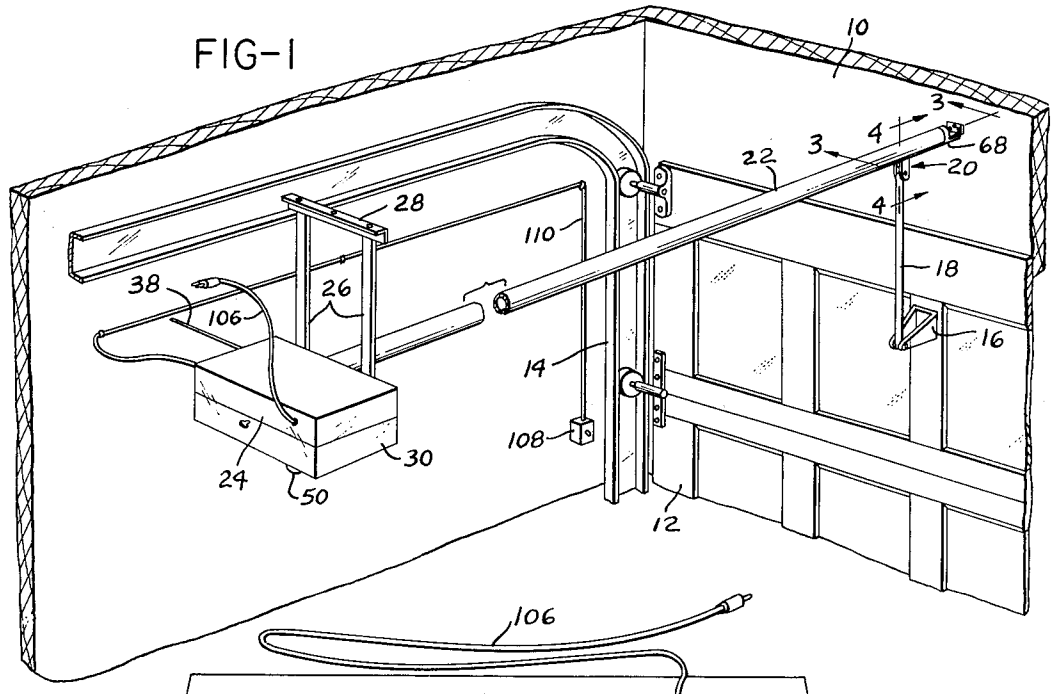
Feb. 28, 1956 S. S. BROWN 2,736,553

DOOR OPERATOR

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FIG-1



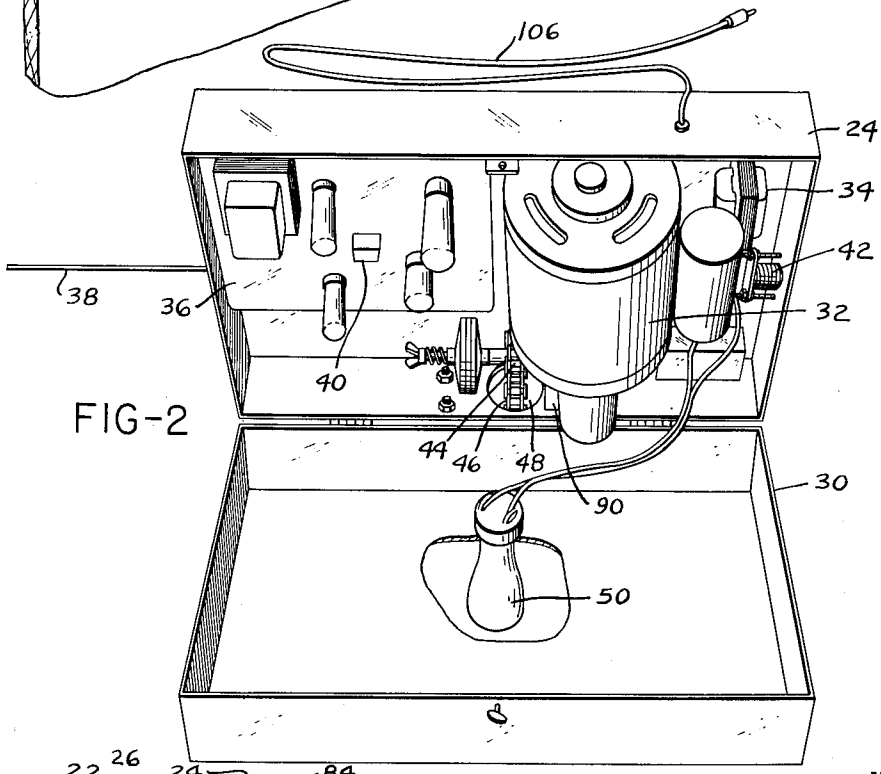


FIG-2

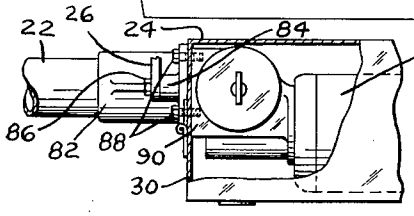


FIG-6

INVENTOR.
STEFFEN S. BROWN
BY Toulmin & Toulmin
ATTORNEYS

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DOOR OPERATOR

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FIG-3

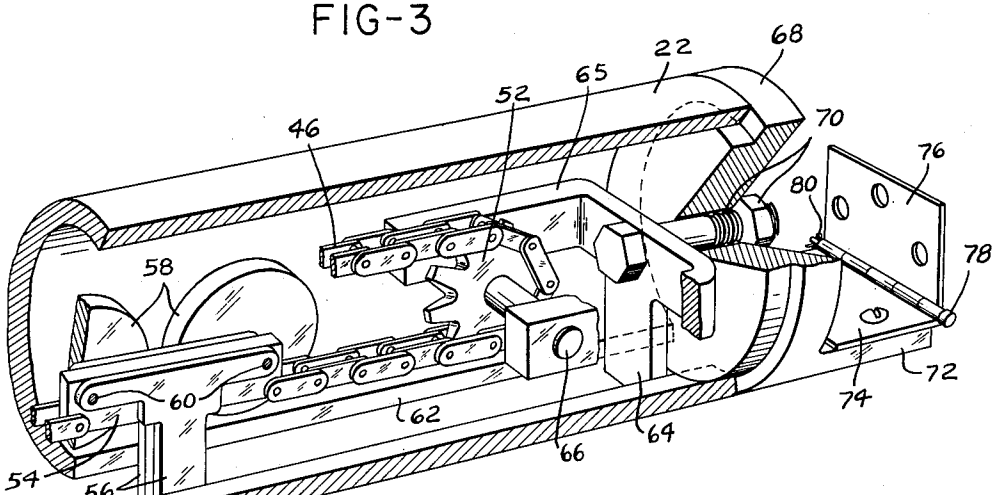


FIG-5

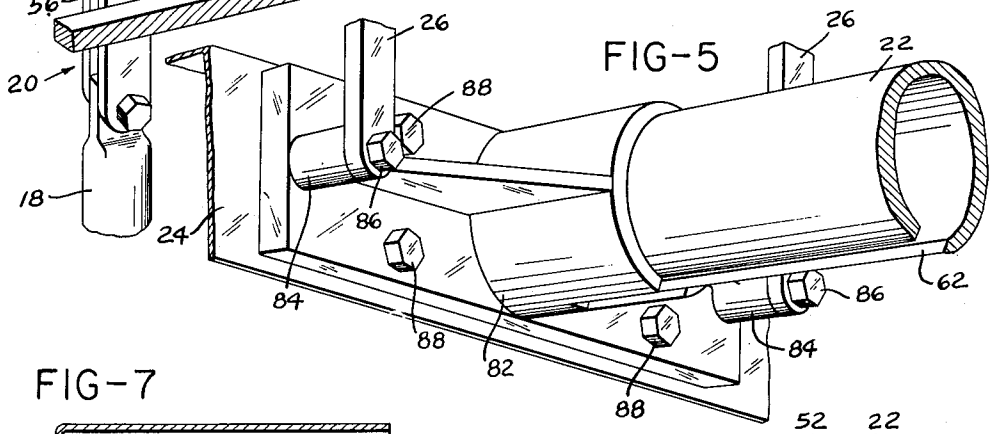


FIG-7

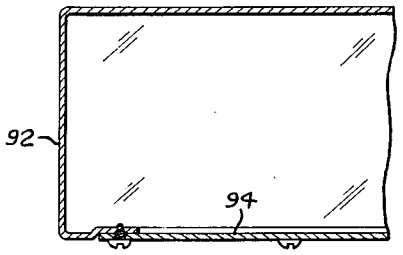


FIG-4

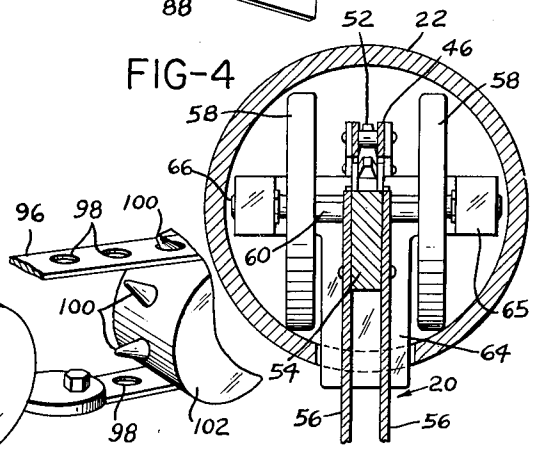
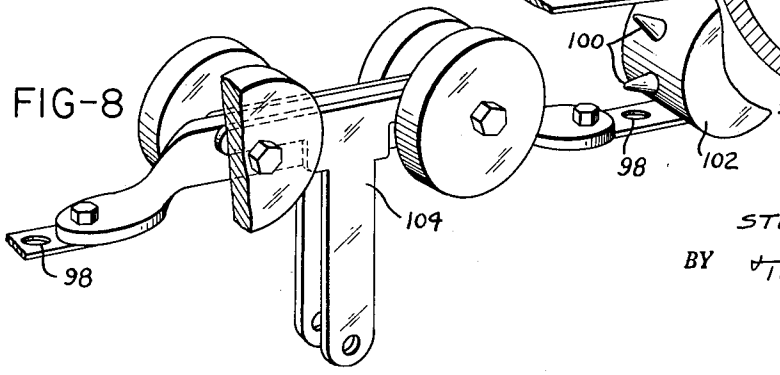


FIG-8



INVENTOR.
STEFFEN S. BROWN
BY Toulmin & Toulmin
ATTORNEYS

United States Patent Office 2,736,553 Patented Feb. 28, 1956

2,736,553

DOOR OPERATOR

Steffen S. Brown, Dayton, Ohio, assignor to The Brown-Brockmeyer Company, Dayton, Ohio, a corporation of Ohio

Application December 1, 1954, Serial No. 472,383

6 Claims. (Cl. 268—59)

This invention relates to automatic door operators, particularly for overhead garage doors, and more particularly still to an automatic garage door operator of this nature which is substantially universally applicable to all types of overhead garage doors.

In the co-pending applications, assigned to the same assignee as the present case, in the name of Steffen S. Brown, Serial No. 339,698, filed March 2, 1953; Serial No. 425,853, filed April 27, 1954; Serial No. 459,920, filed October 4, 1954; in the name of James L. Trant, Serial No. 414,207 filed March 4, 1954; and Patents 2,549,265 issued April 17, 1951, and 2,592,492 issued April 8, 1952, in the name of James L. Trant, there are shown reversible motors and drives associated therewith particularly adapted for use as a door operator. These applications and patents also show a control arrangement for controlling the motor to bring it to a halt at about the same time the door operated thereby reaches the limits of its travel.

Heretofore these motors have been utilized in construction of garage door operators for certain specific types of overhead doors. This entailed the disadvantage that the units were not operable with certain types of doors, and also usually involved considerable installation expense.

With the foregoing in mind, the present invention has as an object the provision of a door operator that is substantially universal in that it can be applied to substantially any type of overhead door regardless of the manner in which the door is guided in its movements and regardless of the arrangement of the counterbalancing means for the door.

A further object of the present invention is the provision of a door operator of the nature referred to for overhead doors, particularly garage doors, which can be installed quite simply thereby permitting the purchaser of the door operator to eliminate installation expenses.

It is also an object of the present invention to provide a substantially universal overhead door operator which is neat in appearance and in which all of the moving parts are substantially completely enclosed, thereby protecting them from foreign matter and promoting long life of the door operator.

A still further object of the present invention is the provision of an automatic overhead door operator which locks the door in its closed position so that the door cannot be manually opened.

These and other objects and advantages of this invention will become more apparent upon reference to the following specification taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view somewhat diagrammatically drawn showing an operator according to the present invention installed in a garage for operating the sliding door thereof;

Figure 2 is another perspective view showing a housing forming a part of the unit and within which the drive motor and other electrical accessories are mounted in a substantially completely enclosed position;

Figure 3 is a sectional view indicated by line 3—3 on Figure 1 showing the details in connection with the chain tube forming a part of the operation of the present invention and the manner in which it is attached to the wall of the garage above the door;

Figure 4 is a transverse sectional view indicated by line 4—4 on Figure 1 showing details in connection with the carriage that is movable within the tube and which is connected with the garage door;

Figure 5 is a perspective view showing the tube at the end thereof which is connected with the housing and encloses the electrical components;

Figure 6 is a fragmentary view showing the manner in which the electric motor within the housing and the end of the tube adjacent the housing are interconnected;

Figure 7 is a fragmentary view showing another form which the housing enclosing the electrical components can take; and

Figure 8 is a fragmentary perspective view showing the use of a perforated steel tape in place of the chain illustrated in Figures 3 and 4.

Referring to the drawings somewhat in more detail, Figure 1 diagrammatically illustrates a garage **10** having an opening adapted for being closed by the door **12** which is guided for sliding movement in the tracks **14**. The door **12** may be counterbalanced in any suitable manner by a transverse shaft having a torsion spring thereon, or by elongated tension springs, or by weights. For the sake of simplicity no counterbalance arrangement is illustrated.

Similarly, while the door illustrated is one which slides in tracks running along the sides of the garage, it will be evident that the door operator of the present invention can be utilized with any type of door which moves vertically to enclose the garage opening.

Attached to the side of the door is a bracket **16** for pivotally receiving the lower end of a link **18**, the upper end of which is pivotally connected with a carriage **20** that is movable lengthwise of a tube **22** running rearwardly from the front wall of the garage.

The tube **22**, at its rear end, is connected with a housing **24**, and vertical bars or angle members **26** are connected with the tube at its rear end and extending upwardly for connection with a ceiling-supported angle or support member **28**.

Turning now to Figure 2 it will be observed that frame **25** comprises a lid **30** hinged thereto, and that within the frame are located all of the electrical components of the door operator with the exception of the manual control switch.

These electrical components include a reversible electric motor **32**, preferably constructed according to one of my copending applications referred to above, and a transformer **34** which steps down the supply voltage to a voltage suitable for use in a control circuit, say 24 volts. Also located within the frame is a radio receiver **36** which includes an antenna **38** and a relay **40** which is connected for controlling an indexing switch **42** for reversibly energizing motor **32**.

A reversible motor control and a switching arrangement therefor of a type which can be used in connection with the present invention is illustrated in the issued James L. Trant Patent No. 2,592,492.

The output shaft associated with the motor includes a sprocket **44** that drives a chain **46** extending through an aperture **48** in the side wall of the housing and into the previously referred to tube **22**.

There is preferably mounted on the lower wall of the housing **24** the light bulb **50** which is wired in circuit with the motor so that it is illuminated when the motor runs and, preferably, is illuminated while the door is in an open position.

In Figures 3 and 4 it will be noted that chain **46**, which

runs lengthwise of the tube 22, passes around a sprocket 52 at the end of the tube remote from housing 24, and that the lower reach of the chain is interrupted and has its opposite ends connected to a bar 54 forming a part of the previously mentioned carriage 20. The carriage 20 includes the side plates 56 fixed to bar 54 and extending downwardly and pivotally connected to the upper end of link 18. The carriage likewise includes the rollers 58 mounted on the shaft 60. The rollers, as will best be seen in Figure 4, locate the carriage within the tube, and support the carriage during its travel along the tube. As will also be seen in Figures 3, 4 and 5, tube 22 is longitudinally slotted along its bottom as at 62 to provide a space through which the downwardly projecting side plates 56 of carriage 20 move.

The slot 62 in the tube is also availed of for receiving the portion 64 of a yoke 65, generally U-shaped in plan, which receives between the outer ends of its turned-up legs the support shaft 66 for the sprocket 52. Yoke 65 is adjustable longitudinally of tube 22 to take up any slack in chain 46 by a screw-threaded means associated with the end cap 68, which screw-threaded means can take the form of the nut and bolt 70, as illustrated in Figure 3.

End cap 68 also preferably comprises an outwardly extending platform or ledge 72 on which is mounted one portion 74 of a hinge having another portion 76 that is detachable from portion 74 by the removable pin 78 which is detachably retained in position by cotter pin 80.

At the end of the tube 22, adjacent housing 24, the said tube is fitted into a cast support member 82 which comprises bosses or projections 84 to which the lower ends of support members 26 are attached by cap screws 85. A plurality of bolts or cap screws 88 extend through the flanged base of member 82 through the adjacent wall of housing 24 thereby supporting the housing on member 82.

As will be seen in Figure 6, at least two of the elements 88 take the form of cap screws which thread into the mounting base of the gear box portion 90 of motor 32 whereby the said motor is also supported by the element 82. In this manner all of the heavy components of the door operator, according to the present invention, are rigidly connected together and are supported directly on the walls of the structure having the door to be opened.

The motor 32 has no other connection to the housing other than the one described, and the other electrical components within the housing that are secured thereto are relatively light and are easily supported by the housing.

The described arrangement also eliminates difficulties that might be encountered in aligning the several parts of the assembly should the motor be mounted in the housing rather than directly on the end of the tube structure, as is illustrated in Figure 6.

The housing 24, as it is illustrated in Figures 1 and 2, has a hinged cover thereon, but it will be understood that the housing could be formed in a somewhat simpler and less expensive manner without affecting the operation of the unit in any way.

For example, in Figure 7 the housing shown is a drawn box-like member 92 having a cover 94 secured thereto by screws so that the box can be opened should it be necessary to repair or adjust the mechanism therein. Similarly, the driving element in Figures 2, 3 and 4 is illustrated as the chain 46, but it will be apparent that any substantially flexible element capable of substantially positive driving engagement with the driven member 48 can be employed.

For example, in Figure 8 a flexible steel tape 96 is provided with somewhat elongated perforations 98 adapted for engagement with pins 100 of a cylindrical member 102, which may be either the member driven by the reversible motor 32 or the idler member at the opposite end of the tube. The tape 96, as in the case of the chain 46 of the first modification, is suitably attached to a carriage 104 comprising rollers running within the tube portion of the structure.

One of the important features of the present invention

is in connection with the ease of installation thereof, which centers about the separable hinge attached to the end cap 68. In installing the operator according to the present invention the hinge portion 76 is detached from hinge portion 74 by removing pin 78, and the hinge portion 76 is then attached to the front wall of the garage in the proper position. The forward end of tube 22 is then raised up to the hinge portion 76, and the hinge portions 74 and 76 are aligned and the pin 78 is then replaced. Thereafter the rear end of tube 22, which is the end of tube 22, which is the end attached to housing 24, is raised upwardly and attached to the supporting means therefor, which can conveniently be accomplished by raising the door 12 into a position where it will support housing 24. After the housing end of tube 22 has been attached the link 18 is connected between bracket 16 and carriage 20, the supply cable 106 is plugged into an outlet, and the device is ready for operation.

While the arrangement illustrated is adapted for radio operation by a transmitter carried in the vehicle to be placed in the garage, it is preferable to include also a manual operator 108 which may be mounted on the garage wall and connected with the electrical components within housing 24 by wiring 110.

While the operator, according to this invention, has been illustrated as comprising a tube within which the carriage is supported that is connected to the link leading to the door, it will be evident that the tube could be replaced by any suitably rigid member, such as an angle or a channel, and the idler and driving members for the flexible drive element supported thereon and with the carriage guided for movement lengthwise of the rigid member, preferably by roller means or the like engaging the said rigid member.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. In an operator for an overhead garage door; a horizontal longitudinally slotted tube having means at the front end for connection thereof with the front wall of the garage above the door and means at the rear end of said tube for suspension thereof from the ceiling of the garage, an endless flexible drive element in the tube having one reach connected via said slot with the door to be operated, a reversible motor at the rear end of the tube for driving said element, said means at the rear end of the tube comprising a support member having a flanged base, said motor also having a base, bolts connecting said bases together to support the motor on the tube, a housing enclosing said motor and the electrical operating auxiliaries therefor, and said housing having one wall clamped between said bases for supporting the housing thereon.

2. In an operator for an overhead garage door; a horizontal longitudinally slotted tube having means at the front end for connection thereof with the front wall of the garage above the door and means at the rear end for suspension thereof from a wall of the garage, an endless flexible drive element in the tube having one reach connected via said slot with the door to be operated, a reversible motor at the rear end of the tube for driving said element, said means at the rear end of the tube comprising a fitting having a flanged base, said motor also having a base, bolts connecting said bases together to support the motor on the tube, a housing enclosing said motor and the electrical operating auxiliaries therefor, and said housing having one wall clamped between said bases for supporting the housing thereon, said housing having a detachable lower cover whereby the said motor and auxiliaries are substantially completely enclosed but are readily accessible for service.

3. In a garage door operator; a tube adapted for being

mounted above the door to be operated, a flexible drive element in the tube connected to the door, a reversible motor at the rear end of the tube drivingly connected to said drive element, means comprising a socket supporting the rear end of the tube, a housing supported on said supporting means enclosing said motor and the electrical operating auxiliaries therefor, and means supporting the front end of the tube on the wall above the garage door comprising a hinge having a first part fixed to the tube and a second part detachable from the first part adapted for being mounted on said wall, said hinge including a transverse hinge pin connecting said parts and removable from the hinge.

4. In a garage having a ceiling and an opening in one wall closed by a vertically movable door, a housing having a wall facing said opening in said garage wall, means supporting said housing from said ceiling inwardly of said wall, said support means secured to said wall of said housing and having a socket opening toward said garage wall, a tube having one end fitted into said socket and the other end mounted on said wall above said door opening, means for mounting said other end of said tube and comprising cooperating hinge portions on said wall and tube and connectable by a pin, and means in said housing and tube for opening and closing said door.

5. In a garage having a ceiling and an opening in one wall closed by a vertically movable door, vertical support means depending from said ceiling, a flange support member secured to the lower portion of said vertical support means, said flange support member having a socket therein directed toward said wall, a motor control housing mounted on the other face of said flange support member, said socket communicating with said housing, a tube having one end fitted into said socket and the other end mounted on said wall above said door opening, means for mounting said other end of said tube and comprising cooperating hinge portions on said

wall and tube and connectable by a pin, and means in said housing and tube for opening and closing said door.

6. In a garage having a ceiling and opening in one wall closed by a vertical movable door, vertical support means depending from said ceiling, a flange support member secured to the lower portion of said vertical support means, said flange support member having a socket therein directed toward said wall, a motor control housing mounted on the other face of said flange support member, said socket communicating with said housing, a tube having one end fitted into said socket and the other end mounted on said wall above said door opening, an endless chain within said tube and extending the length thereof, motor means in said housing driving said chain in either direction, a longitudinal slot in the lower portion of said tube, a wheeled carriage within said tube connected to said chain, the wheels of said carriage straddling said slot, and side plates attached to said carriage and depending through said slot, a link pivotably connecting said side plates with said door whereby movement of the chain will result in opening or closing said door.

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