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GATE STRUCTURE FOR RAILWAY CROSSINGS

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3 Sheets-Sheet 1

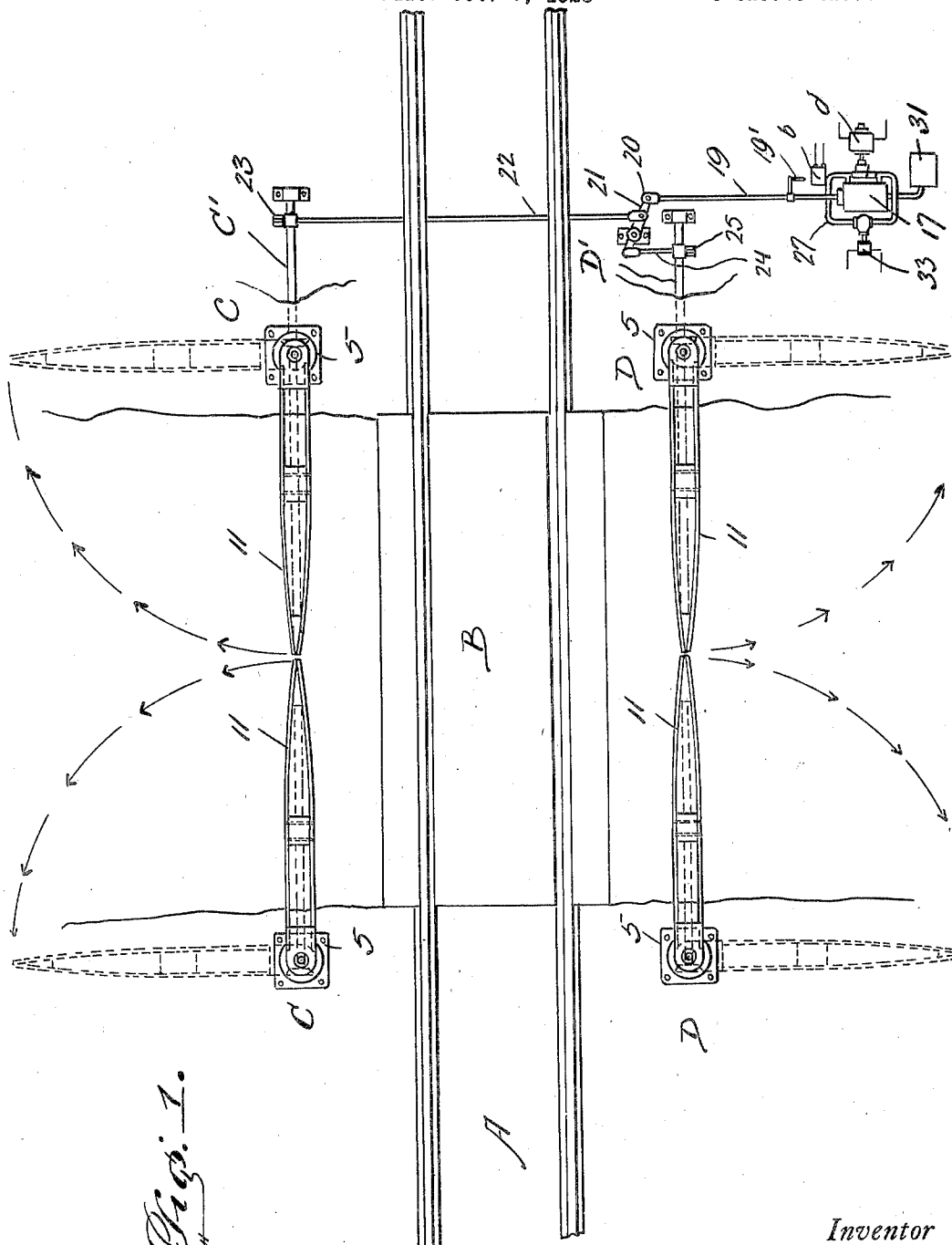


Fig. 1.

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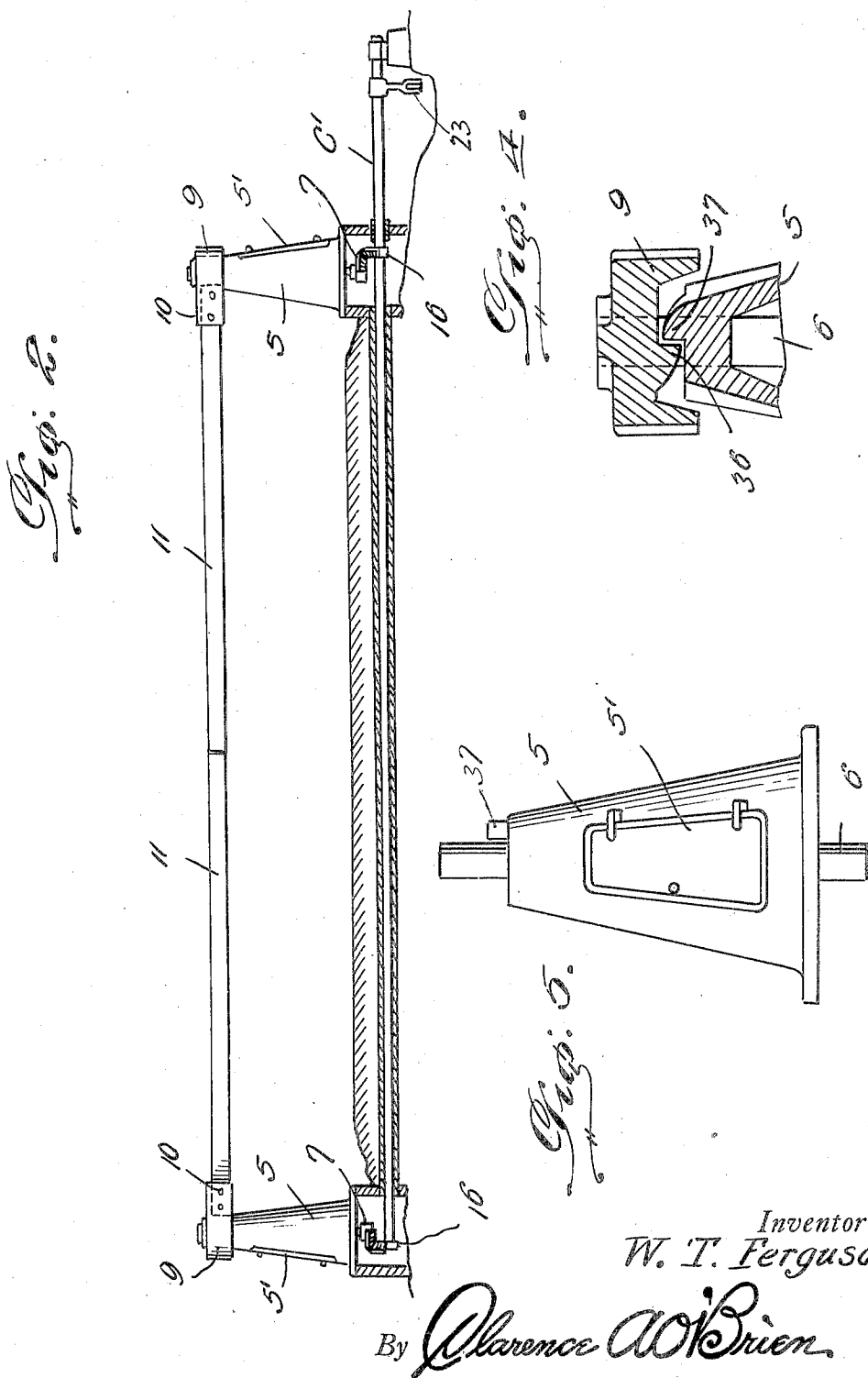
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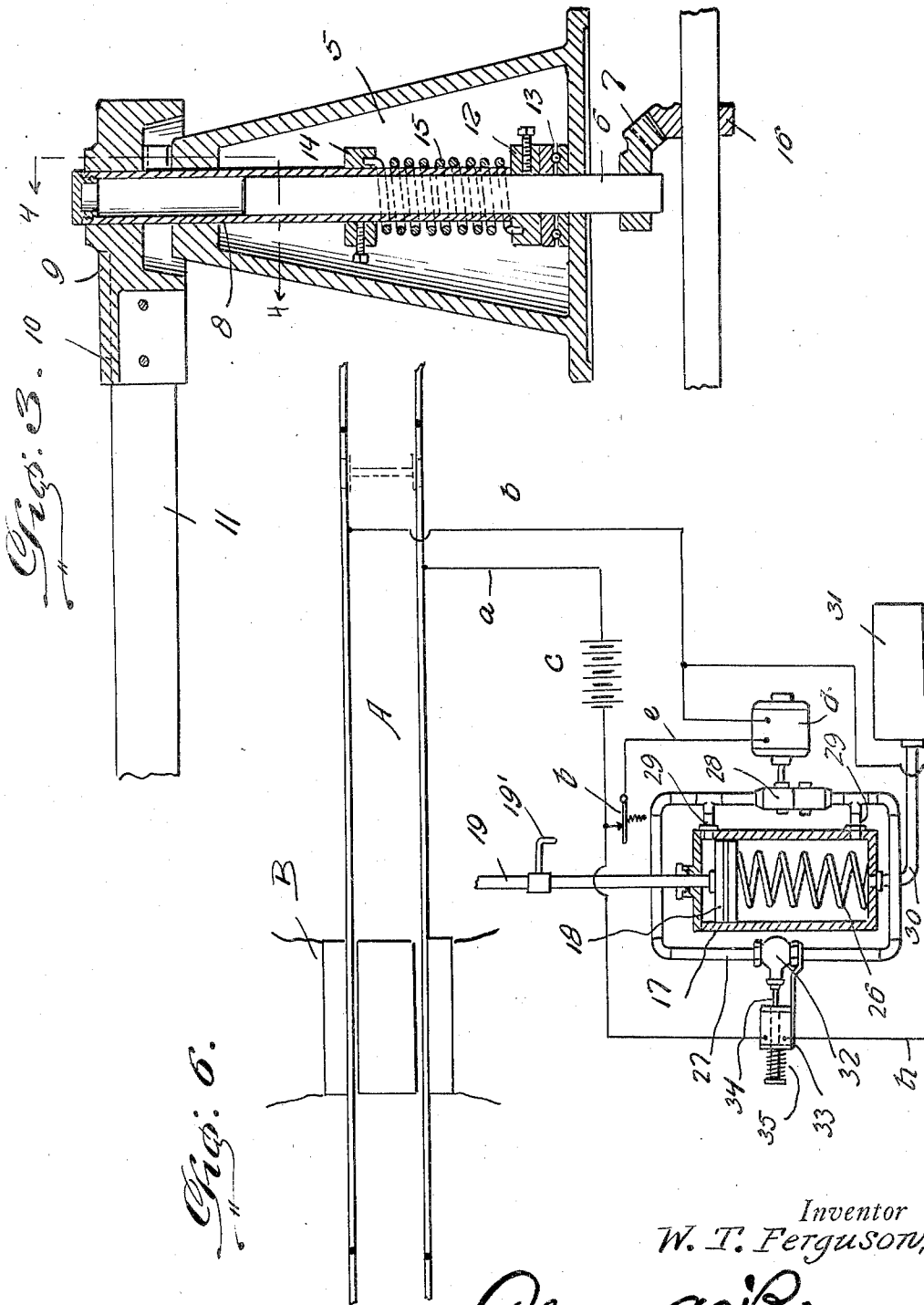
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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GATE STRUCTURE FOR RAILWAY CROSSINGS.

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This invention relates to new and useful improvements in gates for railway crossings of the type wherein the gate members are automatically moved to closed position whenever a train comes within a block, the crossing being generally in the center of the block. The primary object of the invention resides in the provision of such a gate mechanism that is extremely simple of construction, inexpensive of installation and operation, and one wherein the gates are positively moved to closed position whenever a train comes within the block, and wherein the gates may be forcibly opened should a vehicle be caught between the gates when the same are fully closed or are being moved to a closed position. By reason of the present invention said gate members per se will automatically swing to closed position after the vehicle has passed therethrough.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings.

In the accompanying drawings wherein like numerals indicate like parts:

Figure 1 is a top plan view of a railway crossing equipped with my improved gate mechanism, the gate bars per se being disclosed in full line closed position and in dotted line open position.

Figure 2 is a transverse section through the roadway at one side of the crossing for more clearly disclosing the means whereby the pair of gate units at each side of the crossing are automatically simultaneously moved to an open or closed position.

Figure 3 is an enlarged detail vertical section through one of the gate units per se.

Figure 4 is an enlarged fragmentary vertical section taken substantially upon the line 4—4 of Figure 3 for more clearly disclosing the means for limiting the inward swinging movement of the gate arm.

Figure 5 is an outside elevation of one of the gate unit stands, and

Figure 6 is a diagrammatic view disclosing the hydraulic means for forcibly moving the gate to a closed position, said view also disclosing the wiring between the said trackway blocks and the electrical means included in the present invention.

Now having particular reference to the drawings, A indicates a trackway, while B indicates a roadway intersecting said trackway. In carrying out the present invention

I provide at each side of the trackway A pairs of gate units C—C and D—D, the units of the pairs being arranged at the opposite edges of the roadway B as clearly indicated in Figure 1. Each gate unit constitutes the provision of an inverted conical shaped stand 5 closed at its opposite ends and being so constructed at its lower end as to permit the same to be anchored to the ground by bolts or other suitable anchoring means. Extending vertically through the bottom wall of each stand 5 and terminating within the upper end thereof is a shaft 6 upon the lower outer end of which is a segmental bevel gear 7. Arranged upon the shaft 6 is a hollow shaft 8 the upper end of which projects through the top wall of the stand 5 and to which end is secured a circular head 9 preferably in the form of a casting and equipped at its side with a socket 10 for receiving the inner end of the gate arm 11.

Secured to the shaft 6 directly beneath the lower end of the hollow shaft 8 is a collar 12 beneath which is a suitable bearing unit 13, while secured to the hollow shaft 8 within the stand 5 is a similar collar 14. Surrounding the hollow shaft 8 between said collars and connected at its respective ends thereto is a helical spring 15 that provides a flexible connection between the solid shaft 6 and hollow shaft 8 so that when said shaft 6 is forcibly rotated, rotation will be imparted to the shaft 8 and consequently the gate arm 11 will be moved to an open or closed position as indicated in the dotted full lines in Figure 1.

Extending parallel with the trackway A beneath the stands C—C and D—D are shafts C' and D', each of which is equipped with segmental bevel gears 16—16 for mesh with the segmental gears 7 upon the lower ends of the solid shaft 6 of each gate unit.

The rails of the track way at the crossing B and considerably beyond the crossing at opposite sides thereof are insulated from the adjoining rails so as to provide a block as indicated in Figure 6, the rails of the track way being respectively electrically connected as at *a* and *b* to one pole of a storage battery *c* and to one binding post of an electric motor *d*, the other pole of said storage battery being electrically connected to the other binding post of the storage battery by electric wiring *e* within which line is a spring controlled normally closed switch *f*.

Directly adjacent the motor d is a closed cylinder 17 that is arranged horizontally at the inner end of the armature shaft of said motor d as indicated in Figure 6. The motor d as well as the cylinder 17 are arranged at the side of the roadway B outwardly of the gate arm operating shaft D' as indicated in Figure 1.

Rectilinearly movable within the cylinder is a piston 18 mounted upon the inner end of a piston rod 19, the outer end of which is pivotally connected as at 20 to a rock lever 21 suitably pivoted adjacent the end of the shaft D' . Pivoted to this rock lever 21 at one side of its pivot is one end of a relatively elongated bar 22 that extends beneath the rails of the trackway and that is connected at its opposite ends to an arm 23 depending from a shaft C' at the opposite side of the trackway as clearly disclosed in Figures 1 and 2. The inner end of the rock lever is pivoted to a short bar 24 that is in turn connected at its opposite end to an arm 25 that depends from the gate arm operating shaft D' .

Arranged within the cylinder 17 in back of the piston 19 is a heavy expansible spring 26 that normally forces said piston in a forward direction so as to normally swing the gate arm 11 in the open dotted line position shown in Figure 1.

Arranged entirely around the cylinder 17 is a fluid pipe 27 in which is arranged a liquid pump 28 that is operatively connected to the armature shaft of the electric motor d . For establishing communication between the cylinder 17 at opposite sides of the piston 18 and the pipe 27 at opposite sides of the pump 28 are branch pipes 29—29. In communication with the cylinder 17 in back of the piston 18 by reason of a pipe 30 is a liquid reserve tank 31.

Arranged in the pipe 27 at the side of the cylinder 17 opposite from the motor d is a spring controlled normally open globe valve 32, the stem 34 of which is slidably disposed through an electromagnet 33 of the solenoid type, said stem being of such material as to act as the core for said magnet. Surrounding the stem between the outer end thereof and said magnet is an expansible coil spring 35 that normally maintains the valve in open position.

The binding posts of said magnet 33 are respectively connected as at g and h to the opposite pole of the storage battery c to which the track wire a is attached and to the wiring connection between the motor d and the opposite rail of said track way.

Obviously as soon as a train enters the block as disclosed in Figure 6 the circuit will be completed to the motor d as well as to the magnet 33. The valve will immediately close while the motor will be operated for forcing the fluid into the cylinder

17 in front of the piston 18 causing a movement of the same against the action of the coil spring 26 which movement will pull upon the rod 19 for so rotating the shaft C' and D' as to swing the gate arm 11 into closed full line position as shown in Figure 1. Just prior to the piston 18 reaching its inward limit of movement, a finger 19' upon the piston rod 19 will engage the movable contact of the electric switch f so as to break the circuit to the motor d thus stopping the operation of the pump 28. However, by reason of the fact that the valve 32 is maintained closed as long as the train is within the block, the fluid will be trapped within the cylinder so as to prevent the gate from swinging to open position. The fluid will flow through the pump 28 when the motor d becomes deenergized. After the train has passed out of the block the circuit is then broken to the electromagnet 33 and by reason of the spring 35 the valve 32 will open and due to the pressure of the heavy spring 26 the fluid will be caused to flow out of the cylinder through the innermost branch pipe 29 around through the valve 32 and then into the cylinder in back of the piston through the outermost branch pipe 29. Upon the outward movement of the piston 18 the finger 19' will disengage from the movable contact switch f so as to permit the same to close.

By reason of the spring connection 15 between the shaft 6 and hollow shaft 8 of all of the gate units any one of the gates may be forcibly moved to open position should a vehicle be trapped between the gates while the same are being moved to closed position or in fully closed position. However, after the vehicle has passed through the gate said springs will forcibly move the opened gate to closed position.

Formed upon the inner side of each gate arm attached head 9 is a lug 36 that will engage a lug 37 upon the upper end of the respective stand 5 when the gates have been moved to fully closed position so as to prevent any further inward swinging movement of said gate arm.

As disclosed in Figure 5, each conical gate stand 5 is equipped with a hinged door 5' in order that access may be had to the interior of the stand to facilitate repair, renewal, or cleaning of the structural elements within said stand.

In view of the foregoing description when considered in conjunction with the accompanying drawings it will at once be apparent that I have provided a highly novel, simple, and efficient gate mechanism for railway crossings that is well adapted for all the purposes heretofore designated and even though I have herein shown and described the invention as consisting of certain detail structural elements it is nevertheless to be

understood that some changes may be made therein without effecting the spirit and scope of the appended claims.

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

1. A gate structure for railway crossings, gate units disposed at opposite sides of the trackway and at opposite edges of the roadway, each unit consisting of a supporting stand, a shaft journaled vertically through the stand, a gate arm connected to the upper projecting end of the shaft, automatic electric means for rotating all of said shafts simultaneously for moving the gate to closed position, said means consisting of a fluid cylinder, a piston rectilinearly movable within the cylinder and normally maintained in such a position as to place the gates in open position, there being an operative connection between the piston and all of said gate units, a source of fluid supply, electric motor actuated means for forcing the fluid into one end of the cylinder for moving the piston rearwardly therein so as to close the gates, a source of electric supply in normally open circuit with said motor, said circuit to the motor adapted to be completed by a car moving into an insulated track block, means for trapping the fluid within the cylinder in front of the piston while the train remains within the block, and automatic means controlled by the train passing out of the block for permitting the fluid to pass out of the front end of the cylinder whereby the gates will be moved to open position.

2. In combination, a swinging gate arm mounted at the side of a railway crossing, a fluid cylinder arranged at the side of the crossing, a piston rectilinearly movable within the cylinder, an operative connection between the piston and said gate arm, means within the cylinder for normally moving the piston in one direction so as to maintain the gate open, a source of fluid supply, a motor operated fluid pump in communication with the opposite ends of the cylinder, train control means for completing the circuit to a source of supply to the motor for operating the pump so as to project the fluid between the inner end of the cylinder and said piston for moving said piston rearwardly within the cylinder so as to move the gate to closed position, and automatically operable means for opening the circuit to the motor after the piston has been forcibly moved to a predetermined degree in gate closing direction, means for trapping the fluid within the cylinder, automatically operable means for releasing the fluid from the front end of the

cylinder, and automatic means for forcing the piston forwardly so as to open said gate.

3. In combination, a pivotally mounted gate for railway crossings, train controlled means for automatically moving the gate to closed position when the train passes into an insulated track block, said means consisting of a fluid cylinder, a piston rectilinearly movable within the cylinder, a piston rod actuated by the piston and being operatively connected to said gate, means for maintaining the piston in one end of the cylinder so as to maintain the gate open, an electric motor operated pump in communication with a source of fluid material for forcing the fluid into the front end of the cylinder so as to move the piston rearwardly therein resulting in the closing of the gate, a source of electric energy in normally open circuit with the electric motor, said circuit adapted to be closed by a car passing into the track block, means for preventing the escape of the fluid from said end of the cylinder while the train is in the block, and automatic means for opening the valve so as to permit of the escape of said fluid so that the piston will be forced forwardly resulting in the opening of the gate.

4. In combination, a pivotally mounted gate for railway crossings, train controlled means for automatically moving the gate to closed position when the train passes into an insulated train block, said means consisting of a fluid cylinder, a piston rectilinearly movable within the cylinder, a piston rod actuated by the piston and being operatively connected to said gate, means for maintaining the piston in one end of the cylinder so as to maintain the gate open, an electric motor operated pump in communication with a source of fluid material for forcing the fluid into the front end of the cylinder so as to move the piston rearwardly therein resulting in the closing of the gate, a source of electric energy in normally open circuit with the electric motor, said circuit adapted to be closed by a car passing into the track block, means for preventing the escape of the fluid from said end of the cylinder while the train is in the block, automatic means for opening the valve so as to permit of the escape of said fluid so that the piston will be forced forwardly resulting in the opening of the gate, and automatic means actuated by the movement of the piston for breaking the circuit to the motor after a predetermined movement of the piston within the cylinder.

In testimony whereof I affix my signature.

WILLIAM T. FERGUSON.