April 6, 1937. E. S. EVANS 2,075,892

RAILWAY CONTROL AUTO STOP

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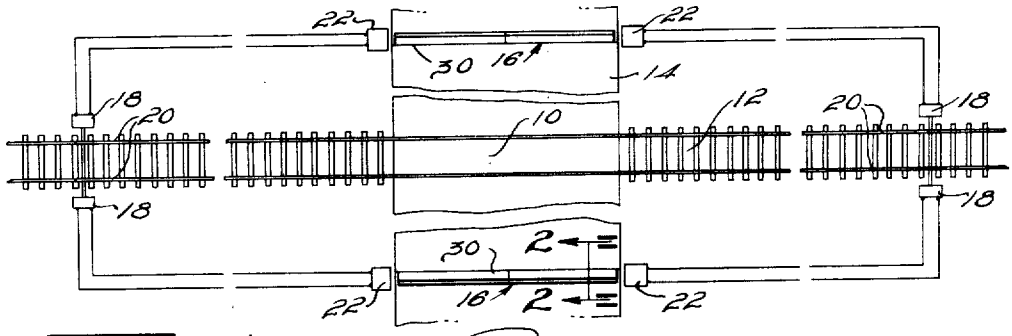


Fig. 1.

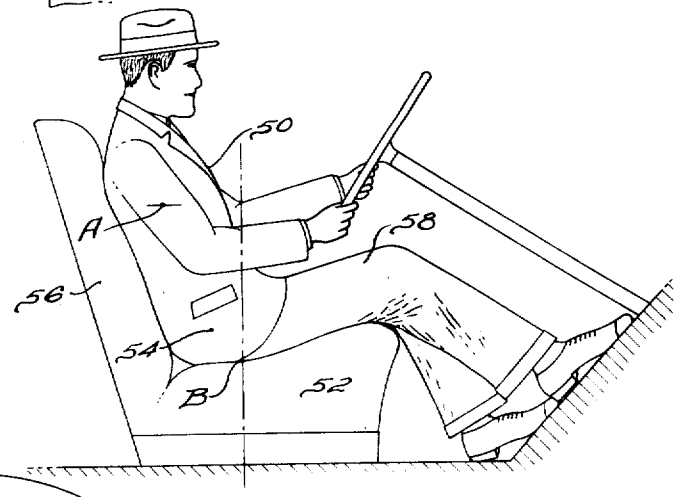


Fig. 3.

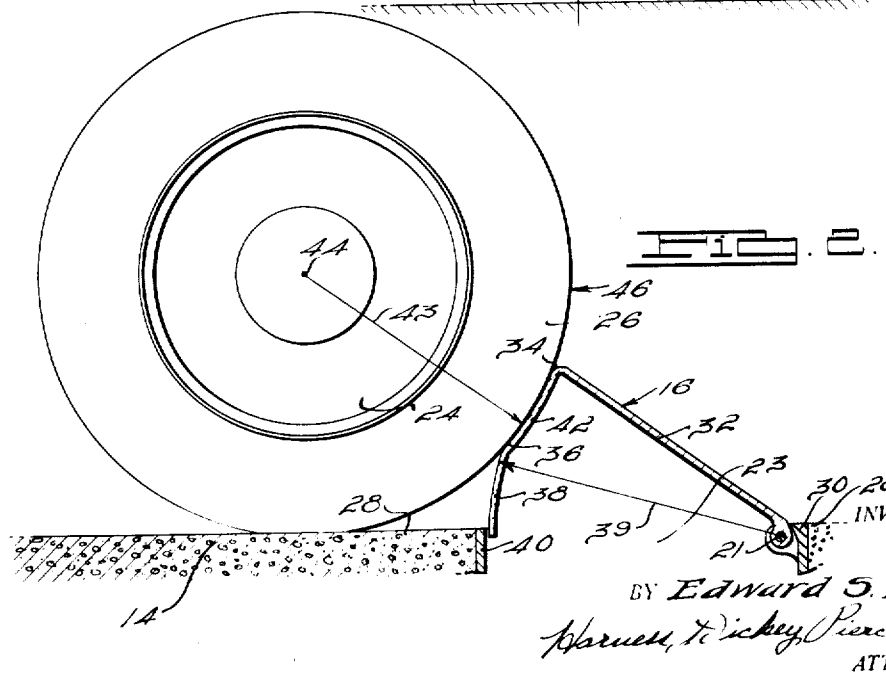


Fig. 2.

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RAILWAY CONTROL AUTO STOP

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3 Claims. (Cl. 39—6)

This invention relates to improvements in railway control auto stops, generally used at railroad and highway intersections to prevent collisions between motor vehicles using the highway and trains or other rolling stock on the railway.

The development of light trains and streamlined motor vehicles and the greatly increased speed at which they are operated makes necessary a positive railway control auto stop at crossings to protect and safeguard lives of passengers in the trains as well as occupants of the motor vehicles. The conventional warnings used at such intersections do not deter or overcome the recklessness or carelessness of drivers operating automobiles where danger of collision is present.

One of the objects of the present invention is to provide a railway control auto stop which establishes a positive barrier in the path of a motor vehicle approaching the crossing and controlled by a circuit mechanism actuated by the railroad when a train is within a predetermined distance from the highway.

Another object of the invention is to provide a barrier across the highway which will effectively stop a motor vehicle short of the collision zone with a minimum of danger of injury to the occupants and the chassis of the motor vehicle.

Another object of the invention is to provide an auto stop road barrier which saves from injury passengers in an automobile which is stopped thereby, in that the forward momentum of the passengers is counteracted or opposed by a simultaneous abrupt upward movement of the car tending to seat the passengers more firmly in the automobile seats.

In the accompanying drawing, which shows a suitable embodiment of the present invention and in which like numerals refer to like parts throughout the several views:

Fig. 1 is a broken plan view of an intersection between a railroad and highway equipped with an embodiment of the present invention as controlled by a circuit mechanism actuated by the railroad;

Fig. 2 is an enlarged cross-sectional view of the auto stop barrier taken on line 2—2 of Fig. 1, showing a conventional automobile wheel contacting the face of the barrier, and the barrier shaped so as to conform with the curvature of the tire circumference.

Fig. 3 is an elevation of a conventional seat of an automobile showing the customary position assumed by a man seated therein and illustrating how the man is supported by the seat with regard to the center of weight of the man's body above and including the hips.

Referring to the drawing in further detail and more particularly to Fig. 1, a conventional crossing 10 between a railroad 12 and a highway 14 is shown equipped with a suitable embodiment of the present invention. On each side of the highway 14, the railroad 12 is equipped with circuit mechanisms 18 actuated when a train or other uninsulated rolling stock (not shown) advances to within the warning or danger zone where it comes into contact with the rails 20. These circuit mechanisms 18 control appropriate devices 22 which raise and lower the barriers 16 in the usual and well known manner.

A preferred construction of the barrier 16, with particular regard to its cross-sectional contour, is shown in Fig. 2, where the barrier 16 is shown mounted over a pit 23 in the highway and raised to its full effective height. In addition, the relative position of a motor vehicle wheel 24 and tire 26 is shown on the highway 14 as the tread face of the tire 46 is brought into contact with the barrier 16 when driven against it.

The barrier 16 comprises an elongated member of substantially L-shaped cross-sectional contour, preferably constructed of metal. One of the legs 32 of the L-shaped barrier is of uniplanar construction which serves, among other things, as a brace member for the other leg or bumper plate 36 which in turn is disposed to face towards vehicles approaching the barrier and the railway crossing.

The barrier is mounted over a pit 23 which is of suitable construction and which extends transversely across the highway 14 at a predetermined distance from the rails 20 of the intersecting railroad 12.

The barrier 16 is pivotally mounted on the frame member 30 at spaced intervals by pins 21, one of which is shown in Fig. 2, so as to be raised and lowered in the usual manner. This pivotal mounting is so arranged that when the barrier 16 is lowered from its raised position, the uniplanar side 32 is flush with the pavement 28 to provide a bridge across the pit 23 for vehicles passing thereover.

The other side of the barrier 16, which affords a bumper for vehicles approaching the crossing, is arcuately formed on its lower portion 38 with a radius 39 centered at the pivotal axis 21 adjacent the frame member 30. This arcuately formed portion 38 of the bumper is so constructed and arranged as to provide a slidable and close relation between the outer face thereof and the

adjacent frame member 40 in order to prevent large objects of debris from slipping into the pit when the barrier is in a raised or semi-raised position.

In the preferred embodiment of the invention, the upper portion 42 of the bumper plate 36 is arcuately formed with the concavity thereof facing outward and slightly upward. The curvature of the concavity is determined by a hypothetical radius 43 which is substantially equal to and coincident with the radius of the tire tread 46 of an average motor vehicle wheel 24, so that when the tire tread 46 comes into an initial contact with the concave upper portion 42 of the barrier 16, the curvature or concavity of portion 42 will be substantially concentric with the curvature or circumference of the tire tread 46 when the barrier 16 is raised to its full height. The height of the barrier 16 when fully raised above the pavement 28 is somewhat less than the radius 43 of the tire tread 46 of the vehicle wheel 24.

The concavity of the upper portion 42 of the bumper plate 36 being so shaped and inclined, the barrier operates to oppose and overcome the force of the vehicle driven against it. That portion of the vehicle's momentum which remains uncounteracted will be expended in an abrupt upward movement of the vehicle by the wheels 24, rising or bouncing over the barrier 16. This develops a favorable ratio between the speed and abrupt upward movement of a vehicle stopped by the barrier 16. Whenever the speeds of vehicles are above a point where the barrier fails to overcome the momentum effort without causing an upward movement of the vehicle, the higher the speed the greater the force expended in upward movement. Actual tests with automobiles at speeds varying from a relatively low speed up to 50 miles per hour have proven this.

To this end the bumper plate 36 may be conformed in any manner, including a convex or straight cross-sectional configuration of a relative height and inclination sufficient to obtain substantially the same results providing the conformation is such that the force of the vehicle driven against it will not cause injury to the tires of the vehicle, nor to the chassis or running gear of the vehicle, and the motor vehicle having an excessive momentum, will be abruptly directed upward and over the barrier.

The significance of the operation of the barrier 16 and the resulting ratio between the speed of the vehicle and the force of the upward movement will be better understood when the position of an occupant in the vehicle is considered.

In Fig. 3, a man 50 is shown seated in a seat 52 of a motor vehicle in the usual manner. The center of weight of the main portion of his body, which is supported by the hips 54 and by the seat back 56, is approximately at A. The center of the vertical support rendered by the seat 52 to the man 50 is slightly anterior to the hip joint 54 and approximately at B. It may be said in explanation at this time, that the point B is anterior to the hip joint 54 due to the fact that the legs 58 and the muscle tension thereof render some support for the trunk of the body. If the vehicle were stopped suddenly, the point A would tend to advance forwardly with B as a point of pivot until further muscle tension of the legs 58 would provide a slight pivotal movement about the feet. The effect would be to throw the man almost directly forward. If the shock to the vehicle was directly upward, the point A, being posterior to the supporting point B, would tend to rotate posteriorly or rearwardly about point B and drop downwardly, if it were not for the support maintained by the seat back 56. Consequently, an upward force causing a posterior rotation of the body 50 about point B would oppose an anterior rotation caused by the momentum of the body 50 when the automobile is stopped.

This translated into the operativeness of the present invention means that a car which fails to stop short of the barrier 16 is not only slowed quickly horizontally by the barrier, but is instantaneously and abruptly thrown upward in a manner whereby the anterior rotation tendency of the body due to horizontal shock is opposed or counteracted effectively by the posterior rotation tendency induced by an upwardly directed shock to the car as cushioned by the chassis springs. The passenger remains in his customary position with only a slight jar which operates to press points A and B more securely against the adjacent seat structures 56 and 52 respectively, thereby avoiding any danger of the man 50 being injuriously jostled in a car as stopped by the barrier 16.

The present invention is particularly effective throughout all driving speeds. The ratio to the effect, that with higher speds the abrupt upward force is greater, shows a safety equalizing effect where the higher speeds cause a greater horizontal forward momentum of the occupants. Since, with the barrier 16, this greater speed or forward momentum is the index to the increased abrupt upward force to the vehicle, the posterior rotation tendency of an occupant's body caused by the upward force is increased with the speed of the vehicle and opposes and counteracts the forward momentum which likewise increases with the speed, thereby maintaining the safety factors at a norm.

The present invention is capable of being adapted to be used at other points along a highway or at highway intersections where it is desired to intermittently or otherwise control the flow of traffic, including approaches to draw bridges or the like. Consequently, although but one preferred embodiment and application of the present invention has been shown and described herein, it will be apparent that it is capable of various uses, modifications and changes and, accordingly, formal changes may be made therein without departing from the substance of the broad invention, the scope of which is commensurate with the appended claims.

What is claimed is:

1. A crossing carrier disposed to be retractably and projectably mounted across a roadway to present, when projected, an impact surface for the forward wheels of vehicles for obstructing the passage thereover of said vehicles, characterized as being sufficiently elevated above the roadway that when the forward wheels of a vehicle strike the barrier impact surface, said barrier subjects said wheels to an upward force sufficient to substantially counteact the forces due to the retardation of the vehicle tending to throw an occupant forwardly in the vehicle.

2. A crossing barrier disposed to be projectably mounted across a roadway for obstructing the passage thereover of vehicles, said barrier, when projected, having an impact surface inclined for engagement by the forward wheels of said vehicles, the height and inclination of said surface relative to a said vehicle being such that when the forward wheels of a said vehicle strike the

barrier impact surface, said barrier subjects said wheels to an upward force sufficient to substantially counteract the forces due to the vehicle retardation tending to throw an occupant forwardly in the vehicle.

3. A crossing barrier disposed to be projectably mounted across a roadway for obstructing the passage thereover of vehicles, said barrier having an outwardly presenting concave impact surface disposed, when projected, to provide an area contact surface for the forward wheels of a said vehicle, the height and inclination of said surface relative to a said vehicle being such that when the forward wheels of a said vehicle strike the barrier impact surface, said barrier subjects said wheels to an upward force sufficient to substantially counteract the forces due to the vehicle retardation tending to throw an occupant forwardly in the vehicle.

EDWARD S. EVANS.

CERTIFICATE OF CORRECTION.

Patent No. 2,075,892. April 6, 1937.

EDWARD S. EVANS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 56, claim 1, for the word "carrier" read barrier; and line 65, same claim, for "counteact" read counteract; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of May, A. D. 1937.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.

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3. A crossing barrier disposed to be projectably mounted across a roadway for obstructing the passage thereover of vehicles, said barrier having an outwardly presenting concave impact surface disposed, when projected, to provide an area contact surface for the forward wheels of a said vehicle, the height and inclination of said surface relative to a said vehicle being such that when the forward wheels of a said vehicle strike the barrier impact surface, said barrier subjects said wheels to an upward force sufficient to substantially counteract the forces due to the vehicle retardation tending to throw an occupant forwardly in the vehicle.

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