Sept. 2, 1958 E. W. VOSS 2,849,810

TREADLE-OPERATED AUTOMATIC GATE

Filed Sept. 18, 1956 2 Sheets-Sheet 1

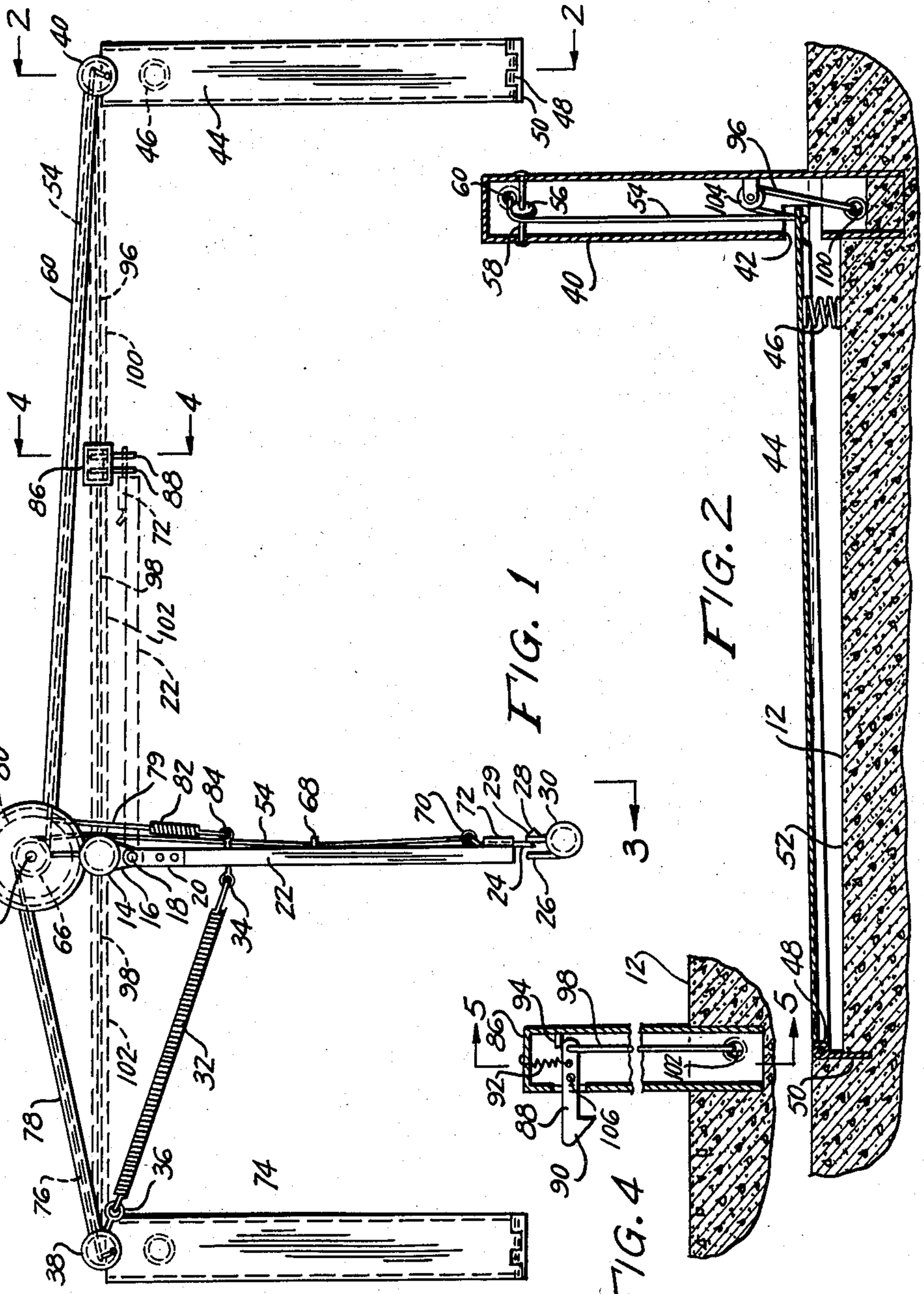

FIG. 1

FIG. 2

FIG. 4

INVENTOR.
ELMER W. VOSS
BY
McMorrow, Berman & Davidson
ATTORNEYS

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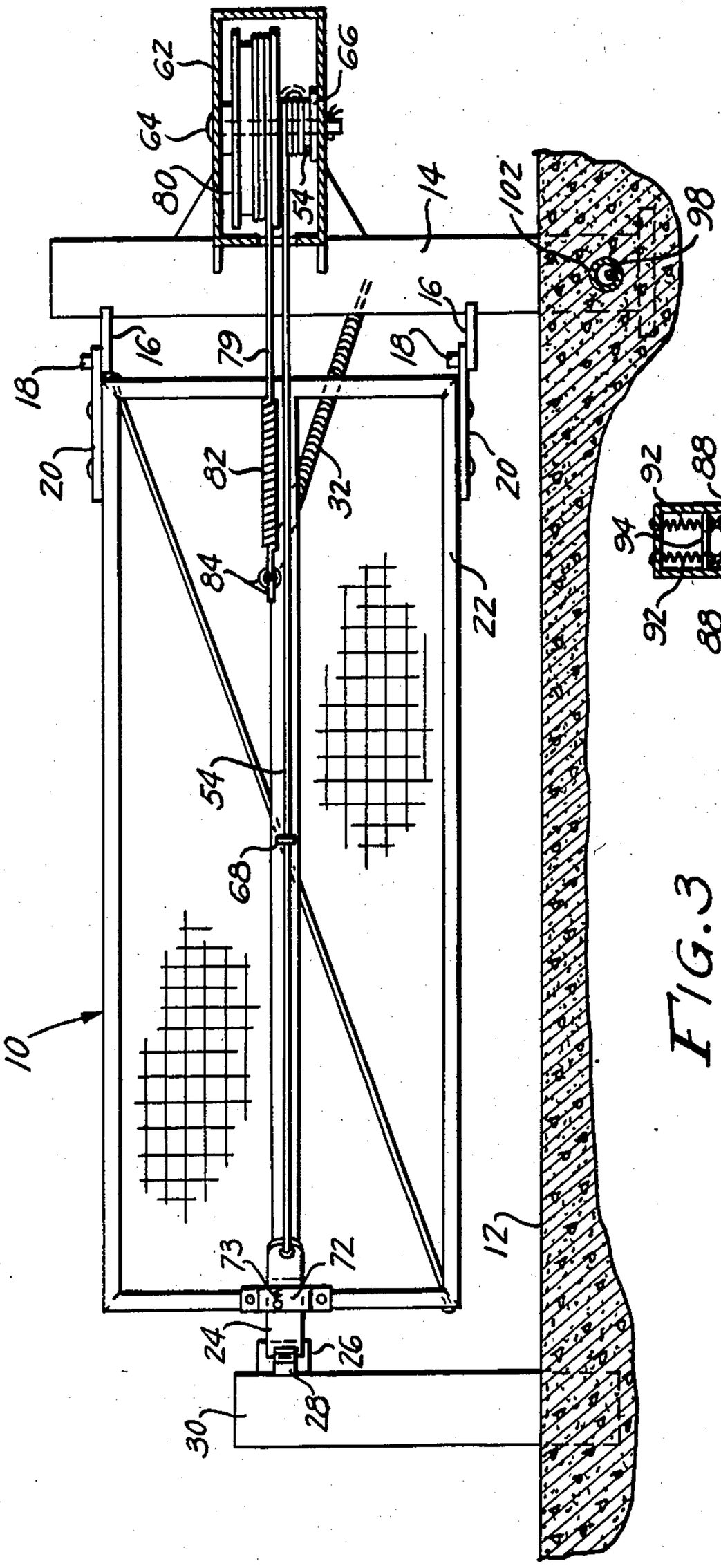

FIG. 3

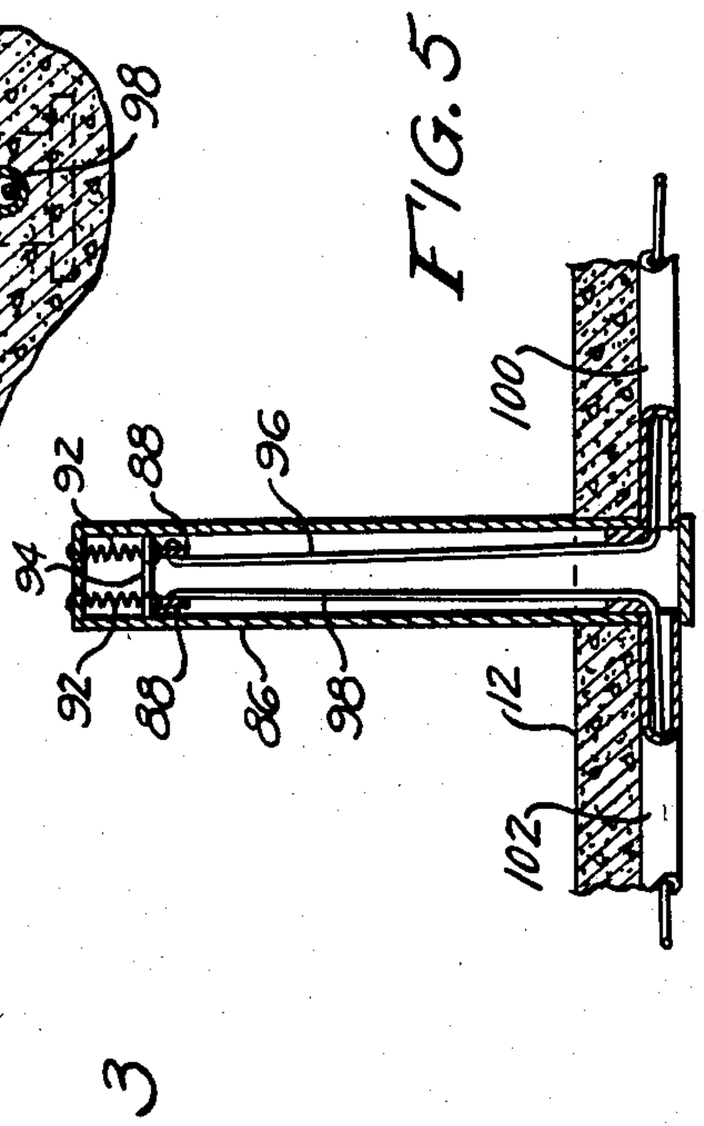

FIG. 5

INVENTOR.
ELMER W. VOSS
BY
McMorrow, Berman + Davidson
ATTORNEYS

United States Patent Office

2,849,810

Patented Sept. 2, 1958

2,849,810

TREADLE-OPERATED AUTOMATIC GATE

Elmer W. Voss, Wagoner, Okla.

Application September 18, 1956, Serial No. 610,505

3 Claims. (Cl. 39—28)

This invention relates to gate assemblies, in general. In particular, the invention has reference to a gate so designed as to be normally maintained in a closed position, with the gate being releasably latched in said closed position thereof. On depression of a treadle disposed at one or the other side of the gate, the latch is disengaged, and the gate automatically swings to and latches in an open position, to permit passage of a vehicle. Following passage of the vehicle, the gate is automatically disengaged from the latch that holds the same in open position, and returns to and latches in a closed position.

Summarized briefly, the invention includes a horizontally swinging gate, and at opposite sides of the gate are provided treadles adapted to be depressed by a vehicle approaching the gate from either side. Connected to the treadles are cable and pulley assemblies, operatively connected to a latch that normally holds the gate in closed position, so that on depression of either treadle, the latch is disengaged to free the gate for movement to open position. The latch and pulley means further includes cable connections that will pull the gate to an open position responsive to depression of either treadle, and a second latch means is provided that will automatically engage the gate in the open position to permit passage of the vehicle.

The invention, further summarized, is so designed that the second latch is disengaged from the gate responsive to passage of the vehicle over the second treadle, and spring means is associated with the gate adapted to return the same to its closed position for automatic latching of the same once again in its closed position, awaiting the approach of the next vehicle.

The desirability of a gate of the type described will be readily appreciated, particularly in rural areas in which roads must often be closed where, for example, they pass through a stock fence, to insure that the stock will be confined. In such instances, it is usually necessary that the person pull the vehicle to a halt, get out of the same, open the gate, and after returning to the vehicle and driving the same through the gate, stop the vehicle once again for the purpose of closing the gate. Obviously, this is an annoying and time-consuming task. The invention is so designed that the gate will automatically open as the vehicle approaches the same from either direction, and will automatically close behind the vehicle immediately after the vehicle has passed through the gate, all without the necessity of stopping the vehicle.

One object of importance is to provide a generally improved mechanism of the type described, that can be readily installed at any location at which a gate may be desired.

A second object is to design the mechanism in such a manner that it will act efficiently under all circumstances.

A third object is to so design the gate that it will open and close with minimum necessity of properly locating the vehicle relative to the threadles of the device, the treadles being so designed as to be depressible under the imposition of a predetermined weight, which weight will

be sufficient even if only a single wheel of the vehicle passes over the treadle.

Another object is to provide a gate of the type described in which the various cable and pulley assemblies will be protectively housed in a manner to prevent the same from deteriorating.

Other objects will appear from the following description, the claims appended thereto, and from the annexed drawing, in which like reference characters designate like parts throughout the several views, and wherein:

Figure 1 is a top plan view of a gate formed according to the present invention;

Figure 2 is a transverse section on line 2—2 of Figure 1;

Figure 3 is a transverse section on line 3—3 of Figure 1;

Figure 4 is a transverse section on line 4—4 of Figure 1, portions being broken away; and

Figure 5 is a section on line 5—5 of Figure 4.

Referring to the drawings in detail, the device 10 constituting the present invention is preferably mounted upon a large, concrete slab 12, in which is embedded the lower end of an upstanding, tubular, capped post 14 of any suitable material. Rigid with and projecting radially outwardly from the post 14, at locations spaced vertically of the post, are flat hinge plates 16 in horizontal planes, and integral with and projecting upwardly from the outer ends of the hinge plates are vertically aligned hinge pins 18 passing through openings, formed in horizontally extending hinge arms 20, 20 secured to the top and bottom edges of a gate 22. The gate may be of any suitable design, but preferably is a wire gate, to reduce wind resistance when the same is swinging between open and closed positions.

Slidable horizontally in the outer or free end of the gate is a latch plate 24, adapted (see Figure 1) to normally engage between keeper plates 26, 28 respectively, the keeper plate 28 having at its free end a cam surface 29 disposed to engage and bias inwardly the slidable latch plate 24 of gate 22.

The keeper plates are mounted upon an upstanding post 30 also embedded in the concrete slab 12. By reason of the construction so far illustrated and described, it will be seen that the gate is swingable about a vertical axis between the full and dotted line positions shown in Figure 1, through 90 degrees, said gate, when in its closed position shown in full lines, being latchably engaged to normally maintain the same in its closed position.

An elongated pull-back spring 32, maintained under tension normally contracting the same, is connected at one end to an eye 34 projecting outwardly from one face of the gate. At its other end, the contractile or expansion spring 32 is connected to an eye 36 projecting radially toward the gate from an upstanding post 38 spaced laterally a substantial distance from the gate support post 14.

A post 40 is spaced laterally from post 14, at the opposite side of the post, and is at a substantially greater distance from the post 14 than is the post 38.

Referring now to Figure 2, the post 40 is embedded at its lower end in the concrete slab 12, and immediately above the surface of the slab has a deep recess 42 receiving the free or inner end of an elongated, flat treadle 44 normally biased upwardly above the plane of the slab by the compression spring 46 disposed adjacent the inner end of the treadle. At its outer end, the treadle is hingedly connected for swinging movement about a horizontal axis, as at 48, to an anchored hinge plate 50 embedded in the slab. Underlying the treadle is an elongated recess 52 into which the treadle is depressible when a vehicle passes thereover.

The amount of weight required to depress the treadle can of course be predetermined, and further, the distance the treadle is normally disposed at its free end above the slab surface can also be predetermined as necessary. The treadle thus might, adjacent its free end, be disposed a distance of about four inches above the plane of the concrete slab, this being sufficient to permit passage of a wheel onto the treadle for the purpose of depressing the same. Further, the amount of weight required to depress the treadle can also be predetermined, and in a preferred embodiment approximately 200 pounds of pressure, substantially midway between the ends of the treadle, may be required. This is ample to permit the treadle to be depressed by any automobile, even if only one wheel of the vehicle passes over the treadle, with the construction still being adapted to prevent accidental opening of the treadle under a lesser weight.

To the inner end of the treadle, within post **40**, there is connected one end of a latch release cable **54**, trained within the upper portion of post **40** over a pulley **56** freely rotatable upon a cross pin **58** of the post. Cable **54** extends from the post through a sheath or protective sleeve **60** that is connected between the post **40** and a larger diameter pulley housing **62** secured to the post **14**.

The pulley housing **62**, as shown in Figure 3, carries a vertical pin **64**, and freely rotatable upon the lower portion of said pin is a relatively small diameter pulley **66** about which the cable **54** is coiled. The cable **54** as shown in Figure 3 leaves the pulley **66** to pass through an opening of the pulley housing **62**, and this passes along one face of the gate through a guide **68** carried by the gate intermediate opposite ends of the gate. Cable **54** is connected to the inner end of the latch plate **24**, through the medium of an eye **70** (Figure 1) carried by the latch plate. The latch plate is slidably engaged in a latch plate guide **72** that is secured to the outer end of the gate **22** and a small spring **73** is connected between the latch plate and guide, said spring being a contractile spring and being so connected as to normally bias the latch plate to its latching position, that is, to the left in Figure 3.

A second treadle **74** is identical to the treadle **44**, and post **38** is also formed identically to post **40**. Within post **38**, the treadle **74** is connected to a latch release cable **76**, extending through a protective, sleeve-like housing **78** that is connected between post **38** and pulley housing **62**. Within the pulley housing **62** the cable **76** is trained about the pulley **66**, and is connected to the cable **54**. As a result, depression of either treadle will cause rotation of the pulley **66** in a direction to shift the portion of cable **54** that extends along the gate **22**, to the right in Figure 3 for the purpose of pulling back the latch plate **24**.

It is thus seen that on approach of the gate from either side by a vehicle, and depression of either the treadle **44** or the treadle **74**, the latch plate **24** will be pulled back and disengaged from its keepers **26**, **28** to free the gate **22** for swinging movement to its open position shown in dotted lines in Figure 1.

A gate-opening cable **79**, relatively short in length, is wound about and is fixedly secured to a large diameter pulley **80** within pulley housing **62** (see Figure 3). Pulley **80** can be of any diameter, but it is preferred that it be of a diameter of approximately one foot. The pulley **80** is fixedly secured to the small pulley **66** for rotation therewith. Therefore, when either treadle is depressed the pulley **80** will be rotated, and will shift cable **79** to the right in Figure 3. Cable **79** is connected to a contractile spring **82** which is of a strength selected at a value such that expansion of the spring is highly limited. The spring **82** serves the function of cushioning the swinging of the gate to open position against excessive shocks, and serves the further function

of permitting movement of the cable **79** to the right in Figure 3 to a slight extent before the latch plate **24** is fully released. In other words, when a treadle is depressed, cables **79** and **54**, viewing the same as in Figure 3, both move simultaneously to the right in this figure of the drawing. Since cable **79** pulls the gate to open position, it is necessary that means be provided for permitting initial movement of cable **79** to the right to a slight extent, during the few moments that the latch plate **24** is moving to but has not been completely disengaged from its associated keepers **26**, **28**. As soon as the latch plate is disengaged fully, the cable **79**, during continued rotation of the pulley **80** caused by depression of the treadle, exerts a pull on the gate swinging the same to its open position.

Again, it should be noted that the diameter and particular location of the pulley **66** is of importance in assuring that there is sufficient rotatable movement of the pulley **80**, responsive to depression of a treadle, to cause cable **79** to be shifted to an extent sufficient to fully open the gate.

It may be understood that a hydraulic cylinder means can be employed as a shock absorber, to cushion the shock when the gate is swung fully to its open or closed positions. Such means has not been illustrated herein, but can be located wherever desired, at locations at which heavy shocks may tend to occur.

The spring **82**, it may be noted, is connected to an eye **84** carried by the gate **22** inwardly a short distance from the inner end of the gate.

Referring now to Figures 4 and 5, substantially midway between the treadle **44** and the post **14** there is embedded in the concrete slab an upstanding, tubular post **86**. Vertically conjointly swingable in side-by-side relation within the post **86** are latch arms **88**, having outer ends projecting forwardly from the post **86** and terminating in downwardly projecting latching teeth **90**, the outer surfaces of which are inclined to provide cam surfaces adapted to be engaged by the latch plate **24** when the gate **22** is swung to its fully open position.

At their inner ends, the latch arms **88** are connected to contractile springs **92**, which are connected to the cap of the post **86**, so that the latch arms **88** are normally biased in a counterclockwise direction, with movement of the latch arms in this direction being limited by stops **94** projecting from the wall of the post **86** in position to engage the inner extremities of the latch arms.

Connected to the inner ends of the latch arms are side-by-side cables **96**, **98** (see Figure 5), extending to the lower end of the post **86** and extending outwardly from the post in opposite directions through buried, sleeve-like housings **100**, **102**. As shown in Figure 1, housings **100**, **102** extend to the posts **38**, **40** respectively.

Referring now to Figure 2, cable **96** extends out of housing **100** into the lower end portion of post **40**, and is trained about an idler pulley or roller **104** within the post, and is then connected to the inner end of the treadle. as a result, depression of the treadle will cause the cable **96** to be pulled in a direction to swing its associated latch arm **88** in a clockwise direction viewing the latch arm as in Figure 4, that is, in a direction to elevate the tooth **90** to a releasing position.

The cable **98** is similarly associated with the treadle **74**, within the post **38**. Therefore, depression of either treadle will swing both latch arms **88** upwardly. Both latch arms will swing together in view of the fact that they are both fixedly connected to a shaft **106** the ends of which are journalled in the side walls of the post **86**.

Considering now the operation of the invention, as previously noted the gate is normally closed. A vehicle approaching from either direction is adapted to depress a treadle for the purpose of releasing the latch **24**. Assuming for the sake of example that the vehicle is approaching from the right in Figure 1, it will first depress treadle **44**. When treadle **44** is depressed, cable **54**

is pulled, and cable **79** is also pulled in the manner previously described, so that the latch plate **24** is retracted to free the gate for swinging movement to open position under the pull of the cable **79**. The gate swings to open position against the restraint of the spring **32**. Spring **32** is of a strength insufficient to prevent the gate from swinging to open position, when the gate is being pulled upon by cable **79**. When, however, neither treadle is held positively depressed, the pull of cable **79** no longer exists, and under these circumstances the spring **32** is free to pull the gate back to a closed position.

In any event, gate **22** is swung to its open position under the pull of cable **79** in the manner described above, and on arriving at its open position, will automatically be latched by the latch arms **88**, due to the fact that the plate **24** biases the latch arms **88** clockwise in Figure 4 by camming engagement with the teeth **90**. The gate is thus automatically latched, to permit passage of the vehicle.

When the vehicle passes the gate, its front wheels will depress the treadle **74**. This will cause the cable **98** to be pulled, and as previously described this has the effect of rocking the latch arms **88** clockwise in Figure 4, to disengage the same from the gate **22**, so that the gate **22** is now returned to a closed position under the pull of the spring **32**.

It is thus apparent that the gate when closed and latched can be approached from either direction, with the vehicle being adapted to set into action mechanism effective to open the gate without requirement of stopping the vehicle. The gate, further, is adapted to automatically swing to open position and latch in said open position for a time sufficient to permit passage of the vehicle, after which the vehicle again actuates mechanism sufficient to disengage or unlatch the gate for return movement, automatically, to its closed position, in which it will latch by camming engagement of the latch plate **24** against the cam surface of the keeper **28**. The invention thus has general utility in any situation under which it is desired to normally place a gate across the roadway, with the gate to be kept normally closed at all times at which it is not to be specifically moved to open position for the purpose of permitting passage of a vehicle.

It is believed apparent that the invention is not necessarily confined to the specific use or uses thereof described above, since it may be utilized for any purpose to which it may be suited. Nor is the invention to be

necessarily limited to the specific construction illustrated and described, since such construction is only intended to be illustrative of the principles of operation and the means presently devised to carry out said principles, it being considered that the invention comprehends any minor change in construction that may be permitted within the scope of the appended claims.

What is claimed is:

1. A gate structure comprising a pair of fixed posts arranged in spaced relation, a gate having an inner end and an outer end positioned between said posts so as to close the space between said posts with the inner end adjacent one of said posts and the outer end adjacent the other of said posts, means connecting the gate inner end to said one post for movement from the closed position to an open position in which the outer end is spaced from and contiguous to said one post, a latch plate slidable horizontally in the outer end of said gate and normally engaged in keeper means carried by said other post for holding said gate in the closed position, depressible treadles positioned on opposite sides of said gate, a releasable latch arm disposed between said one post and one of said treadles and engageable with said latch plate when said gate has been moved to the position in which the outer end is spaced from and contiguous to said one post for holding the gate in open position, spring means operatively connected to said gate for biasing said gate toward the closed position, and means connecting said latch plate and said latch arm to said treadles so that upon depression of either of said treadles said latch plate will be moved from engagement with said keeper means, said gate will be moved from the closed position against the action of said spring means to the open position, and said latch arm will be moved after said gate has been moved to the open position into engagement with said latch plate.

2. A gate structure according to claim 1 in which said means embodies cable and pulley means.

3. A gate structure according to claim 1 in which said means embodies cable and pulley means, and said latch arm embodies a pair of spring biased horizontally disposed spaced arms.

References Cited in the file of this patent

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