

G. B. VARNUM.
GATE OPERATING MECHANISM.
APPLICATION FILED APR. 19, 1915.

1,202,129.

Patented Oct. 24, 1916.

Fig. 1.

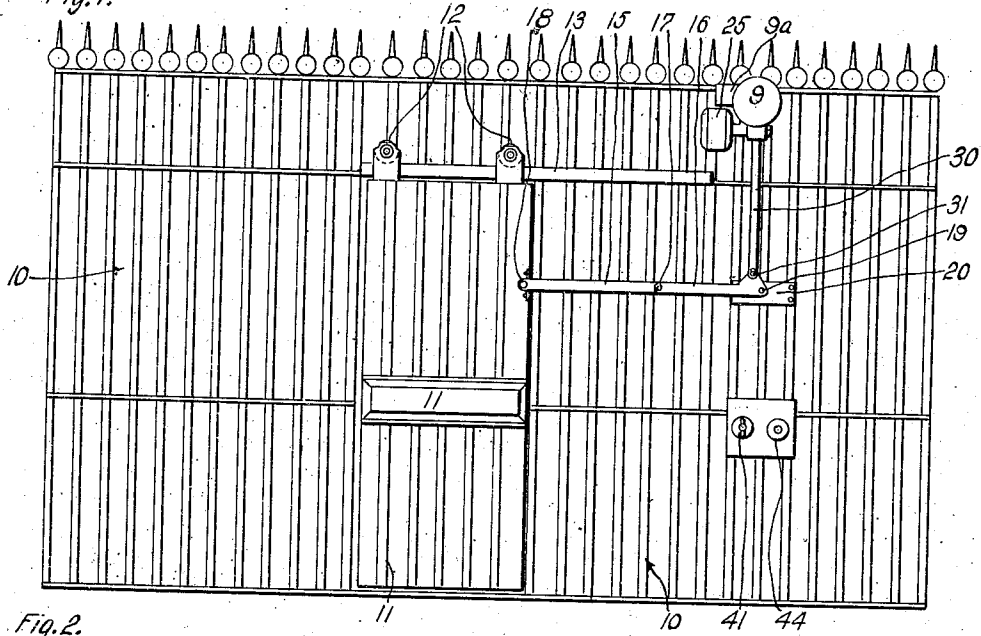


Fig. 2.

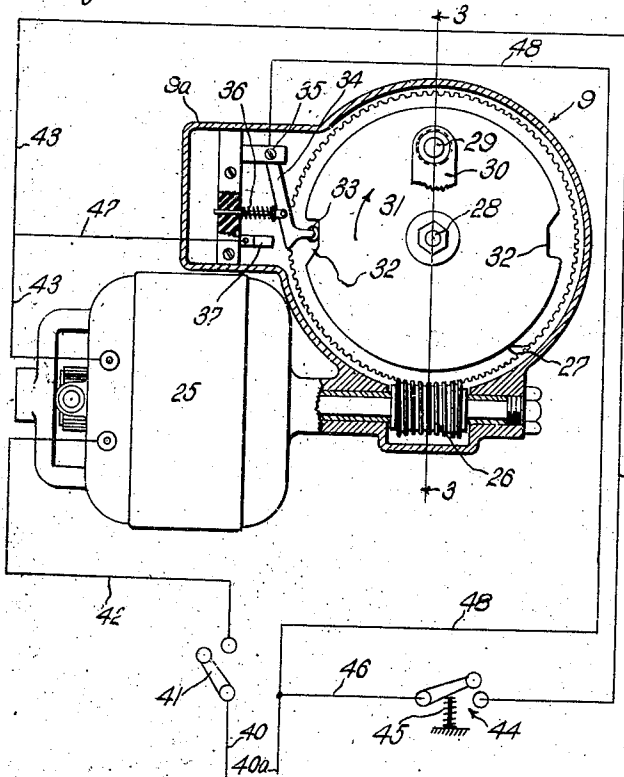


Fig. 3.

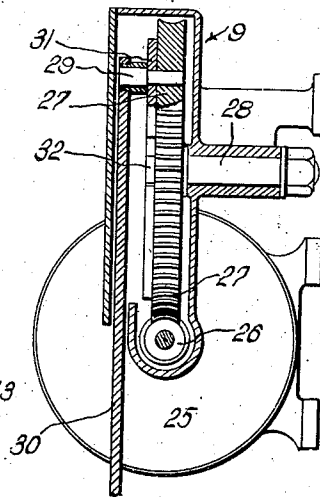
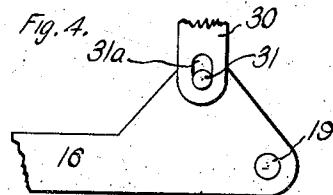


Fig. 4.



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UNITED STATES PATENT OFFICE.

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GATE-OPERATING MECHANISM.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORGE B. VARNUM, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles, State of California, have invented new and useful Improvements in Gate-Operating Mechanism, of which the following is a specification.

This invention relates to mechanism for operating gates, and particularly for sliding or rolling gates such as are used in banks, jails and the like; and the invention consists particularly in the provision of a simple and efficient means for easily, quickly and noiselessly handling heavy gates without exertion on the part of the attendant.

The details of my invention are fully described in the following specification.

For the purpose of this specification I have illustrated in the accompanying drawings a preferred and specific form of mechanism embodying my invention; but it will be understood that many variations in construction and operation may be made without departing from my invention, and also that my invention is not limited in its use to the particular class of gates shown in the drawings, being useful for operating gates regardless of their class or of their manner of movement.

In the accompanying drawings Figure 1 is an elevation showing my mechanism as it appears in use, Fig. 2 is a view showing a section of the operating mechanism and also showing diagrammatically the electrical control system therefor, Fig. 3 is a section taken as indicated by line 3—3 of Fig. 1, and Fig. 4 is a detail showing a modified construction.

In the drawings I have shown a typical installation of my improved operating mechanism. I illustrate a bank grille 10 of any usual type having a gate 11 hung on rollers 12 which run on a horizontal way 13. Gates of this type are usually very heavy, and an excessive exertion is required of the attendant in order to manually open and close them with any celerity.

It is a particular object of this invention to provide a simple mechanism which, under

complete control of the attendant, will automatically open and close such a gate. I prefer, in gates of the general class illustrated herein, to have a mechanism, which, once set in operation will automatically open and then automatically close the gate; but the mechanism may be varied, as is hereinafter explained, so that both the opening and the closing movement must be started by manual action of the attendant.

In the preferred form of mechanism, illustrated herein, I utilize a pair of links 15 and 16, which links are pivoted together at 17 and the end of one link is pivoted at 18 to the gate while the end of the other link is pivoted at 19 to a small bracket 20 mounted upon the stationary part of the grille. In the normal closed position of the gate the two links 15 and 16 are made to extend in a straight line; so that very little force is required to keep the links in a straight line and to thus prevent gate 11 being forced open. My operating mechanism is so constituted that these links 15 and 16 are rigidly held in their straight line positions, so that the gate 11 is securely locked in closed position. The mechanism which causes the movement of the links 15 and 16 is now described.

I employ an electric motor 25 of suitable power, said motor driving a worm 26 meshing with a worm wheel 27 mounted upon stud shaft 28. A crank pin 29 is carried by the worm wheel, and a connecting rod 30 connects with the crank pin and extends downwardly to connect at 31 with the link 16. When the device is in normal position, with the gate 11 closed, crank pin 29 is in the position illustrated, so that the shaft 28, crank pin 29 and the connecting rod are on a straight line. The web or disk of the worm wheel 27 and the pin 29 may be considered as forming a crank rotating about the shaft 28. When the parts are in the position stated it will be seen that this crank and the connecting rod are on a straight line. Any pressure longitudinally on the connecting rod 30 will thus have no effect (or very little effect, if the crank and connecting rod are slightly out of line) to rotate the worm

wheel 27; and in any case, any pressure which may be brought to bear tending to rotate the worm wheel cannot be sufficient to cause the worm wheel 26 to rotate, the pitch 5 of the worm 26 being such that the gear train formed by the worm 26 and the worm wheel 27 is incapable of being moved by back pressure exerted through the worm wheel 27.

10 The foregoing described parts constitute a particular feature of my invention. It will be noted that these operating parts are simple in their nature and in their combination; yet the arrangement is such that 15 it is practically impossible to force the gate 11 open when the mechanism is in its normal position holding the gate closed. Even if the links 15 and 16 should be slightly out of line, and the connecting rod 30 and crank 29 be also slightly out of line, sufficient pressure could not possibly be exerted upon the gate to cause the worm 26 to revolve. The gate is held just as if it were 20 locked solidly in place. The case 9 containing the worm mechanism, and the box 9^a containing the switch, are made so as to be easily and conveniently mounted upon the grille work.

A feature of my invention which I wish 30 to particularly emphasize is the electrical control thereof. The worm wheel 27 carries a cam disk 31 which may have one or more notches 32 in its periphery, the periphery of the disk being followed by a 35 small roller follower 33 on a switch arm, 34 pivoted at 35 and pressed into engagement with the cam by the spring 36. A stationary contact 37 is adapted to be engaged by the switch arm 34 when the switch 40 arm is pressed back away from the cam disk 31. When the roller 33 enters one of the notches 32 the circuit is broken between the switch arm 34 and the stationary contact 37. I provide a circuit such as shown in 45 Fig. 2.

The feed wires are designated by the numerals 40 and 40^a. I provide a main control switch 41 on one side, said switch being arranged to totally discontinue the 50 action of my gate operating mechanism when necessary. A wire 42 leads from this switch to one side of the motor 25 while a wire 43 leads from the other side of the motor to a hand operated switch 44 which 55 switch preferably has a spring 45 normally holding it open. A wire 46 leads back to the other side of the electrical source, to the other feed wire 40^a. A wire 47 connects with wire 43 and leads to the stationary 60 contact 37, while a wire 48 connects between the switch arm 34 and the feed wire 40^a. It will be seen that the switch 44 and the cam operated switch are arranged in parallel with each other.

The operation of the device is as follows: 65 The attendant momentarily closes the switch 44, thus supplying current to the motor which starts the rotation of the parts in the direction indicated in the Fig. 2. Immediately the rotation starts the switch 70 arm 34 is thrown to the left in Fig. 2, and the circuit to the motor is closed at the contact 37. The attendant can then release the switch 44, and the subsequent operation of the gate will take place automatically 75 without care on the part of the attendant. The motor continues to operate and to revolve the parts in the direction indicated until the cam follower 33 drops into one of the notches 32. These notches may be 80 arranged as desired. If two notches are arranged diametrically opposite each other, then the operation will be stopped when the crank pin 29 has made a half revolution about the shaft 28 and the gate 11 will consequently be held in open position. However, for some installations, and particularly for bank installations, I prefer to have only one notch 32 in the disk 31, which will cause the automatic and continuous operation 90 of the mechanism until the crank pin 29 has made a complete revolution, causing the gate 11 to be automatically opened and immediately automatically closed. The notches 32 are made sufficiently long to allow a slight over-run by the motor 25 after 95 current is cut off, without again pushing the switch arm 34 outwardly and again closing the circuit. The exact length of the notch depends upon how far the motor 25 100 will run after current is cut off. It will be noted that the swing of the connecting rod 30 is such as to give it greater leverage on the link 16. Thus, when the opening operation is just commencing, the upper 105 end of the connecting rod 30 swings toward the right in Figs. 1 and 2, so that the pull through the connecting rod 30 becomes more nearly at right angles to the line through pivots 19 and 31; and that, similarly, 110 when the crank pin 29 is at the bottom of its travel, the upper end of the connecting rod 30 is then traveling to the left in Fig. 1, tending to make said angle again as nearly as possible a right angle. It will 115 be noticed the opening and closing movements of the gate are very gradually and easily begun. Gates of the character illustrated are usually very heavy, but are hung on bearings of a character which allows them 120 to move with minimum friction. These gates move very easily after they are once started.

It is a feature of my invention that I utilize very little power for moving the gate. 125 I need very little power for starting the movement of the gate, as it will be seen that the gate is very gradually accelerated both

at the start of the opening and of the closing movements. This is due to the particular arrangement of the parts as hereinbefore described, to the fact that when the links 15 and 16 are on a straight line the crank (hereinbefore referred to) is also on a straight line with the connecting rod 30, with the result that at the beginning and ending of the movement the motor has a great leverage or advantage over the gate.

Needing no excessive power for starting the gate motion, I am enabled to use a motor having just sufficient power to cause proper operation of the gate and have practically no excessive power whatever. This is not only an economy, but provides that any obstruction will immediately cause the whole operation to cease. Thus, in bank grilles, where the operation is preferably automatic for both opening and closing, should any person be caught in the gate the closing operation would immediately cease. The switch 41 also provides means under control of the attendant for stopping the operation of the gate at any desired point.

It will be noted that the links 15 and 16 move downwardly during the opening movement of the gate; and the weight of the links assists the motor in opening the gate. When the gate is closing the weight of the links opposes the motor. The result is that the gate opens comparatively quickly and closes comparatively slowly. As shown in Fig. 4, I may make a slot 31^a for the reception of pin 31 in the connecting rod 30 so that there may be an appreciable lost motion at the upper and lower ends of the stroke. Thus, on the downward stroke of the connecting rod, when opening the gate, the pin is at the upper end of the slot; and when the lowermost point is reached by the connecting rod the gate will stand open an appreciable time while the connecting rod moves upwardly until the lower end of the slot moves up under the pin.

Having described a preferred form of my invention, I claim:

1. Gate operating mechanism, embodying a stationary frame, a horizontally movable gate, a pair of links pivoted one at one end to the gate, the other at one end to the stationary frame; the other two ends of said links being pivotally connected together, all of said pivotal points being normally approximately on a straight line, and means to move the second mentioned link about its stationary pivot embodying a crank and connecting rod between the crank and said link, said connecting rod and crank being normally on a straight line when the two links are on a straight line, a worm wheel connected with the crank, a worm meshing with said worm wheel, a motor driving said worm, a cam disk on said worm wheel, and electrical control means embodying a circuit

including the motor, a hand operated switch in said circuit, and a cam operated switch embodying a stationary contact and a movable arm, a spring to throw the arm away from the stationary contact and toward said cam, and a cam follower on said arm, said cam operated switch being arranged in said circuit in parallel with the hand operated switch.

2. Gate operating mechanism, embodying a stationary frame, a horizontally movable gate, a pair of links pivoted one at one end to the gate, the other at one end to the stationary frame, the other two ends of said links being pivotally connected together, all of said pivotal points being normally approximately on a straight line, and means to move the second mentioned link about its stationary pivot embodying a crank and connecting rod between the crank and said link, said connecting rod and crank being normally on a straight line when the two links are on a straight line, a worm wheel connected with the crank, a worm meshing with said worm wheel, a motor driving said worm, and electrical control means for the motor embodying a circuit including the motor, a hand operated switch in said circuit, and an automatic switch in said circuit in parallel with said hand operated switch, said automatic switch being operated from the worm wheel.

3. Gate operating mechanism, embodying a stationary frame, a horizontally movable gate, a pair of normally horizontal links pivoted one at one end to the gate, the other at one end to the frame, the other two ends of said links being pivotally connected together, all of said pivotal points being normally approximately on a straight line, and means to move the second mentioned link about its stationary pivot embodying a crank and a connecting rod extending vertically from the crank to the link, the connection between the rod and link allowing a limited lost motion between those parts for the purpose described, said connecting rod and crank being normally on a straight line when the links are on a straight line, and means to rotate the crank to cause operation as described.

4. Gate operating mechanism, embodying a stationary frame, a gate movable thereon, a pair of links pivoted one at one end to the gate, the other at one end to the stationary frame, the other two ends of the links being pivotally connected together, all of said pivotal points being normally in an approximately straight line, and means to oscillate the second mentioned link about its stationary pivot, said means embodying a motor, a worm driven by the motor, a worm wheel driven by the worm, connecting means between the worm wheel and the second mentioned link, and electrical control means

for the motor embodying a circuit including the motor, a hand operated switch adapted to close the circuit to the motor, and means operated by the worm wheel for
5 opening the circuit after a pre-determined movement of the worm wheel and when the links are in normal alined position.

In witness that I claim the foregoing I have hereunto subscribed my name this 12th day of Apr., 1915.

GEO. B. VARNUM.

Witnesses:

JAMES T. BARKELEW,
ELWOOD H. BARKELEW.