Aug. 7, 1934. W. WORNICK 1,969,286

TRAFFIC GOVERNOR

Filed July 14, 1933 4 Sheets-Sheet 1

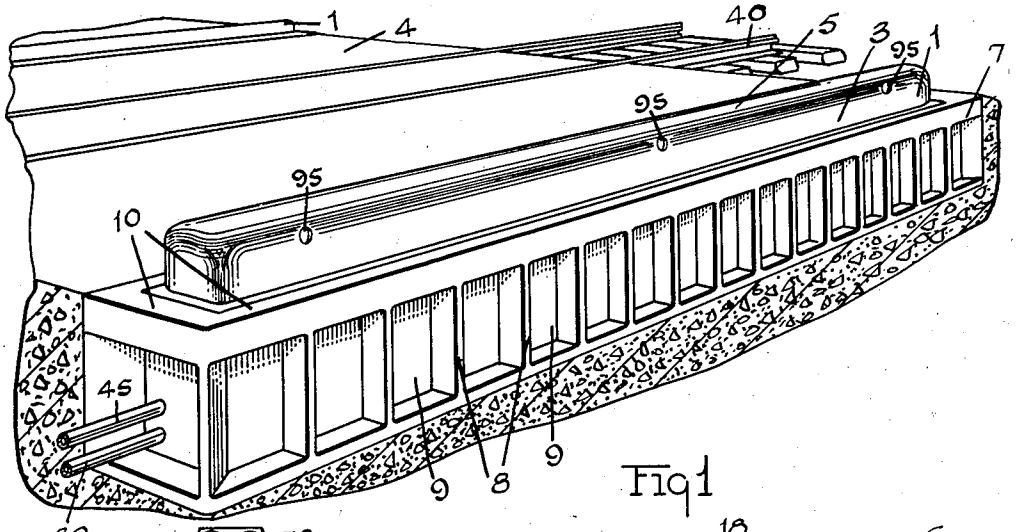


Fig 1

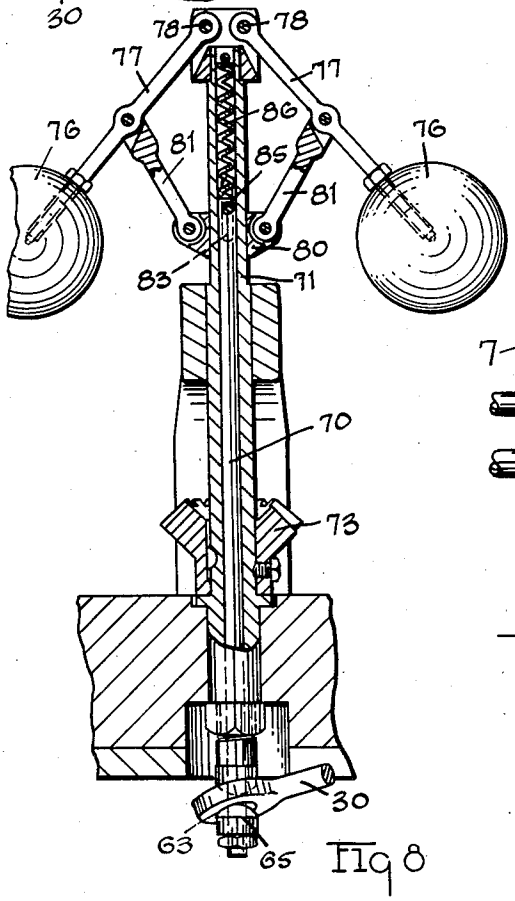


Fig 8

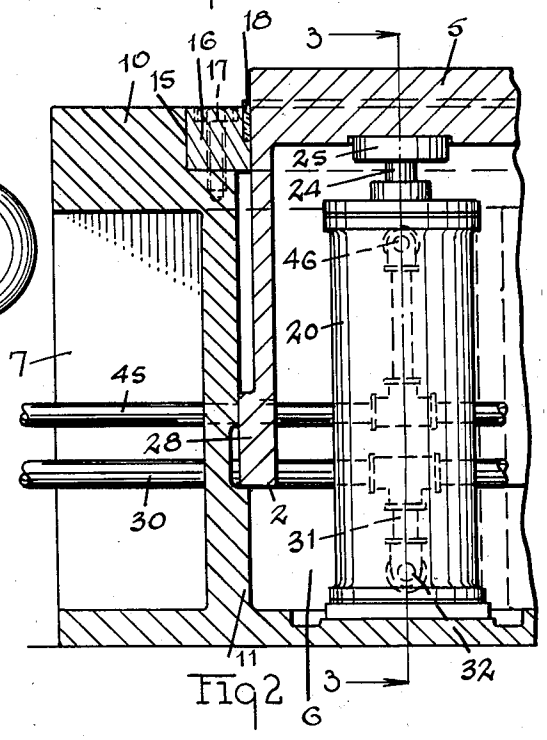


Fig 2

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TRAFFIC GOVERNOR

Filed July 14, 1933 4 Sheets-Sheet 2

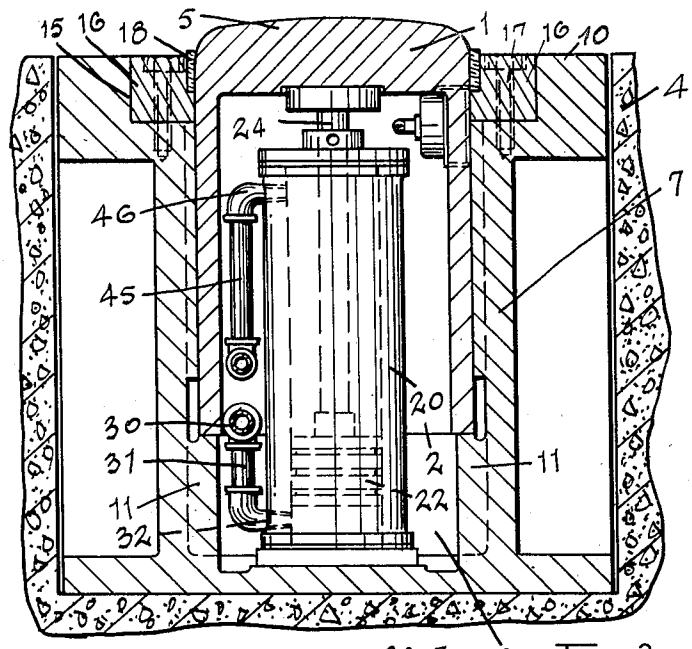


Fig 3

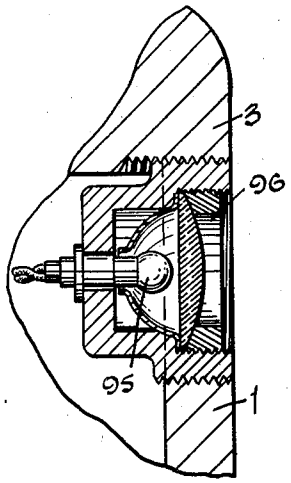


Fig 5

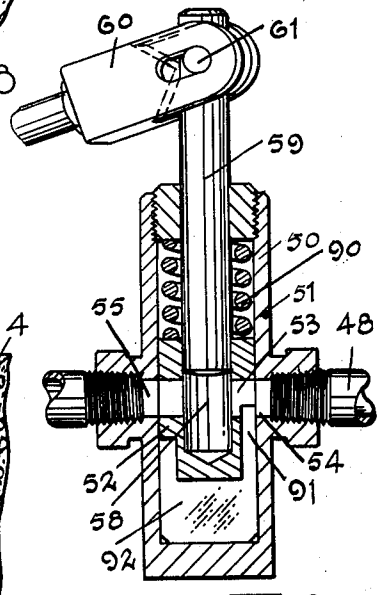


Fig 9

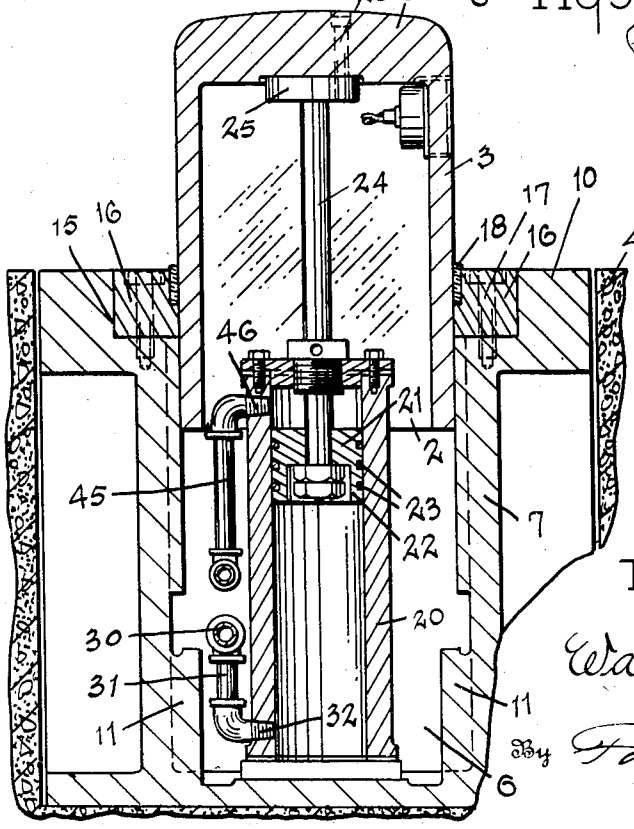


Fig 4

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Aug. 7, 1934. W. WORNICK 1,969,286

TRAFFIC GOVERNOR

Filed July 14, 1933 4 Sheets-Sheet 3

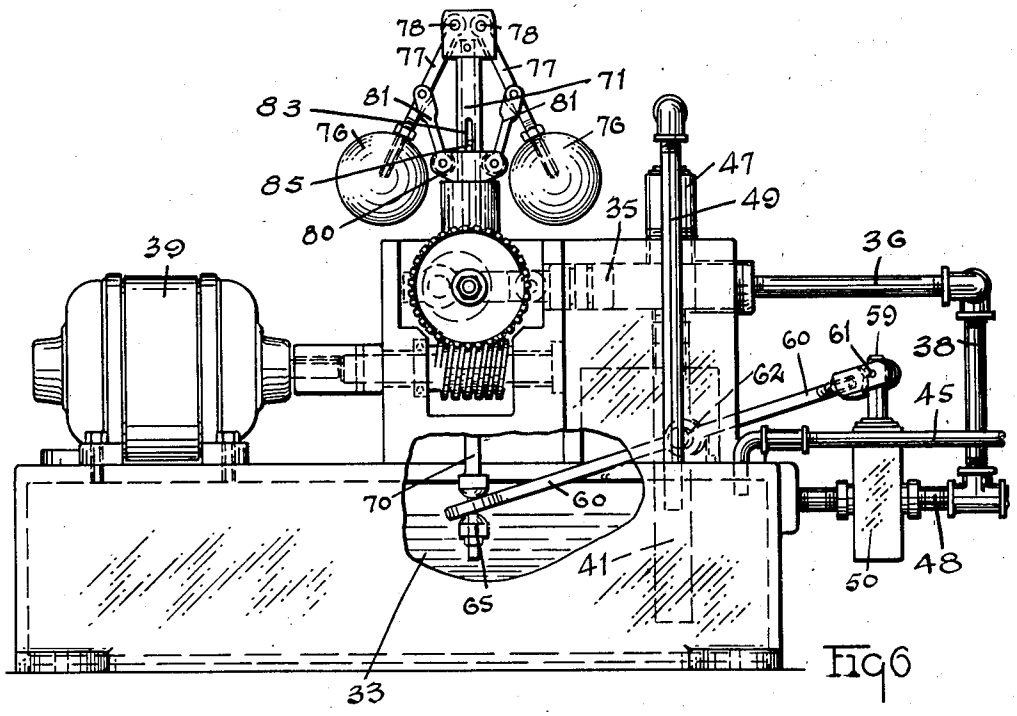


Fig 6

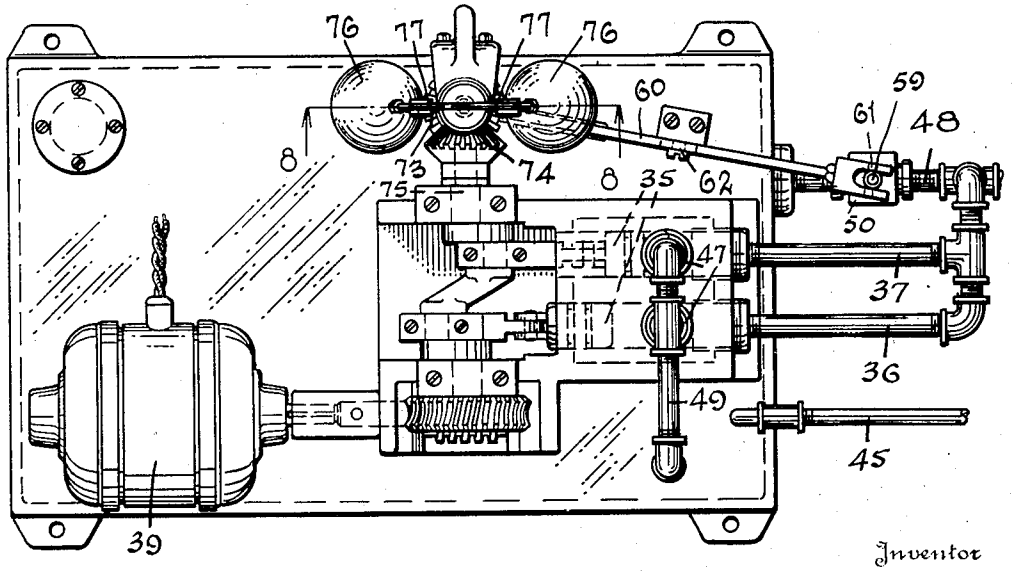


Fig 7

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TRAFFIC GOVERNOR

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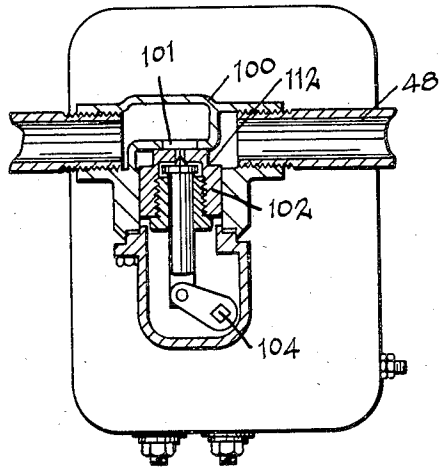


Fig 10

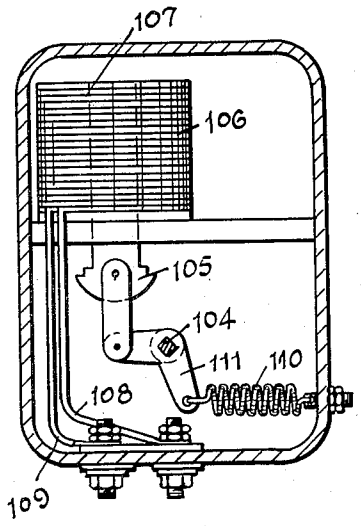


Fig 11

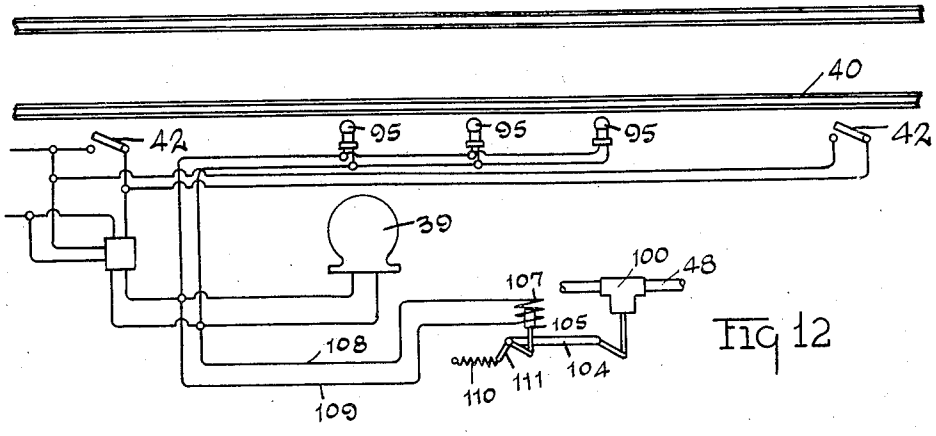


Fig 12

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Patented Aug. 7, 1934 1,969,286

UNITED STATES PATENT OFFICE

1,969,286

TRAFFIC GOVERNOR

Walter Wornick, Toledo, Ohio

Application July 14, 1933, Serial No. 680,370

7 Claims. (Cl. 39—7)

My invention relates to road signaling and gate devices, and particularly to devices presaging the approach of other vehicles or moving bodies from points other than on the road which may endanger the safety of a continued flow of traffic over the road, and for effectively blocking off the said flow of traffic to prevent the consequent results of collisions between the approaching bodies and the road traffic.

The invention has for an object to provide means ordinarily disposed below the span of the road surface at points of periodic danger to the traffic over the said road, said means being actuated at a predetermined time period before the establishment of said danger to rise from its position below the span of the road to a position well above the said span to definitely block further traffic over the road during the existence of said danger and be maintained for a predetermined period after the reestablishment of a normal safe condition during which the said means is returned to its primary position below the span of the road surface. Thus my invention may be put to ready use at points of juncture of railroad tracks and vehicle roads or highways and serve to govern and regulate the highway traffic with reference to the railroad traffic.

Another object of my invention is to provide a barrier for highway traffic which, under the normal condition of traffic on said highway, is retained in a well, formed in the roadbed of said highway, but which may be raised from the said well upon a change of condition of traffic to warn and stop the traffic over the highway until the normal condition has been reestablished. The invention lends itself to city streets which are crossed by main arterial highways or railroad right-of-ways and serves to prevent vehicular and pedestrian traffic from endangering itself without the use of bulky and unsightly swinging cantilever gates commonly known.

A particular object of my invention is to provide a metallic barrier adapted to be reciprocated in and out of a recess formed in the road, together with fluid operated means for reciprocating the barrier, the fluid operated means being controlled by a suitable fluid pressure motor actuated at points remote therefrom. The invention has for a further particular object to provide a novel means for maintaining said barrier in a lifted position comprising a valve operated in ratio and sympathy with the motor and having means for shunting the field medium when the pressures developed in the system exceed that required to maintain the barrier in position.

A still further particular object of the invention is to provide the combination of a vertical moving road barrier normally maintained below the span of the road surface and hydraulic means for lifting and lowering the barrier, said hydraulic means controlled at remote points from the said road.

The invention consists of other features and advantages which will appear from the following description and upon examination of the drawings. Structures containing the invention may partake of different forms and may be varied in their details and still embody the invention. To illustrate a practical application of the invention, I have selected a traffic governor embodying the invention as an example of the various structures and details thereof that contain the invention and shall describe the selected structure hereinafter, it being understood that variations may be made without departing from the spirit of the invention. The particular structure selected is shown in the accompanying drawings.

Fig. 1 of the drawings illustrates a view in perspective of an application of the invention to a railroad crossing. Fig. 2 illustrates a view of a partial end longitudinal section. Fig. 3 illustrates a view of a section taken along the plane of the line 3—3 indicated in Fig. 2. Fig. 4 illustrates a view of a section taken along the same plane as Fig. 3 but showing the governor in barrier forming position. Fig. 5 illustrates a view of an enlarged section of one of the warning lamps carried by the governor. Fig. 6 illustrates a view of a side elevation of the motor means for driving the barrier. Fig. 7 illustrates a plan view of the motor means shown in Fig. 6. Fig. 8 illustrates an enlarged view of a section taken along the plane of the line 8—8 indicated in Fig. 7. Fig. 9 illustrates a view of an enlarged longitudinal section of the valve control of the system. Fig. 10 illustrates a view of a section of a modification of the valve control of the system. Fig. 11 illustrates a view of a section of the modified valve operating mechanism. Fig. 12 illustrates diagrammatically the electrical circuit of the governor with the modified valve and its operating mechanism.

Cantilever safety gates of a construction, well known in the art, found their inception in the days of horse-drawn vehicles where a barrier of a mere wooden bar character was sufficient to prevent a horse from attempting to pass. Not only was the attention of the driver utilized to prevent accidents, but also the instinct of the draft animal itself which exercised due respect to a gate

barrier and seldom attempted to pass beyond. With the advent of motor driven vehicles, the instinctive knowledge of an animal was no longer a contributive factor to safe traffic and, consequently, safe passage depended solely on the operator's attention and good sense.

It has become increasingly apparent in view of the number of barriers crashed by motor driven vehicles and resultant collisions therefrom, that the operator's attention and good sense cannot be solely depended on by society generally to maintain a safe traffic condition and, therefore, it becomes necessary to provide a barrier that, even though the operator should desire to pass through, it will be a practical impossibility. My invention provides such a barrier which, coupled with its safety features, has various other advantages among which are hidden retirement when not in use, automatic operation, positive performance and simplicity of design and consequent low cost.

An embodiment of my invention comprises a metallic shell suitably reinforced and of a dimension substantially equal to the width of the road to which it is to be applied. The shell is adapted to be reciprocated in a housing which extends transverse the roadbed and below the surface span of the road so that when the shell is raised it forms a distinct and impassable barrier, but when nested in the housing forms a part of the road surface. At spaced points within the shell are connected the rams of a plurality of fluid operated pistons for raising the barrier. The cylinder of each piston is preferably fixed to the housing and is connected by suitable piping to a pump. The pump is preferably driven by an electric motor controlled by any suitable manual switch or by switches tripped or closed by the movement of wheels over a track, as in the case of a railroad.

The system is designed and controlled so that the pump will perform its full duty and discharge a complete displacement before the fluid operated on is placed under pressure and applied to the work of lifting the barrier, thus insuring quick and positive performance and easy starting of the pump. This result is obtained by a control valve which is operated after the electrical motor for driving the pump has attained a predetermined number of revolutions per unit of time. By providing a means for delayed performance of work by the fluid, I am able to use an electrical motor of less rating and therefore cheaper in cost to drive the pump than were the pump put to immediate labor on the first turnings of the motor. The return of the barrier is effected by its own weight which also serves to vacate the fluid from the cylinders.

In the particular embodiment of my invention shown in the drawings, for purposes of illustration, a shell 1, preferably formed of cast metal, is provided and operates, when in a raised position, as the traffic barrier of the traffic governor. The shell 1 has an open bottom 2, a face portion 3, and a top portion 5. The longitudinal dimension of the shell 1 is substantially equal to the width of a road to which the governor is to be applied, such as the road 4, shown in Fig. 1. The shell 1 is adapted to be reciprocated in and out of a well 6 formed in a housing 7.

The housing 7 is preferably formed of cast metal and has exterior reinforcing webs or flanges 8 which form wall recesses 9 into which the road-making materials of the road 4 may extend to form a suitable interlocking means between the housing and the roadbed. The upper edges 10 of the housing are located so as to be substantially flush with the road surface and form, together with the top portion 5 of the shell, when in normal low position, a part of the surface of the road 4.

The well 6 is of a dimension sufficient to receive the shell 1, open bottom 2 foremost, and has shoulder portions 11 for engaging and supporting the edges of the shell surrounding the open bottom 2 to maintain the top portion 5, of the shell 1, when in normal low position in an approximate common plane with that of the road surface. If desired, the edges 10 of the housing may be rabbetted, as at 15, and a strip frame 16 may be removably socketed therein, as by the bolts 17, to form a guard against the infiltration of dirt into the well and between the shell and well-walls, and also to form a guiding and bearing surface for the reciprocation of the shell with reference to the well. In order to further insure sealing of the well, the strip frame may have its inner edges faced with rubber, as shown at 18.

The shell 1 is caused to reciprocate with respect to the well 6 by a hydraulic means located at spaced points within the housing 7. In the preferred form, a cylinder 20 is supported at each end of the housing 7, each cylinder having a vertically acting piston 21, of the well known construction, having a head 22 provided with piston rings 23 and a stem or shank 24. The shank 24 is tipped with a discular ram 25 which is socketed and connected, as by the bolts 26, to the under side of the top portion 5 of the shell 1. It will be apparent, therefore, that with the introduction of a fluid medium, such as oil, below the face of the piston head 22, the shell 1 will be raised out of the well 6. If desired, the shell 1 may be provided with shoulders 28 which act as limiting stops to the movement of the shell outwardly with respect to the well. The shoulders 28 are adapted to engage the frame 16 when the shell 1 is raised to its highest point.

Each cylinder 20 is supplied with oil by means of a pipe 30 and auxiliary elbow pipes 31 through orifices 32 formed in each cylinder wall. The oil is introduced to the pipe 30 from a reservoir 33 by means of a suitable twin cylinder pump 35 which acts through pipes 36 and 37 and pipe 38. The pump 35 is driven preferably by a suitable electric motor 39, the circuit of which may be controlled by manually operated switches 42, or switches automatically operated by a train passing over a portion of a track of the railroad track 40, illustrated in Fig. 1, in a manner well known in the art.

The circuit of the fluid system from the reservoir 33 to the cylinders 20, comprises pump feed pipes 41, the pump 35, pipes 36 and 27, the pipe 38, pipe 30, auxiliary elbow pipes 31, the orifices 32 and the cylinders 20. In order to provide for and carry off the overflow of the fluid medium in the cylinders 20, an overflow pipe 45 is connected through orifices 46 formed in the upper end of the wall of each of the cylinders 20 with the reservoir to thus carry off the excess or overflow fluid from the cylinders 20. The pump 35 may be likewise provided with overflow valves 47 and connecting pipe line 49 which communicates with the reservoir 33 to carry off excess and overflow quantities of the fluid medium and return it to the reservoir for subsequent use.

In order to lower the shell 1 to its initial nesting position within the well 6, the circuit of the electric motor 39 is broken by the switch 42, or

other automatic switch operated by the wheels of a train on the track, in a manner well known in the art, whereupon the fluid, no longer under pressure, will be returned through the orifices 32, auxiliary pipes 31 and supply pipe 30 and pipe 48, into the reservoir 33, the weight of the shell 1, acting through the piston heads 22, serving to pump the fluid through the system described into the reservoir. The time period occupied in lowering the barrier serves to delay traffic over the road to permit subsequent orderly progression and to prevent too hasty crossings after passage of the train. The cylinders also act as shock absorbers in lowering the shell and insure silent recession of the shell within the well.

The pipe 30 being directly connected with the pipe 48 and through it with the reservoir, a control is provided in the pipe 48 so that a fluid pressure may be built up in the pipe 30 to raise the shell 1 as described. My invention provides a valve 50, located in the pipe line 48, which is actuated to close after the pump has performed a predetermined period of time, thus permitting the use of a pump driving motor of a lower power rating than would ordinarily be required to overcome the inertia of the system and, at the same time, perform the work of lifting the shell. The valve 50 has a shell 51 and a valve seat 52. The valve seat 52 has a passageway 53 that is normally located in registration with the valve inlet 54 and outlet 55. The seat has a centrally bored portion 58 extending across at substantially right angles to the passageway 53 which is adapted to receive a plunger valve member 59. The valve member 59 is adapted to be reciprocated within the bored portion 58 to open and close the passageway 53. The valve member 59 extends through the shell 51 and is pivotally connected to one end of a lever 60, as by the pin and slot connection 61. The lever 60 is fulcrumed in a bracket 62 and has an eye 63 formed at the opposite end. By raising and lowering the eye 63 of the lever 60, the valve member 59 will be moved into valve closing and opening positions.

The lever 60 is caused to move by means of a rod 70, the end of which extends through the eye 63 of the lever and is suitably connected thereto by the washer member 65. The rod 70 is slidably supported in a hollow shaft 71 which is rotatably supported in a portion of the frame of the pump 35. The shaft 71 is caused to rotate by a gear 73 keyed thereto which is located in meshing relation with a bevel gear 74 keyed to the crank shaft 75 of the pump 35. A pair of weight elements 76 are pivotally supported, as at 78, by links 77 on the end of the shaft 71 and tend to move away from the shaft with an increase of angular velocity of the shaft, in a manner well known in the art. The links 77 in being moved with respect to the shaft, move a sliding sleeve or yoke member 80, slidably supported on the shaft 71 connected to the links 77. Thus, as the weight elements 76 move away from the shaft 71 by reason of the centrifugal force exerted thereon, the yoke member 80 will be slidably moved upwardly along the shaft. The shaft 71 has a slot 83 which extends along the wall of the shaft and parallel to its longitudinal axis. A pin 85 connected to the rod 70 extends through the slot 83 and is adapted to be engaged by the yoke 80. Thus when the shaft 71 is caused to rotate at a determined velocity. the rod 70 will be raised and the lever 60 moved to close the valve 50, so that a fluid pressure will be built up in line 30, and its connecting system, for raising the shell 1.

In order to open the valve 50 to permit return of the fluid to the reservoir from the cylinders 20, and after the pump has ceased to operate, a spring 86 is supported in the shaft 71 and adapted to press against the end of the rod 70. The spring 86 is so located as to be compressed when the rod 70 is moved upwardly within the shaft 71 and operates to return the rod 70 to its initial position when the shaft 71 is no longer rotated, thus opening the valve 50 through the lever 60.

Means is provided for by-passing the fluid around the valve 50 should the shell 1 fail to rise for some reason, such as the restraining force of a weighted member, like a parked vehicle, being exerted on the shell 1, during the period of operation of the pump so as to cause pressures of increased magnitude to be built up in the system, endangering the system parts. To permit by-passing of the fluid in the valve 50, the valve seat 52 is slidably supported in the valve shell 51 and is maintained in position of registration of the passageway 53 with the valve inlet 54 and outlet 55 by a suitable spring 90. A passageway 91 is formed in the valve seat proximate to the inlet 54 which communicates with a chamber 92 formed by the valve shell and valve seat. When a pressure in the system is built up that is sufficient to overcome the bias of the spring 90 and the maintaining effect of the rod 70 through the lever 60 and valve member 59, the valve seat 52, together with the valve member 59, will be moved in the valve shell 51 to permit the fluid to by-pass around the valve seat 52 from the pipe 48 through the chamber 92 and outlet 55 to the reservoir 33. The valve seat 52 will be maintained in a by-pass position as long as the fault continues to exist on the shell 1 and as long as the pressure in the system exceeds the predetermined degree.

If desired, a plurality of signal lamps 95 may be located in the shell 1 and be visible through ports 96 formed in the face portion 3 of the shell. The lamps 95 may be connected in circuit with the switches 42 and be lighted upon the initial movement of the shell 1 to visually warn approaching traffic.

If desired, a valve 100, shown in Figs. 10 and 11, may be substituted in the pipe 48 for the valve 50. The valve 100 has a valve seat 101 and a valve member 102 which controls the passage of fluid through the valve. The valve member 102 is pivotally connected to a bell crank 104. The crank 104 is operatively connected to a movable core 105 of a solenoid 106. The coil 107 of the solenoid 106 is connected in circuit by lines 108 and 109 with the motor 39 so that when the switches 42 are closed to start the motor, the coil 107 will be energized to rotate the crank 104 and move the valve member 102 to a closing position with respect to the valve seat, in a manner well known in the art. In order to effect an opening of the valve, a spring 110 is connected to an arm 111 of the crank 104 and, upon opening of the coil circuit, operates to return the crank 104 to its normal position, opening the valve 100.

In order to by-pass fluid through the valve 100 when the valve member 102 is in a closed position to prevent the establishment of high pressures in the system, as may be caused upon a failure of the shell to rise, the valve member 102 has a shoulder portion 112 against which the impressed fluid may act to move the valve member 102 away from its seat 101, thus permitting escape of the fluid to the reservoir until the pres-

sures in the fluid system are reduced to a desirable safe degree.

I claim:

1. A traffic governor for a vehicle roadway having in combination a road barrier, means for receiving the road barrier below the surface of the roadway, means for raising the barrier above the surface of the roadway preliminary to the establishment of an unsafe traffic condition over the said vehicle roadway comprising a plurality of vertical actuating cylinders, a pump for supplying a fluid to said plurality of cylinders, a motor for driving the said pump, and means operated by the said motor for controlling the fluid pressure generated by the said pump and transmitted to the said plurality of cylinders dependent on the speed of operation of the motor.

2. A traffic governor for a vehicle roadway having in combination a road barrier, means for receiving the road barrier below the surface of the roadway, means for raising the barrier above the surface of the roadway preliminary to the establishment of an unsafe traffic condition over the said vehicle roadway comprising a plurality of vertical actuating cylinders, a pump for supplying a fluid to said plurality of cylinders, a motor for driving the said pump, and means for controlling the fluid pressure generated by the said motor and transmitted to the said plurality of cylinders dependent on the speed of operation of the motor.

3. A traffic governor for a vehicle roadway having in combination a road barrier, means for receiving the road barrier below the surface of the roadway, means for raising the barrier above the surface of the roadway preliminary to the establishment of an unsafe traffic condition over the said vehicle roadway comprising a plurality of vertical actuating cylinders, a pump for supplying a fluid to said plurality of cylinders, a motor for driving the said pump, and means for preventing the establishment of a fluid pressure between the pump and the cylinders until after the pump has operated at a predetermined period of time at a predetermined rate of fluid delivery.

4. A traffic governor for a vehicle roadway comprising a housing located below the surface of the said roadway and extending transverse thereof, a shell having an open bottom portion, a well formed in the housing and adapted to receive the shell, means for moving the shell outwardly with respect to the well and above the roadway surface comprising a source of supply of fluid, a pump, means for driving the pump, a cylinder supported in the well and connected to the pump, a piston slidably supported in the cylinder and connected to the shell, a valve actuated by the said means for driving the pump for controlling the fluid pressure generated by the pump and transmitted to the cylinder.

5. In a traffic governor for a vehicle roadway having in combination a road barrier, means for receiving the road barrier below the surface of the roadway, means for raising the barrier above the surface of the roadway preliminary to the establishment of an unsafe traffic condition over the said vehicle roadway comprising a plurality of vertical actuating cylinders, a fluid reservoir, a pump for supplying a fluid from the reservoir to the said plurality of cylinders, a motor for driving the said pump, a valve located between the said reservoir and the said plurality of cylinders, means operable by the said motor for closing the valve after a predetermined period of time, and means located in the said valve and reactant against the said valve closing means for opening the valve during over-load pressure conditions.

6. In a traffic governor for a vehicle roadway having in combination a road barrier, means for receiving the road barrier below the surface of the roadway, means for raising the barrier above the surface of the roadway comprising a plurality of vertical actuating cylinders, a fluid reservoir, a pump for supplying a fluid from the reservoir to the said plurality of cylinders, a motor for driving the said pump, a valve located between the said reservoir and the said plurality of cylinders, the valve having ports connecting with the said plurality of cylinders and the said reservoir, a valve seat located in the valve having a passageway in registration with said valve ports, a valve closure member slideably supported in the said valve and operated by the said motor to close the passageway for creating a fluid pressure between the said pump and the said plurality of cylinders after a predetermined period of time, and means formed in the said valve for relieving over-load pressure conditions in the cylinders without variance of the motor speed.

7. In a traffic governor for a vehicle roadway having in combination a road barrier, means for receiving the road barrier below the surface of the roadway, means for raising the barrier above the surface of the roadway comprising a plurality of vertical actuating cylinders, a fluid reservoir a pump for supplying a fluid from the reservoir to the said plurality of cylinders, a motor for driving the said pump, a valve located between the said reservoir and the said plurality of cylinders, a valve seat located in the valve and having a transverse passageway in registration with said valve ports, a valve closure member slideably supported relative to the said valve seat and operated by the said motor to close the passageway for creating a fluid pressure between the said pump and the said plurality of cylinders after a predetermined period of time, the said valve seat having a U-shaped recess formed in its lower surfaces, one end of the recess communicating with one of the said valve ports and the other end of the recess terminating below the other of the said valve ports, the said valve seat being biased to prevent movement of the fluid through the said recess and from one to the other of the said valve ports, the said valve seat being movable against the biasing means to allow movement of said fluid through the recess during the existence of an over-load pressure condition in the said plurality of cylinders.

WALTER WORNICK.