

The housing 46 is further provided with longitudinal, aligned openings at the opposite ends thereof opening into the lower portion thereof, as shown most clearly in Figure 4, these openings being designated by the numeral 72. Bearings 74 rotatably journal a sleeve 76 in the openings. The central portion of the sleeve 76 is provided with a helical gear 78 disposed at right angles to the driven gear 70. The helical gear 78 constitutes a driving gear for the gear 70. The ends of the sleeve 76 project beyond the ends of the housing 46 of the carriage 42.

Carried on each end of the sleeve 76 constituting the

helical drive gear is a square bracket **80**. Carried by each of the brackets **80** are cam follower bearings or rollers **82**. The rollers on each bracket **80** are spaced 90° apart and form a square around the drive shaft **16**, which drive shaft is in itself square. Thus, the rollers **82** freely, slidably and non-rotatably engage the drive shaft **16** whereby upon rotation of the drive shaft, the drive gear **76** will be rotated consequently causing the rotation of the driven gear **70** turning the propelling wheels **52** engaging the track rails **18** and causing the carriage **42** to move along the track rails in response to the direction of rotation of the drive shaft **16**.

To mount the rollers, each bracket **80** is provided with outwardly projecting lugs **84**, these lugs being arranged in pairs spaced at 90° angles to one another, with each pair of lugs **84** having a pin or shaft **86** extending therebetween and carrying a roller **82**.

Projecting from the undersurface of the housing **46** is a hollow threaded boss **88**. A transversely extending tie bar **90** extends across and projects at its ends beyond the side edges of the carriage **42**. The tie bar **90** is provided centrally thereof with an opening **92** therein into which the boss **88** projects. Gusset plates **94** also depend from the undersurface of the housing **46** and engage the opposite side edges of the tie bar whereby the movement of the tie bar is restricted to vertical movement on the boss, no horizontal or circular movement being permitted. Preferably, there are a series of four gusset plates, two of each being disposed along each side edge of the tie bar **90**.

To adjustably vertically vary the distance of the tie bar **90** from the undersurface of the housing **46**, a stud or bolt **96** is threaded into the threaded bore of the boss **88**. The lower end portion of the stud **96** is also threaded and adjustably carries a cup **98** on the nut **100**. Coil spring **102** surrounds the stud **96** and is interposed between the cup **98** and the tie bar **90**.

To the projecting ends of the transverse tie bar **90** are attached saddle bearings **104** by means of pins **106**. The saddle bearings **104** are disposed beneath the track rails in longitudinal alignment therewith. Each saddle bearing carries a longitudinally spaced pair of follower or idler wheels **108** having grooved periphery **110**, the curvature of the groove being taken from the same radius as the radius of curvature of the guide tracks **18**, whereby these grooved peripheries **110** fit snugly against the track rails **18** and, like the propelling wheels **52** for the carriage, present the maximum rolling engagement with the track rails **18** and at the same time, giving a tracking effect to the carriage in its movement along the track rails. Pins **106** are swivel pins allowing the saddles **104** to swing, whereby the follower or idler wheels **108** may track themselves along the pipe rails and follow the curvature of the track rails in the event they are in other than a straight line.

Obviously, by tightening or loosening of the nut **100** on the stud **96**, the spring **98** is compressed or expanded, thereby adjustably varying the frictional engagement of the propelling wheels **52** and the follower wheels **108** with the track rails **18** whereby the engagement of the wheels with the track rails **18** may be varied with the load to be pulled by the carriage.

To secure the carriage to the structure it is to pull in the operation of the drawings, an overhead sliding door **12**, the forward end of the carriage is provided with a pair of forwardly extending lugs **112** extending forwardly from the opposite side edges thereof. Shaft **114** extends between the lugs **112** and is rotatably journaled to these lugs, if desired. The end portions of a yoke **116** are attached to the ends of the pin or shaft **114**, the arms of the yoke converging to a single opposite end which is pivotally attached to the link **44**, as shown in Figure 1.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those

skilled in the art, it is not desired to limit the invention to the exact construction shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

What is claimed as new is as follows:

1. A carriage having propelling wheels for moving the same along a track, driving means including a nest of rollers rotatably carried by said carriage for slidably and non-rotatably engaging a rotatable drive shaft, driven means interconnecting said driving means and said propelling wheels, said driving means comprising a sleeve having a driving gear thereon, said driven means comprising an axle located above the track and extending transversely of the track, said axle carrying said propelling wheels and having a driven gear thereon in engagement with said driving gear, follow wheels carried by said carriage and engageable with the track, said follow wheels being disposed in offset relation to said propelling wheels for engaging the track on opposite sides thereof.

2. A carriage for a pair of spaced, parallel rails and a rotatable, non-circular drive shaft, said carriage comprising a pair of driving wheels mounted on said rails, an axle connected to said wheels and mounted transversely of said rails, a housing having a pair of bearings through which said axle passes, a gear mounted in said housing and fixed to said axle intermediate the ends thereof, a sleeve in said housing and arranged at right angles to said axle, a gear connected with said sleeve and enmeshed with the first mentioned gear so that upon rotation of said sleeve said gears and therefore said axle is set in motion, means drivingly connecting said drive shaft with said sleeve and including a nest of rollers, and means securing said rollers to one end of said sleeve with said non-circular drive shaft passed through said rollers and arranged to rotate said nest of rollers as a unit in order to impart rotary motion to said sleeve.

3. A carriage for a pair of spaced, parallel rails and a rotatable, non-circular drive shaft, said carriage comprising a pair of driving wheels mounted on said rails, an axle connected to said wheels and mounted transversely of said rails, a housing having a pair of bearings through which said axle passes, a gear mounted in said housing and fixed to said axle intermediate the ends thereof, a sleeve in said housing and arranged at right angles to said axle, a gear connected with said sleeve and enmeshed with the first mentioned gear so that upon rotation of said sleeve said gears and therefore said axle is set in motion, means drivingly connecting said drive shaft with said sleeve and including a nest of rollers, and means securing said rollers to one end of said sleeve with said non-circular drive shaft passed through said rollers and arranged to rotate said nest of rollers as a unit in order to impart rotary motion to said sleeve, said nest of roller mounting means comprising a plate, a plurality of brackets carried by said plate, spindles secured to said plurality of brackets and having the rollers of said nest of rollers mounted thereon.

4. The combination of claim 3 wherein two of said spindles are parallel to each other and perpendicular to the other two of said spindles.

5. The combination of claim 3 together with means located on the side of said rails opposite to the sides of said rails occupied by said driving wheels, and resiliently biased means connecting said guides to said housing in order to yieldingly press said guides against said rails.

References Cited in the file of this patent

UNITED STATES PATENTS

2,052,911	Weathers	Sept. 1, 1936
2,215,678	Weathers	Sept. 24, 1940
2,430,729	Negri	Nov. 11, 1947
2,441,092	Weathers	May 4, 1948
2,574,684	Andrews et al.	Nov. 13, 1951