United States Patent [19]

Walls

[11] **3,775,912**

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[54] **HORIZONTAL-AXIS VEHICLE GATE INCORPORATING LOCKING MECHANISM**

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[21] Appl. No.: **233,471**

[52] **U.S. Cl.** **49/131,** 49/35, 49/269, 49/364, 49/386

[51] **Int. Cl.** **E06b 11/02**

[58] **Field of Search** 49/12, 35, 131, 262, 49/263, 269, 271, 272, 273, 274, 364, 386

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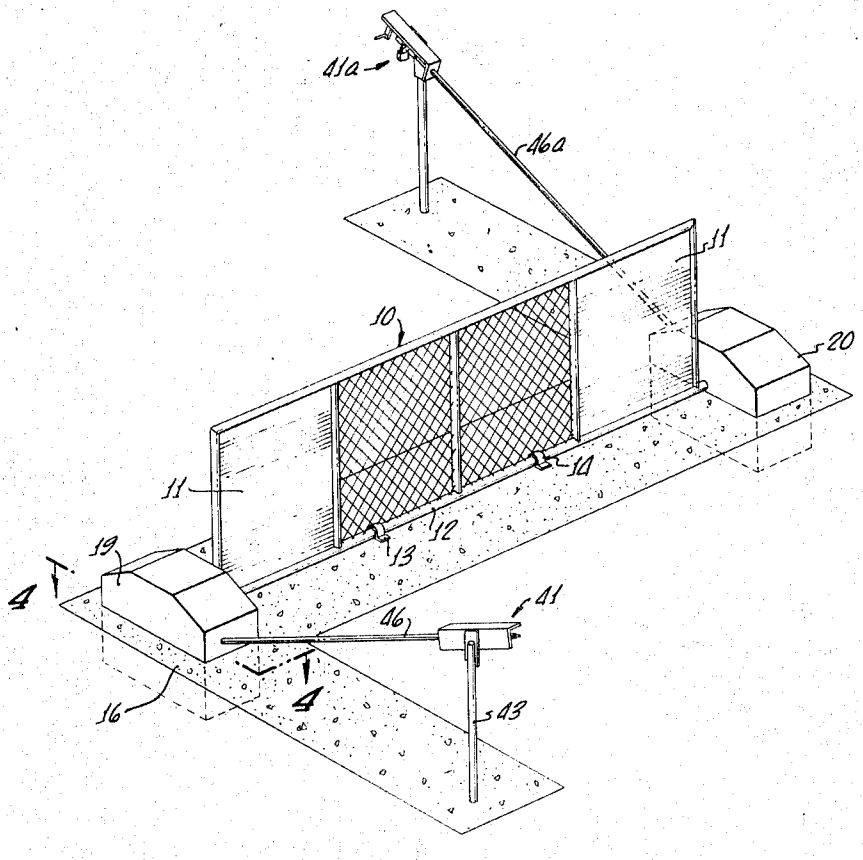
Primary Examiner—J. Karl Bell
Attorney—Richard L. Gausewitz et al.

[57] **ABSTRACT**

A vehicle gate is mounted for pivotal movement about a horizontal axis which is generally coincident with the surface of the roadway, and counterweights are provided to normally maintain the gate in an upright position. A disc is nonrotatably associated with the pivot shaft for the gate, and has a notch therein adapted to receive a pivotally-mounted latch bar. A lock mechanism is so located that it is adjacent the passenger compartment of the vehicle when the vehicle is stopped on the approach side of the gate. Such mechanism is adapted to be operated by the vehicle driver to effect lifting of the latch bar out of the notch. The driver then drives the vehicle against and over the gate, following which the gate moves automatically to its upright condition and becomes locked without need for further action by the driver. The locking of the lock mechanism is effected by the driver while the vehicle is still near (but not at) the position at which it is located while the lock mechanism is being unlocked, but the gate does not actually lock until after the vehicle is driven therethrough.

10 Claims, 7 Drawing Figures



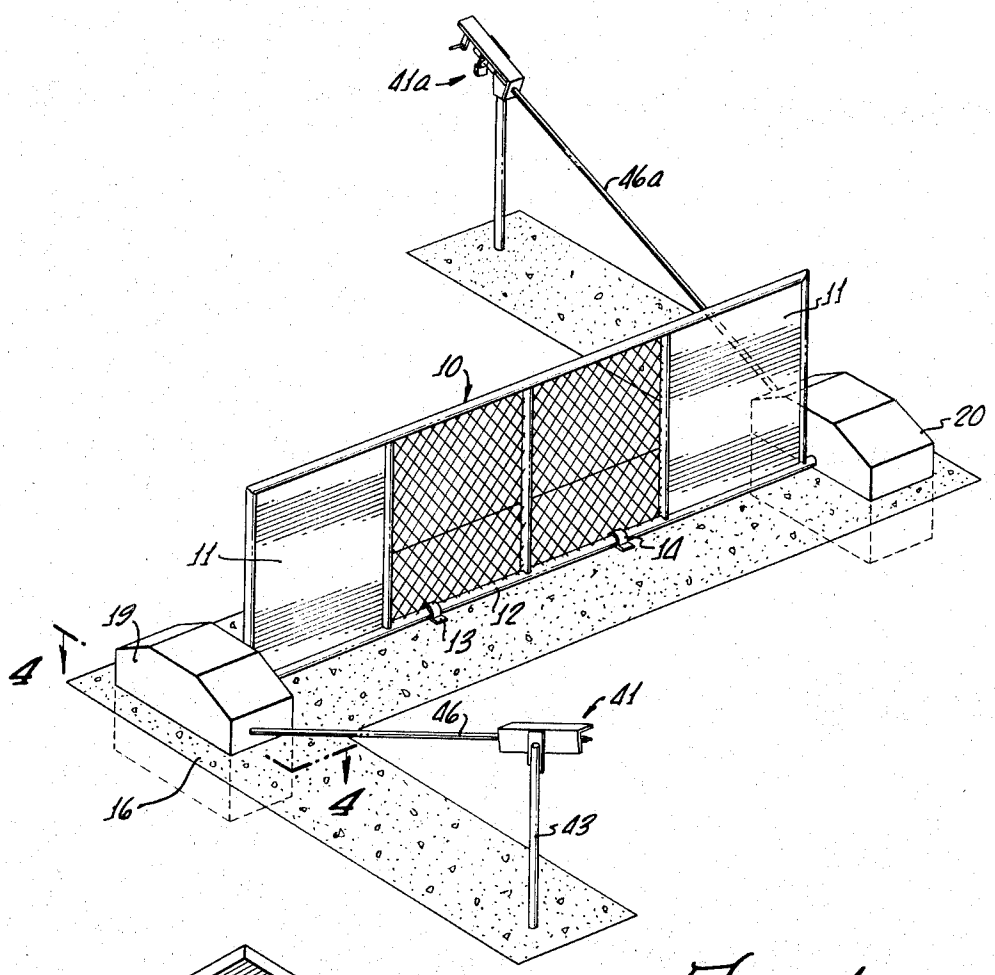

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FIG. 1.

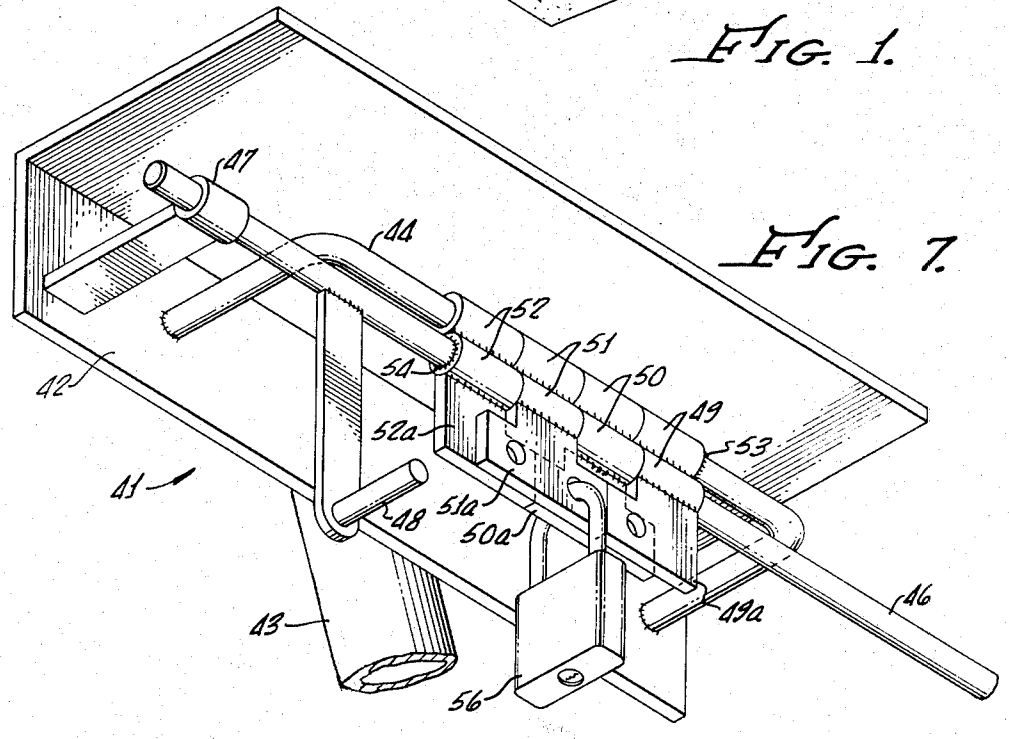
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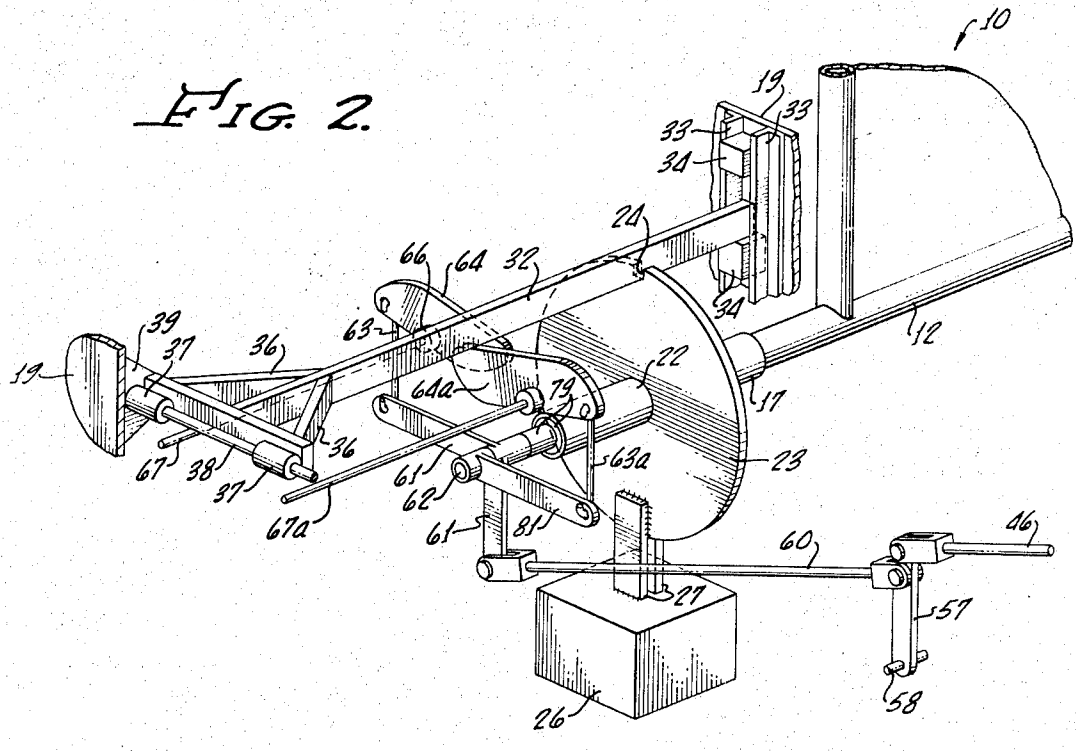
FIG. 7.

FIG. 2.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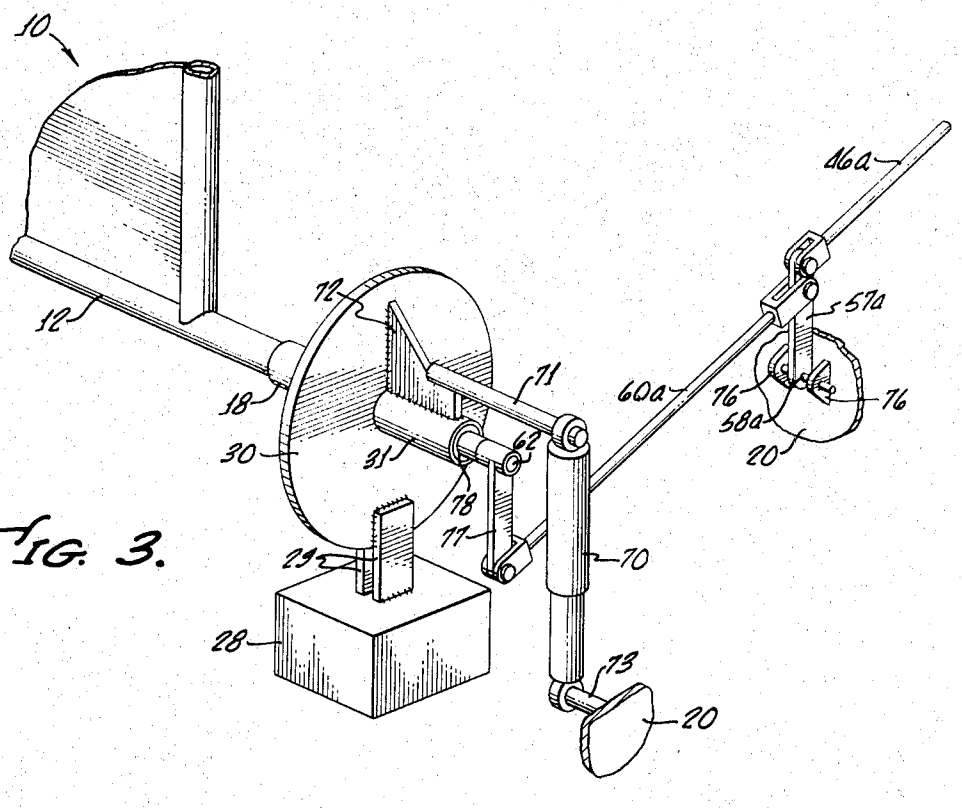
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57a
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73
20

FIG. 3.

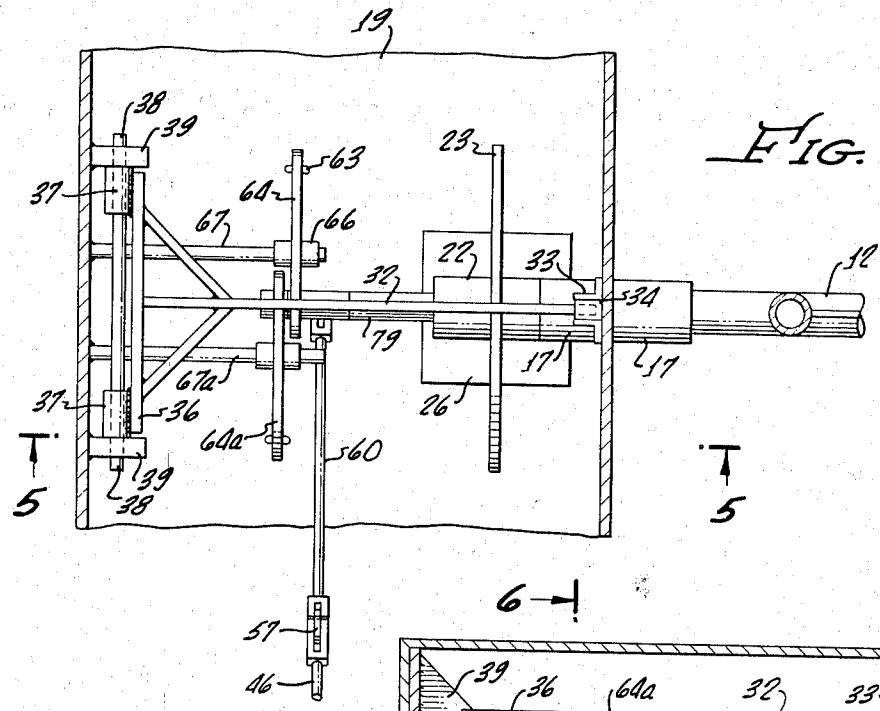

FIG. 4

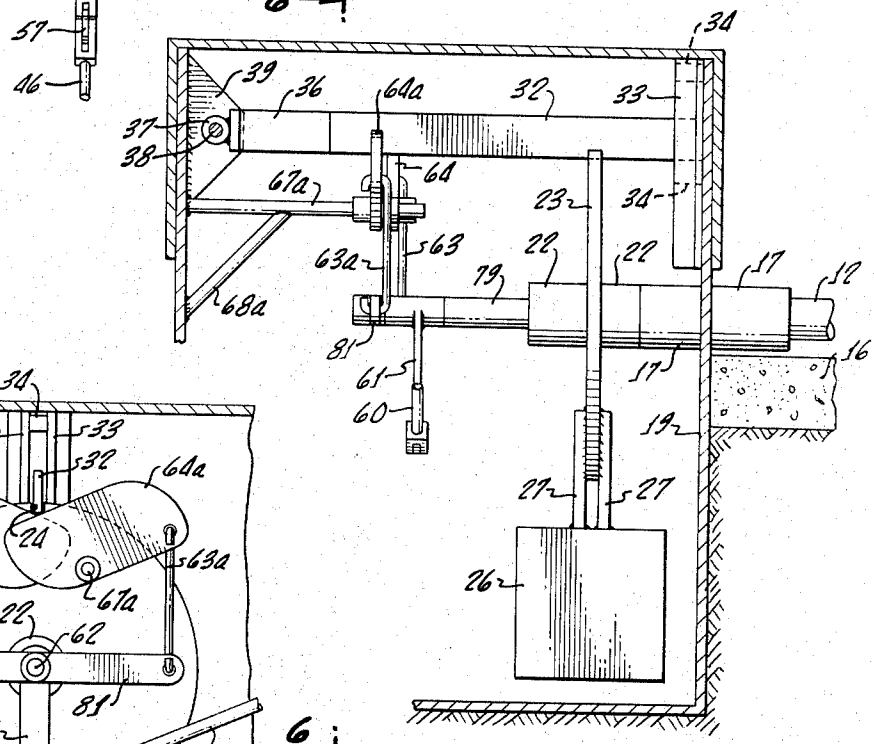

FIG. 5.

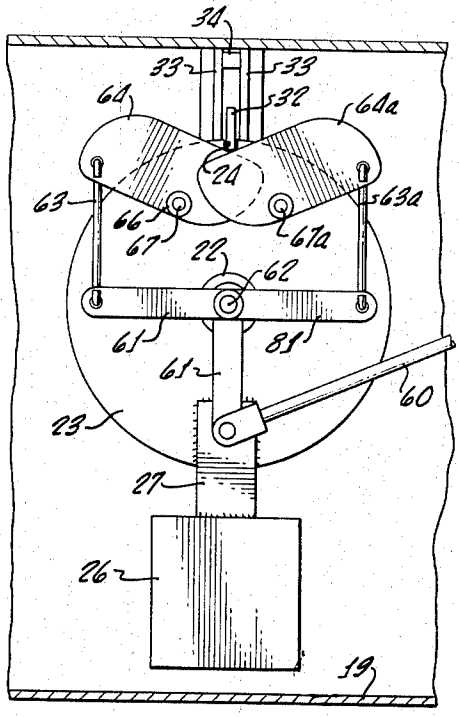

FIG. 6.

HORIZONTAL-AXIS VEHICLE GATE INCORPORATING LOCKING MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of horizontal-axis gates which are provided in fences or walls, and which are adapted to be pushed over and driven over by automobiles or trucks.

2. lDescription of Prior Art

Push-type or bump-type vehicle gates have been known in the art for many years, but have not achieved wide acceptance. It is the belief of applicant that a major reason for such lack of acceptance has been the lack of a locking mechanism which may be operated by the vehicle driver while he is sitting in the passenger compartment on the approach side of the gate, not only to unlock the gate but also to relock it.

It is emphasized that gates which do not have what may be termed "selective" locking nechanisms, for example padlocks which may be opened only be selected individuals who either have keys or who know the combinations, are worthless in many applications. As but one example, certain governmental agencies in the West have large numbers of vehicle gates in mountainous or back-country areas. Each employee of such agencies spends much time in unlocking, opening and then relocking each gate. This laborious procedure constitutes a major waste of valuable time.

The following U.S. Pats. were discovered in a prior-art search of the present invention: Nos. 551,245; 1,617,680; 1,628,703; 1,763,414 and 3,170,258.

SUMMARY OF THE INVENTION

A bump-type vehicle gate has a horizontal pivot shaft disposed near the surface of the roadway, which shaft is associated with means to normally maintain the gate in upright position. A movable latch element is operably related to the shaft in such manner that the gate may pivot when the latch is in one position but not when it is in another position. A lock station is provided in a location accessible to the vehicle driver while he is sitting in the driver's seat on the approach side of the gate. The lock station includes a padlock or other selective locking device, and also an actuating means manually movable by the driver after unlocking has been effected. Means are provided to associate the actuating means with the latch element, and comprise a lost-motion connection such that the driver may relock the padlock while the vehicle is still on the approach side of the gate, near the position where the vehicle was located when unlocking occurred. However, the latch element does not move to its gate-locking position until the vehicle has been driven over and through the gate. Thus, no action by the driver is required when the vehicle is on the exit side of the gate.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic isometric view showing a vehicle gate and gate-locking mechanism constructed in accordance with the present invention;

FIG. 2 is a fragmentary schematic isometric view showing the mechanism which is contained in the box at the left end of the gate (as the gate is viewed in FIG. 1);

FIG. 3 is a fragmentary schematic isometric view of the mechanism contained in the box at the right end of the gate (as viewed in FIG. 1);

FIG. 4 is a top plan view of the mechanism shown in FIG. 2;

FIG. 5 is a vertical sectional view taken on line 5—5 of FIG. 4;

FIG. 6 is a vertical sectional view on line 6—6 of FIG. 5; and

FIG. 7 is an isometric view of the lock station which is provided adjacent the left end of the gate (as viewed in FIG. 1),

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, the vehicle gate and locking mechanism is illustrated to comprise a horizontally-elongated gate 10 which is illustrated in the present embodiment as including a rectangular frame formed of tubular members. Vehicle track portions 11 are provided on the gate in order to prevent damage thereto when an automobile or truck is driven thereover after the gate has been pivoted downwardly to a horizontal position parallel to and adjacent the roadway. It is to be understood that the gate 10 is incorporated in a fence or wall, not shown, and which includes posts located sufficiently near ends of the gate that no passage may be effected except after opening of the gate.

The pivot axis of the gate is adjacent the roadway, being disposed in the center of a horizontal hollow shaft 12 which rotates in four bearings. It is pointed out that gate 10 is a crank on shaft 12, so that pushing or bumping of the gate turns the shaft (and, conversely, turning of the shaft raises the gate).

Two of the gate bearings, numbered 13 and 14 (FIG. 1), are secured to a concrete deck 16 which is provided in the roadway. The remaining bearings, numbered 17 (FIGS. 2, 4 and 5) and 18 (FIG. 3), are fixedly mounted (respectively) in the inner walls of partially-buried boxes 19 and 20 which are located at opposite ends of gate 10.

Each box 19 and 20 has a substantial portion beneath the surface of deck 16, and also has a cover portion above the surface of such deck. The boxes 19 and 20 may, for example, be formed of metal, and each has a removable cover (as indicated in FIG. 5) to permit access to the mechanism. Such cover is locked in place by suitable lock means, not shown.

The end of shaft 12 within box 19 is connected to a sleeve 22 by welding or other rigid and strong means, such sleeve being shown in FIGS. 2, 4 and 5. A relatively large-diameter, strong and rigid disc 23 is fixedly mounted on sleeve 22 as by welding, and has a notch 24 (FIG. 2) at one point about the periphery thereof, A counterweight 26 is connected by two bars 27 to the portion of disc 23 diametrically opposite notch 24, and serves to maintain the gate 10 in upright position at all times except when a vehicle is being driven thereover.

Referring to FIG. 3, a second counterweight 28 is mounted in the box 20 at the other end of the gate 10 (the right end as shown in FIG. 1), such second counterweight being connected by bars 29 to a disc 30. Disc 30 is (correspondingly to disc 23 but at the other end of the gate) welded on a sleeve 31 which is welded or otherwise rigidly secured to the end of pivot shaft 12. Thus, both of the counterweights 26 and 28 cooperate

in normally maintaining the gate **10** in the upright condition shown in the drawings.

To maintain the pivot shaft **12** (and thus gate **10**) locked in the gate-upright position, a latch bar **32** is seated in the notch **24** (FIG. **2**). Latch bar **32** is an elongated horizontal element having an inner end which may move within the limits permitted by a pair of vertical bars **33** and by two end blocks **34**, the bars **33** and blocks **34** being mounted on the inner vertical wall of box **19**.

The outer end of latch bar **32** is pivotally associated with the outer vertical wall of box **19**, by means of a yoke **36** having journal portions **37** through which a horizontal pivot shaft **38** extends. The ends of shaft **38** are mounted in brackets **39** which are suitably welded to the box wall.

The various elements **33–34** and **36–39** effectively prevent any motion of latch bar **32** except in a vertical plane. Thus, the disc **23** and associated pivot shaft **12** and gate **10** are prevented from rotating until such time as the bar is lifted out of the notch.

REMOTE-OPERATED MEANS FOR LIFTING LATCH 32 OUT OF NOTCH 24

A lock (and operating) station **41** is located adjacent the roadway in which gate **10** is disposed, at such position that the lock station **41** is accessible to the driver of a vehicle which is approaching gate **10** from the right (FIG. **1**), and while the driver is sitting in the driver's seat of the vehicle. As best shown in FIG. **7**, lock station **41** comprises a support and cover bar **42** having an angle-shaped cross-section, and which is mounted at a convenient height above deck **16** by means of a post **43**. A U-shaped slide rod **44** is welded at its ends to the vertical portion of bar **42**. The center portion of rod **44** is disposed adjacent and parallel to an inclined actuating rod **46**. The outer end of rod **46** is slidably mounted in a bearing element **47** (FIG. **7**), whereas the inner end of rod **46** extends slidably through a wall of box **19**. A handle or actuating element **48** is mounted on actuating rod **46** and is adapted to be grasped by the vehicle driver in order to shift rod **46** in a direction away from box **19** after unlocking of a mechanism next to be described.

Four (or any other desired number of) interrelated tabs **49–52** are mounted both on the center portion of slide rod **44** and on the actuating rod **46**. Tab **49** is welded at **53** to rod **44**, whereas tab **52** is welded at **54** to rod **46**. The welds **53** and **54** are the only direct connections between the tabs and elements **44** and **46**.

As shown at the lower-right portion of FIG. **7**, the tabs **49–52** have interrelated leaf protions **49***a*, **50***a*, **51***a* and **52***a*, respectively, which are correspondingly apertured in order to receive padlocks one of which is indicated at **56**.

When there are three padlocks provided through the three sets of registered holes in tab portions **49***a*, **50***a*, **51***a* and **52***a*, there can be no sliding of rod **46** relative to rod **44**, this being because the padlocks create connections between welds **53** and **54** which prevent such sliding. On the other hand, removal of any one of the padlocks frees a joint between the two adjacent tabs and thus permits the actuating rod **46** to be slid by a person who is grasping handle **48** and moving the same to the left in FIG. **7**.

It follows that the person having the key to, or knowing the combination of, any one of the three padlocks may open the locking means at lock station **41**, and thus shift rod **46** for actuation of the latch bar **32** in a manner described below.

Referring to the lower-right portion of FIG. **2**, the end of actuating rod **46** remote from lock station **41** is connected to the free end of a lever **57**. The other end of the lever is pivotally connected by means of a shaft **58** to bearing means (not shown) on the wall of box **19**. Such bearing means correspond to those shown at the right in FIG. **3** (relative to the wall of box **20**).

An additional rod, numbered **60**, is pivotally connected to lever **57** adjacent the connection thereof to rod **46**, and is also pivotally connected to a bell crank lever **61**. The bell crank lever **61** is freely rotatable on (and is not attached to) a rotatable connector shaft one end of which is shown at **62** in FIG. **2** and the other end of which is shown in FIG. **3**. Connector shaft **62** extends all the way through, and coaxially of, the tubular horizontal shaft **12** which is the main pivot means for gate **10**. The connector shaft permits operation of the latch bar **32** from a second locking station, as described hereinafter.

Shifting of the two connected rods **46** and **60**, in a direction away from the plane of gate **10**, will cause counterclockwise pivoting of bell crank **61** as viewed lin FIGS. **2** and **6**. This effects downward pulling of a link **63** to thereby pivot downwardly the outer end of a lift member **64**. Since the upper edge of the inner end of lift member **64** is disposed beneath and adjacent the latch bar **32**, it is lifted out of the notch **24** in disc **23**, thereby freeing such disc and the associated gate shaft **12** for pivotal movement.

The lift member **64** is pivotally mounted in a manner of a first-class lever, having a central journal or fulcrum portion **66** which is rotatably mounted at the outer end of a rod **67**. Rod **67**, in turn, is fixedly connected to the outer side wall of box **19**, for example by a suitable weld and by a brace corresponding to the one at **68a** in FIG. **5**.

OPERATION OF THE MECHANISM THUS-FAR DESCRIBED

Let is be assumed that a vehicle is approaching the gate **10** from the right as viewed in FIG. **1**. As previously indicated, the driver stops the vehicle with the driver's seat adjacent lock station **41**, at which time the front bumper of the vehicle is immediately adjacent but not in contact with gate **10**.

The driver then reaches out the window, unlocks one of the three padlocks **56** (FIG. **7**), grasps the handle **48**, and shifts actuating rod **46** to the left as viewed in FIG. **7** (to the right as viewed in FIG. **2**). The bell crank lever **61** is therefore pivoted counterclockwise as viewed in FIGS. **2** and **6**, which operates (as described above) to lift latch bar **32** out of notch **24** and thus free the disc **23** for rotation.

Prior to the time that the operator shifts handle **48** back to its original position, he drives the vehicle a short distance (for example, 1 or 2 feet) forwardly to effect a small amount of pivotal movement of gate **10**. Such pivotal movement of the gate effects corresponding rotation of disc **23**, the result being that notch **24** is then no longer registered with latch bar **32**. The operator then reaches back to the lock station **41**, grasps handle **48**, shifts rod **46** to the right as viewd in FIG. **7** (to the left as viewed in FIG. **1**), and reinserts the padlock **56** to relock the mechanism at station **41**.

Because notch 24 is not at this time registered with latch bar 32, the latch bar does not drop into the notch and the disc is not locked. Instead, the latch bar rides on the peripheral surface of the disc 23 at a position angularly removed from the notch 24. The disc therefore serves as a means to maintain the latch bar 32 in elevated condition until occurrence of a subsequent event.

The operator then drives the vehicle against and over the gate 10, and continues on his way there being no necessity for stopping or for further action.

After the vehicle disengages the gate 10, the counterweights 26 and 28 pivot the gate 10 to upright position, at which time the latch bar 32 drops (due to the effect of gravity) into the notch 24 to lock the disc 23 and thus the gate.

It is pointed out that there is a lost motion between lift member 64 and latch bar 32 at the time of relocking of the mechanism at station 41, in that the inner end of lift bar 64 pivots downwardly away from the latch bar 32 (such latch bar being held upwardly by the periphery of disc 23). It is this lost motion which permits the operator to reinsert and relock the padlock 56 without simultaneously locking the gate 10, and which also permits the gate to lock itself after the driver has driven his vehicle therethrough.

DAMPER MECHANISM, AND MECHANISM FOR EFFECTING LOCKING FROM THE OTHER SIDE OF THE GATE

It is highly desirable that gate 10 pivot to its upright position from its depressed position in a reasonably slow manner, one reason being that it is not desired that the upper edge of the gate bump or drag along the underside of the vehicle being driven thereover. Therefore, a damper mechanism is associated with one end of the gate, as illustrated in FIG. 3. The damper mechanism is indicated at 70 as being a hydraulic shock absorber the upper end of which is connected to a pin 71. Pin 71 is, in turn, connected to a bracket 72 on disc 30. The lower end of the damper 70 is pivotally connected by pin 73 to one wall of box 20.

When the gate is in upright position, damper 70 is vertical and is disposed in the same plane as the axis of shaft 12. Thus, rotation of the gate 10 and of disc 30 in either direction effects shortening of the damper. Conversely, rotation of the gate and the disc 30 in a direction causing the gate to resume its upright position (after being depressed by the vehicle) causes lengthening of the damper. The damper causes such upward rotation to be reasonably slow, for purposes described above.

In order that the gate may be operated by a driver who is driving a vehicle from the left as viewed in FIG. 1, a second lock station is provided as indicated at 41*a*. Such station 41*a* is on the opposite side of gate 10 from station 41, and also on the opposite side of the roadway from station 41. Station 41*a* corresponds (is identical) to station 41, and the actuating rod 46*a* therefrom extends into the box 20 through an opening therein. As shown in FIG. 3, rod 46*a* connects to a lever 57*a* which extends downwardly to a shfat 58*a*. As previously indicated, shaft 58*a* is mounted in bearings which are secured to a wall portion of box 20.

Lever 57*a* is pivotally connected to a rod 60*a*, the inner end of such rod being pivotally connected to a crank 77 on the above-indicated connector shaft 62. The shaft 62 is journaled in bearings 78 and 79 at opposite ends of the shaft 12, as shown in FIGS. 2 and 3. The crank 77 is fixedly associated with shaft 62, so that pulling on the rods 46*a* and 60*a* effects corresponding rotation of crank 77 and thus of shaft 62.

A second crank, numbered 81 and shown in FIGS. 2 and 5–6, is fixedly connected to the end of connector shaft 62 remote from crank 77. Crank 81 therefore rotates with crank 77 when the latter is actuated as described, and operates through a link 63*a* to pull downwardly on the outer end of a lift member 64*a*, so that the inner end of such member 64*a* is lifted to elevate latch bar 32 out of notch 24. Lift member 64*a* is journaled on a rod 67*a* which is braced by an element 68*a* (FIG. 5) as previously indicated relative to rod 67.

The gate therefore is operable equally well from either direction of approach, yet the locking mechanism is located at only one end of the gate. The vehicle driver performs the same functions relative to station 41*a* as are described above relative to station 41. Except for the described connecting means between lock station 41*a* and the latch bar 32, the functions of the elements are the same, regardless of direction of approach.

The foregoing detailed description is to be clearly understood as given by way of illustration and example only, the spirit and scope of this invention being limited solely by the appended claims.

I claim:

1. A vehicle gate assembly, which comprises:
- a gate element,
- means to mount said gate element for pivotal movement about a horizontal axis,
  - said means to mount said gate element comprising a hollow shaft which is coincident with said horizontal axis,
    - said horizontal axis being disposed at an elevation near that of the surface of the roadway over which said gate element is mounted,
- means to bias said gate element toward an upright road-blocking position,
  - whereby said gate element is in said upright road-blocking position at all times except while a vehicle is driven thereagainst and thereover,
- an operating station disposed at one side of said roadway and spaced from said gate element,
  - the location of said operating station being such that it is accessible to a driver sitting in the driver's seat of a vehicle which is stopped on said roadway adjacent said gate element,
- latch means to latch said gate element in said upright position,
- means operable from said operating station to release said latch means and thus said gate element to thereby permit said vehicle to be driven against and over said gate element,
  - said release means, said latch means and said bias means cooperating with each other to effect relatching of said gate element in upright road-blocking position after said vehicle has driven through said gate, and without requirement for further action by the vehicle driver,
- a second operating station provided on the side of said gate element remote from said first-mentioned operating station,
  - said second operating station being on the other side of said roadway, and

mechanical connection means provided between said second operating station and said release means, said mechanical connection means extending through said hollow shaft.

2. A vehicle gate assembly, which comprises:

a gate element,

means to mount said gate element for pivotal movement about a horizontal axis,

said horizontal axis being disposed at an elevation near that of the surface of the roadway over which said gate element is mounted,

means to bias said gate element toward an upright road-blocking position,

whereby said gate element is in said upright road-blocking position at all times except while a vehicle is driven thereagainst and thereover,

an operating station disposed at one side of said roadway and spaced from said gate element,

said operating station comprising an elongated movable actuating element, an elongated slide element mounted in fixed relationship parallel to said actuating element, and a plurality of tabs slidably mounted on said slide element,

said tabs having overlapping portions which are apertured to receive padlocks,

said tabs being adapted to prevent movement of said actuating element when all of said tabs are connected together in series relationship by said padlocks, but to permit movement of said actuating element when any one padlock is removed,

the location of said operating station being such that it is accessible to a driver sitting in the driver's seat of a vehicle which is stopped on said roadway adjacent said gate element,

latch means to latch said gate element in said upright position, and

means operable from said operating station and responsive to movement of said actuating element to release said latch means and thus said gate element and thereby permit said vehicle to be driven against and over said gate element,

said release means, said latch means and said bias means cooperating with each other to effect relatching of said gate element in upright road-blocking position after said vehicle has driven through the gate, and without requirement for further action by the vehicle driver.

3. A self-closing and self-locking vehicle gate assembly, which comprises:

an elongated shaft,

bearing means to rotatably mount said shaft in a horizontal position parallel to and adjacent the surface of a vehicle roadway,

a gate rigidly connected to said shaft and normally extending vertically upwardly therefrom,

a first lock station disposed on one side of said gate and on one side of said roadway,

a second lock station disposed on the other side of said gate and on the other side of said roadway,

both of said lock stations being so disposed as to be accessible to the driver of a vehicle while he is sitting in the driver's seat of said vehicle and said vehicle is stopped adjacent and facing said gate,

means to bias said gate toward vertically-upwardly extending position,

a latching assembly normally adapted to prevent rotation of said shaft and of said gate when said gate is in said vertically-upwardly extending position,

said latching assembly comprising a first element fixedly mounted on said shaft at one end portion thereof,

said latching assembly also comprising a second element mounted generally above said first element for movement in generally upward and downward directions,

said second element when in a downwardly-shifted latching position being adapted to prevent rotation of said first element and thus of said shaft and said gate,

said second element when in an upwardly-shifted nonlatching position being adapted to permit rotation of said first element and of said shaft and gate,

lift means movably mounted under said second element and adapted when moved from one position to another position to shift said second element to said upwardly-shifted position,

first mechanical connector means extending from said lift means to said first lock station, and adapted when actuated by the vehicle driver to move said lift means from said one position to said other position, and

second mechanical connector means extending from said lift means to said second lock station, and adapted when actuated by said vehicle driver to move said lift means from said one position to said other position.

4. The invention as claimed in claim 3, in which selective locking means are provided at both of said lock stations, in which the selective locking means at one of said lock stations must be unlocked before the mechanical connector means at such station may be actuated, and in which such selective locking means at said one lock station may be relocked, after the vehicle has been driven against the gate to pivot it away from vertically-upwardly extending position, witout locking said latching assembly and preventing additional pivotal movement of the gate.

5. The invention as claimed in claim 4, in which means other than said lift means are provided to maintain said second latching element in an upwardly-shifted nonlatching position after said gate has pivoted away from vertically-upwardly extending position, and after said lift means has disengaged said second latching element, such means for maintaining said second latching element in an upwardly-shifted nonlatching position being adapted to permit said second latching element to shift downwardly to said downwardly-shifted latching position after said gate swings back to said vertically-upwardly extending position.

6. The invention as claimed in claim 3, in which said shaft is hollow, and in which said first mechanical connector means has a portion which extends through said hollow shaft.

7. The invention as claimed in claim 3, in which each of said lock stations includes padlock means to prevent movement of the associated mechanical connector means until after the padlock means in unlocked.

8. The invention as claimed in claim 3, in which means are provided to constrain said second latching element to insure that it moves only along a predetermined path.

9. The invention as claimed in claim 3, in which damper means are provided to cause said gate to pivot relatively slowly, said damper means being connected at one end to an element fixed to said shaft, and at the other end to a fixed support.

10. The invention as claimed in claim 3, in which housing means are provided to enclose said latching assembly and prevent tampering therewith.

* * * * *