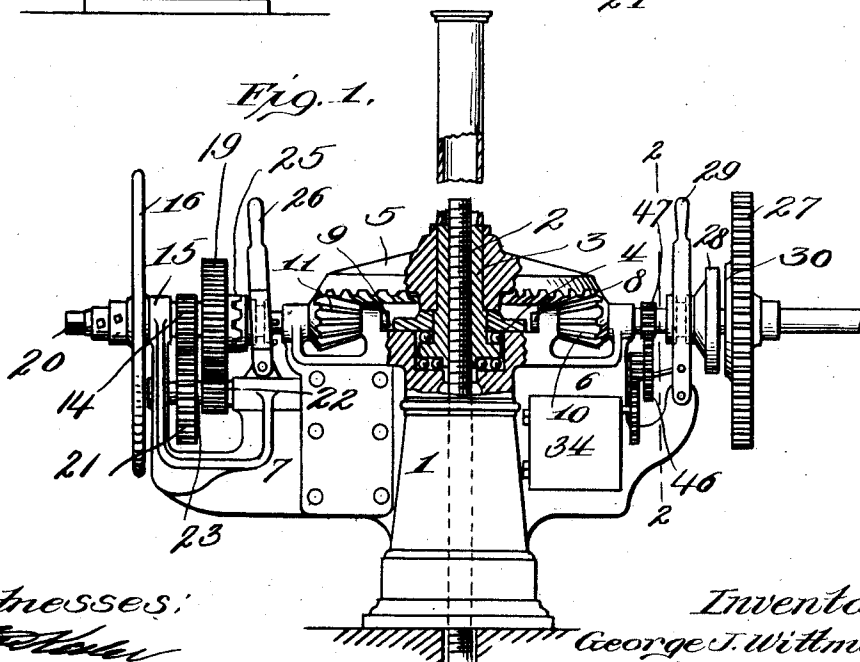
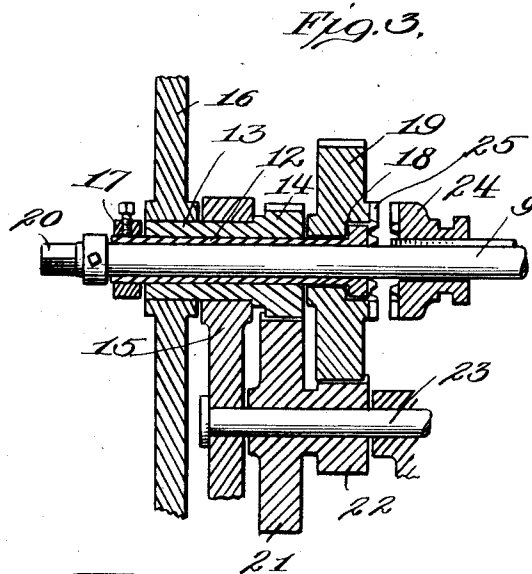
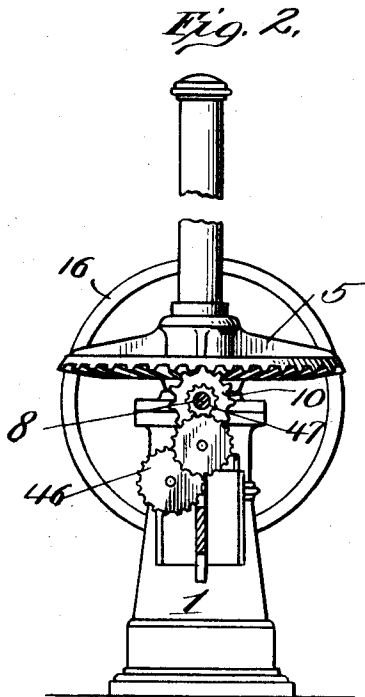


1,009,611.

2 SHEETS—SHEET 1.



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G. J. WITTMANN & P. E. KING.
VALVE OPERATING MECHANISM.
APPLICATION FILED SEPT. 27, 1909.

1,009,611.

Patented Nov. 21, 1911.

2 SHEETS-SHEET 2.

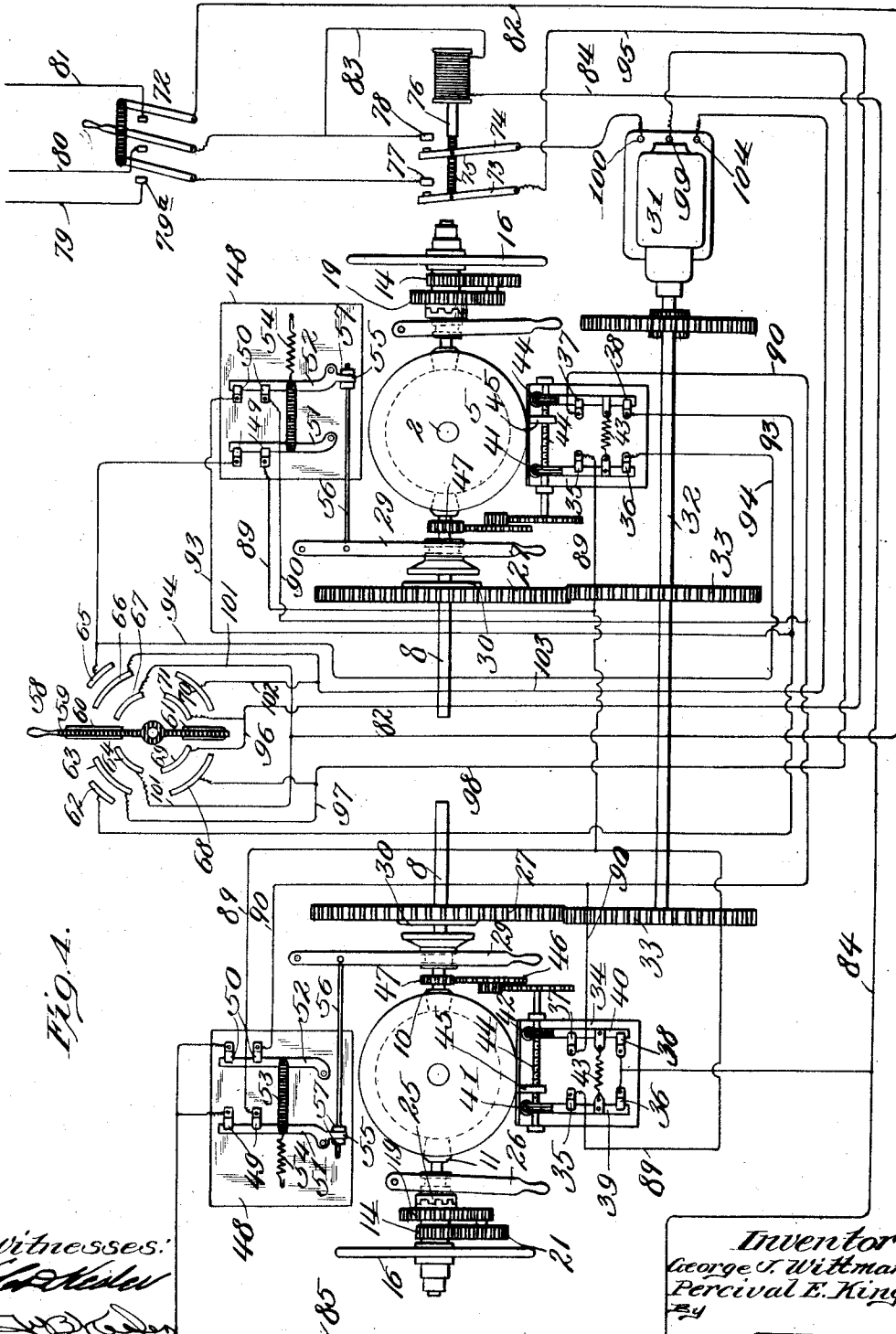


Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE J. WITTMANN AND PERCIVAL E. KING, OF NEWBURGH, NEW YORK.

VALVE-OPERATING MECHANISM.

1,009,611.

Specification of Letters Patent. Patented Nov. 21, 1911.

Application filed September 27, 1909. Serial No. 519,853.

To all whom it may concern:

Be it known that we, GEORGE J. WITTMANN and PERCIVAL E. KING, citizens of the United States, residing at Newburgh, in the county of Orange and State of New York, have invented new and useful Improvements in Valve-Operating Mechanism, of which the following is a specification.

The present invention relates to improvements in mechanism for operating gates and similar valves, and it is particularly adapted for use in the opening and closing of gate valves which control the flow of water or other fluids, and it has for its object, primarily to provide electrically operated means for opening and closing one or more gates, the motor being controlled by a limit switch which automatically breaks the circuit and stops the motor when the gate reaches the limit of its opening or closing movements, thereby preventing jamming of the gate either at the top or bottom, the present invention also providing a by-pass switch whereby a plurality of gates may be operated by a single motor, each gate, however, preferably having an individual limit switch for automatically stopping it when the gate reaches the limit of its movement, the present invention furthermore providing a closed circuit system which prevents the motor from operating and thereby doing damage in case any of the controlling wires should become broken or disconnected at any time while the mechanism is either standing idle or being operated.

To these and other ends, the invention consists in certain improvements, and combinations and arrangements of parts, all as will be hereinafter more fully described, the novel features being pointed out particularly in the claims at the end of the specification.

In the accompanying drawing: Figure 1 is a view of a gate pedestal partly in elevation and partly in section showing a portion of the motor or power driven mechanism, and the compound hand or auxiliary hoist; Fig. 2 represents a side elevation of the pedestal and hoist mechanism as viewed from the right, and on the line 2—2 of Fig. 1; Fig. 3 is a detail sectional view of the compound hand or auxiliary hoist; and Fig. 4 is a diagrammatic view of two gates

equipped with the electric hoist and its controlling devices and also with the compound hand or auxiliary hoists.

Similar parts are designated by the same reference characters in the several views.

In the accompanying drawing, we have shown one specific embodiment of the invention. It will be understood, however, that the present embodiment of the invention is shown as an example, as certain modifications and changes may be made in the structure in order that the invention may be applied to the best advantage according to the circumstances of each particular case.

In the present instance, we have shown a pedestal 1 through which extends the threaded valve or gate stem 2, the latter cooperating with a threaded sleeve 3 which is rotatably journaled in the upper portion of the pedestal by means of the ball-bearing 4, the threaded sleeve 3 having a bevel gear 5 fixed thereto. Projecting from opposite sides of the pedestal are bearing arms 6 and 7 which support shafts 8 and 9 and these shafts carry pinions 10 and 11 which mesh with the bevel gear 5. In the present instance, the pinion 10 serves to operate the gate from the electric or power driven mechanism, while the pinion 11 serves to operate the gate from the compound hand or auxiliary hoist. This compound hand or auxiliary hoist consists in the present instance of the shaft 9 with its pinion 11 thereon and this shaft has a sleeve 12 loosely fitted thereover and this sleeve 12 is surrounded by the hub 13 of a pinion 14. The hub 13 is journaled in a bearing 15 formed as a part of the bearing arm 7 of the pedestal, and a hand-wheel 16 is fixed to that portion of the hub 13 which projects outwardly beyond the bearing arm 7. The location of the pinion 14 and the hand-wheel 16 at opposite sides of the bearing 15 serves to prevent longitudinal movement of the pinion 14 and its hub. The outer end of the sleeve 12 is provided with a thrust collar 17 which is arranged to engage the outer end of the hub 13, and the inner end of the sleeve 12 is provided with a shoulder 18 which is preferably fitted into a recess formed in a gear wheel 19, the latter being loosely mounted upon the sleeve 12 at the

inner side of the pinion 14. The shaft 9 is directly connected to the pinion 11, and by providing the outer end of this shaft with an angular end 20 or otherwise to receive a crank, the gate may be opened or closed by a relatively quick movement. In order, however, to enable the operator to exert a greater power upon the gate so as to start it and thus overcome any wedging or binding that may exist, the present invention provides a reduction gearing between the hand-wheel 16 and the shaft 9, this reduction gearing comprising the pinion 14 and the relatively larger gear 19 and cooperating gears 21 and 22 which mesh with the pinion 14 and the gear 19 respectively, the gears 21 and 22 being connected to revolve together and journaled upon a suitable shaft 23 supported by the bearing arm 7 of the pedestal.

In order to connect and disconnect the reduction gearing with respect to the shaft 9, a suitable clutch is provided, that shown in the present instance consisting of a clutch member 24 which is splined to the shaft 9 and a cooperating clutch face 25 which is preferably formed at the inner face of the gear 19, and a lever 26 is provided whereby the clutch member 24 may be shifted into and out of engagement with respect to the clutch face 25. It will therefore be understood that by operating the lever 26 to engage the clutch member 24 with the clutch face 25 on the gear 19, an operative connection is formed between the hand wheel 16 and the pinion 11 through the medium of the reduction gearing and, by turning the hand wheel 16, a considerable force may be applied to the gate that will be sufficient to start it from its seat and after the gate has been thus started, the lever 26 may be shifted to disengage the clutch member 24 and the clutch face 25 and, by turning a crank applied to the angular end 20 of the shaft 9, a direct and quick motion of the gate may be produced.

The electric or power hoist consists in the present instance of the shaft 8 and its pinion 10, an operating gear 27 for each pedestal or gate which is loosely mounted upon the shaft 8, and a clutch for connecting and disconnecting the driving gear 27 with respect to the shaft 8, a friction clutch being shown in the present instance which comprises a clutch member 28 which is splined to the shaft 8 and shiftable axially thereon by the clutch lever 29, and a cooperating clutch face 30 provided on the adjacent face of the gear 27. One of these driving gears and a cooperating clutch are provided for each gate pedestal, and any number of gates may be operated from a common motor 31 by means of a countershaft 32 having gears 33 which mesh with the plurality of gears 27 as shown diagrammatically in Fig. 4. In this figure but two gates are shown although it is obvi-

ous that various numbers of gates may be operated from the same motor.

According to the present invention, a circuit controlling switch is provided for the motor whereby the movement of the respective gate will be automatically arrested when it reaches the limit of either its opening or closing movement in order to prevent jamming of the gate. We have shown in the present instance an example of such a switch which consists of an insulating base 34 which is preferably fastened to one side of the arm 6 of the pedestal and is provided with two pairs of contacts 35 and 36 and 37 and 38. A pair of switch blades 39 and 40 are mounted upon the base and are arranged to cooperate with and connect the respective members of each pair of contacts, these switch blades in the present instance being pivoted to the base at 41 and 42 and being preferably connected by a tension spring 43, the action of which normally tends to hold the respective blades in circuit closing position. A screw shaft 44 is used as a part of this limit switch, it having a nut 45 which is adapted to be moved toward one or the other end of the screw shaft as the latter is revolved and is so connected to the operating mechanism of its respective gate that when the gate reaches the limit either of its opening or closing movement, this nut will engage the proper switch blade and thereby move it into circuit opening position. In the present instance suitable gearing 46 serves to operatively connect the screw shaft of the limit switch with a pinion 47 fixed to the shaft 8. In order to provide for the operation of a plurality of gates from a single motor, we also provide a by-pass switch which is capable of closing the circuit and setting the desired gate into condition for operation, this by-pass switch being preferably automatically operated by the clutch which mechanically connects and disconnects the respective gate relatively to the motor. In the present instance, we have shown each gate as equipped with a by-pass switch which may consist of a suitable insulating base 48 which may be conveniently bolted to the opposite side of the arm 6 of the pedestal which supports the limit switch, and to this base are attached two pairs of contacts 49 and 50, a pair of switch blades 51 and 52 being pivoted to the base and adapted to close the circuit between the respective pairs of contacts. These switch blades in the present instance are connected for simultaneous movement by means of a fiber or other insulating strip 53, and a spring 54 is provided the action of which normally tends to move or hold the switch blades in circuit opening position. One of the switch blades is provided with a lug 55 through which extends an operating rod 56 having a pair of appropriately positioned

collars or shoulders 57 thereon, and the rod 56 is operatively connected to the clutch operating lever 29. The contacts and the switch blades of the by-pass switch are so related to the clutch lever 29 that when the clutch operated by this lever is in open position, the by-pass switch will be closed and vice versa.

In order to enable the same motor to open and close any desired gate, a reversing switch 58 is provided, and any suitable form of reversing switch may be used. In the present instance we have shown a reversing switch which embodies a rotatable switch and 59 having contact plates 60 and 61 thereon. The contact plate 60 is adapted to bridge a series of three contacts 62, 63 and 64 when the switch arm is turned in one direction and it is adapted to bridge contacts 65, 66 and 67 when the switch arm is rotated in a reverse direction, while the contact plate 61 is adapted to bridge contacts 68 and 69 when the switch arm is rotated in one direction and to bridge the contacts 70 and 71 when the switch arm is rotated in a reverse direction. A main switch 72 is also shown and as the circuit outlined in Fig. 4 is adapted for use in a three-phase current, this main switch has three blades. A solenoid switch is also provided for automatically closing and opening the circuit when the reversing switch is manipulated, and any suitable switch of this character may be used. That shown in the present instance consists of a pair of switch blades 73 and 74 connected for movement in unison by an insulating bar 75 and this bar in turn is connected to a solenoid 76, the switch blades 73 and 74 being arranged to cooperate with contacts 77 and 78.

In Fig. 4, we have shown diagrammatically one way of electrically controlling a plurality of valves or gates by a single common motor, the latter being controlled by a closed circuit system. In the diagram shown, three main line wires 19, 80 and 81 are used, the wire 81 being connected when the main line switch 72 is closed to a wire 82 which wire is connected to a bridge wire the two ends of which are connected to the contacts 64 and 67 of the reversing switch. The main line wire 80 is adapted to be connected through the main line switch 72 to the contact 78 of the solenoid switch and when the latter is closed, one branch of this circuit is completed through the switch blade 74 to one of the motor terminals 100, a branch wire 83 being also connected to the main line wire 80 when the main switch 72 is closed and this branch wire 83 leads to the coil of the solenoid, the opposite terminal of the solenoid coil being connected to a wire 84 which wire is connected to the contacts 36 and 38 of the limit switch for the left hand valve or gate, while a branch

wire 85 leads from the wire 84 and is connected to the two upper contacts 49 and 50 of the by-pass switch for the left hand gate, the lower contacts 49 and 50 of the said by-pass switch being connected to wires 89 and 90, the wire 89 being connected to the contacts 35 of the two limit switches, while the wire 90 is connected to the two contacts 37 of the two limit switches. A wire 93 leads from the contact 38 of the limit switch for the right hand valve or gate and is branched, one branch being connected to the special contact 62 of the reversing switch while the other branch leads to the upper contact 50 of the by-pass switch for the right hand gate. A wire 94 leads from the contact 36 of the limit switch for the right hand valve or gate and is branched, one branch connecting with the special contact 65 of the reversing switch while the other branch is connected to the upper contact 49 of the by-pass switch for the right hand valve or gate. The main wire 79 is connected when the main switch is closed to the contact 77 of the solenoid switch and when the latter is closed, it is connected by the switch blade 73 to the wire 95 which wire is connected to a bridge wire 96 which in turn is connected to the contacts 69 and 71 of the reversing switch. The contacts 63 and 68 are connected by a bridge wire 97 which bridge wire is connected by the wire 98 to the motor terminal 99, the contacts 66 and 70 being connected by a bridge wire 102 and the latter is connected by a wire 103 to the motor terminal 104.

The operation of the valve or gate operating mechanism when equipped in the manner shown in Fig. 4 may be briefly described as follows: After the main line switch 72 is closed, the clutch lever 29 for the gate which is to be operated is shifted so as to cause its clutch to connect the motor with the power driving shaft for that particular valve or gate, and such a shifting movement of the appropriate clutch lever will open the circuits with respect to the by-pass switch with which the selected gate is equipped. The switch blades of the limit switch, it is to be assumed, are at this time in circuit closing position and the clutch for the compound hand operating mechanism is adjusted so as to disconnect the hand mechanism from the gate or valve operating mechanism. The rotatable arm 59 of the reversing switch may be then shifted in the desired direction, the direction being determined according to whether the valve or gate is to be opened or closed. Such a shifting movement of the arm of the reversing switch will cause the contact plate 60 thereon to bridge, it will be assumed, the contacts 65, 66 and 67. Starting with wire 79, the circuit is then established through the contact 79^a, solenoid switch blade 73, wire 95, bridge wire 96 to

contact 69, thence through the contact plate 61 of the reversing switch arm to contact 68, to wire 98, and to the motor terminal 99. Starting with wire 81, a circuit is established
 5 through the wire 82, through the bridge wire 101, to the contact 67, through the contact plate 60 on the reversing switch arm to the contact 66, to bridge wire 102, to wire 103 and to the motor terminal 104. The controlling
 10 circuit starts from the wire 80 through the main switch to the wire 83, the solenoid coil, the wire 84 and to one limit switch, the limit switch for the left hand gate in the present instance, at which point the controlling circuit
 15 divides, passing through both blades of the limit switch and the controlling circuit continues as a double circuit through all limit switches connected in the system, the last limit switch of the system (the limit
 20 switch for the right hand gate in the present instance) being connected at one side, that is, from the terminal 36 to the special contact 65 of the reversing switch, while the other side of the circuit for this particular
 25 limit switch is connected through the contact 38 and wire 93 to the other special contact 62 of the reversing switch. As the reversing switch arm is capable of closing the circuit only through one or the other of the
 30 special contacts 62 and 65, one side only of the divided controlling circuit will be used at once and, moreover, it is necessary that this controlling circuit be closed or perfect before the solenoid switch will operate to
 35 close the motor circuit and hence it is obvious that if any wire or connection in the controlling circuit is broken before the motor is started, the motor cannot start, and if any wire or connection in the controlling
 40 circuit should become broken while the motor is running, the solenoid switch will instantly open and stop the motor, thus preventing damage to the gates, valves or hoists which would otherwise occur should the motor
 45 not stop at the proper time.

We claim as our invention:

1. The combination of a plurality of gate operating members, operating shafts for said members, a motor common to said members,
 50 a motor circuit, a limit switch for each gate operating member capable of interrupting the motor circuit after its respective member has moved a predetermined distance, and a by-pass switch connected in the motor circuit and capable of establishing the motor
 55 circuit to operate one gate after the limit switch has opened the circuit at the completion of the operation of another gate.

2. In an apparatus of the class described,
 60 the combination of a plurality of gate operating members, operating shafts for said members, a motor common to said shafts, clutches for connecting and disconnecting said motor with respect to said shafts, limit
 65 switches for automatically stopping the mo-

tor after said members have reached the limits of their movements, a reversing switch connected in circuit with said limiting switches and motor, and a by-pass switch having means for automatically closing it
 70 when the clutch for one of the gate operating members is opened.

3. In an apparatus of the class described, the combination of a valve or gate operating mechanism, a motor capable of being operatively connected thereto, a motor circuit, a solenoid switch through which the motor circuit is adapted to be closed, and a controlling circuit which when closed is adapted to retain the solenoid switch in position
 80 to close or complete the motor circuit and which when opened will break the motor circuit through the solenoid switch.

4. In apparatus of the class described, the combination of a plurality of valve or gate
 85 operating mechanisms, an electric motor having means for operatively connecting it to said mechanisms, a motor-operating circuit, a solenoid switch operative to open and close said motor-operating circuit, a motor-controlling circuit including said solenoid
 90 switch and permitting operation of the motor only while such controlling circuit is closed, and limit switches for the respective gate-operating mechanisms connected to and
 95 governing said controlling circuit.

5. In apparatus of the class described, the combination of a plurality of valve or gate-operating mechanisms, an electric motor having means for operatively connecting it
 100 to said mechanisms, a motor-operating circuit, a motor-controlling circuit including a solenoid operative to open and close the motor-operating circuit when the controlling circuit is opened and closed respectively,
 105 and means governed by the respective gate-operating mechanisms for automatically opening the motor-controlling circuit.

6. In apparatus of the class described, the combination of a plurality of gate-operating
 110 units, an electric motor having means for operatively connecting it to said units, a controlling circuit for said motor, a limit switch connected in said motor-controlling circuit and operative automatically by one
 115 of said units to open the controlling circuit and interrupt the operation of the motor, and means for closing the motor-controlling circuit while said limit switch is in open condition whereby independent operation of
 120 said units by said motor may be accomplished.

7. In apparatus of the class described, the combination of a plurality of gate-operating
 125 units, an electric motor having means for operatively connecting it to said units, a motor-controlling circuit, a limit switch connected in said motor-controlling circuit and operative automatically by one of said units
 130 to open said controlling circuit and inter-

rupt the operation of the motor, and a by-pass switch for closing said motor-controlling circuit while said limit switch is open.

8. In apparatus of the class described, the combination of a plurality of gate-operating units, an electric motor, means for operatively connecting said motor to said units including a clutch, a motor-controlling circuit, a limit switch connected in said motor-controlling circuit and operative automatically by one of said units to open the motor-controlling circuit and interrupt the operation of the motor, and means controlled by said clutch for closing the motor-controlling circuit.

9. In apparatus of the class described, the combination of a plurality of gate-operating units, an electric motor, means for operatively connecting said motor to said units in-

cluding a clutch, a motor-operating circuit, a motor-controlling circuit including a solenoid operative to open and close the motor-operating circuit when said controlling circuit is opened and closed respectively, a limit switch connected in said motor-controlling circuit and operative automatically by one of said units to open the motor-controlling circuit, and means controlled by said clutch for closing the motor-controlling circuit when said limit switch is open.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

GEORGE J. WITTMANN.
PERCIVAL E. KING.

Witnesses:

GEORGE A. DIEMER,
NEHEMIAH FOWLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."