



Escape Door In Rail Gate

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Abstract—Accidents at level cross occurring are always a regular incident both in India and also around the world. Trapping of vehicle in between the rail gates are the most among them. The accidents seem to be more occurring at automatic rather than manned level crosses. Here arose the need of an escape method to protect the man, vehicle as well as the train. For this an “Escape Door” is made installed in the rail gate which allows the one directional travel possible for the vehicles which are caught inside. If a vehicle is trapped between the two rail gates, the vehicle could easily push and make its way forward through the “Escape Door” there by escaping from the accident that could have occurred if not. The specialty of this new design is the low cost, simple structure and lifesaving operation done by it. This “Escape Door” in rail gates will surely decrease the number of accidents occurring due to trapping of vehicle between the rail gates. This will be for sure a commercial product that could be installed worldwide.

Index Terms—Escape Door, Spring, Rail Gate, Rubber Bush.

I. INTRODUCTION

Accidents at level cross occurring are always a regular incident both in India and also around the world. Even though we could see the decrease in number of occurrence of accidents in course of time there are still numerous number of accidents takes place even now. Continuous research is conducted in order to improve the safety at rail gates.

Accidents at the Rail-Road Interface are a global problem and each region should try to tackle the ways of occurrence of accidents in trains. Some steps like educating the people and providing awareness could help in decrease accidents up to a level. But by improving the safety measures we could surely avoid the loss of human resource.

Trapping of vehicle in between the rail gates are the most among them. This result in the loss of life of those people travelling in the vehicle and if no rescue actions are taken in the correct time the accident will grow up to a disaster. Then the need of a sudden escape is needed in order to eliminate the upcoming accident.

The accidents seem to be more occurring at automatic rather than manned level crosses. Sometimes even in manned rail gate also, there occurs accidents due to the trapping of vehicles between the rail gates. For re-opening the rail gate some time delay will occur, which makes the situation crucial for the people travelling in it.

Here arose the need of an escape method to protect the man, vehicle as well as the train. Because, we cannot neglect the value of a life even if it is in case of one person. When trapped between the rail gates the only option to the people travelling in the vehicle in the current scenario is to leave the vehicle behind and run for one's life.

But now-a-days the standardized automatic lock in vehicles like cars makes the situation more badly. In this condition the door of the vehicle will not open when the engine is in ON position. In this sudden situation, there is chance of sudden panic and one won't be able to open the door, which intern makes them face the accident.

As a remedial solution for this an “Escape Door” is made installed in the rail gate which allows the one directional travel possible for the vehicle which is caught inside. If a vehicle is trapped between the two rail gates, the vehicle could easily push and make its way forward through the “Escape Door” there by escaping from the accident that could have occurred if not. The specialty of this new design is the low cost, simple structure and lifesaving operation done by it. This “Escape Door” in rail gates will ensure the decrease the number of accidents occurring due to trapping of vehicle between the rail gates.

Another main problem in this situation is the lack of time availability. Only a limited time is provided by this situation to take the sudden and necessary action. The public would not try to help the people due to the possibility of high risk.

This Escape Door is mainly designed to suit the needs of the future. It is sure that all over the world automatic rail gates will be installed in the near future itself by using sensors or other advanced techniques. The automatic rail gate is sure to be an unmanned level cross. Here the chance of trapping of the vehicle in between the two rail gates is not negligible for sure. So the Escape Door will be a great need for the automatic rail gates.

Another main factor which is saved by the Escape Door is nothing but the time itself. The modern world has less time to waste by waiting in front of the rail gates. But in the present condition the rail gate is sure to be closed at least five minutes before arrival of train to eliminate tapping of train inside. By installing the Escape Door in rail gates the time for waiting could be decreased to a great level.



STUDY OF SUBJECT

India is a thickly populated country with increasing demand for transportation, both rail and road traffic is continuously increasing. This has necessitated construction of very large number of level crossings on railway track. Due to astronomical number of level crossings in our country, it has not been possible to man each and every level crossing. Therefore, we have both manned as well as unmanned level crossings.

COMMON PROBLEMS AT LEVEL CROSSINGS

Uneven road surface: Road at level crossings are generally found uneven or broken due to traffic density and due to over hauling of level crossings and also for track maintenance at level crossings. In manned level crossing, proper attention is not being given for levelling of road and providing proper slope causing inconvenience to road users. Hence, the proper attention for the same should be adhered to. The uneven or broken surface of road should be levelled as early as possible. And patch work should be done immediately, so that the road surface can be made levelled and smooth.

Low life of paints at speed breakers: Paint at speed breakers get faded with the time and due to the road vehicles. Paint of speed breakers should be regularly painted with luminous paint having more durability. As far as luminous strip and luminous paint are concerned, for speed breakers sign boards, whistle boards and stop boards etc. the luminous strip are more effective rather than luminous paint as it is just a like a pre-cast concrete which cannot be deteriorated immediately.

Inadequate visibility: Un-manned level crossings are more prone to accidents which can be avoided by maintaining proper visibility. In India a number of level crossings are not having adequate visibility and even then the adequate speed restriction has not been imposed. It is very serious matter. Visibility of many level crossings can be improved by relocation and slight diversion of road in consultation with road authorities.

Difference in level between check rail and running rail: At level crossings, in most of the cases there is difference of level between check rail and running rail resulting in inconvenience to the road users. Hence, proper attention should be made at the time of overhauling of level crossing by providing proper sleepers underneath the rails.

Fencings: Sometimes fencing along the level crossings gets damaged, so it becomes unsafe. If fencing is found broken, it should be immediately attended. Gates and locks are not working properly; there should be arrangement of spare chain in case of emergency.

The escape door is the future of all rail gates. In the nearby future it is also sure that automatic unmanned rail gates will take the place. So study on automatic railway crossing system is necessary.

INTRODUCTION OF AUTOMATED RAIL GATE

In an Automatic Rail Gate, when train arrives at the sensing point alarm is triggered at the railway crossing point so that the people get intimation that gate is going to be closed. Then the control system activates and closes the gate on either side of the track once the train crosses the other end control system automatically lifts the gate. For mechanical operation of the gates 1.8 steep angle stepper motors are employed. Here we are using embedded controller built around the 8051 family (AT89C52) for the control according to the data pattern produced at the input port of the micro controller, the appropriate selected action will be taken.

The logic is produced by the program written in Embedded C language. The software program is written, by using the KEIL micro vision environment. The program written is then converted in HEX code after simulation and burned on to microcontroller using FLASH micro vision. Managing the control system of railway gate is done by using the microcontroller.

This provides the installation of an automatic railway gate at a level crossing replacing the gates operated by the gatekeeper. It deals with two things. Firstly, it deals with the reduction of time for which the gate is being kept closed. Secondly, to provide safety to the road users by reducing the accidents.

By the presently existing system once the train leaves the station, the stationmaster informs the gatekeeper about the arrival of the train through the telephone. Once the gatekeeper receives the information, he closes the gate depending on the timing at which the train arrives. Hence, if the train is late due to certain reasons, then gate remain closed for a long time causing traffic near the gates.

By installing the automatic railway gate control at the level crossing the arrival of the train is detected by the sensor placed near to the gate. Hence, the time for which it is closed is less compared to the manually operated gates and also reduces the human labour.

This type of gates can be employed in an unmanned level crossing where the chances of accidents are higher and reliable operation is required. Since, the operation is automatic; error due to manual operation is prevented. Automatic railway gate control is highly economical microcontroller based arrangement, designed for use in almost all the unmanned level crossings in the country.



PROPOSED METHODOLOGY

PRINCIPLE USED

A one directional door is made installed in the Rail Gate which allows the escaping of vehicles that are trapped inside, thereby avoiding the occurrence of accident.

A spring allows the re-closing of the escape door possible and a Directional Control Rod allows only one direction travel of vehicle through Escape Door.

PARTS OF AN ESCAPE GATE

The five major parts that of an Escape Door are namely:

1. Base Frame
2. Rubber Bush
3. Spring
4. Direction Control Rod

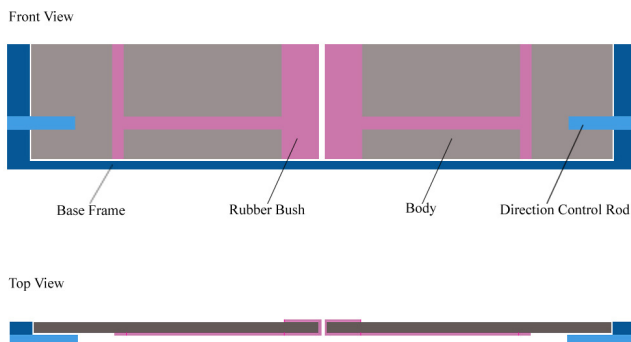


FIG-01

Base Frame: A base frame is the one which holds the whole arrangement as together as one complete functional one. This is used to raise and down as if in a rail gate.

Rubber Bush: A layer of rubber bush is made installed in the Escape Door to eliminate the chance of formation of scratches or damages to the vehicle.

Spring: The springs are made installed in order to make the Escape Door close automatically after the escape of the vehicle.

Direction Control Rod: The Direction Control Rod only facilitates the vehicle to move only in one direction. Only trapped vehicles could push their way out through this escape gate.

STAGES OF OPERATION

There exist three stages in the operation of Escape Door in Rail Gate. They are:

Stage 01: Vehicle is trapped between the gates.

Stage 02: Moves Forward to push open the escape door.

Stage 03: Escape of Vehicle is followed by closing of Spring loaded gate.

Stage 01: Vehicle is trapped between the gates.

At the initial there occurs a critical situation that a vehicle is got trapped in between the two rail gates and the train could arrive at any moment.

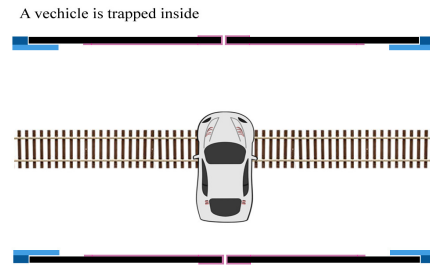


FIG-02

There is a need of sudden escape to save the life and vehicle from the upcoming situation.

Stage 02: Moves Forward to push open The Escape Door

The vehicle is made move forward and to push open the escape gate that is installed in a rail gate. The Escape gate is limited to one directional movement of vehicles. Only trapped vehicles could push their way out through this gate.

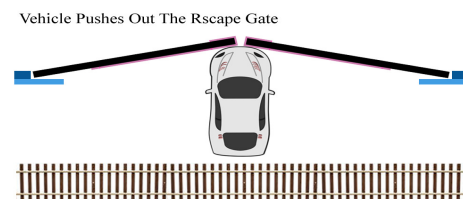


FIG-03

To avoid scratch or other defects we introduce a layer of bush at the area of contact.

Stage 03: Escape of Vehicle is followed by closing of Spring loaded gate.

The Vehicle moves forward and makes its way out through the escape gate. This avoids the chance of occurrence of an accident.

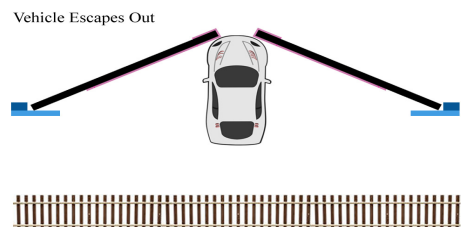


FIG-04

As soon as the vehicle escapes out, the spring attached to it makes the return of the escape door possible back to the closed position.



CONCLUSION

An Escape Door in Rail Gate will eliminate the chance of accident that could be caused by trapping of vehicles in between the two rail gates. This is a safety arrangement which will be best suitable for unmanned automatic rail gates.

This Escape Door is mainly designed to suit the needs of the future. It is sure that all over the world automatic rail gates will be installed in the near future itself by using sensors or other advanced techniques. The automatic rail gate is sure to be an unmanned level cross. Here the chance of trapping of the vehicle in between the two rail gates is not negligible for sure. So the Escape Door will be a great need for the automatic rail gates.

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