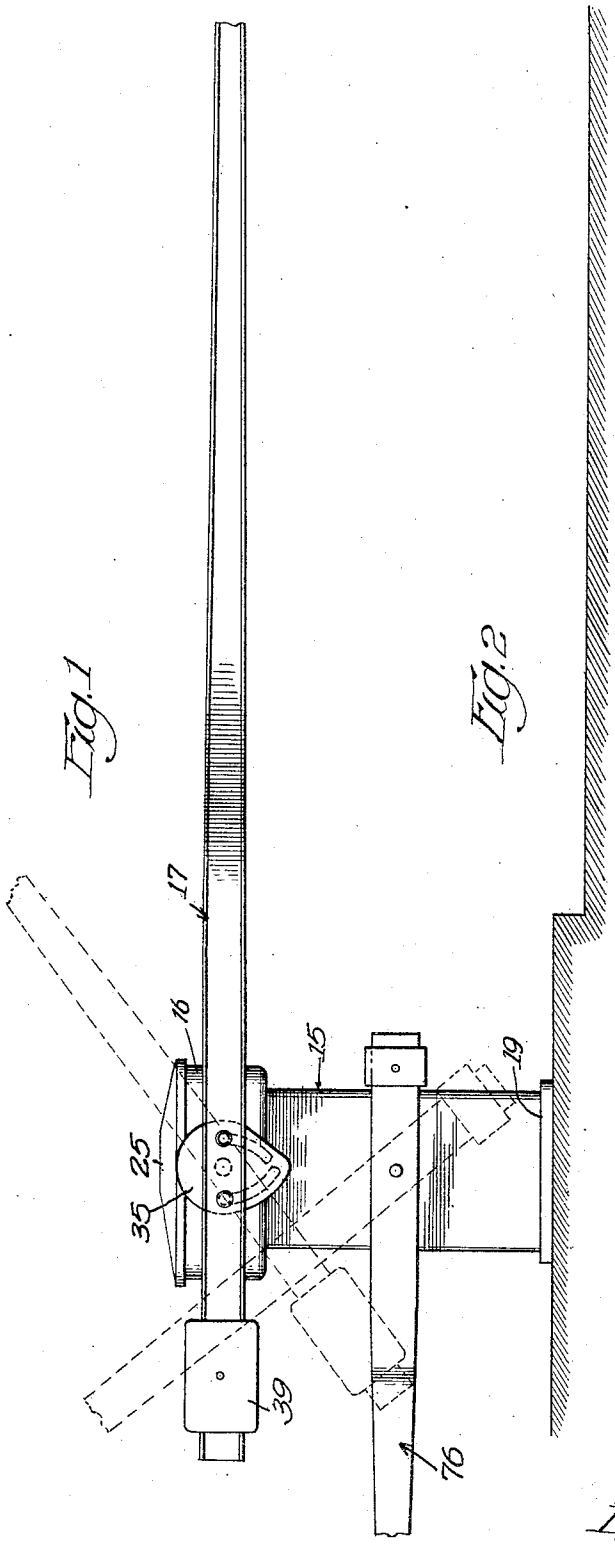
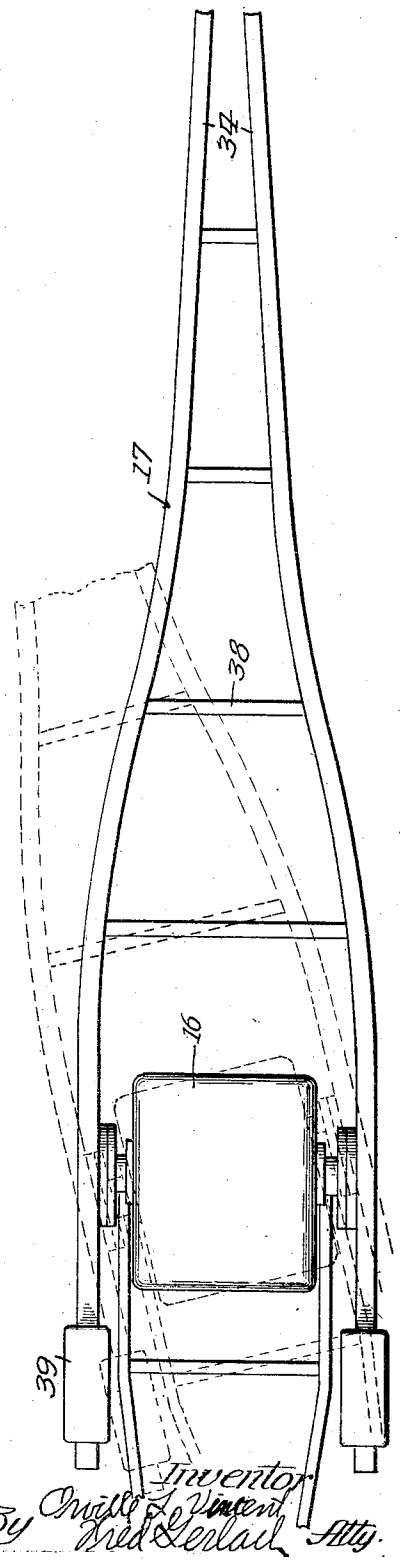
Nov. 15, 1932. O. L. VINCENT 1,888,058

ELECTRICALLY OPERATED AUTOMATIC CROSSING GATE

Filed Sept. 30, 1931 5 Sheets-Sheet 1





Inventor
By Orville L. Vincent
Fred Gerlach Atty.

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Fig. 3

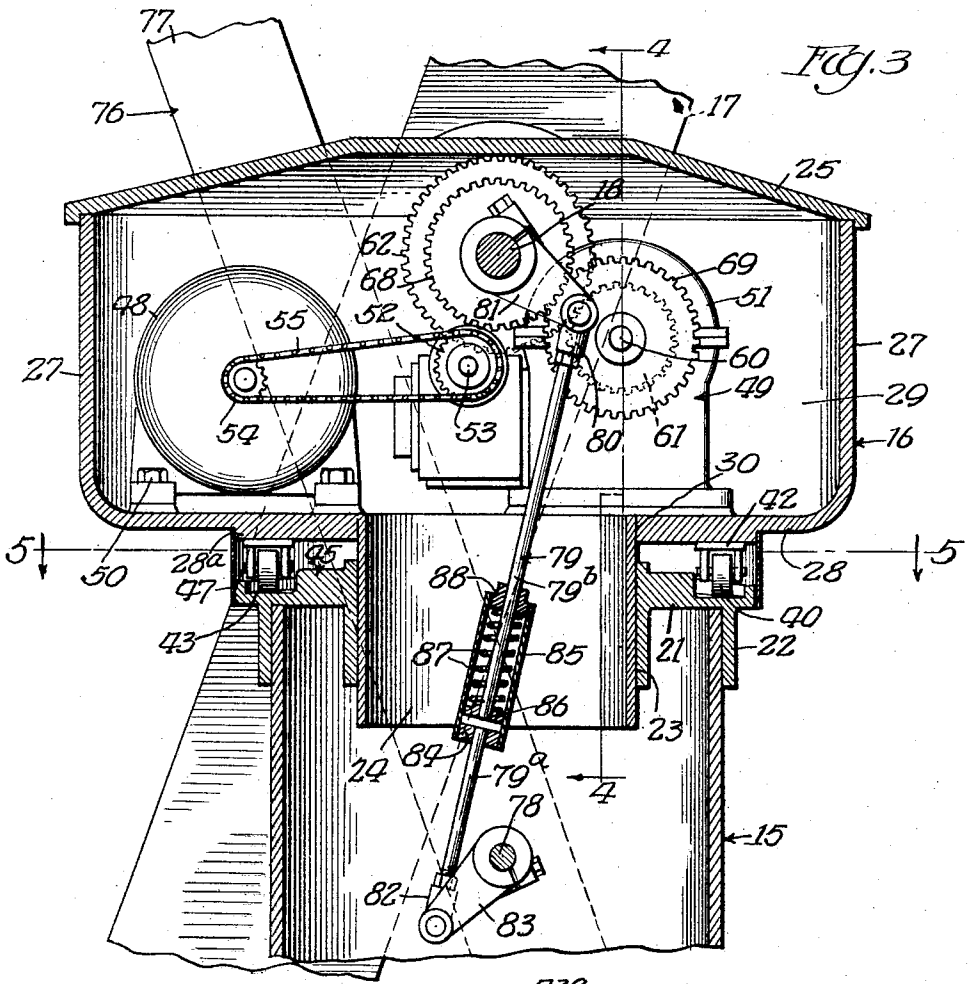


Fig. 10

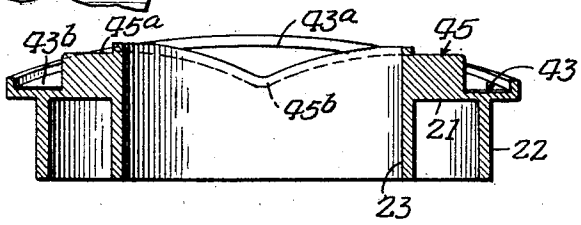
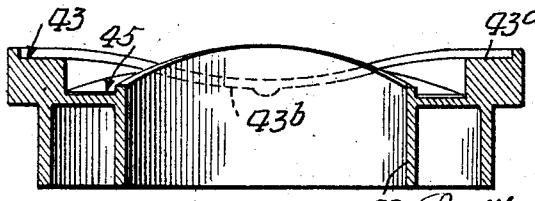


Fig. 11



Inventor
Orville L. Vincent
By Fred Gerlaugh
Atty

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Fig. 4

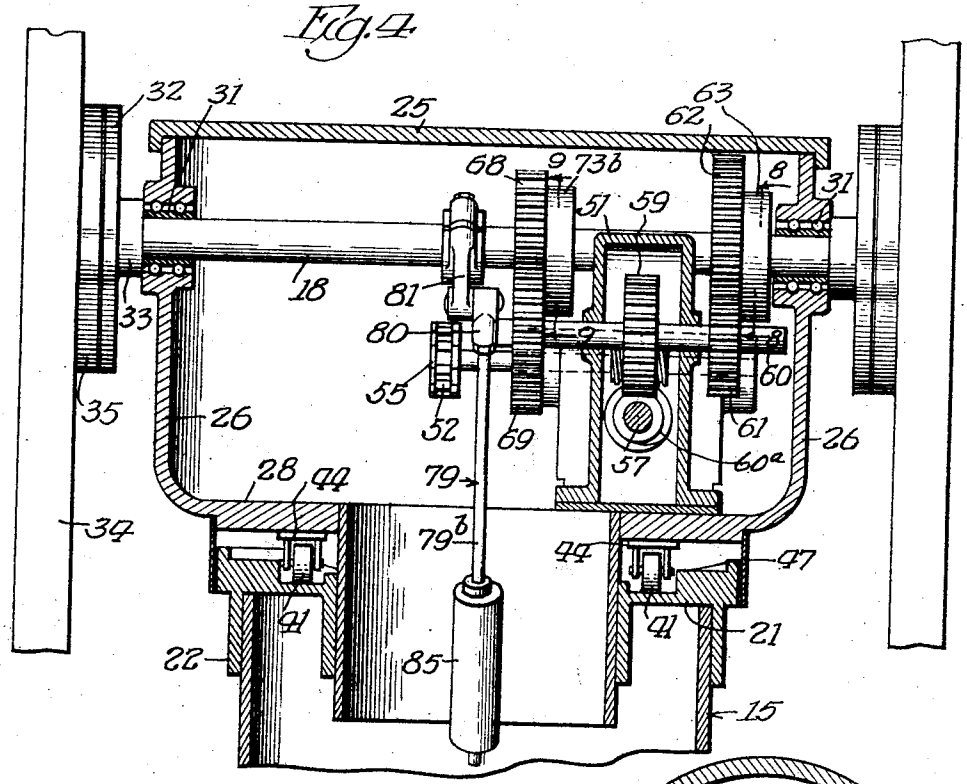


Fig. 9

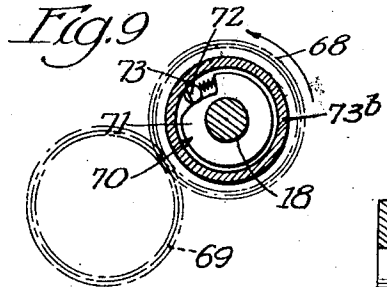


Fig. 7

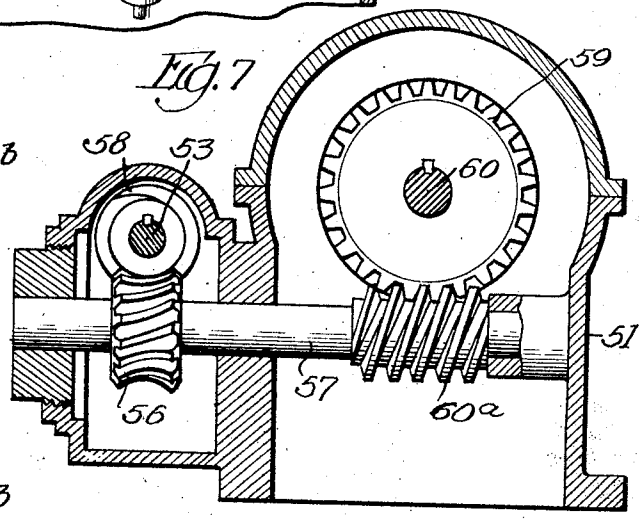
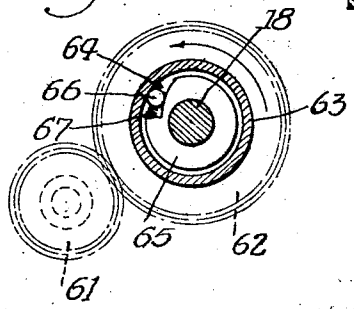


Fig. 8



Inventor
Orville L. Vincent
By Fred Gerlach
Atty.

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Fig. 5

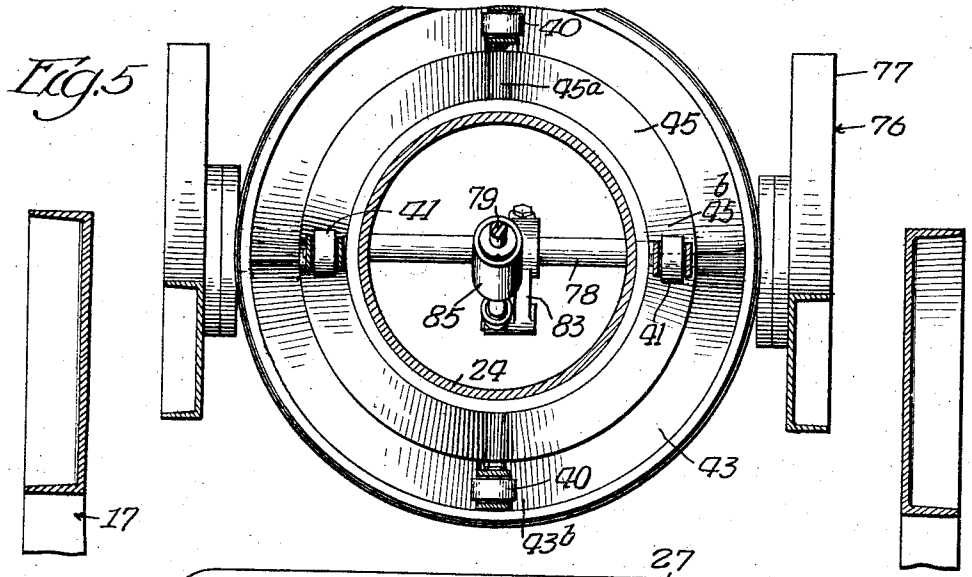
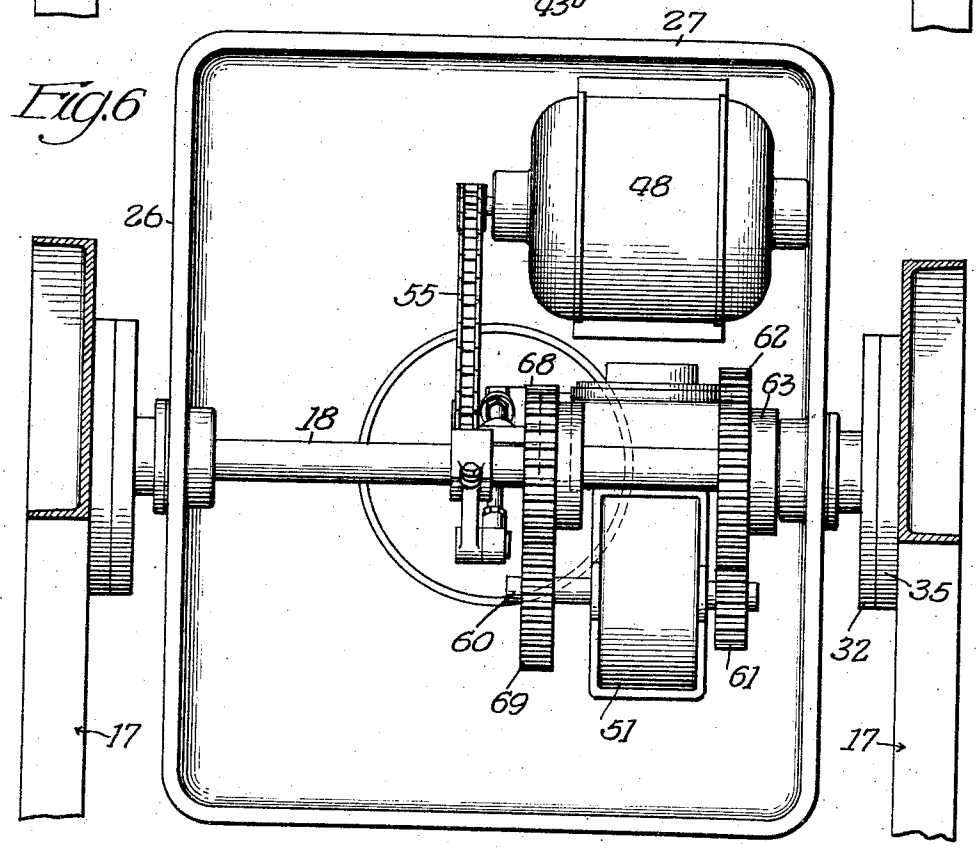


Fig. 6



Inventor:
Orville L. Vincent
By Fred Gerlach
Atty.

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Fig. 13

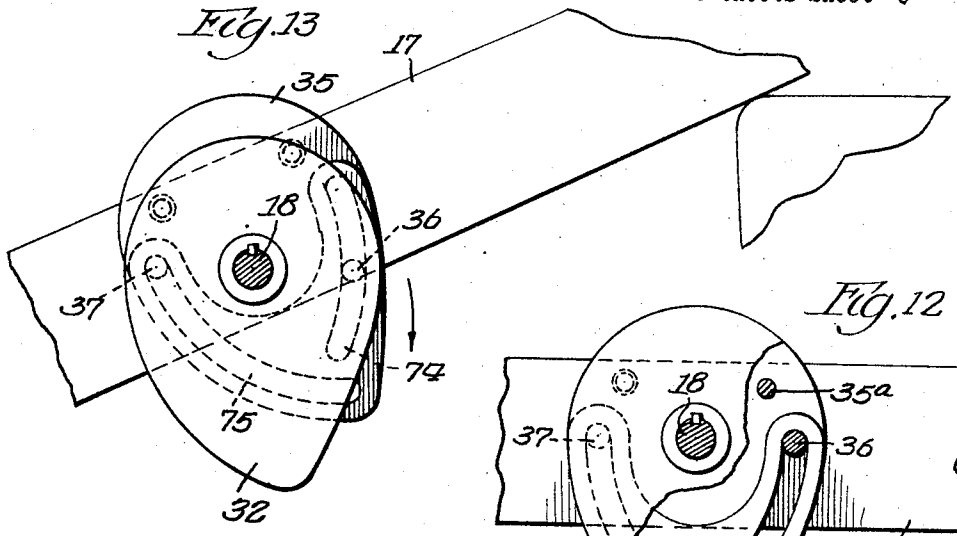


Fig. 12

Fig. 14

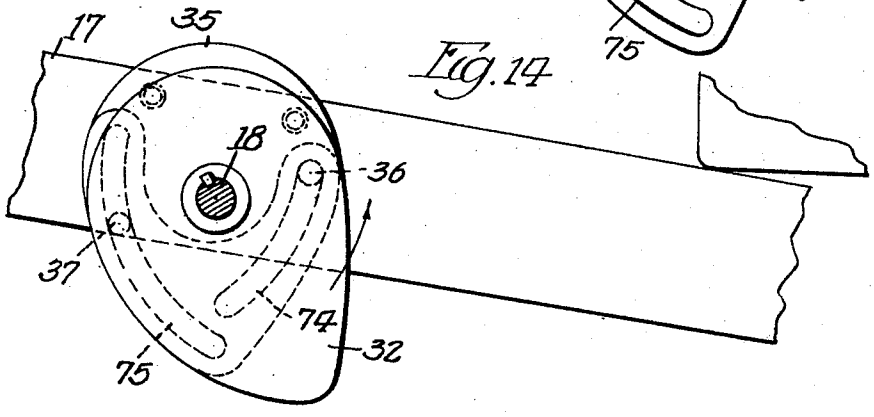


Fig. 15

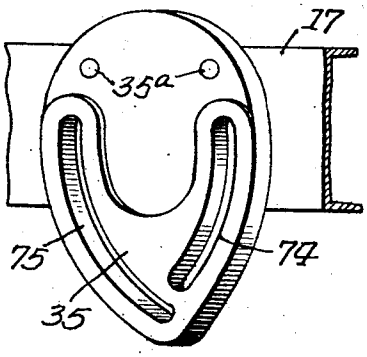
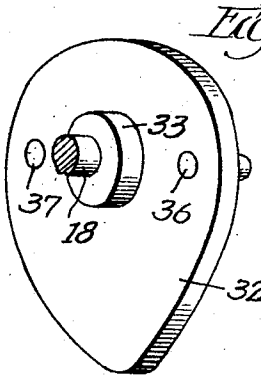


Fig. 16



Inventor:
Orville L. Vincent
By Fred Gerlach
Atty.

Patented Nov. 15, 1932 1,888,058

UNITED STATES PATENT OFFICE

ORVILLE L. VINCENT, OF CHICAGO, ILLINOIS

ELECTRICALLY OPERATED AUTOMATIC CROSSING GATE

Application filed September 30, 1931. Serial No. 565,975.

The present invention relates generally to electrically operated gates. More particularly the invention relates to that type of gate which is designed for use in connection with a railway crossing, is controlled automatically and comprises (1) a hollow standard; (2) a housing which is mounted rotatably on the upper end of the standard and has a horizontal shaft extending therethrough; (3) a gate arm which is carried by the shaft so as to swing vertically into and out of its operative position, extends normally parallel to the railway crossing and, due to the mounting of the head on the standard, is free to swing horizontally in the event that it is struck by a vehicle; and (4) an automatically controlled, reversible electric motor which is connected by way of gearing to the horizontal shaft and operates to lower the gate when driven in one direction and to raise the gate when driven in the opposite direction.

One object of the invention is to provide an electrically operated gate of this type which consists of fewer parts and is simpler in construction than previously designed gates of the same general type, by virtue of the fact that the electric motor and the gearing for driving the shaft from the motor for gate arm lowering and raising purposes are located in and rotatable with the housing.

Another object of the invention is to provide a railway crossing gate of the type under consideration in which the housing is supported rotatably on the upper end of the hollow standard by means of rollers which are mounted on the bottom of the housing and travel on undulatory, circular tracks of such character and design that the housing tends automatically to assume a position wherein the gate arm is parallel to the railway crossing.

Another object of the invention is to provide an automatically controlled, electrically operated crossing gate of the aforementioned type in which the gearing between the reversible electric motor and the horizontal shaft in the housing is designed so that the gate arm is raised at a greater rate of speed than it is lowered.

A further object of the invention is to provide a railway crossing gate of the electrically operated, automatically controlled type in which the gate arm is connected to the horizontal shaft in the housing so that it is lowered and raised through the medium of pin and slot connections which permit the arm to be arrested during its down or up stroke without stopping the electric motor.

A still further object of the invention is to provide a railway crossing gate of the type under consideration which embodies a vertically swinging sidewalk gate arm on the standard and includes an operating connection for this gate arm which is connected to and operated by the horizontal shaft in the housing and extends through the bottom of the housing into the upper end of the standard.

In addition, it is contemplated as one of the objects of the invention to provide an electrically operated, automatically controlled railway crossing gate which is generally of new and improved construction, may be manufactured at a comparatively low and reasonable cost and in which accessibility of the various parts is combined with compactness and durability of construction.

Other objects of the invention and the various advantages and characteristics of the present gate construction will be apparent from a consideration of the following detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawings which accompany and form a part of this specification or disclosure and in which like numerals of reference denote corresponding parts throughout the several views:

Fig. 1 is a side elevation of a gate embodying the invention;

Fig. 2 is a plan view showing the manner in which the gate arm is free to swing horizontally when it is struck by a vehicle or otherwise displaced;

Fig. 3 is a vertical section exhibiting in detail the arrangement and location of the motor and gearing within the housing, and

the construction of the operating connection for the sidewalk gate arm;

Fig. 4 is a vertical section on the line 4—4 of Fig. 3, illustrating the manner in which the horizontal shaft is mounted in the housing and the construction of the gearing between the electric motor and the shaft;

Fig. 5 is a horizontal section on the line 5—5 of Fig. 3, disclosing in detail the roller and undulatory track arrangement whereby the housing is rotatably mounted at the upper end of the standard and tends normally to assume a position wherein the gate arm is parallel to the railway crossing with which the gate is used;

Fig. 6 is a top view of the housing, the cover being omitted for purposes of illustration;

Fig. 7 is an enlarged section of the speed reducing unit which forms a part of the gearing between the electric motor and the horizontal shaft in the housing;

Fig. 8 is a detail view of the gears which operate during drive of the electric motor in one direction to rotate the shaft so as to lower the gate arm;

Fig. 9 is a detailed view of the gears which serve during reverse drive of the motor, to rotate the horizontal shaft in the housing so that it raises the gate arm at a greater rate of speed than it is lowered;

Figs. 10 and 11 are vertical sections of the undulatory, circular tracks which, in conjunction with the rollers on the bottom of the housing, support the housing rotatably;

Figs. 12, 13, 14, 15 and 16 are detail views of the pin and slot connections for connecting the gate arm to the horizontal shaft so that the latter may be arrested during its down or upstroke without stopping the electric motor.

The gate which forms the subject matter of the present invention is adapted for use in connection with a railway crossing and comprises a hollow standard 15, a housing 16 and a gate arm 17. The housing 16 is mounted at the upper end of the standard 15 and supports a horizontal shaft 18. The gate arm 17 is carried by the shaft 18 so as to swing vertically, extends normally parallel to the crossing and is adapted, as hereinafter described, to be lowered from a substantially vertical, inoperative position to a horizontal operative position wherein it extends parallel to the crossing and blocks traffic when a train passes over the railway tracks. The standard 15 is cylindrical. It is preferably formed of steel tubing and is supported upon a cast metal base 19. The latter is located on a foundation of concrete or like material at one side of the crossing and embodies an upwardly extending, annular flange 20. The lower end of the standard fits within this flange and is bolted or otherwise secured thereto so that the standard is connected fixedly to the base. The upper end of the standard 15 is provided with a cast metal cap 21. The latter is circular in conformation and is provided with an annular flange 22. The latter is formed integrally with and depends from the marginal portion of the cap and surrounds the upper end of the standard 15, as illustrated in Figs. 3 and 4 of the drawings. The central portion of the cap is enlarged or extended upwardly and downwardly and has formed therein a vertically extending, circular opening 23 in which a hollow cylindrical member 24 is mounted rotatably and slidable vertically.

The housing 16 is formed of cast metal and is substantially rectangular. It consists of a cover 25, a pair of side walls 26, a pair of end walls 27 and a bottom wall 28. The bottom 28 is flat and forms with the side and end walls 26 and 27 a compartment 29. The cover 25 serves to close the top of the compartment 29 and embodies a depending, marginal flange 25[a] whereby it is detachably connected to the upper marginal portions of the side and end walls 26 and 27. The cylindrical member 24 fits in and depends from a circular opening 30 in the bottom 28 of the housing and establishes communication between the compartment 29 and the interior of the standard 15. The horizontal shaft 18 extends transversely across the compartment 29 and is journalled in ball bearings 31 in the housing sides 26. The ends of the shaft 18 project beyond the housing sides 26 and have keyed or otherwise fixedly secured thereto a pair of cast metal plates 32. The latter are provided with hub portions 33 and are arranged so that the outer faces thereof are flush with the extreme outer ends of the shaft 18.

The gate arm 17 consists of a pair of side members 34 and is carried by the shaft 18 through the medium of a pair of cast metal plates 35. The side members 34 are arranged in laterally spaced relation and lap the side walls 26 of the housing 16. The plates 35 are secured by bolts 35[a] to the inner faces of the central portions of the side members and fit against the outer faces of the plates 32 on the ends of the shaft 18. The plates 32 are each provided with a pin 36 and a pin 37. These pins project outwardly from the plates 32 and, as hereinafter described, cooperate with the plates 35 so as to connect the gate arm 17 to the shaft 18 for lowering or raising movement. When the shaft 18 is rotated in one direction, the gate is lowered into a horizontal position wherein it extends parallel to the railway crossing. When the shaft 18 is driven in the opposite direction, the gate arm is raised into its operative position wherein it extends substantially vertically, as previously pointed out.

Cross braces 38 extend between and connect the end portions of the side members of the gate which are adapted to bridge or extend across the road over the railway crossing when the gate arm is in its operative position. The other end portions of the side members 34 are provided with weights 39. The latter operate as counterweights and serve to balance the gate arm about the axis of the shaft 18.

The housing 16 is supported rotatably on the upper end of the standard 15 by a pair of rollers 40 and a pair of rollers 41 so that the gate arm 17 is free to swing horizontally in the event that a vehicle strikes it when it is in its operative position. The rollers 40 are supported rotatably on brackets 42 on the under face of the bottom 28 of the housing. They are positioned adjacent the end walls 27 and travel on an undulatory, circular track 43. The latter is formed on the top face of the cap 21 and has a pair of diametrically opposite crests 43^a and a pair of diametrically opposite depressions 43^b. The depressions 43^b are positioned at right angles to the crests 43^a, and are arranged so that when the rollers 40 are disposed therein, the housing 27 is in its normal position, that is, in a position wherein the gate arm 17 is parallel to the railway crossing. When the gate arm is struck by a vehicle and swung horizontally, the housing 16 is rotated and causes the rollers 40 to travel up the crests 43^a of the track 43. Upon release of the gate arm 17, the rollers travel down the crests and into the depressions in response to the weight of the housing and thus automatically return the gate arm to its normal position with respect to the railway crossing. The cylindrical hollow member 24 operates as a guide whereby the housing is held against lateral displacement when it is moved vertically as a result of the rollers travelling up the crests. The rollers 41 are mounted rotatably on brackets 44 on the under side of the housing bottom 28 and are positioned adjacent the side walls of the housing. They are located at right angles to the rollers 40 and travel on an undulatory circular track 45. The latter is formed on the top face of the cap 21 at the upper end of the standard 15, is positioned within and concentrically with respect to the undulatory circular track 43 and has a pair of diametrically opposite crests 45^a and a pair of diametrically opposite depressions 45^b. The depressions 45^b are located at right angles to the depressions 43^b of the track 43 and receive therein the rollers 41 when the housing is in its normal position. The crests 45^a extend at right angles to the depressions and are positioned adjacent the depressions 43^b of the track 43. By arranging the crests 45^a in this manner and positioning the rollers 41 at right angles to the rollers 40, the rollers 41 travel up the crests 45^a at the same time the rollers 40 travel up the crests 43^a as the result of the gate arm 17 being swung horizontally. The rollers 41 together with the rollers 40 exemplify simple and improved means for supporting the housing 16 rotatably at the upper end of the standard 15 and for automatically returning the gate arm to its operative or normal position after it is shifted or swung horizontally as a result of being struck by a vehicle. By employing the rollers 40 and 41 and the circular undulatory tracks 43 and 45, no springs or like instrumentalities are needed to retain the housing and gate arm in their normal position. To prevent the gate arm and housing from being displaced from their normal position by but slight pressure or force, such as wind, radially extending grooves 46 are formed in the lowermost portions of the depressions 43^b and 45^b. The rollers 40 and 41 are normally seated in these grooves and tend to oppose rotation of the housing. The rollers and tracks are protected against damage from the elements by means of a circular sheet metal band 47. This band is secured to and depends from a circular boss 28^a on the under face of the housing bottom 28 and laps the marginal portion of the cap 21 so as to enclose the space above the circular undulatory tracks 43 and 45.

The horizontal shaft 18 is rotated so as to lower and raise the gate arm 17 by means of mechanism which is housed wholly within the housing 16. This mechanism includes a reversible electric motor 48 and a speed reducing unit 49. The electric motor 48 is positioned in one end of the chamber 29 and is secured to the housing bottom 28 by bolts 50. It is supplied with current through conductors (not shown) and is controlled by track switches in such a manner that it is driven in one direction to lower the gate arm when a train approaches the crossing and is driven in a reverse direction to raise the gate arm after passage of the train over the crossing. The unit 49 is located in the other end of the compartment 29 and consists of a casing 51 and speed reducing gearing. The casing is removably secured to the bottom 28 of the housing 16 in any suitable manner and contains oil or any other suitable lubricant for the speed reducing gearing. The latter consists of a sprocket 52 which is fixed to one end of a horizontally extending shaft 53 and is driven from a sprocket 54 on the armature shaft of the reversible electric motor 48 by an endless chain 55; a worm wheel 56 which is fixed to one end of a horizontally extending shaft 57 and meshes with and is driven by a worm 58 on the central portion of the shaft 53; and a worm wheel 59 which is mounted on a horizontally extending shaft 60 and meshes with and is driven by a worm 60^a on the other end of the shaft 57. The worm wheel 56, the worm 58, the worm wheel 59 and the worm 60^a are located in the casing 51.

The shaft 60 is located above the shaft 57 and is arranged so that the ends thereof project through the casing 51. The horizontally extending shaft 18 is rotated so as to lower the gate arm 17 by means of a gear 61. The latter is fixed to one end of the shaft 60 of the speed reducing unit 49 and meshes with a larger gear 62 on the shaft 18. The gear 62 embodies a hub 63 and is connected to drive the shaft 18 in the proper direction for effecting lowering of the gate arm by means of a one-way clutch 64. The latter (see Fig. 8) consists of a collar 65 on the shaft 18 within the hub 63 and a spring-pressed roller 66 which is located in a notch 67 in the collar and bears against the inner periphery of the hub. When the electric motor 48 is driven so as to lower the gate arm 17, the gear 62 which is driven by the gear 61 operates to rotate the shaft 18 through the medium of the one-way clutch 64. When the motor is driven in the reverse direction, the gear 62 rides loosely around the shaft 18. The shaft 18 is rotated so as to raise the gate arm 17 by means of a gear 68. This gear meshes with a gear 69 of equal size on the shaft 60 and is connected to drive the shaft 18 through a one-way clutch 70. The latter (see Fig. 9) consists of a collar 71 on the shaft 18 and a spring-pressed roller 72 which is located in a notch 73 in the collar 71 and engages the inner periphery of a hub 73ª. This hub is formed integrally with the gear 68 and encircles the collar 71. The one-way clutch 70 operates oppositely from the one-way clutch 64 and is arranged so as to effect a driving connection between the shaft 18 and the gear 68 when the gate arm is to be raised, and to permit the gear 68 to ride loosely on the shaft 18 when the latter is driven by the gear 62 to effect lowering of the gate arm. By virtue of the fact that the gear 62 is larger than the gear 61 and the gears 68 and 69 are of the same size, the gate arm 17 is raised more rapidly or at a greater rate of speed than it is lowered. When the motor 48 is driven so as to lower the gate arm, the gear 62 is connected to the shaft 18 and the gear 68 is loose. When the motor is reversed so as to raise the gate arm, the gear 68 is connected to drive the shaft 18 and the gear 62 is loose. By disposing the electric motor and the gearing for raising and lowering the gate in the compartment 29, the construction of the gate proper is simplified. In the event that it is necessary to repair the electric motor, the speed reducing unit or the gearing, it is only necessary to remove the cover 25 from the housing 16 so as to open the compartment 29.

In order to permit the gate arm 17 to be arrested on its down or up stroke without stopping the electric motor 48, the cast metal plates 35 have formed therein slots 74 for the pins 36 and slots 75 for the pin 37. The pins 36 are positioned on one side of the horizontally extending shaft 18. The pins 37 are located on the opposite side of the shaft 18 and are spaced the same distance from the shaft as the pins 36. The slots 74 for the pins 36 are arcuate and have the inner ends of the slots 75 for their centers. The slots 75 for the pins 37 are also arcuate and have the inner ends of the slots 74 for their centers. The pins 36 are normally disposed in the inner ends of the slots 74 and the pins 37 are normally disposed in the inner ends of the slots 75. When the electric motor 48 is driven to lower the gate arm, the plates 32 are rotated by the shaft 18 and cause the pins 37 to jamb against the inner ends of the slots 75 and to swing the gate arm downwardly. During lowering or downward movement of the gate arm by the pins 37, the pins 36 remain in the inner ends of the slots 74 due to the fact that the gate arm is balanced and swings downwardly on the axis of the shaft 18. When the gate arm is arrested during downward shift thereof, the pins 36 are shifted during rotation of the plates 32 towards the outer ends of the slots 74, as shown in Fig. 14. This shift of the pins 36 leaves the gate arm in an over-balanced position and consequently when the gate arm is released, it swings downwardly until it is arrested by engagement of the pins 36 with the inner ends of the slots 74. When the electric motor 48 is driven to raise the gate arm, the plates 32 are rotated so that the pins 36 jamb against the inner ends of the slots 74 and raise the gate arm above the axis of the shaft 18. During raising of the gate arm, the pins 37 remain within the inner ends of the slots 75. This is attributable to the fact that the gate arm is balanced and swings on the axis of the shaft 18. In the event that the gate arm is arrested on its up stroke, the pins 37 are moved during rotation of the plates 32 into the outer ends of the slots 75. This leaves the gate arm in an under-balanced position and results in the gate arm swinging upwardly automatically when it is released. The pin-equipped plates 32 and the plates 35 with the slots 74 and 75 exemplify simple and efficient means for permitting the gate arm to be arrested on its down or up stroke without stopping the electric motor.

In addition to the arm 17, the gate comprises a sidewalk gate arm 76. The latter consists of a pair of laterally spaced, side members 77 and is supported by a horizontally extending shaft 78. The latter extends transversely through and is journalled in bearings in the central portion of the standard 15. The side members 77 of the sidewalk gate arm lap opposite sides of the standard 15 and are fixedly secured in any suitable manner to the ends of the shaft 78. The sidewalk gate arm 76 faces in the opposite direction from the gate arm 17 and is lowered and raised con-

jointly with the gate arm 17 by means of a substantially vertically extending, two-piece link 79. The latter extends through the hollow cylindrical member 24 and is connected at the upper end thereof by a universal joint 80 to an arm 81 on the shaft 18. The lower end of the link 79 is connected by a universal joint 82 to an arm 83 on the shaft 78. The arm 81 is mounted on the central portion of the shaft 18 and is fixed in any suitable manner to the shaft so that it rotates therewith. The arm 83 is keyed or otherwise secured to the central portion of the shaft 78 and is arranged so that it raises the sidewalk gate arm 77 when the link 79 and the arm 88 are raised and lowers the sidewalk gate arm when said link and arm are lowered. The link 79 consists of a lower piece 79[a] and an upper piece 79[b]. The lower piece is provided at the upper end thereof with a head 84 which is fixedly secured to the lower end of a vertically extending cylinder 85. The lower end of the link piece 79[b] is provided with head 86 which is slidably mounted in the cylinder 85. A coil spring 87 extends between a plug 88 at the upper end of the cylinder and the head 86 and operates as a yielding connection between the two pieces of the link which permits of extension of the link when the housing 16 is rotated as the result of the gate arm 17 being struck by a vehicle or otherwise swung horizontally.

The operation of the gate is as follows:

When a train approaches the railway crossing with which the gate is associated, the motor 48 is driven so as to effect a lowering of the gate arm 17 through the medium of the speed reducing unit 49, the gears 61 and 62, the shaft 18 and the pins 37 on the plates 32. After passage of the train over the crossing, the motor 48 is driven in the opposite direction and operates to raise the gate arm 17 at a greater rate of speed than it is lowered through the medium of the speed reducing unit 49, the gears 68 and 69 and the pins 36. In the event that a vehicle strikes the gate arm 17 when it is in its lowered or operative position, the gate arm swings horizontally by virtue of the fact that the housing 16 is mounted rotatably on the upper end of the standard 15. Upon release of the gate, the housing is returned automatically to its normal position as a result of the action of the rollers 30, 31 and the undulatory circular tracks 43 and 45. In the event that the gate arm 77 is arrested during either its down or up stroke, the motor 48 continues to run until the current is cut off. Upon release, the gate arm swings automatically into its proper position.

The herein disclosed electrically operated, automatically controlled crossing gate consists of but a small number of parts and hence may be manufactured at a comparatively low and reasonable cost. By virtue of the fact that the electric motor and the gearing for raising and lowering the gate arm are located in the housing 16, no yieldable or lost motion connections other than the link 79 need be used on account of the housing 16 being rotatable relatively to the standard so as to permit the gate arm to be swung horizontally. The gate as a whole is compact and operates in an extremely efficient manner.

Whereas the gate has been described for use in connection with a railway crossing, it is to be understood that the gate may be used wherever it is desired to give a signal by the lowering and raising of a gate arm. It is also to be understood that the invention is not to be restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a crossing gate of the character described, the combination of a tubular standard having at the upper end thereof a cap with a pair of undulatory, concentrically arranged, circular tracks, a housing positioned above the cap, a gate arm carried by the housing so as to swing vertically and adapted normally to extend substantially parallel to the crossing, rollers on the under side of the housing arranged to travel on the tracks and form therewith a mount whereby the housing is supported to rotate on a substantially vertical axis to permit the gate arm to swing horizontally, and is automatically urged in response to the joint action of the rollers and the undulations of the tracks to return to its normal position wherein the gate arm is parallel to the crossing when it is rotated out of such position by horizontal swinging of the gate arm, and mechanism for swinging the gate arm vertically into and out of a substantially horizontal, operative position comprising an electric motor and speed reducing gearing disposed in and rotatable with the housing.

2. In a crossing gate of the character described, the combination of a tubular standard having a cap at the upper end thereof, a housing mounted above the cap for rotation on a substantially vertical axis and having a horizontal shaft extending transversely therethrough, a gate arm carried by the shaft so that it swings vertically in response to rotation of the shaft, means between the housing and cap for normally maintaining said housing in a position wherein the gate arm is substantially parallel to the crossing, and mechanism for rotating the shaft so as to swing the gate vertically into and out of a substantially horizontal operative position disposed in and rotatable with the housing and comprising an electric motor, an encased speed

reducing unit driven by the motor and a driving connection between the unit and the shaft.

3. In a crossing gate of the character described, the combination of a tubular standard having a cap-member at the upper end thereof, a housing-member above the cap-member, a gate arm carried by the housing-member to swing vertically, mechanism for swinging the gate arm into and out of substantially horizontal, operative position, and a mount whereby the housing-member is supported to rotate on a substantially vertical axis in order to permit the gate arm to swing horizontally, and is normally maintained in a position wherein the gate arm is substantially parallel to the crossing, comprising an undulatory, circular track on one of the members and rollers on the other member arranged to travel on the track and to cooperate with the undulations of the latter to urge the housing automatically into the aforesaid position after it is displaced from such position by horizontal swinging of the gate arm.

4. In a crossing gate of the character described, the combination of a standard having a cap at the upper end thereof, a housing above the cap, a gate arm carried by the housing to swing vertically, mechanism for swinging the gate arm into and out of a substantially horizontal, operative position, and a mount whereby the housing is supported to rotate on a substantially vertical axis in order to permit the gate arm to swing horizontally, and is normally maintained in a position wherein the gate arm is substantially parallel to the crossing, comprising an undulatory track on the upper face of the cap and rollers on the under side of the housing arranged to travel on the track and to cooperate with the undulations of the latter to urge the housing automatically into the aforesaid position after it is displaced from such position by horizontal swinging of the gate arm.

5. In a crossing gate of the character described, the combination of a standard-member, a housing-member on top of the standard-member, a gate arm carried by the housing-member to swing vertically, mechanism for swinging the gate arm into and out of a substantially horizontal operative position, and a mount whereby the housing-member is supported to rotate on a substantially vertical axis in order to permit the gate arm to swing horizontally, and is normally maintained in a position wherein the gate arm is substantially parallel to the crossing, comprising a pair of undulatory, concentrically arranged, circular tracks carried by one of the members and rollers on the other member arranged to travel on the tracks and to cooperate with the undulations of the latter to urge the housing automatically into the aforesaid position after it is displaced from said position by horizontal swinging of the gate arm.

6. In a crossing gate of the character described, the combination of a standard, a housing on top of the standard, a gate arm carried by the housing to swing vertically, mechanism for swinging the gate arm into and out of a substantially horizontal operative position, and a mount whereby the housing is supported to rotate on a substantially vertical axis in order to permit the gate arm to swing horizontally, and is normally maintained in a position wherein the gate arm is substantially parallel to the crossing, comprising a pair of undulatory, concentrically arranged, circular tracks carried by the upper end of the standard and rollers on the under side of the housing arranged to travel on the tracks and to cooperate with the undulations of the latter to urge the housing automatically into the aforesaid position after it is displaced from said position by horizontal swinging of the gate arm.

7. In a crossing gate of the character described, the combination of a supporting member, a gate arm supported by said member to swing vertically into and out of a substantially horizontal, operative position, and mechanism for swinging the gate arm comprising a motor and gearing between the motor and the gate arm, said gearing being operative to swing the gate downwardly at a comparatively low speed when the motor is driven to lower the gate into its operative position and to swing the gate upwardly at a greater speed when the motor is driven to raise the gate arm out of said operative position.

8. In a crossing gate of the character described, the combination of a supporting member, a gate arm supported by said member to swing vertically into and out of a substantially horizontal, operative position, and mechanism for swinging the gate arm comprising a reversible electric motor and gearing driven by the motor and operative to swing the gate arm downwardly into its operative position at a comparatively low speed when the motor is driven in one direction and to swing the gate arm upwardly out of its operative position at a greater speed when the motor is driven in the opposite direction.

9. In a crossing gate of the character described, the combination of a housing-member having a horizontal shaft extending transversely therethrough, a gate arm carried by the shaft so that it swings vertically in response to rotation of the shaft, and mechanism in the housing-member for swinging the gate arm into and out of a substantially horizontal, operative position, comprising a reversible electric motor and speed reducing gearing between the motor and the shaft operative when the motor is driven in one direction to rotate the shaft at low speed to

swing the gate arm slowly into its operative position and when the motor is driven in the reverse direction to rotate the shaft at high speed to swing the arm quickly out of its operative position.

10. In a crossing gate of the character described, the combination of a supporting member, a rotatable horizontally extending shaft supported by said member and provided at one end thereof with a plate-element, a gate arm carried by the shaft and arranged to swing vertically into and out of a substantially horizontal, operative position in response to rotation of the shaft, said gate arm being provided with a plate-element opposite the plate-element on the shaft, motor-driven mechanism associated with the supporting member for rotating the shaft for gate arm swinging purposes, and a driving connection between the shaft and the gate arm, a pin and slot connection between the two plate-elements whereby the arm may be arrested during downward swinging thereof without stopping rotation of the shaft and drive of the motor.

11. In a crossing gate of the character described the combination of a supporting member, a rotatable horizontally extending shaft supported by said member, a gate arm carried by and substantially balanced about the shaft and arranged to swing vertically into and out of a substantially horizontal, operative position in response to rotation of the shaft, motor-driven mechanism associated with the supporting member for rotating the shaft for gate arm swinging purposes, and a driving connection between the shaft and the gate arm comprising a pin and slot connection whereby the arm may be arrested during upward swinging thereof without stopping rotation of the shaft and drive of the motor.

12. In a crossing gate of the character described, the combination of a supporting member, a rotatable horizontally extending shaft supported by said member, a gate arm carried by and substantially balanced about the shaft and arranged to swing vertically into and out of a substantially horizontal operative position in response to rotation of the shaft, motor-driven mechanism associated with the supporting member for rotating the shaft for gate arm swinging purposes, and a driving connection between the shaft and the gate arm consisting of a pair of coactive pin and slot connections whereby the arm is permitted to be arrested during downward or upward swinging thereof without stopping rotation of the shaft and drive of the motor.

13. In a crossing gate of the character described, the combination of a housing member, a rotatable horizontal shaft extending transversely through the housing and provided at the ends thereof with plate elements, a vertically swinging gate arm consisting of a pair of laterally spaced side members having plate elements positioned opposite the plate elements on the shaft, motor-driven mechanism in the housing for rotating the shaft in either direction, and pin and slot connections between the plate elements on the shaft and the plate elements on the side members of the gate arm forming a driving connection for swinging the gate arm downwardly when the shaft is rotated in one direction and for swinging the gate arm upwardly when the shaft is rotated in the opposite direction and operative to permit the gate arm to be arrested on its down or up stroke without stopping rotation of the shaft and drive of the motor.

14. In a crossing gate of the character described, the combination of a tubular standard, a housing mounted in the upper end of the standard for rotation on a substantially vertical axis, a gate arm carried by the housing to swing vertically, mechanism for swinging the gate arm into and out of a substantially horizontal, operative position disposed in the housing and comprising a motor and speed reducing means, an oscillatory gate arm carried on the standard to swing vertically and positioned opposite the gate arm on the housing, and means for swinging the oscillatory gate arm conjointly with the housing gate arm operated by the motor in the housing and comprising an extensible link extending through the bottom of the housing and into the upper end of the standard.

15. In a crossing gate of the character described, the combination of a tubular standard, a housing mounted on the upper end of the standard for rotation on a substantially vertical axis and having a rotatable horizontal shaft extending transversely therethrough, a gate arm connected to the shaft and adapted to swing vertically, mechanism for rotating the shaft so as to swing the gate arm into and out of a substantially horizontal, operative position, disposed in the housing and comprising a motor and speed reducing gearing between the motor and the shaft, an oscillatory gate arm carried on the standard to swing vertically and positioned opposite the gate arm on the housing, and means for swinging the oscillatory gate arm conjointly with the gate arm on the shaft operated by the motor and comprising a link connected to the shaft and extending through the bottom of the housing into the upper end of the standard.

Signed at Chicago, Illinois, this 23rd day of June, 1931.

ORVILLE L. VINCENT.