July 4, 1961 C. A. SEITH ET AL 2,991,406

OVERHEAD DOOR OPERATING MECHANISM

Filed July 11, 1958

4 Sheets-Sheet 1

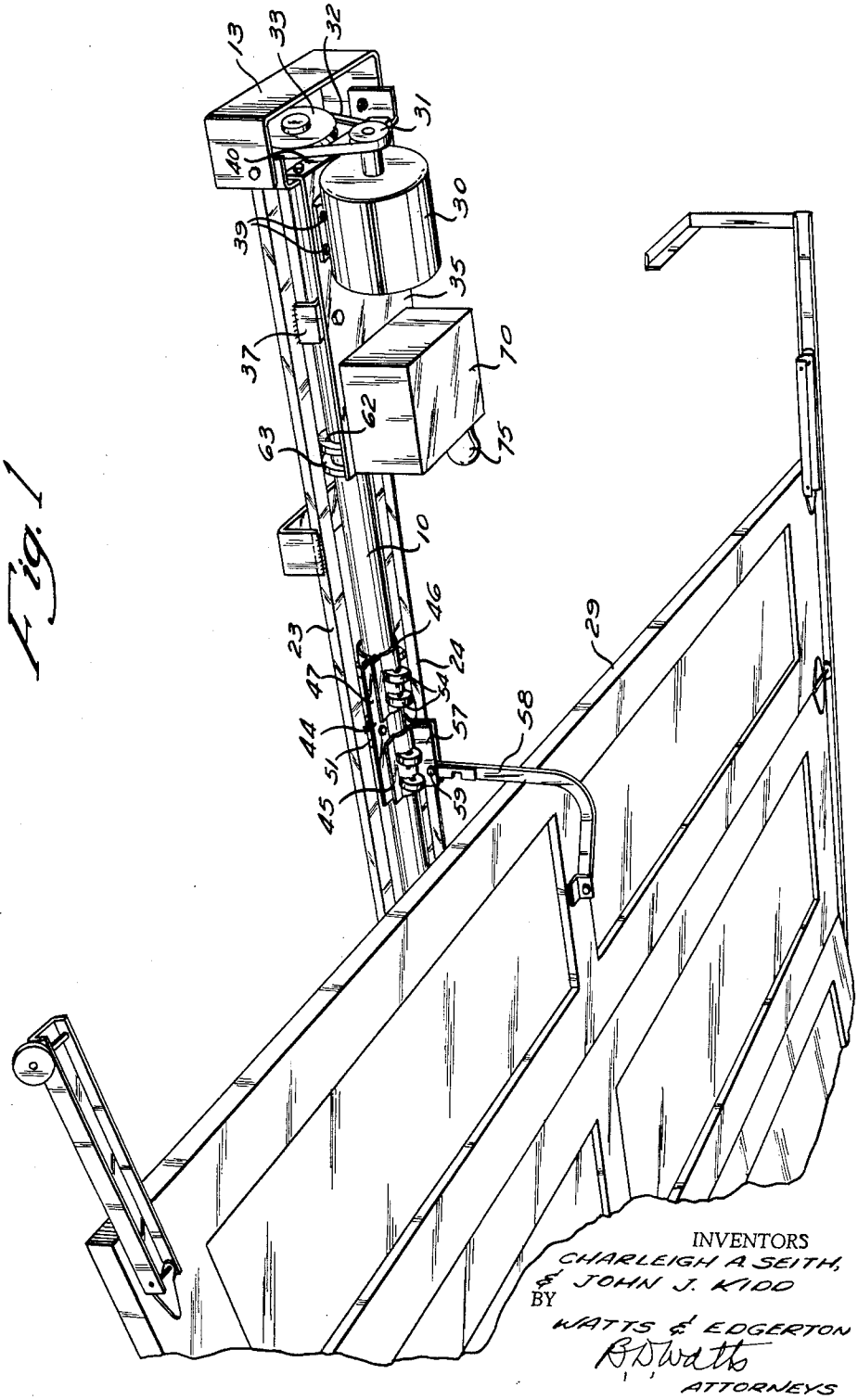


Fig. 1

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4 Sheets-Sheet 2

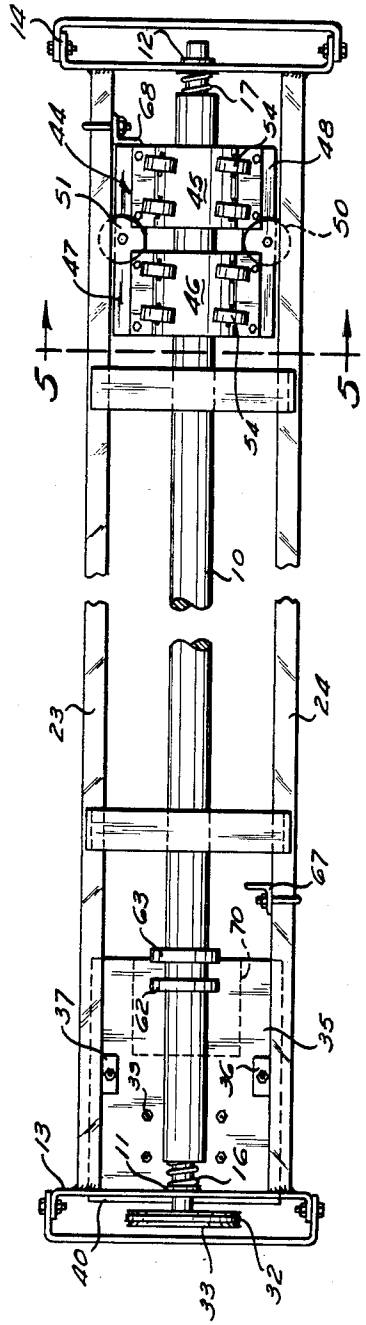


Fig. 3

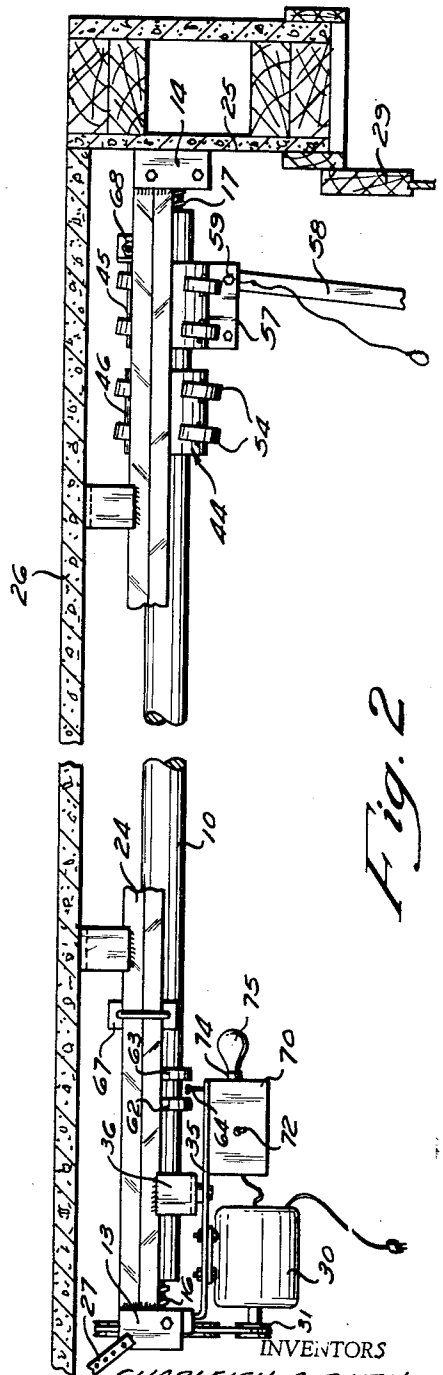


Fig. 2

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OVERHEAD DOOR OPERATING MECHANISM

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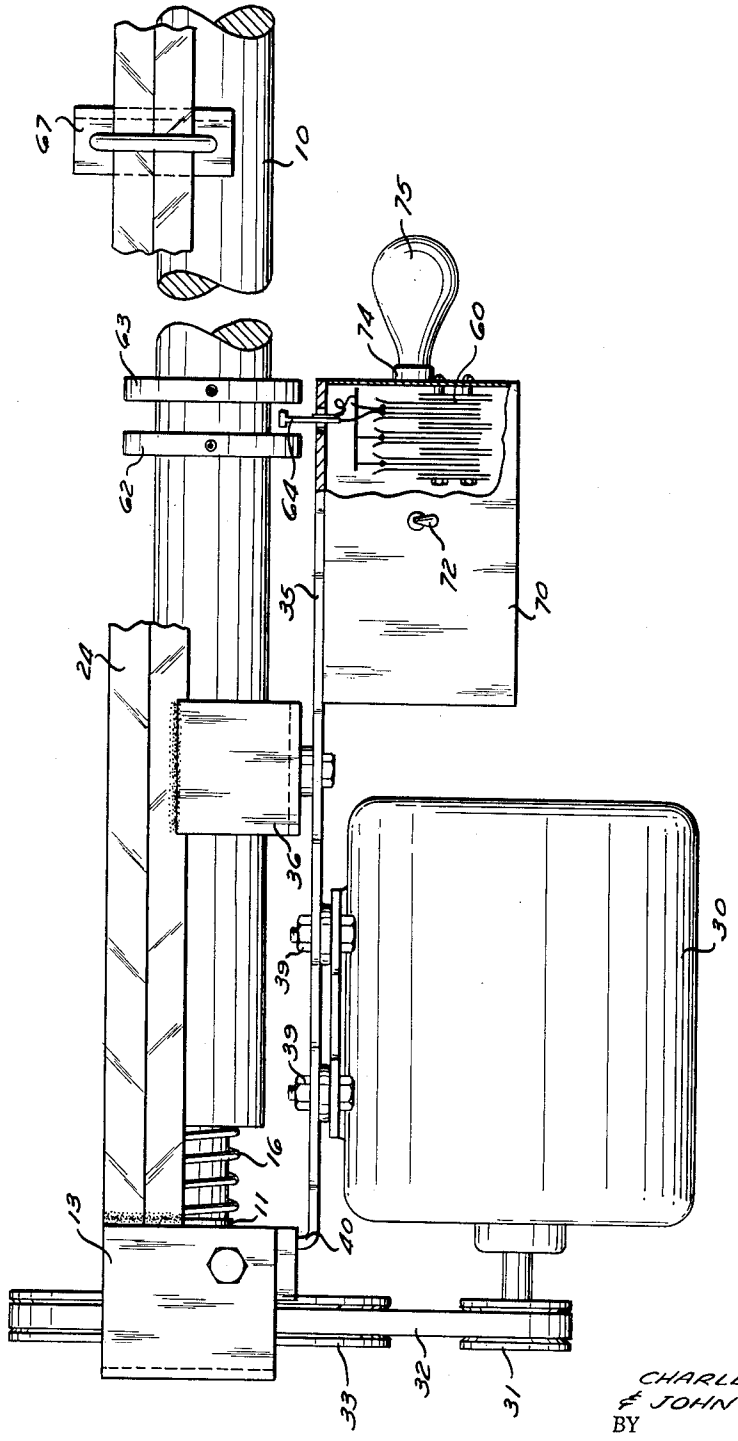


Fig. 4

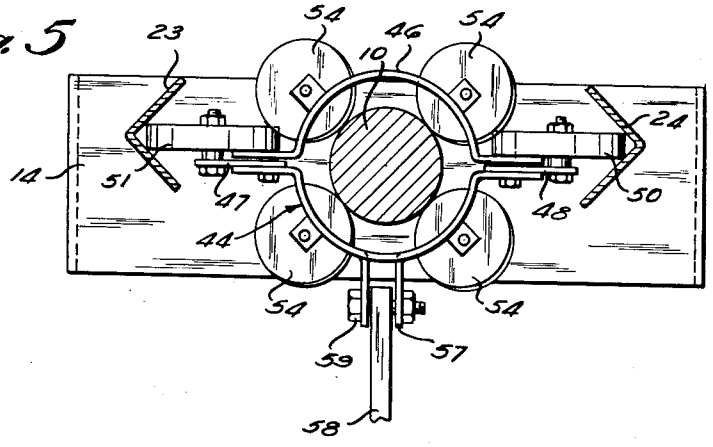
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Fig. 5



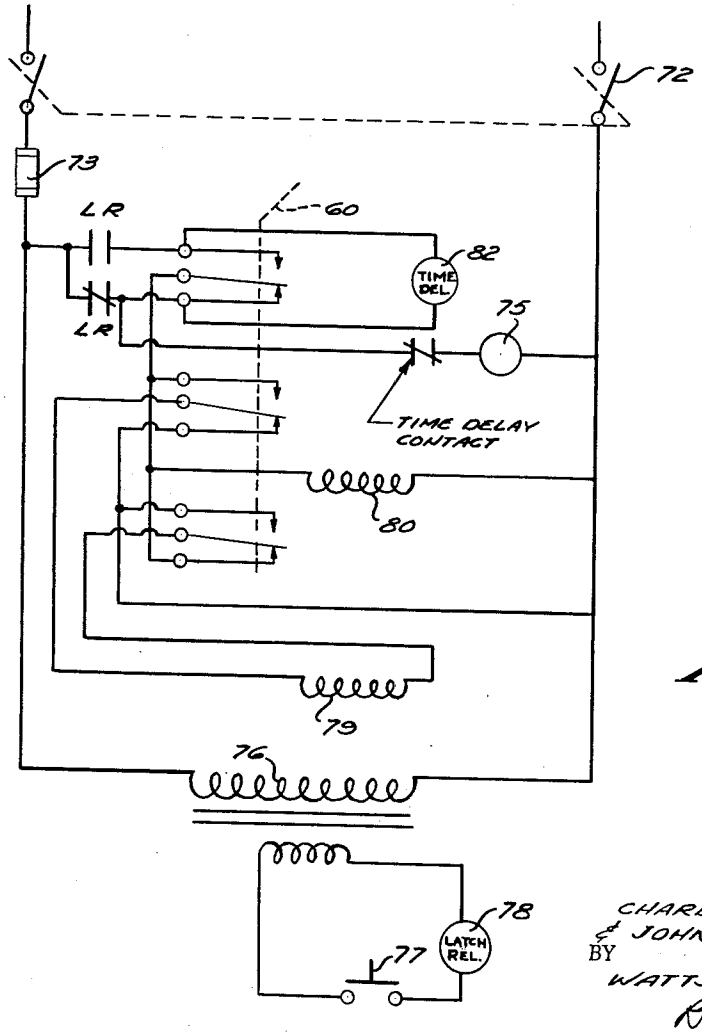


Fig. 6

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2,991,406

OVERHEAD DOOR OPERATING MECHANISM

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2 Claims. (Cl. 318—475)

The present invention relates in general to overhead door operating apparatus, and is more particularly concerned with a novel door operator which is especially adapted for use with garage doors of the vertical roll-up type.

It is a primary object of this invention to provide garage door operating apparatus which combines the safety and dependability of the best prior devices of this type with uniquely low manufacturing cost.

It is a further important object of this invention to provide such apparatus having substantially fewer moving parts than prior similar devices.

It is still another object of this invention to eliminate all the solenoids and substantially all the micro-switches of the prior art without in any way impairing safety or operational features.

These and other objects and advantages are fully realized in the present invention and in the specific preferred embodiment thereof described and illustrated in the drawings accompanying and forming a part of this specification, in which:

FIG. 1 is a fragmentary perspective view of a garage door installation equipped with operating apparatus embodying this invention in preferred form;

FIG. 2 is a fragmentary side-elevational view of the assembly of FIG. 1;

FIG. 3 is a fragmentary top plan view of the FIG. 1 assembly;

FIG. 4 is a fragmentary, enlarged, side-elevational view of the FIG. 1 assembly, showing a part of the automatic motor control means;

FIG. 5 is a transverse sectional view taken on line 5—5 of FIG. 3; and

FIG. 6 is a wiring diagram of the door operating apparatus of FIG. 1.

In general, overhead door operating apparatus of this invention comprises a rotatable and endwise reciprocable drive shaft, means resiliently opposing longitudinal travel of the drive shaft in each direction, reversing motor means operative to rotate the drive shaft, and a carriage adapted to be connected to an overhead door and supported in driven arrangement with the shaft for travel axially with the shaft whenever the load on the carriage exceeds a predetermined maximum. This apparatus includes in addition a snap switch to operate the motor means, and mechanical switch operating means mounted on the drive shaft for travel with that shaft and disposed to engage and operate the snap switch to stop the motor means whenever endwise travel of the drive shaft in either direction exceeds a predetermined limit.

More specifically and with reference specifically to the drawings, a preferred form of our invention comprises a drive tube or shaft **10** journaled for rotation and endwise reciprocation in bearings **11** and **12** carried by end brackets **13** and **14**, respectively. The end portions of the shaft are of reduced diameter and compression springs **16** and **17** are disposed on these parts of the shaft in engagement with the end brackets and with annular abutments on the shaft to resiliently oppose endwise travel of shaft **10** relative to its bearings.

Brackets **13** and **14** each comprise two opposed channel members which are bolted together in their overlapping flange portions. Bearings **11** and **12** are disposed in openings in the centers of the webs of the bracket channels, and the brackets are secured rigidly together by a pair of angle guide rails **23** and **24** located on opposite sides of shaft **10** and welded at their ends to the opposing faces of the bracket webs.

Bracket **14** is secured to garage frame member **25** above the door opening by means of lag bolts (not shown) and bracket **13** is fastened to garage ceiling **26** by means of strap iron **27** and screw and bolt means (also not shown). In the illustrated installation the shaft assembly is suspended in this manner so that shaft **10** extends substantially horizontally 6 inches or so below ceiling **26** with its axis on the centerline of door **29**.

Shaft **10** is driven by motor **30** through motor shaft pulley **31**, belt **32** and drive shaft pulley or sheave **33** disposed in bracket **13**. The direction of rotation of the shaft will be determined by the motor control means as will be described.

Motor **30** is supported below shaft **10** by bed plate **35** which is suspended from guide rails **23** and **24** by flanged hangers **36** and **37** welded to the guide rails and bolted to the bed plate. Bolt means indicated at **39** and **40** secure the motor to the bed plate. A flange **40** formed at one end of plate **35** is received in end bracket **13** for engagement with the near web thereof as seen to the best advantage in FIG. 3.

A carriage **44** is mounted on shaft **10** for travel lengthwise of the shaft as the shaft is rotated by motor **30**. The carriage comprises a pair of trucks **45** and **46** and a pair of connecting links **47** and **48** which are bolted to each truck and which carry, respectively, guide rollers **50** and **51** running in guide rails **24** and **23**, respectively. Each truck includes a two part body disposed around shaft **10** and radially spaced therefrom and a set of eight rollers **54** rotatably connected to the truck body and extending through openings in said body and engaging shaft **10**. Rollers **54** are so related to shaft **10** that as the shaft is rotated in either direction, the carriage is driven through these rollers toward one or the other end of the shaft. The body of truck **45** has a downwardly disposed bifurcated portion **57** to which door arm **58** is pivotally connected by bolt means **59**.

The motor control means of this installation includes a snap switch **60** (a double-throw, triple-pole switch) and the mechanical switch operating means comprising rings **62** and **63** secured to shaft **10** by Allen set screws for adjustability. Switch **60** has a paddle **64** extending between rings **62** and **63** so that the paddle will be deflected by one of these rings and switch **60** will be actuated when shaft **10** moves far enough lengthwise. This lengthwise movement of the shaft will result, as those skilled in the art will understand, whenever the load applied to the carriage is sufficiently great to arrest travel of the carriage along the shaft. Such a condition exists when door **29**, in either opening or closing, encounters an object which blocks or impedes its travel. It also occurs when the carriage reaches the end of its travel course in either direction and encounters either pair of stationary carriage stops **67** and **68** mounted adjustably on guide rails **23** and **24**.

There is by the nature of the motor control means a door inertia factor of greater or lesser dimension effective to overcome certain obstacles to door travel without however adversely affecting the safety factor. Also in accordance with the desires or requirements of the user this inertia factor may be regulated within certain limits to produce the best results. Adjustments for this purpose can easily and quickly be made simply by moving rings **62** and **63** along the shaft to enlarge or reduce the gap between rings and the limit switch paddle.

Switch **60** is disposed in motor control box **70** suspended from bed plate **35**. A manual-power switch **72** is mounted on the control box and a socket **74** for receptacle **75** is also provided.

Regarding FIG. 6, it will be observed that switch 72 connects the control circuit to a power source, suitably 115-volt, 60 cycle, and a fuse 73 stands between switch 72 and said circuit. A transformer 76 (110-volt primary, 24-volt secondary) serves the system and current is provided thereby to external push button 77 and latching relay 78. Motor starting winding 79 and motor running winding 80 as well as receptacle 75 are controlled by paddle switch 60. A time delay element 82 is provided in the lamp circuit to keep light bulb in receptacle 75 illuminated for 90 seconds following each actuation of switch 60. Light is thereby automatically provided for the period during which one using this apparatus in the usual way may enter or leave the garage.

Having thus described this invention in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains to make and use the same, and having set forth the best mode contemplated of carrying out this invention, we state that the subject which we regard as being our invention is particularly pointed out and distinctly claimed in what is claimed, it being understood that equivalents or modifications of, or substitutions for, parts of the above specifically described embodiments of the invention may be made without departing from the scope of the invention as set forth in what is claimed.

What is claimed is:

1. Overhead door operating apparatus including a frame, a drive shaft carried by said frame for rotational and endwise reciprocable movement, means resiliently opposing longitudinal movement of the drive shaft in each direction, reversing motor means operative to rotate said shaft, a carriage adapted to be connected to an overhead door and supported in driven engagement with the shaft for travel lengthwise thereof, stops fixed to the frame and engageable by the carriage at the ends of its predetermined stroke, a snap switch operatively connected to the motor means and mechanical switch operating means mounted on the drive shaft for travel therewith and disposed to engage and operate said snap switch to stop the motor means whenever the load applied to the carriage is sufficiently great to arrest travel of the carriage along the shaft.

2. The combination of elements set forth in claim 1 in which the carriage is provided with rollers spaced apart circumferentially around the shaft and in engagement therewith and having their axes of rotation disposed at an acute angle to the axis of rotation of the shaft.

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