Nov. 24, 1931. C. BURNETT 1,833,354

SAFETY CROSSING FOR HIGHWAY AND TRACKWAY INTERSECTIONS

Filed Aug. 15, 1930 2 Sheets-Sheet 1

Fig.1.

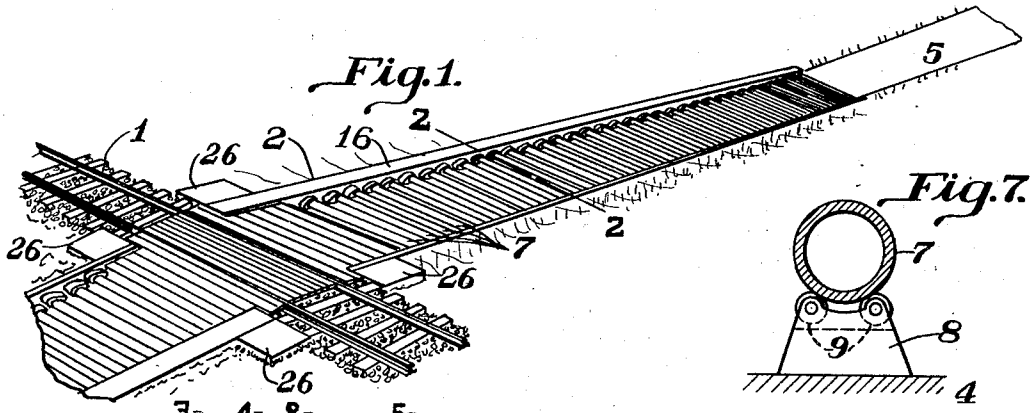
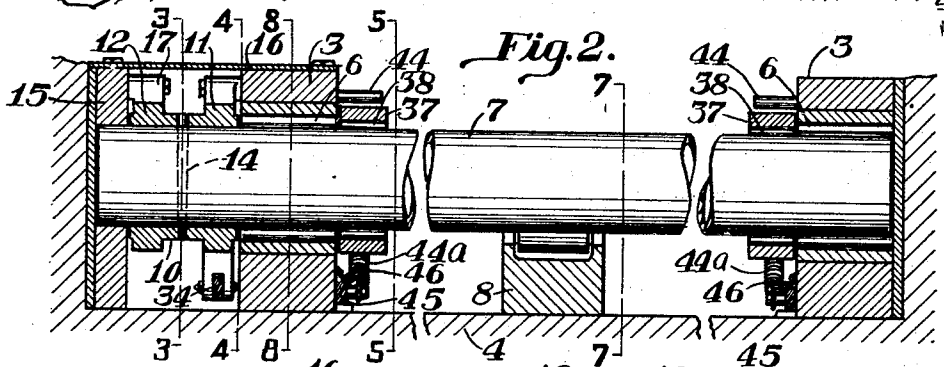


Fig.7.

Fig.2.



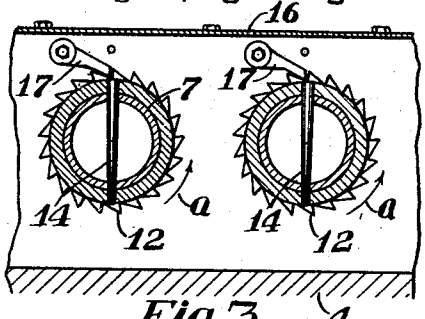


Fig.3.

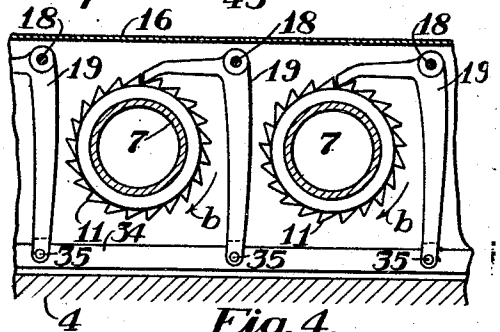


Fig.4.

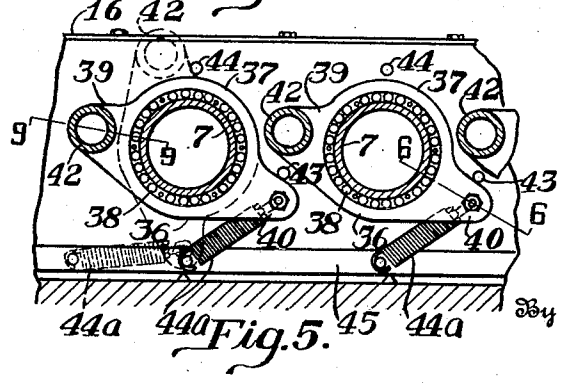


Fig.5.

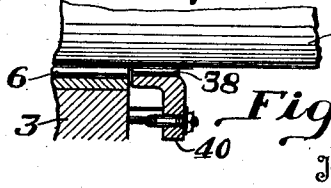


Fig.6.

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SAFETY CROSSING FOR HIGHWAY AND TRACKWAY INTERSECTIONS

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Fig. 8.

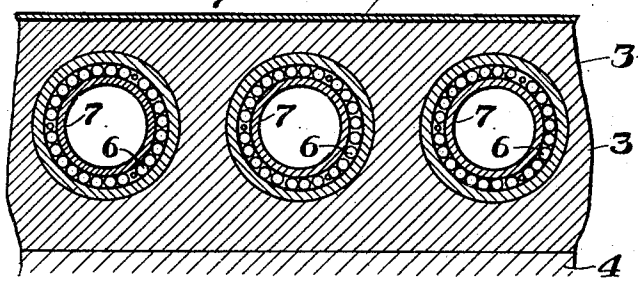


Fig. 9.

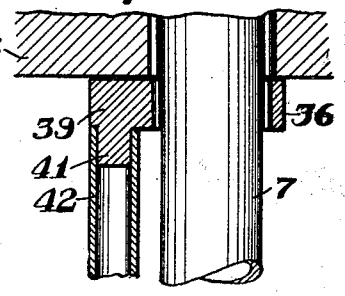
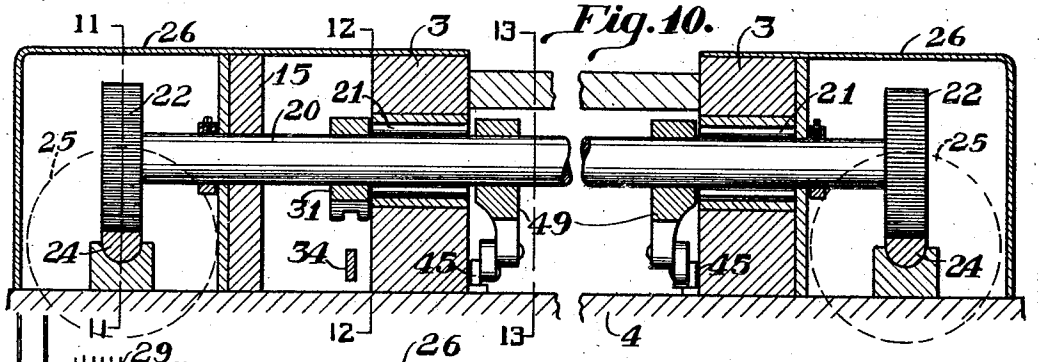


Fig. 10.



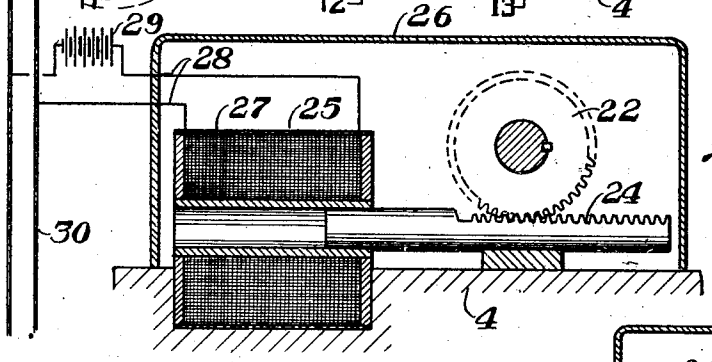
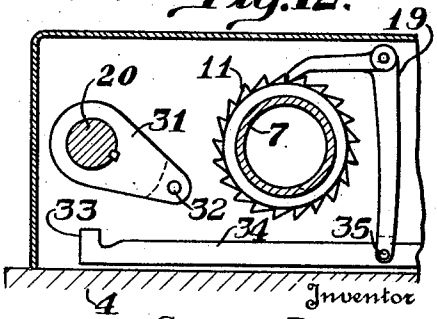


Fig. 11.

Fig. 12.



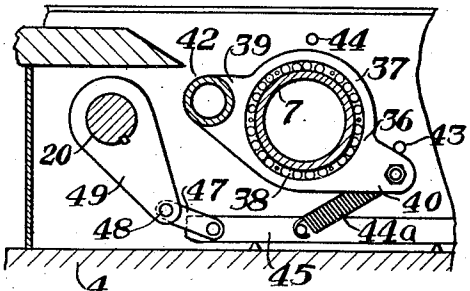


Fig. 13.

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Patented Nov. 24, 1931 1,833,354

UNITED STATES PATENT OFFICE

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SAFETY CROSSING FOR HIGHWAY AND TRACKWAY INTERSECTIONS

Application filed August 15, 1930. Serial No. 475,475.

This invention relates to improvements in safety track crossings and the object of the invention resides in the provision of a crossing wherein provision is made for controlling the tractive effort of motor vehicles particularly when such vehicles approach the proximity of tracks over which pass high speed rolling stock, whereby when the tracks are clear or open the crossing will admit of substantially the normal passage of vehicular traffic over the protected tracks but in the event of the presence of rolling stock within a predetermined distance of the crossing, the latter will function automatically to deprive vehicles engaged therewith of their effective tractive efforts to the end of bringing such vehicles to a complete stand still before reaching the trackway.

It is another object of the invention to provide a safety crossing which consists of a frame structure adapted to be arranged in a roadway on one or more sides of an intersecting trackway and wherein the frame is provided with a plurality of horizontally journalled parallel rolls which extend transversely of the frame structure and which constitute that portion of the crossing with which the wheels of passing vehicles are disposed to engage, provision being made for maintaining the rolls normally against rotation in said frame to permit the vehicles to pass thereover when the trackway is clear without difficulty, together with cooperating means for releasing the rolls so that lateral frictional engagement of the wheels of vehicles will be permitted to revolve in one direction, whereby the wheels engage with movable surfaces to deprive the same of forwardly moving tractive effort, the locking and unlocking of the rolls being effected automatically by the passage of rolling stock and associated circuit means over the trackway.

It is a further object of the invention to provide the crossing with resilient braking means for checking the momentum or velocity of motor vehicles arranged on the crossing when the rolls are released so that continued forward movement of vehicles on the crossing will be gradually yet positively checked before the vehicles reach the trackway.

It is another object of the invention to provide a safety crossing of relatively simple, practical and inexpensive construction which may be used admirably in protecting minor railroad crossings and especially in locations where the degree of road traffic does not justify the expense of building standard grade crossings or bridges, although of course the invention is not limited to any particular class of crossing and may be employed in any capacity where it may be used advantageously either for protecting railroad crossings or other classes of ways, such as through highways for motor vehicle traffic or in connection with conveying apparatus.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawings wherein there is set forth in detail the single embodiment of the invention from which the operating features of the invention will be readily understood although the invention is capable of being embodied in many other different structural forms.

In the accompanying drawings:

Fig. 1 is a perspective view of a trackway provided as a safety crossing comprising the invention;

Fig. 2 is a vertical transverse sectional view taken through the crossing on the plane indicated by the line 2—2 of Fig. 1;

Fig. 3 is a detail horizontal sectional view on the plane disclosed on the line 3—3 of Fig. 2, illustrating one set of ratchets and pawls for holding the main rolls of the crossing against rotation in one direction;

Fig. 4 is a similar view disclosing the other set of ratchets and pawls for retaining the rolls against rotation in the opposite direc-

tion, the said latter set of pawls comprising the releasing pawls;

Fig. 5 is also a vertical longitudinal sectional view taken through the rolls in the associated vehicle braking means, the several operating positions of the braking means being set forth in full and in broken lines;

Fig. 6 is a detail transverse sectional view disclosing the means taken on the plane indicated by the line 6—6 of Fig. 5;

Fig. 7 is a view on the line 7—7 of Fig. 2 showing the center supports for the main rolls;

Fig. 8 is a vertical longitudinal sectional view on the line 8—8 of Fig. 2 disclosing the anti-friction bearings for the support of the main rolls;

Fig. 9 is a detail horizontal sectional view taken on the plane indicated by the line 9—9 of Fig. 5 and showing the mounting for the braking rods as provided in conjunction with the main rolls;

Fig. 10 is a vertical transverse sectional view taken through the operating shaft of the crossing;

Fig. 11 is a vertical sectional view on the plane disclosed by the line 11—11 of Fig. 10 and illustrating one of the solenoids for governing the control of the operating shaft;

Fig. 12 is a vertical section on the line 12—12 of Fig. 10; and

Fig. 13 is a similar view on the line 13—13 of Fig. 10.

Referring more particularly to the drawings, the numeral 1 designates a railroad trackway and which is provided with the safety vehicular crossing 2 comprising the present invention. The crossing 2 consists of a pair of parallel longitudinally extending transversely spaced frame members 3—3 which are preferably arranged on a concrete base 4 provided in conjunction with a vehicular roadway or highway 5, the frame members 3—3 being arranged so as to extend longitudinally of the highway on opposite sides of the latter at positions where the highway intersects the trackway 1.

Journalled in longitudinally spaced roller bearings 6 carried by the frame members 3—3 are a plurality of parallel transversely extending longitudinally spaced main rolls 7. These rolls occupy a substantially horizontal plane and constitute the wheel engaging surfaces of the roadway 5 at points adjacent the trackway. It will be understood that the frames 3—3 may be of any desired length, depending upon the character of the roadway, the amount of vehicular travel thereover and the speed at which vehicular traffic operates. Thus the frames 3—3 may each be of substantially fifty feet in length, although this of course is subject to modification depending upon circumstances. Rolls 7 are preferably formed from mild steel and may possess an outside diameter of for example six inches and may be spaced apart on substantially twelve inch centers. The rolls may vary from ten to twenty feet in length depending upon the width of the roadway in connection with which they are used. The rolls arranged as specified, however, readily serve to support the weight of vehicles passing thereover and provide traction surfaces suitable for the movement of vehicles without discomfort at safe rates of speed and will not injure the vehicles even though the latter may pass over the rolls at rates of speed excessive upon public highways. Between the frames 3, the rolls may be supported by one or more appropriately spaced intermediate supports which may consist, as shown in Fig. 7, of brackets 8 mounted on the concrete base 4. Journaled in brackets 8 are spaced rollers 9 which function to support the intermediate portion of the rolls to relieve the latter of shear or bending strains and yet to permit of the free rotation of the rollers.

When the trackway 1 is clear of travel in the vicinity of the crossing the rolls 7 are locked against rotation in either direction in order that vehicles may pass over the rolls, as described, under normal tractive power. To attain this end, the single form of the invention under consideration provides each of the rolls 7 at one end with a sleeve 10 formed at opposite ends to include spaced inner and outer ratchet wheels 11 and 12 respectively, the teeth of which wheels being of relatively reversed order. Pins or keys 14 extend through each of the sleeves 10 to lock the latter for rotation in connection with each of the rolls 7. The outer ratchets 12 and mounted for rotation adjacent to an outer longitudinally extending stationary frame member 15 which is spaced from one of the frame members 3. A metallic cover 16 unites the upper edges of the frame member 15 with the adjacent frame member 3 so as to protect and conceal the mechanism arranged therebetween.

Pivotally carried by the inner vertical wall of the frame member 15 are pawls 17 which engage with the teeth of the outer ratchets 12 to prevent rotation of the rolls 7 in the direction indicated by the arrows *a* in Fig. 3, while pivotally carried as at 18 on one of the frame members 3 disposed adjacent to the frame member 15 are releasable pawls 19 which cooperate with teeth of the ratchets 11 to prevent rotation of the rolls normally in the direction indicated by the arrows *b*, shown in Fig. 4. Therefore, due to the provision of the double ratchets and the double set of pawls, the rolls 7 cannot rotate in either direction under normal conditions of operation of the crossing. However, upon the presence of a train or other vehicle in a predetermined zone or block within the immediate vicinity of the crossing an automatic mechanism operates to move the pawls 19 to

releasing positions free from engagement with the ratchets 11, thereby permitting the rolls 7 to rotate in a single direction, rotation of the rolls in the opposite direction being prevented by the pawls 17. The release of the pawls 19 is such, however, as to permit the rolls 7 to rotate freely by engagement or frictional contact with the drive wheels of motor vehicles passing over the crossing towards the trackway 1. This release of the rolls, therefore, causes the motor vehicles to lose their effective tractive power, since the rolls 7 spin freely in their antifriction bearings and in this manner the forward movement of the motor vehicles toward the trackway is prevented. After a train passes the crossing the pawls 19 return to their normal positions again locking the rolls 7 against rotation.

In order to automatically release the pawls 19, the frames 3—3, adjacent the trackway 1, are provided with a transversely journalled operating shaft 20 mounted for free rotation in roller bearings 21 carried by the frames 3. The opposite ends of the shaft 20 are equipped with gears 22, the teeth of which mesh with rack teeth provided upon solenoid armatures 24. These armatures slidably cooperate with large heavy duty solenoids 25 suitably positioned in a housing 26 at the track end of the crossing. The fields 27 of these solenoids are connected with leads 28 which extend to the tracks of the trackway 1 and to a source of electrical energy 29. The trackway 1 includes, adjacent to the crossing, an insulated block or zone 30, as diagrammatically illustrated in Fig. 11 and the operation of this block is such that when a wheeled vehicle enters the block, the circuits controlling the excitation of the fields 27 are closed, thereby attracting the armatures 24 and moving the latter inwardly of the solenoids. This results in partial rotation of operating shaft 20 through the medium of the gears 22. The operating shaft is provided at one end, as indicated in Fig. 12, with a crank arm 31, formed with a pin 32, and this pin is arranged in the path of an up-turned finger 33 provided upon one end of a movable bar 34 which is pivotally carried as at 35 by the lower ends of the pawls 19. Thus after some degree of rotation of the operating shaft from its normal position, shown in Fig. 12, the bar 34 is engaged and the pawls 19 are rocked about their pivots 18 to release the ratchets 11 and to antomatically provide for the rotation of the main rolls 7 in the single direction specified. It will be appreciated that the present invention is not limited to the employment of any particular type of electrical apparatus for effecting the automatic operation of the shaft 20. Solenoids have been selected herein for convenience and simplicity in illustration and description although it will be understood that other equivalent apparatus such as electrical motors and gearing or even mechanical appliances may be used for imparting a slight degree of rotative movement, usually less than 90 degrees, to the shaft 20, and I therefore reserve the right to employ or substitute any desired operative means for automatically rotating the shaft 20 when a train enters a given zone around the crossing.

In the preferred form of my invention, I employ means for arresting or yieldably checking the advance of road vehicles toward the trackway when such vehicles engage the crossing either before or after the rolls 7 are released. This is accomplished in a practical form of the invention by providing the rolls 7 between the frames 3—3 with brackets 36 having hub portions 37 which surrounds the rolls 7 and turn freely with respect thereto about the axes of said rolls. This free turning movement is best effected by providing the hubs 37 with internal roller bearings 38 as shown in Fig. 2. The brackets 36 on each roll are provided with extensions 39 and 40. The extensions 39, as shown in Fig. 9, include inturned studs 41, which are positioned in the open ends of tubes or rods 42. These rods are of lesser diameter than the main rolls 7 and, as shown in Fig. 3 in full lines, the said rods, when the rolls 7 are locked, are located in horizontal planes below the horizontal plane defining the tops or upper surfaces of the rolls 7. In other words, the rods 42 occupy positions where they do not interfere with the forward travel of road vehicles over the crossing. The downward swinging movement of the brackets 36 and the rods 42 is limited by the engagement of the lower extensions 40 with fixed studs 43 carried by the inner walls of the frames 3. These studs or stops may of course be adjustable to control the degree of downward movement of the rods 42 toward their inactive positions. Similarly, corresponding studs or stops 44 are provided in conjunction with the frames 3 for arresting the upward turning movement of the brackets 36 and their associated rods 42. It will be seen that when the rods are in their under active positions, as disclosed by dotted lines in Fig. 5, the said rods will be in position to be engaged by the wheels of the road vehicles and to offer yielding resistance to the forward advance of such vehicles.

This yielding resistance is accomplished by providing the extensions 40 with springs 44^a which springs have their opposite ends connected with parallel bars 45 extending adjacent to the frames 3. The bars 45 are slidably mounted in guides 46 and have their forward ends, as shown in Fig. 13, provided with pivoted links 47, which links have their opposite ends pivotally connected as at 48 with crank arms 49 fixed to the operating shaft 20. It will therefore be seen that when

the shaft 20 is rotated, by the operation of the solenoids 25 or their equivalents, the bars 45 will be moved forwardly to rock the brackets and their associated rods 42 to an active position, placing the springs 44 under tension and positively holding the extensions 39 in contact with the stops or studs 43. In this position the rods are free to move backwardly or downwardly to their inactive positions under the weight and pressure of the wheels of road vehicles but in doing this the road vehicles encounter a stiff though yieldable resistance which exercises a retarding or braking influence on the advance of such vehicles over the rolls 7 toward the trackway. When the train or other high speed vehicle has passed out of the block 30 and the solenoids 25 are deenergized, the brackets 36 and the rods 42, responding to gravity, drop back to their lower inactive positions, moving the bars 45 with them as well as rotating the shaft 20 back to its normal position which, in turn, results in lowering the pawls 19 into engagement with the ratchets 11. The stops 44 are so disposed as to prevent the rods 42 from assuming a vertical plane but, as shown in Fig. 5, the said rods when raised are laterally offset with respect to the vertical plane passing through the center of the companion rolls 7. This enables the weight of the rods to be used in restoring the operating parts of the crossing to normal positions.

In view of the foregoing, it will be seen that the present invention provides a safety crossing well suited for the purpose of protecting railroad trackways, collisions and crossing mishaps. The mechanism employed by the present invention is essentially a simple construction and is capable of operating under all manner of climatic conditions. The operating of the crossing is essentially automatic and therefore following its installation, the crossing eliminates the expense of a watchman or other attendants.

What is claimed is:

1. A safety crossing for track and other ways comprising a stationary frame disposed in angular relation with respect to said way, a plurality of rolls having the ends thereof journalled for rotation in said frame, said rolls extending in parallel order transversely of said frame, means normally serving to retain said rolls locked against rotation in either direction, and automatic means for releasing said rolls to admit of their rotation in but one direction.

2. A safety railroad crossing comprising a frame structure arranged stationary in the bed of a roadway intersecting a railroad trackway and to one side of said trackway, a plurality of rolls extending transversely of the frame structure and having the ends thereof mounted for rotation in said frame structure, said rolls being disposed in a substantially horizontal plane constituting a continuation of the tread surface of the roadway, means normally serving to retain said rolls locked against rotation in said frame structure, and automatic means responsive to the presence of a vehicle on said trackway in the vicinity of the crossing to release said rolls to admit of their rotation.

3. A safety crossing for railroad and highway intersections comprising a frame extending longitudinally of the highway adjacent to the railroad trackway, a plurality of rolls extending transversely of the frame and disposed in a substantially horizontal plane constituting a continuation of the roadway, bearings provided in said frame for the rotatable reception and support of said rolls, means normally operating to lock said rolls against rotation in said bearings, and cooperating means for unlocking said rolls to admit of their rotation when the railroad trackway in the vicinity of said crossing contains a vehicle.

4. A railroad crossing for vehicle highways, comprising a frame, a plurality of rolls extending transversely of the frame in a substantially horizontal plane and spaced longitudinally with respect to each other, antifriction bearings carried in said frame for the support of said rolls, means normally serving to retain said rolls locked against rotation, and automatic means for unlocking said rolls.

5. A safety railroad crossing for vehicular highways comprising a frame disposed in the highway adjacent to an intersecting railroad trackway, horizontally placed and longitudinally spaced rolls extending transversely of said frame and highway, antifriction bearings carried by said frame for effecting the rotatable support of said rolls, means for locking said rolls normally against rotation in either direction, and automatic means for releasing said rolls to permit of their rotation in a single direction.

6. A safety railroad crossing of the character described, comprising a longitudinally extending frame, a plurality of rolls extending transversely of said frame and disposed in a substantially horizontal plane, said rolls being relatively spaced longitudinally of the frame, antifriction bearings carried by said frame for supporting the ends of said rolls, intermediate roller supports engaging with said rolls between said frames, means normally locking each of said rolls against rotation in either direction in said bearings, and automatic means for releasing said rolls to permit of their rotation in but a single predetermined direction.

7. A safety railroad crossing comprising a frame consisting of transversely spaced longitudinally extending members stationarily positioned in a vertical roadway adjacent to an intersecting railroad trackway,

a plurality of parallel longitudinally spaced rolls positioned for rotation in said frame and extending transversely of the latter, ratchets fixed to rotate with each of said rolls, the ratchets on each roll being provided with reversely disposed teeth, movable pawls engageable with said ratchets and normally serving to lock said rolls against rotation, and automatic means cooperative with one set of said pawls for removing the latter from engagement with their cooperative ratchets automatically upon the presence of a vehicle on the trackway adjacent to the crossing.

8. A railroad crossing of the character set forth comprising a longitudinally extending frame, spaced rolls extending transversely of said frame and journalled for rotation therein, an operating shaft rotatably mounted in said frame adjacent to said rolls, pawl and ratchet mechanism cooperative with each of said rolls and normally serving to lock the latter against rotation, means operated by said shaft for moving said pawl and ratchet mechanism to positions permitting of the rotation of said rolls in but a single direction, and automatic means for imparting movement to said shaft to effect the operation of said pawl and ratchet mechanism upon the presence of a vehicle on the trackway in the vicinity of said crossing.

9. A safety crossing for highway and trackway intersections comprising a stationary frame extending longitudinally of the highway adjacent to the trackway, transversely extending rolls journalled in said frame, means normally serving to hold said rolls against rotation in said frame, automatic means responsive to the presence of a vehicle on said trackway in the vicinity of the highway for releasing said rolls to permit of their rotation in a single direction, and means operable when said rolls are in a rotatable condition to yieldably retard the advance of highway vehicles over said rolls.

10. A safety crossing for trackway and highway intersections comprising a frame extending longitudinally of the highway adjacent to the trackway, longitudinally spaced rolls extending transversely of said frame in parallel horizontal order and constituting a continuation of the tread surface of the highway, means normally locking said rolls against rotation, automatic means responsive to the presence of a vehicle on said trackway in the vicinity of said crossing to release said rolls, and means operated by said roll releasing means for presenting yieldable obstructions in the path of road vehicles passing over said rolls when the latter are in a released rotatable state.

11. A safety crossing for highway and trackway intersections comprising a frame, a plurality of rolls supported by said frame and extending transversely thereof in a horizontal plane, the said rolls being relatively spaced, swinging brackets carried by said rolls, rods carried by the upper ends of said brackets and normally occupying a position below the horizontal plane defining the tops of said rolls, means normally locking said rolls against rotation, automatic means responsive to the presence of a vehicle on said trackway in the vicinity of said crossing to release said rolls to admit of their rotation, and operating connections between said automatic roll releasing mechanism and said brackets for swinging the latter and the rods carried thereby to elevated operating positions disposed in planes above the horizontal plane defining the tops of said rolls.

12. Protective mechanism for highway and trackway intersections comprising a frame structure extending parallel with the highway, transverse rolls journalled in said frame structure, means normally locking said rolls against rotation, automatic means responsive to the presence of a vehicle on said trackway in the vicinity of the protector to release said rolls, swinging brackets turnable about the axes of said rolls, rods carried by the outer ends of said brackets and normally disposed so that said rolls are in a locked condition below the horizontal plane of the rolls, and yieldable for swinging said brackets and the rods carried thereby to positions above the horizontal plane of said rolls when the latter are free to rotate.

13. A safety mechanism for highway and trackway intersections comprising a frame extending longitudinally of the highway adjacent the trackway, spaced horizontal rolls rotatably supported by said frame and extending transversely of the latter, pawl and ratchet mechanism cooperative with each of said rolls to normally retain the latter against rotation, an operating shaft journaled in said frame, means responsive to the presence of a vehicle on said trackway in the vicinity of said frame to partially rotate said shaft, operating connections between said shaft and said pawl and ratchet mechanism for releasing said rolls to admit of their rotation during the presence of the vehicle on the trackway, a plurality of braking rods pivotally carried by said rolls and normally disposed below the horizontal plane of said rolls when the latter are in a locked condition, and resilient connections between said rods and said operating shaft for raising said rods to an elevated position above said rolls when the latter are free to rotate.

14. A safety mechanism for highway and trackway intersections comprising a frame arranged in and extending longitudinally of the highway adjacent the trackway, a plurality of relatively spaced transversely extending rolls rotatably supported by said frame, pawl and ratchet mechanism cooperative with each of said rolls for normally

locking the latter against rotation, an operating shaft journalled in connection with said frame, electro-responsive means for partially rotating said shaft upon the presence of a vehicle on said trackway within a predetermined distance of the highway, a bar movable in unison with said shaft upon the operation of said electro-responsive means to permit of the rotation of said rolls, brackets arranged in said frame and rotatable about the axes of said rolls, rods carried by said brackets and normally positioned between said rolls below the horizontal plane defining the top of said rolls, a second bar movable in unison with said shaft, and springs connected with said second bar and with said brackets and operable upon the release of said rolls to move said rods to elevated braking positions above the plane defining the top of said rolls.

In testimony whereof I affix my signature.

CHARLEY BURNETT.