March 27, 1934. O. L. VINCENT 1,952,641

GATE OPERATING MEANS

Original Filed Oct. 10, 1927 4 Sheets-Sheet 1

Fig. 1.

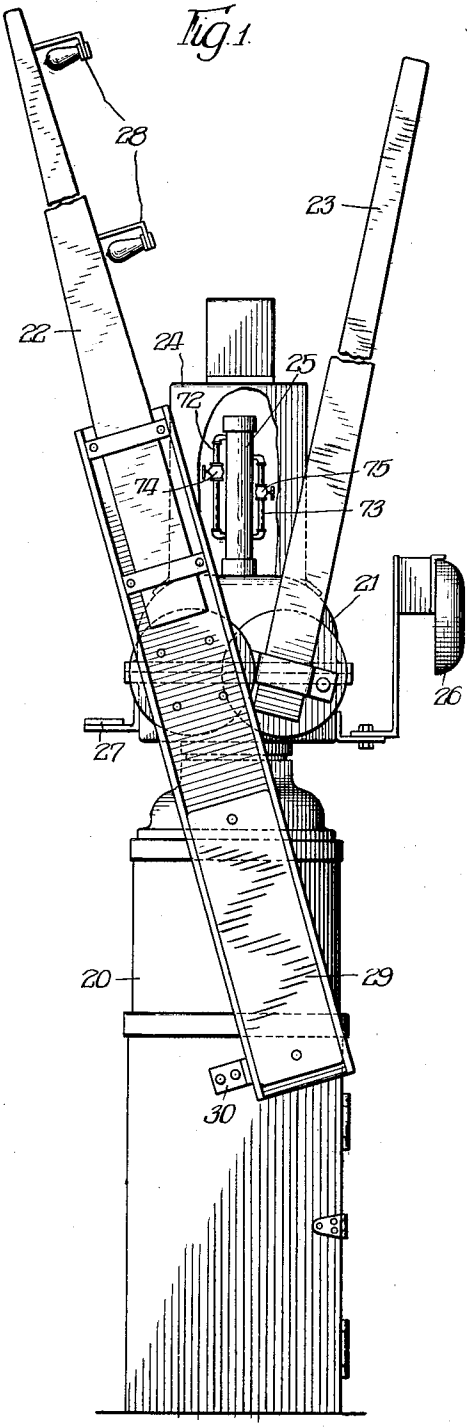
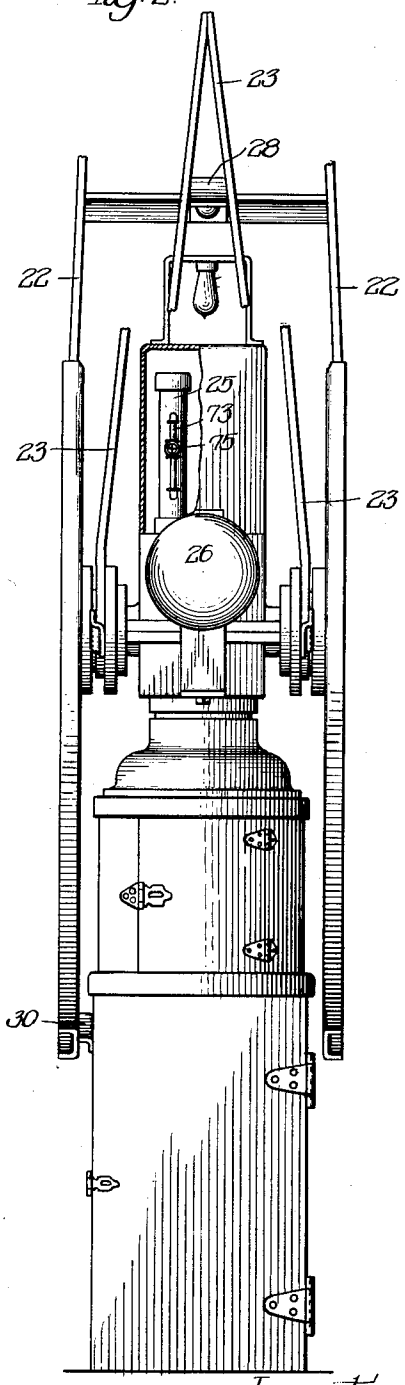


Fig. 2.



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Fig. 3.

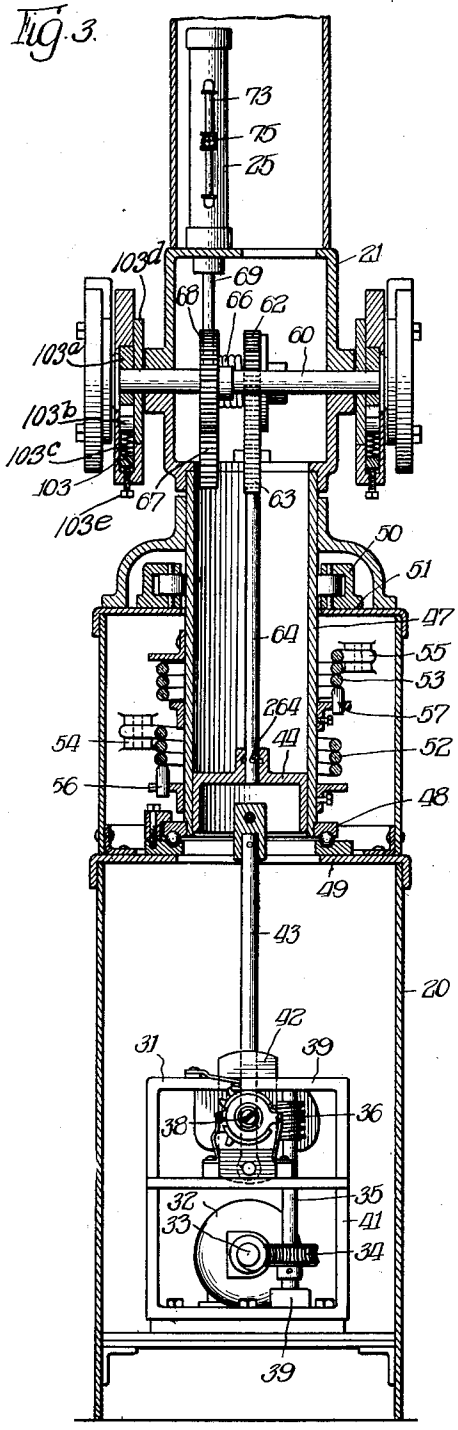
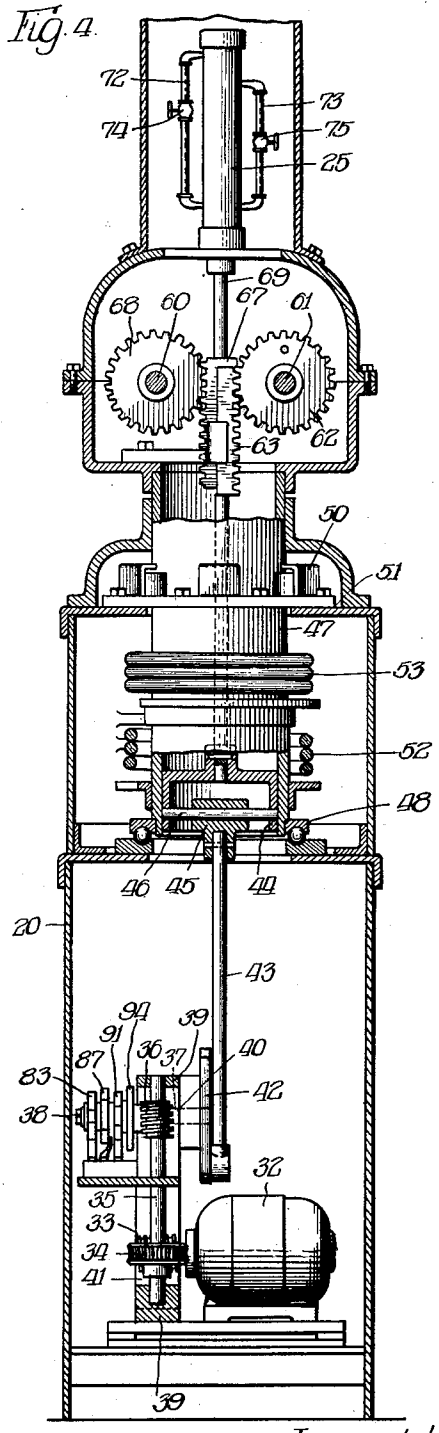


Fig. 4.



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Fig. 5

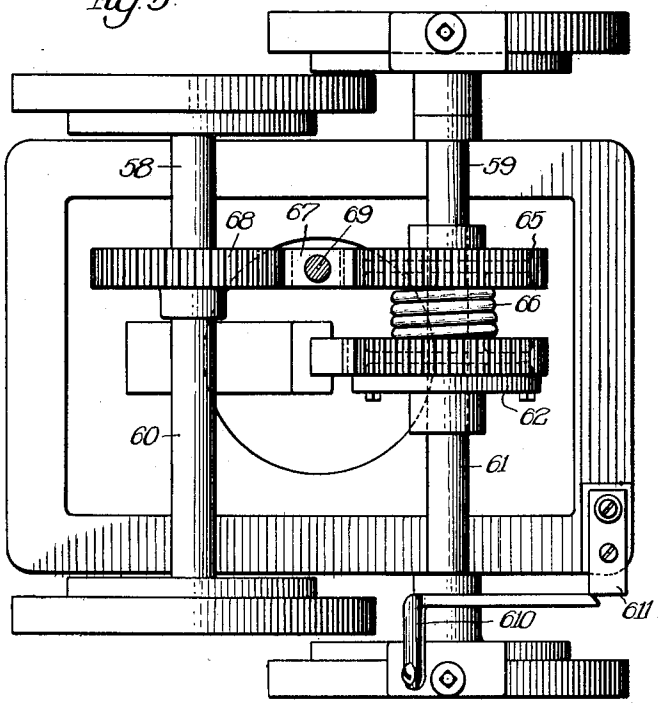


Fig. 7

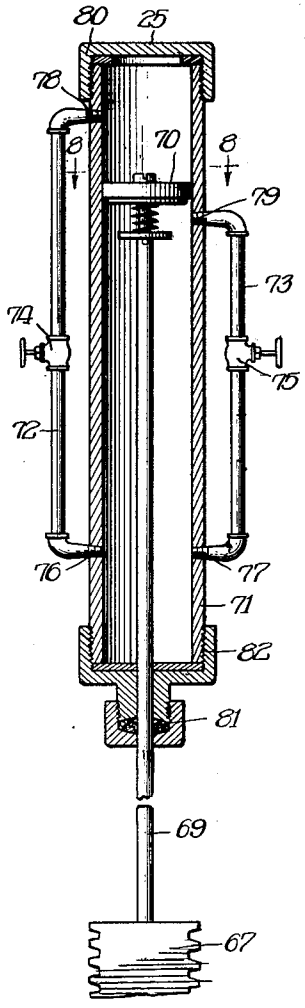


Fig. 6

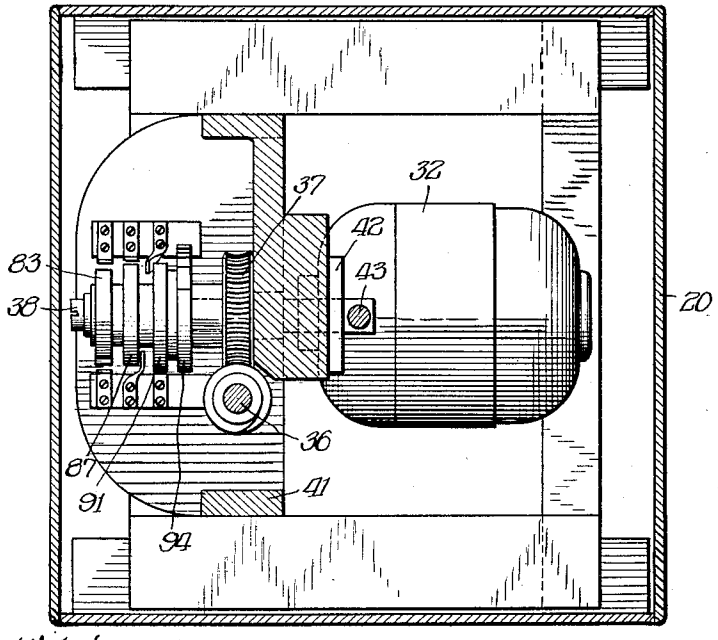
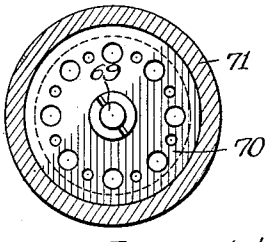


Fig. 8.



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Fig. 9

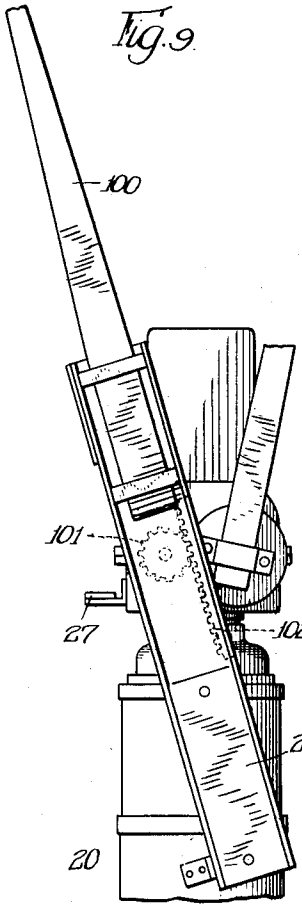


Fig. 10

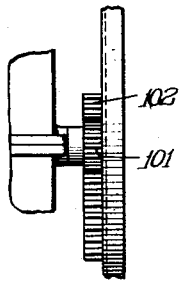


Fig. 11

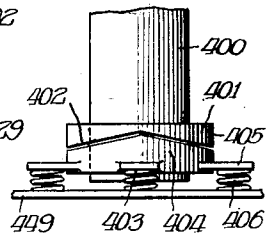
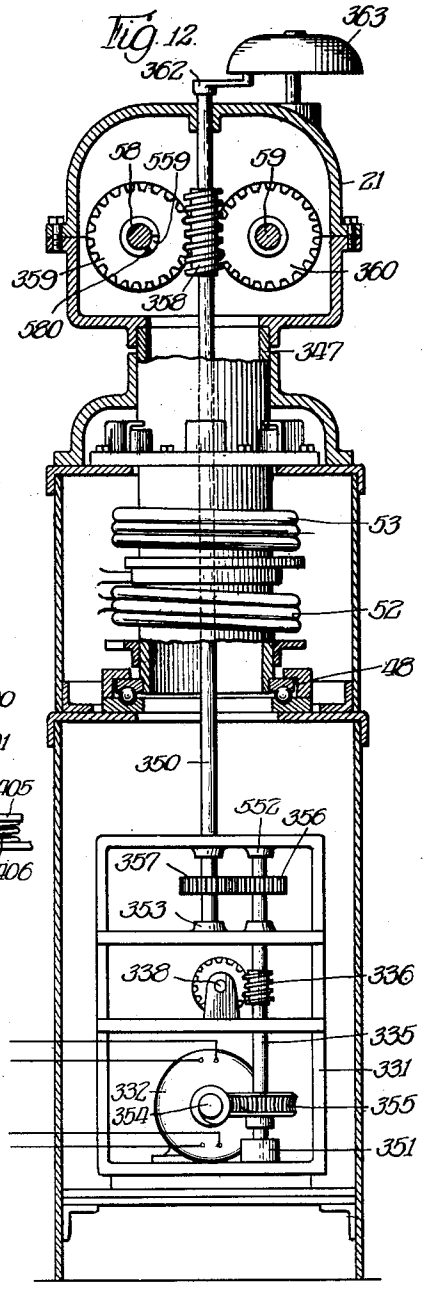


Fig. 12



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Patented Mar. 27, 1934 1,952,641

UNITED STATES PATENT OFFICE

1,952,641

GATE OPERATING MEANS

Orville L. Vincent, Chicago, Ill., assignor, by mesne assignments, to Consolidated Signal Company, a corporation of Illinois

Original application October 10, 1927, Serial No. 225,313. Divided and this application April 25, 1930, Serial No. 447,131

10 Claims. (Cl. 39—7)

This invention pertains to crossing gates, and more particularly to automatic and multiple safety gate and signal systems.

Much difficulty has been found in providing a satisfactory crossing barrier. Much of the difficulty has been in expense of a satisfactory unit and its actuation. Many are automatic or semi-automatic, and to be practical from a commercial standpoint must be positive and not easily put out of order. Manual barriers are expensive in upkeep and are not always operated in time to be effective. Then too, when barriers are used, they are often run into, damaging or destroying them so that much expense is necessary for repair.

It is therefore an object of this invention to provide a crossing gate provided with signals operable in predetermined sequences with respect to said gate.

Another object is to provide barrier construction effective to provide safety means for a crossing or the like, yet one which is yieldable under impact and/or obstructions.

Still another object is to provide a crossing barrier having delayed return operation after the controlling mechanism has been actuated to return said barrier to inoperative position.

A further object is to provide crossing protection and warning signals operative either automatically or manually.

A still further object is to provide barrier construction having cushioning means for absorbing shocks incident to operation or use and one which fulfills all requirements of manufacture and service.

A yet further object is to provide a barrier wherein the center of gravity is shiftable for effecting operation thereof.

With these and various other objects in view, the invention consists of certain novel features of construction and operation as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings, wherein like reference characters are used to designate like parts—

Figure 1 is a side elevation of a crossing gate unit with the gates in raised position;

Figure 2 is an end elevation of Figure 1;

Figure 3 is a sectional elevation of Figure 2 with the gates omitted;

Figure 4 is a sectional elevation of Figure 1 with the gates omitted;

Figure 5 is a sectional plan showing the relation between the gate operating shaft and a brake control unit carried thereby;

Figure 6 is a sectional plan showing the operating motor unit together with the switch control elements;

Figure 7 is a side elevation of the gate brake unit;

Figure 8 is a sectional plan taken substantially in the plane as indicated by the line 8—8 of Figure 7;

Figure 9 is a fragmentary side elevation of a modified form of the gate actuating mechanism shown in Figure 1;

Figure 10 is a detail of Figure 9 taken at right angles thereto and showing the relation between the parts of a rack and pinion control unit for the gate;

Figure 11 is a more or less diagrammatic sectional side elevation of a modified form of barrier; and

Figure 12 is an enlarged elevation of a form of mechanical barrier return positioning mechanism.

Referring now more particularly to the first modification illustrated in Figures 1 to 8 inclusive, the unit consists of a standard or housing 20, upon which is rotatably mounted a gate carrying head 21 having pivoted thereto gate means 22 and 23, the head 21 serving also to carry a housing 24 in which is disposed a brake cylinder 25. The member 21 also may carry a signal, such as a bell 26, and a stop 27 adapted to contact with gate 22 in its lowered position to maintain the same in its limited horizontal lowered position. Gate 22, being preferably longer than gate 23, is used as a barrier for the vehicle road, while gate 23 is for the sidewalk or passenger road, and either or both of these gates may be provided with lights or signals 28. Gate 22 is of course provided with a counterweight 29, and the lower portion of this gate may well be adapted to have contact with the stop 30 disposed on the housing of standard 20 for limiting the raised position of the gates.

Within the housing 20 is mounted a motor and switch unit 31 adapted to control or operate the gates. This unit consists of a motor 32 connected through suitable gearing, such as the worm and wheel 33 and 34, to a jack shaft 35, which shaft is connected through suitable gearing such as the worm and wheel 36 and 37, to a shaft 38, it being understood of course that jack shafts 35 and 38 are carried in suitable bearings, such as 39 and 40, disposed in a frame 41. Shaft 38 has disposed at one end thereof a crank 42 or a disc to which a link 43 may be eccentrically pivotally connected, said link in turn being pivoted to a suitable cross head 44 through members 45 and 46. The cross head may be circular in section and adapted to reciprocate in a cylindrical track, shaft or sleeve 47 disposed in the upper part of the housing 20, said sleeve 47 being so mounted as to be capable of rotation on bearings 48 disposed between the sleeve and a part 49 of the housing 20.

In the upper part of the housing, bearings 50 may also be provided, suitably spaced and positioned with respect to the sleeve, on the upper part 51 of said housing. Spring segments 52 and 53 surrounding the sleeve may be anchored as at 54 and 55 to the housing 20 and as at 56 and 57 to the sleeve 47 in order to provide for means for allowing pivoting of the gate and returning the gate to initial or barrier position; that is, to such a position where it will be disposed across the roadway should said gate be moved out of barrier position by any object or obstruction.

It is understood of course that the sleeve 47 is fixedly connected to the head 21 which supports, by means of suitable bearings at 58 and 59, the gate shafts 60 and 61. Shaft 61 is provided with a pinion 62 adapted to be operated by a rack 63 which is attached to the cross-head 44 by means of a link or rod 64 so connected, as by the pin and slot connection 264, that it has rotatable movement with respect to said cross-head. Loosely mounted on the shaft 61, there is another pinion 65 connected to the pinion 62 by means of a coil spring 66. Pinion 65 is in engagement with one side of a double rack 67, the other side of which engages a pinion 68 secured to the shaft 60. Rack 67 is provided with an extension or link 69, one end of which is connected to a spring-pressed disc, piston or spider 70 of the brake 25. This brake consists of a cylinder 71 acting as a guide or track for the piston 70 and by-passes 72 and 73 controlled by valves 74 and 75. These by-passes communicate with the cylinder at their lower points 76 and 77 in substantially the same horizontal plane, but at their upper points 78 and 79, they communicate with the cylinder on opposite sides of the piston 70 when said piston is at the top of its travel, it being understood of course that the cylinder on both sides of the piston is provided with a fluid acting as a brake medium.

It will of course be appreciated that the cylinder 71 is provided with a top or cap 80 threaded to the cylinder in oil-tight relation and the lower end of said cylinder is provided with a suitable stuffing box or gland 81 similarly screw-threaded as at 82 to said cylinder, through which gland the piston rod or link 69 passes.

The shaft 61 is provided at an outer end with a connection 610 adapted to have fixed or sliding contact with a switch element 611 for the purpose of controlling the lights 28.

The jack shaft 38 is provided with switch elements, one of said elements 83 being substantially circular and provided with a projection 84 normally in contact with the finger 85, this element 83 having constant electrical connection with one terminal of the motor 32. Another finger 86 is provided which is adapted to be contacted by the lug or projection 84 upon predetermined rotation of the element 83. Another motor element 87 is provided having constant electrical contact with the same terminal of the motor 32 with which switch element 83 has contact. Member 87 is substantially circular and is provided with diametrically opposed notches 88, said notches being normally out of contact with a switch finger 89 and so proportioned that the peripheral length 90 of said notches is greater than the peripheral length of the lug 84 for the purpose of preventing feed-back through conductors 166 and 189 or 185 to another gate assembly where a plurality of said assemblies is used at a crossing.

Another switch element 91 is provided on the shaft and is connected to one side of a circuit controlling the lights 28, said element being substantially circular and provided with a single notch 92 disposed, when the gates are in raised position, in way of a switch finger 93 so that there is no connection between said finger and the element 91. Though element 91 is shown with only one notch, it causing a continuing lighting of the lights for a period, it will be appreciated that said element may just as readily be provided with a plurality of notches forming a plurality of fingers to cause the lights to be lighted intermittently, or flashed, as in the winking form of signalling. An element 94 is provided having a plurality of lugs or fingers 95 adapted to be moved into successive contact with the finger 96 in order to operate the signal or bell 26, it being understood that element 94 is in constant connection to one side of the bell. If desired, the relay may be used to directly operate either or both lighting and audible signals thereby eliminating switch elements and connections.

It will then be seen that when the gate is in lowered position blocking a road, if it is run into or hit in any manner, due to the pivotal connection of the sleeve 47 with the standard 20, the gate may be rotated substantially 90°, it being returned to the original position by means of the spring elements 52 and 53. A slip clutch means 103 may be provided for the shaft 61, should the gates be let down upon any object, they will have no tendency to crush the object but will remain in the position in which they have been stopped. Each of the clutch means 103 may comprise a friction disc 103*a* contacted by a friction element 103*b* urged into engagement by a spring 103*c* mounted within a housing 103*d* and adjusted to compensate for wear or for varying the frictional resistance to movement of the gate 100, by means of the thumb screw 103*e*. It will also be seen that there is a flexible connection between the gates 22 and 23 through the spring 66 augmenting cushioning action, and in return position, of course, the speed of return of the gates may be readily regulated through the brake member 25, preventing slamming of said gates.

Referring now more particularly to Figure 9, it will be understood that the essential elements are substantially the same as already described, the only difference being that instead of gate 100 being connected directly to the shaft 61, said shaft carries a pinion 101 in contact with a rack 102 carried by the gate 100, this gate, it being understood, being provided with the usual counterweight 29. The shaft 61 is adapted to be mounted in a slotted plate (not shown) or other suitable means, for guiding movement of the gate 100 and to maintain the pinion 101 in operative position with the rack 102. The gate then, by means of its balanced relation through the rack and pinion, readily operates to open and closed position. A slight overbalancing causes the raising or lowering of said gate and is advantageous in permitting overtravel, due to inertia, where there is a sudden reversal or stopping of the operating mechanism. The raising or lowering of the gate serves to shift the center of gravity thereof with respect to the pinion 101 so that a very easy or soft operation occurs. Movement to shift the center of gravity first bodily moves the gate and thereafter the rotative movement of the gate occurs so that it might be said that predetermined movement is necessary or a

predetermined time elapses before the gate is operated.

Further, the modification shown in Figure 9 provides the rack and pinion connection in order that in operation to lower the gates, the pinion 101 will revolve in a counterclockwise direction, having the effect of extending the gate 100 so that should it be stopped in its downward path, after the path of movement of the gate is unblocked, said gate will assume a lowered position across the road.

With the construction above described, the motor 32 is actuated in only one direction. However, if a reversible motor be used, the system and construction may be altered and simplified as shown in Figure 11. Referring first to the construction of the barrier unit, the essential parts of the gates, lights, standard, etc. are the same; that is, it is only necessary to change the motor unit and its connection to the transverse gate shafts 60 and 61 (Figure 5). This motor unit includes the frame 331 supporting the motor 332 and properly bearinged shafts 335 and 350, bearings therefor being indicated at 351 and 552 and 353. The motor is geared to shaft 335 through the worm and gear 354 and 355, and the shaft 335 is in turn geared to shaft 350 through gear wheels 356 and 357 so that a movement of rotation is imparted thereto which in turn is transferred to shafts 58 and 59 through reversible worm and gears 358, 359 and 360. Shaft 350 is preferably carried through a bearing in the head 21 for the reception of mechanical bell operating mechanism 362 cooperating with gong 363. It is further understood that jack shaft 338, actuated by worm 336 on shaft 335, carries the switch element in a manner similar to shaft 38.

In this construction, the turning sleeve and spring mechanism 347 and 52 and 53 may be varied somewhat to eliminate the coil springs and bearings. This may be accomplished as shown in Figure 11 by providing the head 21 with a depending tube 400, replacing sleeve 347, to which is fixedly attached a crown gear or cam 401 preferably provided with teeth 402 at the quadrants. A reciprocating cooperating sleeve 403 has teeth 404 cooperating with the spaces between teeth 402 and may be provided with shoulders 405 between which and the shelf 449 of the standard, coil springs 406 are disposed so that should the barriers be rotated the springs will be depressed until the barriers are released. Then the collar 403 will be forced against collar 401 and camming action between the teeth will return the barrier to crossing protecting position. Of course the parts may be varied; for instance, the head may be adapted to be moved upwardly over crown gear teeth to return by gravity and/or spring action, in which case a sliding connection is provided with shaft 350.

With the type of barriers described, suitable operating means may be used, such as described in application Serial No. 225,313, filed October 10, 1927, of which the present application is a division; and it will be seen from the above that a very desirable signal barrier is provided.

It is to be understood that I do not wish to be limited by the exact embodiments shown, which are by way of illustration and not limitation, as other and various forms will of course occur to those skilled in the art.

I claim:

1. A crossing gate assembly including supporting means, barriers mounted thereon, operating mechanism for said barriers, and rack and pinion connections disposed between said mechanism and each of said barriers, the rack being fixed on said barrier whereby said barriers are hung on said pinion.

2. In a device of the character described, the combination of supporting means, barrier means thereon, barrier operating shaft means disposed adjacent said barrier, operating means for said barrier, and a rotary connection between said shaft means and said operating means permitting movement of rotation of said barrier means in a plurality of planes about said supporting means.

3. In a crossing barrier, the combination of a support, a barrier arm movable to raised or lowered positions, and means for bodily moving said arm to shift the center of gravity thereof for selectively raising or lowering said arm.

4. In a crossing barrier, the combination of a support, a barrier arm movable to raised or lowered positions, and means for bodily moving said arm to shift the center of gravity thereof for selectively raising or lowering said arm, said means including a rack and pinion.

5. In a crossing gate, the combination of a supporting pedestal, a head movably mounted for oscillatory movement thereon, means for resiliently maintaining said head in predetermined position, a barrier pivotally mounted on said head, means in said pedestal for moving said barrier, and a rotatable member for transmitting movements from said last named means to said barrier.

6. In a crossing gate, the combination of a supporting pedestal, a head movably mounted for oscillatory movement thereon, means for resiliently maintaining said head in predetermined position, a barrier pivotally mounted on said head, means in said pedestal for moving said barrier, said means comprising a slidable member, guide means for said slidable member, and means connecting said second named means and said slidable member.

7. In a crossing gate, the combination of a supporting pedestal, a head movably mounted for oscillatory movement thereon, means including a cam for maintaining said head in predetermined position, a barrier pivotally mounted on said head, means in said pedestal for moving said barrier, and connecting means between said barrier and said second named means.

8. In a crossing gate, the combination of a pedestal, a gate arm mounted for movement of translation thereon, means for moving said arm to up and down positions, and shock absorbing means associated with said arm for checking movement after a predetermined travel thereof.

9. In a crossing gate, the combination of a pedestal, a gate arm, mounting means between said pedestal and arm, operating means for said gate arm for moving said arm translationally and rotatably.

10. In a crossing gate, the combination of a pedestal, a gate arm, mounting means between said pedestal and arm, operating means for said gate arm for moving said arm translationally to shift the center of gravity of said arm with respect to said mounting means whereby said arm will rotate to a predetermined position.

ORVILLE L. VINCENT.