Feb. 2, 1954 P. S. JOHNSON 2,668,052

MAXIMUM SECURITY DOOR

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Fig. 1.

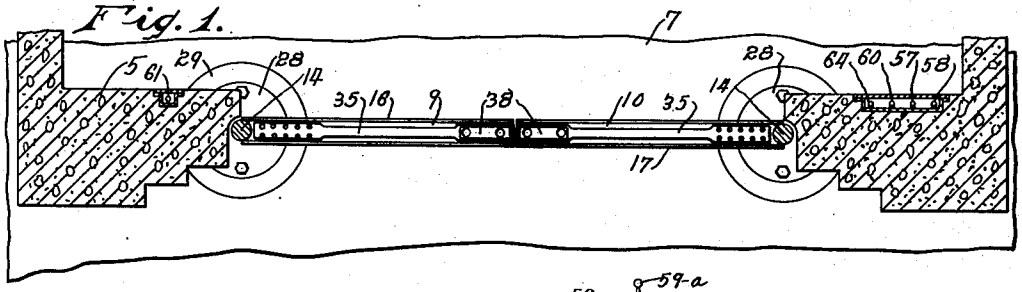
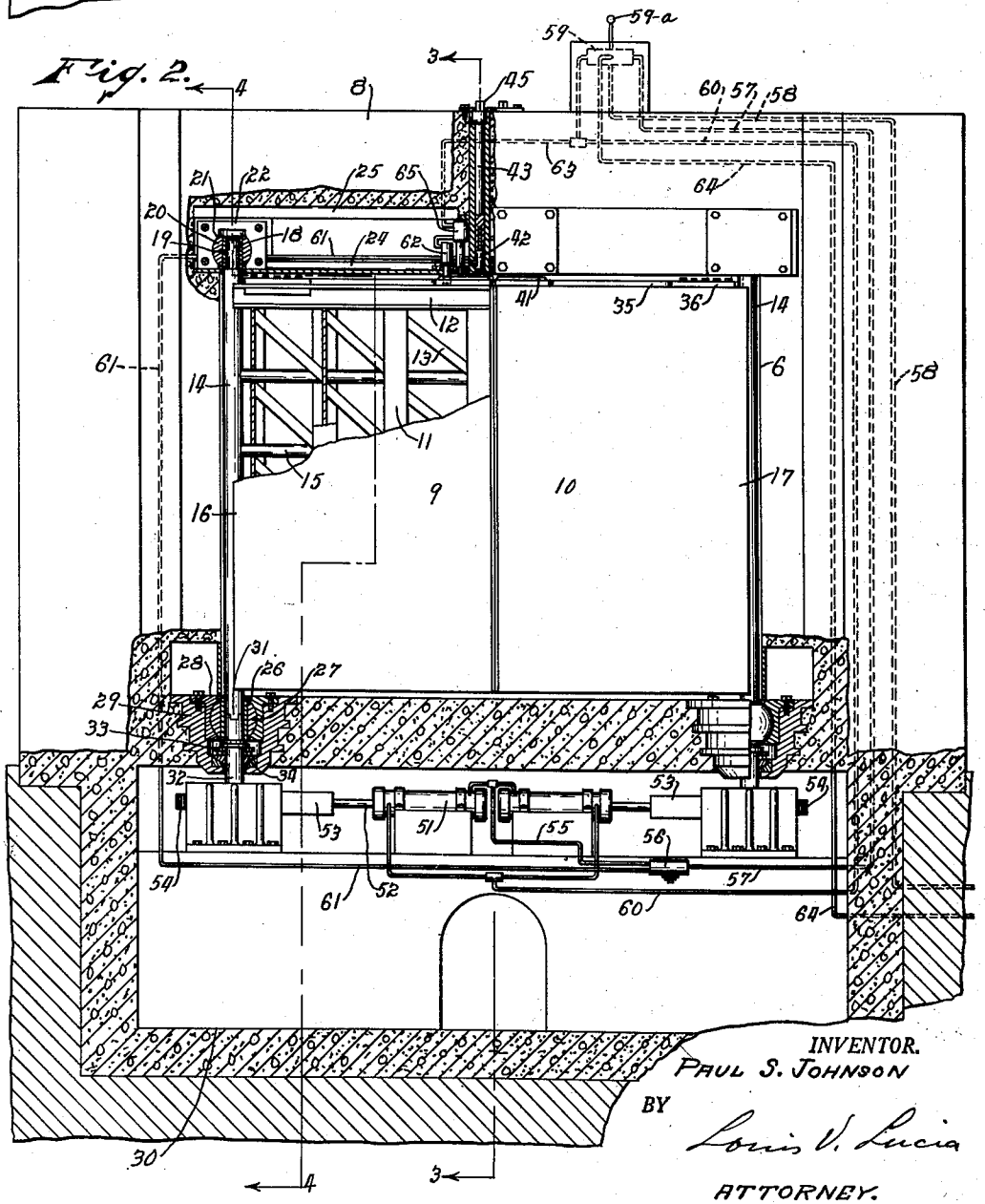


Fig. 2.



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Fig. 3.

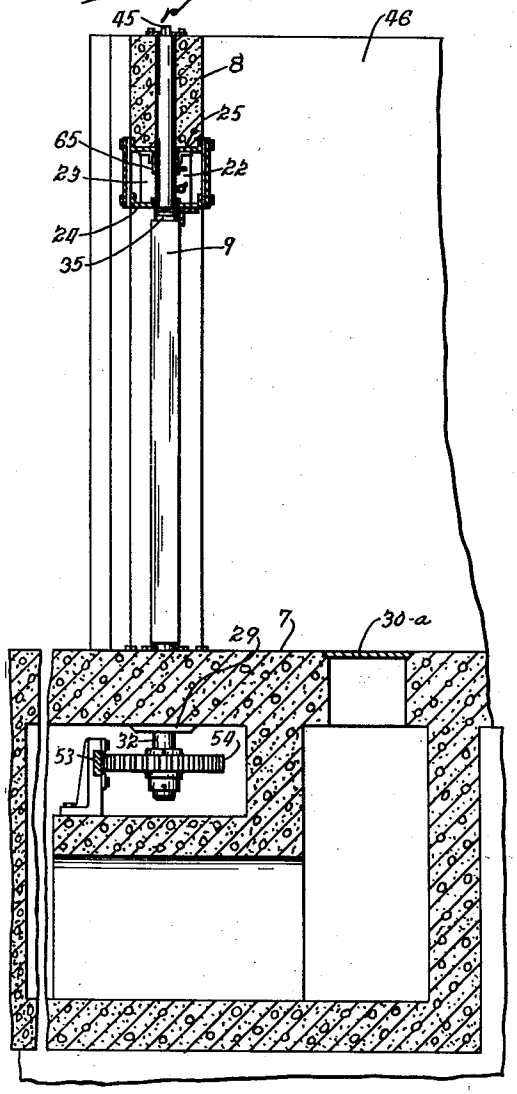


Fig. 4.

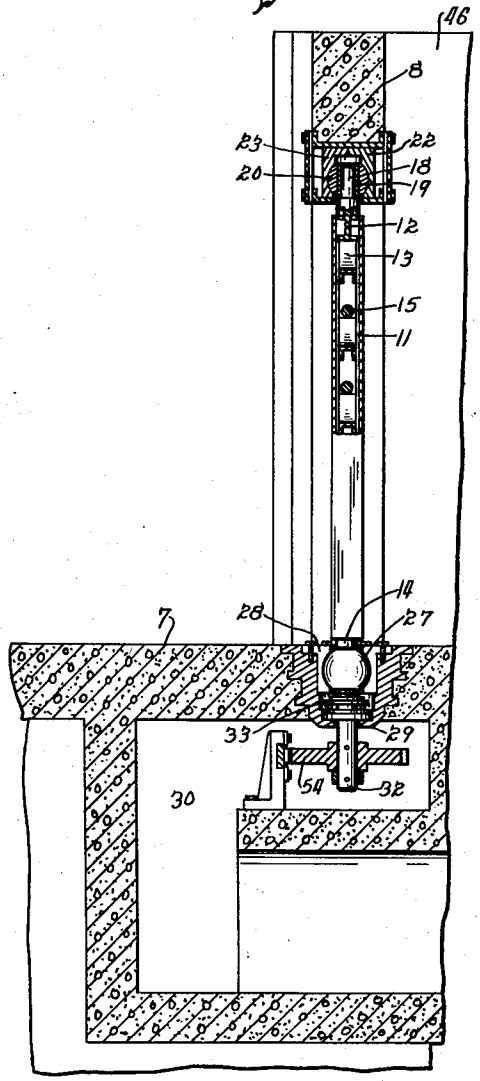


Fig. 5.

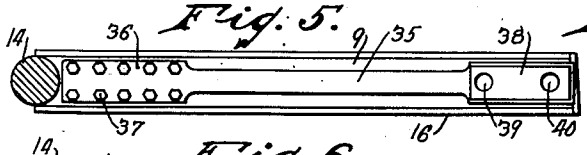


Fig. 6.

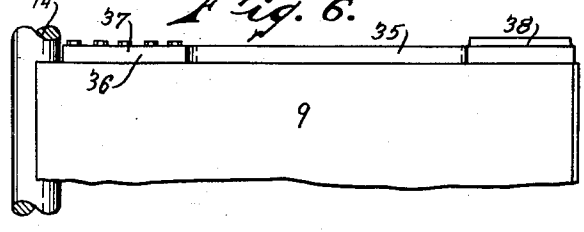
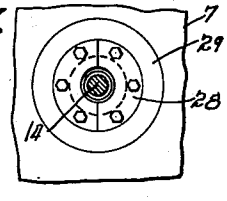


Fig. 7.



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Fig. 8.

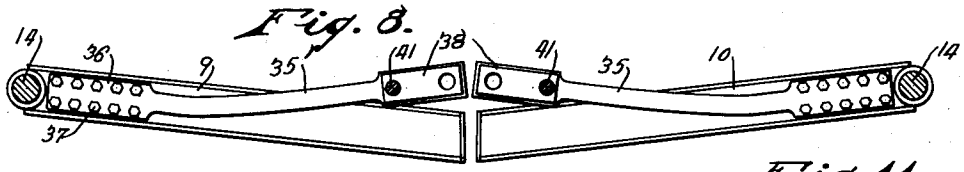


Fig. 9.

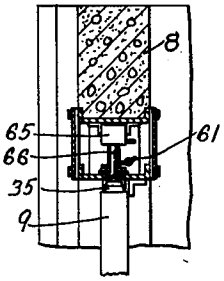


Fig. 10.

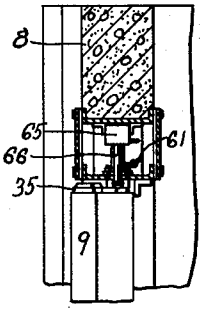


Fig. 11.

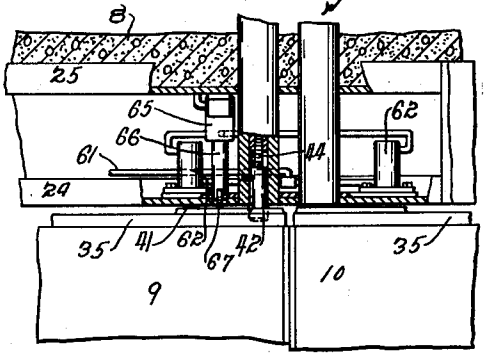
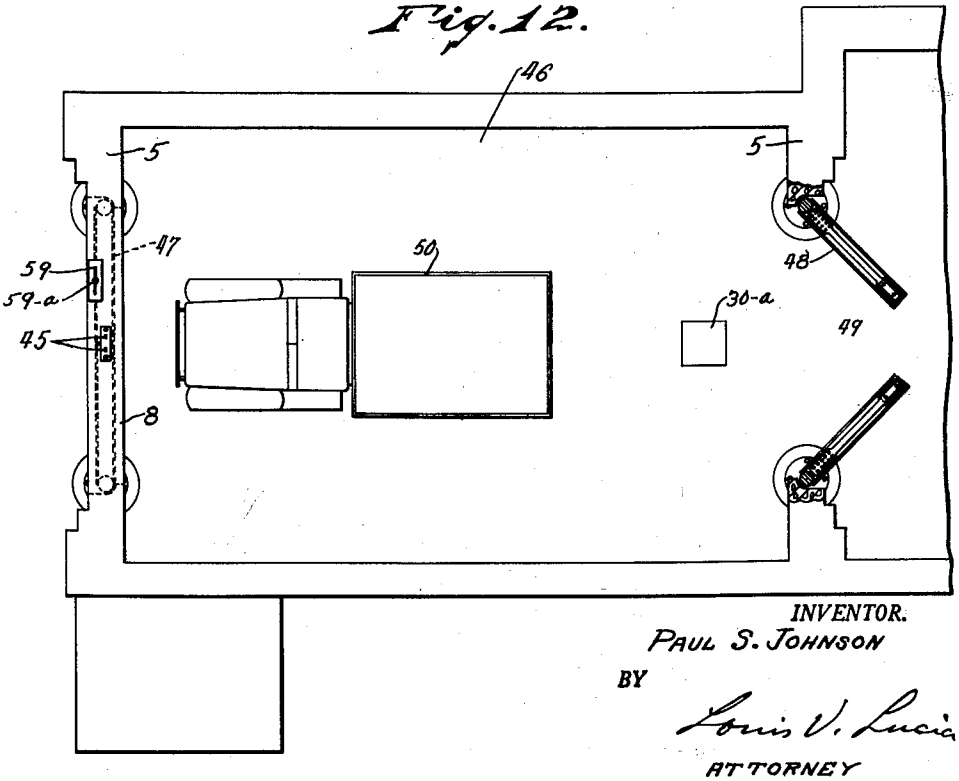


Fig. 12.



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UNITED STATES PATENT OFFICE

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MAXIMUM SECURITY DOOR

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Application January 13, 1950, Serial No. 138,295

4 Claims. (Cl. 268—64)

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This invention relates to a maximum security door and more particularly to crash resistant doors such as are primarily intended for prison gates and the like and which are adapted to resist attempts to force said doors open by crashing through them with a truck or other similar vehicle.

It is an object of this invention to provide a door which will very effectively resist crashing without damage thereto.

It is a further object to provide a door which is yieldingly retained in locked position so that it will yield a certain extent to an attempted crash without damage and without opening sufficiently to permit passage therethrough.

A further object is to provide a system for operating said door from a remote position.

A still further object of this invention is to provide a system of gates including a pair of such doors at opposite ends of a passageway, and mechanism for jointly operating said doors to control traffic through said passageway.

Further objects and advantages of this invention will be more clearly understood from the following description and from the accompanying drawings in which:

Fig. 1 is a plan view showing a pair of my improved doors mounted in an entrance; the walls of said entrance being shown in section.

Fig. 2 is a front view of said entrance and doors with parts thereof being shown in vertical section.

Fig. 3 is a sectional side view of the door and entrance structure, on line 3—3 of Fig. 2.

Fig. 4 is a similar view on line 4—4 of Fig. 2.

Fig. 5 is an enlarged plan view of one of the doors.

Fig. 6 is a front view of the upper portion of said door.

Fig. 7 is a plan view of the main bearing for my improved door.

Fig. 8 is a plan view illustrating the operation of my improved door when resisting a forceful attempt to open it by a crash or otherwise.

Fig. 9 is a fragmentary side view, partly in section, showing the control for the automatic locking mechanism for my improved door.

Fig. 10 is a similar view showing said control in a different position.

Fig. 11 is an enlarged view, partly in section, illustrating the mechanism for locking a pair of my improved doors.

Fig. 12 is a plan view, partly in section, showing a passage way with a pair of my improved doors at each end thereof to control the traffic therethrough.

In the embodiment of my invention as illustrated in the drawings, the numeral 5 denotes the wall of a building or passageway having an opening 6 therein in which are contained my improved doors; the said opening being bounded by a floor 7 and an overlying bridge 8.

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My invention provides an improved door of which there is shown a pair including left and right doors 9 and 10, respectively, which are combined within the opening 6 and operated by a control system to be hereinafter described.

Each of the said doors is of heavy duty construction and preferably of a structure comprising a frame which includes a plurality of vertical I beams 11 that are welded to upper and lower beams 12 and braced by channel bars 13. The said door also includes a vertical hinge post 14 and intermediate horizontal bars 15 which extend transversely through the vertical I beams and abut the post 14 with their ends joined thereto so as to reinforce said post and the door. Surface plates 16 and 17 are suitably secured to the opposite sides of the said frame and are constructed of heavy sheet metal to provide a strong crash resistant covering for the door.

The hinge post 14 extends for a distance beyond the top and bottom of the door and provides strong and durable projections for hinging the door within the opening 6. As shown in Fig. 2, the upper end of the post 14 projects above the top of the door and has a reduced portion 18 which is received within a sleeve 19 that is contained in a spherical member 20 positioned in a conforming recess 21 provided between two opposed bearing sections 22 and 23 that are bolted together and secured to a vertically spaced horizontal beam 24 in the bridge 8 and directly adjacent to the top of the opening 6. A similar beam 25 is provided above the beam 24 to provide a chamber for the various parts of the doors and their operating mechanism.

The lower end of the hinge post 14 projects below the bottom of the door into a sleeve 26 which is mounted in a spherical member 27 that is contained in a conforming recess in a two-piece bearing 28. This bearing 28 is secured to a bearing housing 29 which is imbedded in the concrete forming the floor 7 and the foundation for the walls 5. The bottom portion of the said housing extends through the said floor into a chamber 30 which contains a portion of the hydraulic equipment for operating said doors and which has an entrance at 30-*a*.

The said lower end of the hinge post 14 has a tongue 31 which extends into a corresponding groove in the end of an operating shaft 32 that also projects into the sleeve 26. The said operating shaft 32 is provided with a flange that abuts a bearing ring 33 which rests upon bearing balls that roll on a lower bearing ring 34. The said rings 33 and 34, together with the bearing balls, provide a thrust bearing which supports the individual door within the opening 6. The upper bearing for the projecting end portion 18 of the hinge post retains the door in vertical position within the gate opening and in true alignment with the opposite door therein.

My invention is particularly directed to the

provision of suitable means for preventing damage to the door in the event of an attempted crash that is intended to force the said doors open by crashing thereinto with a truck or the like. I have, therefore, provided, at the top of each door, a yielding member, preferably in the form of a heavy spring 35 having an anchoring portion 36 by means of which it is secured, with suitable bolts 37, to the upper edge of the door adjacent to the hinge post 14. The opposite end of said spring member has a locking portion 38 with locking recesses 39 and 40 therein for receiving locking bolts 41 and 42 respectively to retain the door in locked position.

Each of the doors in a pair are constructed alike with the exception that they are made left and right so that they may be hinged at opposite sides of the opening 6, as clearly illustrated in Fig. 4.

Each of the said doors may be manually locked by means of the locking bolts 42 which are manually controlled by an operating bar 43 which engages a threaded stem 44 on the bolt 42 and has a head 45 adapted to receive a suitable key, preferably in the form of a crank, for rotating said bar to raise and lower the locking bolt 42.

In the operation for manually opening said doors from a locked position, each of the bolts 42 are first raised to disengage them from their respective recess 40 in the spring member 35. The doors may then be pushed open.

When it is again desired to lock the doors, they are closed and the bars 43 are rotated to lower the locking bolts 42 into their respective locking recesses 40 and thereby lock each of the spring members 35, and their respective doors, in closed position.

Should an attempt be made to force the doors open when they are in a closed position, such as by crashing into them with a truck or other heavy ramming means, the spring members 35 will yield to a predetermined extent and permit the doors to spring for a slight distance, as illustrated in Fig. 8, and thereby yieldingly resist the thrust of the attempted crash so that the shock of the crash may be absorbed by the movement of the doors and thus prevent serious damage to the doors. Should the crash be so violent that the doors are damaged to the extent that one or both of the hinge posts 14 become bent, the irregularity or misalignment between the top and bottom end portions of the said hinge post in their respective bearings will be accommodated by the spherical bearing members 20 and 28 which will merely turn in their sockets and thereby prevent jamming of the doors due to the bent posts which would otherwise prevent the doors from being opened after such an attempt to crash them.

It will be understood from the above description that the spring members 35 are sufficiently rigid to prevent the doors from being forced open to a position where passage between the doors will be permitted and that the said spring members will act to yield, upon impact with the doors, until the said impact is absorbed and then spring back towards their normal position so as to return the doors to their fully closed position. It has been found that, by reason of the said spring members 35, the doors are enabled to resist, without damage thereto, a much heavier impact than they could resist if they were rigidly locked, such as by direct engagement between the locking bolt and the door.

As shown in Fig. 12, the said doors may be arranged at opposite ends of a passageway 46 and may include an outer pair of doors 47, for an outer entrance, and an inner pair 48 for the inner entrance 49 to a building, such as a prison or the like; the passageway 46 being of sufficient size to receive a vehicle, such as the truck indicated at 50, which is shown in said passageway as it is leaving the building. In this arrangement, wherein two pairs of doors are used in spaced positions, a truck, upon entering the building, first enters through the outer gate, between the doors 47 and waits in the passageway until the outer doors have been closed. The inner doors 48 are then opened. Upon leaving the building, the inner doors are first opened, the truck enters the passageway, the inner doors are then closed and the outer doors are opened to permit the truck to pass. While the truck or other vehicle is in the passageway 46, it may be inspected for contraband as well as to insure that no prisoners are attempting to escape.

The said doors are preferably operated by a system which may be controlled from a remote position and this is particularly preferred when the doors are mounted in spaced apart positions, such as illustrated in Fig. 12. This operating system may be either electrical or hydraulic and such a hydraulic system is illustrated in the drawings and preferably comprises a cylinder 51 which contains a piston that operates a plunger 52 that is connected to a slidable rack 53 which meshes with a gear 54 that is secured to the end of the shaft 32 and thereby permits rotation of the hinge post 14 for the operation of opening and closing the door. It will be noted that the cylinders 51 for each of the doors are connected to a common conductor 55 which is in turn connected to a conventional sequence valve 56 that is connected to a conductor 57, a hydraulic pressure supply conductor 58 which extends through a control valve 59 that is preferably mounted upon the bridge 8. The opposite ends of the said cylinders are connected to a common conductor 60 which is also connected to the supply conductor 58 through the valve 59.

This hydraulic system further includes the hydraulically operated locking bolt 41 which is connected to the system and the supply conductor 58 by means of a conductor 61 that extends from the sequence valve 56 to the bottom of the cylinder 62 that operates the locking bolt 41. The top of the cylinder 62 is supplied by the valve 59 through a conductor 63.

The said hydraulic system also includes a return pipe 64 which connects with the valve 59 and through it with a storage reservoir from which the liquid used in said system is taken.

In the arrangement of my improved gates as illustrated in Fig. 12, the doors at both ends of the passageway 46 are connected to the hydraulic system so that they may be operated from a remote position by means of the control valve 59 which is preferably located upon the bridge 8. With this arrangement, an operator, can take his position upon the bridge 8 so that he may have a clear view of the vehicles that are to pass into the passageway 46 and, by manipulating the handle 59–*a* of the valve, he may control the gates.

The hydraulic operated locking bolts 41 are also controlled by means of a valve 65 which causes the locking bolts to remain in unlocked position while the doors are open and to move to locking position when the doors are fully closed.

In the operation of said system for controlling the doors, an operator, who may be a prison

guard or other authorized person, stands upon the bridge 8 and manipulates the handle 59–*a* of the control valve 59. When the doors are to be operated to permit the passage of a vehicle in leaving the building, the operator standing on the bridge of the inner doors will simply move the handle 59–*a* to the respective position. This will permit the hydraulic pressure to move from the conductor 58 through said valve and then into the conductor 57 and the sequence valve 56, which at this time is conditioned to permit the pressure to first pass through the conductor 61 into the lower end of the cylinder 62 for each door. This will cause the pressure to raise the locking bolts 41 and unlock both doors.

When the said locking bolts 41 are moved to raised position, the return valve 65 is open due to the plunger 66 thereof being in raised position by reason of the contact of a roller 67 on said plunger with the top surface of the spring bar 35. This permits the hydraulic liquid, which is contained in the cylinder 62 above the piston that operates the locking bolt 41, to pass out through the conductor 63, the valve 59 and the conductor 64, into the liquid reservoir.

After the locking bolt 41 of each door has moved to unlocked position, the pressure in the sequence valve 56 will build up to a point where the said valve will open and permit the pressure to pass through the conductor 55 into each of the cylinders 51 and thereby cause operation of the racks 53 to rotate the gears 54 in opposite directions and thereby swing the doors to open position.

When the vehicle has entered the passage 46 and the doors are to be closed behind it, the operator moves the control lever 59–*a* to the respective position for the closing operation of the system. This permits the pressure from the conductor 58 to pass through the control valve into the conductor 60 and enter into the opposite end of the cylinders 51 and thereby operate the gears 54 in the opposite direction so as to close the door. As the doors reach their fully closed position, the upper surface of the spring member 35 will engage the roller 67 and force the plunger of the valve 65 upwardly and permit said valve to open. The pressure will then pass through said valve and into the cylinders 62 and force the locking bolts 41 into their respective recesses 39, which are now in position to receive said bolts 41, and thereby lock the doors. It will be noted, therefore, that the valve 65 will cause the bolts 41 to remain in their raised position until the doors are fully closed and thereby prevent the said bolts from accidentally interfering with the closing of the doors.

It will also be noted that when the valve 59 is opened to cause closing of the doors, the liquid present in the cylinders 51 will be forced out through the conductors 55 and 57, the valve 59, and through the return conductor 64 into the liquid reservoir.

After the said doors have been closed, the vehicle may be inspected and then permitted to pass out through the outer doors by operating the said outer doors in the same manner as above described for the inner doors.

It will be understood that, in the embodiment illustrated, the inner and outer doors at the ends of the passage 46 are operated independently by persons standing upon the bridge of each gate and operating the valve 59. If desired, however, both sets of doors may be interconnected within the same hydraulic system so that they can be operated from a single position.

My improved crash resistant doors, and associated parts, are preferably constructed of steel so as to insure complete rigidity and prevent fracture of the door elements when subjected to a crash load.

I claim:

1. In a gate including a door, hinge means for hinging said door for swinging movement on a vertical axis within an opening in said gate and a locking bolt projecting into said opening; a flexible spring bar secured by an end portion thereof to the edge of said door and adjacent to said axis and extending along said edge, the said spring bar having a recess spaced from said end portion and adapted to receive said locking bolt for yieldingly locking the door in closed position.

2. In a gate for an opening including a door hinged at one side thereof for swinging movement within said opening; a yieldable bar secured by an end portion thereof to the top edge of said door adjacent to the hinged side of the door and running along said edge, the said bar having a recess therein spaced from the said end portion, and a locking bolt positioned adjacent to said opening and adapted to be projected into said recess to thereby yieldingly lock the door in closed position within the recess.

3. In a gate comprising a wall having an opening therein, the combination of a door hingedly mounted for opening and closing said opening, a spring bar secured adjacent to the hinged side of said door and running along the top edge of the door towards the opposite side thereof, a locking bolt engageable with said spring bar at a position adjacent to said opposite side of the door and yieldingly locking the door in a closed position, and cooperating means for moving said bolt to locked and unlocked positions and opening and closing said door.

4. In a gate having an opening therein, a door hingedly mounted within said opening, a locking bolt adapted to engage said door when moved to locking position, pressure means for moving the bolt into locking position and a manually operable valve for controlling the application of said pressure for the operation of said bolt; and a separate intermediate valve for controlling said pressure to prevent the operation of the locking bolt while the door is in its open position.

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References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
650,036	Corbin et al.	May 22, 1900
703,372	Beisel	July 1, 1902
842,668	Huey	Jan. 29, 1907
899,323	Richardson	Sept. 22, 1908
1,002,028	Brown	Aug. 29, 1911
1,002,195	Brown	Aug. 29, 1911
1,022,684	Kleinbaum	Apr. 9, 1912
1,438,233	Hammann	Dec. 12, 1922
1,555,174	Williams	Sept. 29, 1925
1,626,834	Hull	May 3, 1927
1,636,697	Larson et al.	July 26, 1927
1,674,662	Rowntree	June 26, 1928
1,868,149	Nunez	July 19, 1932
1,920,868	Kirk	Aug. 1, 1933
2,219,344	Taylor	Oct. 29, 1940
2,558,867	May et al.	July 3, 1951