Nov. 2, 1965 B. E. HAYES 3,215,091

WHEEL BUMPER

Filed June 9, 1964 3 Sheets-Sheet 1

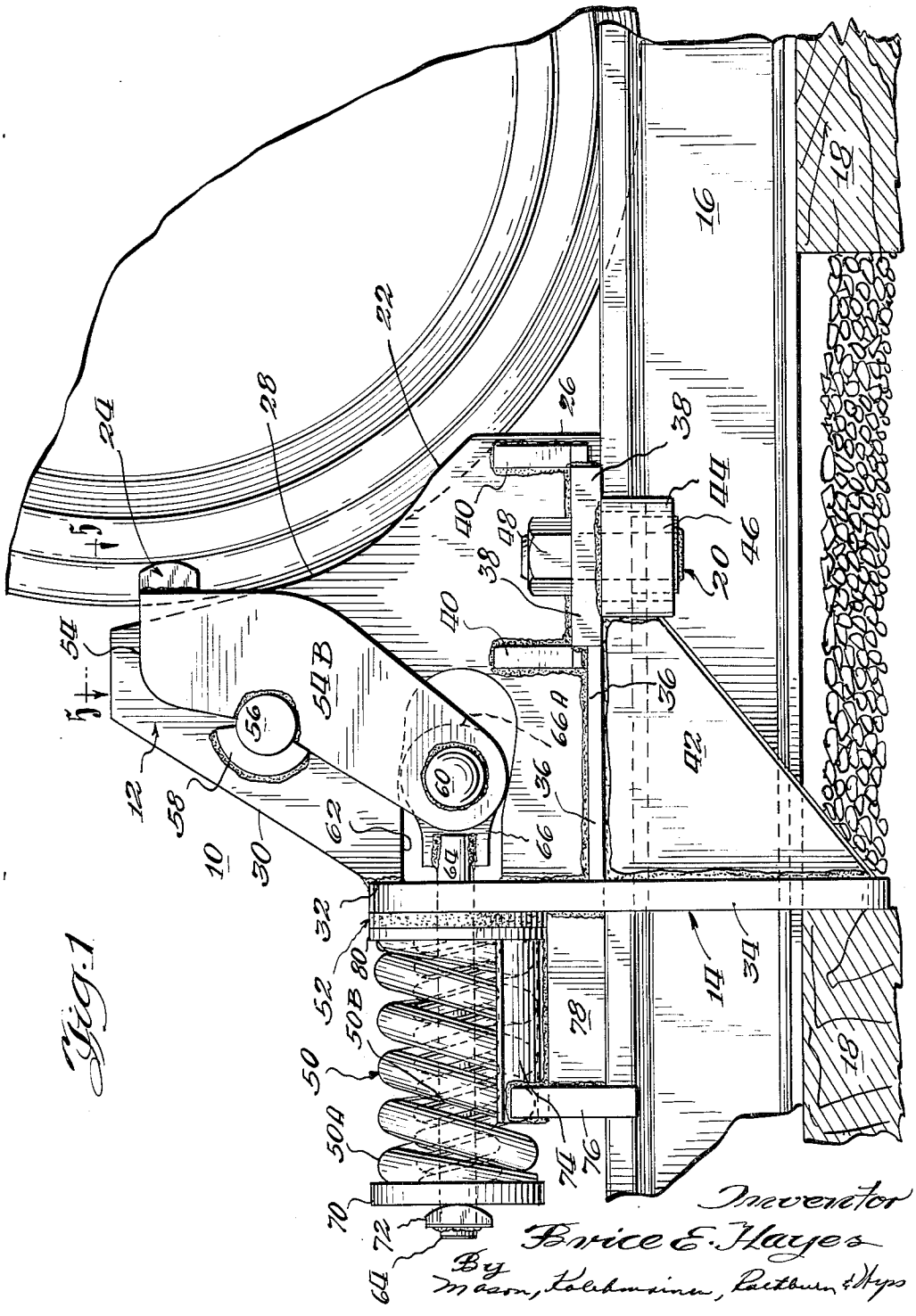


Fig. 1

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WHEEL BUMPER

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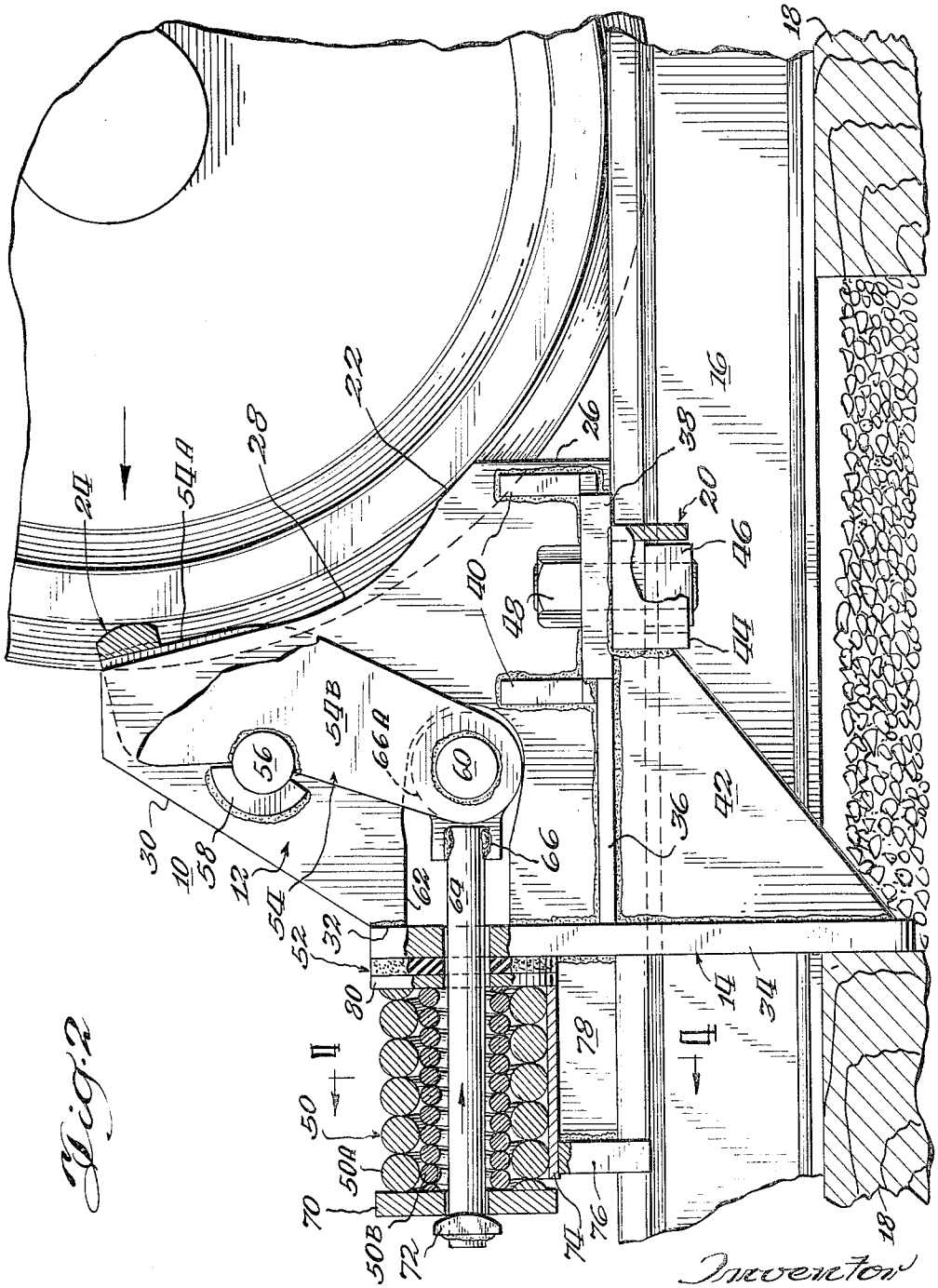


Fig. 2

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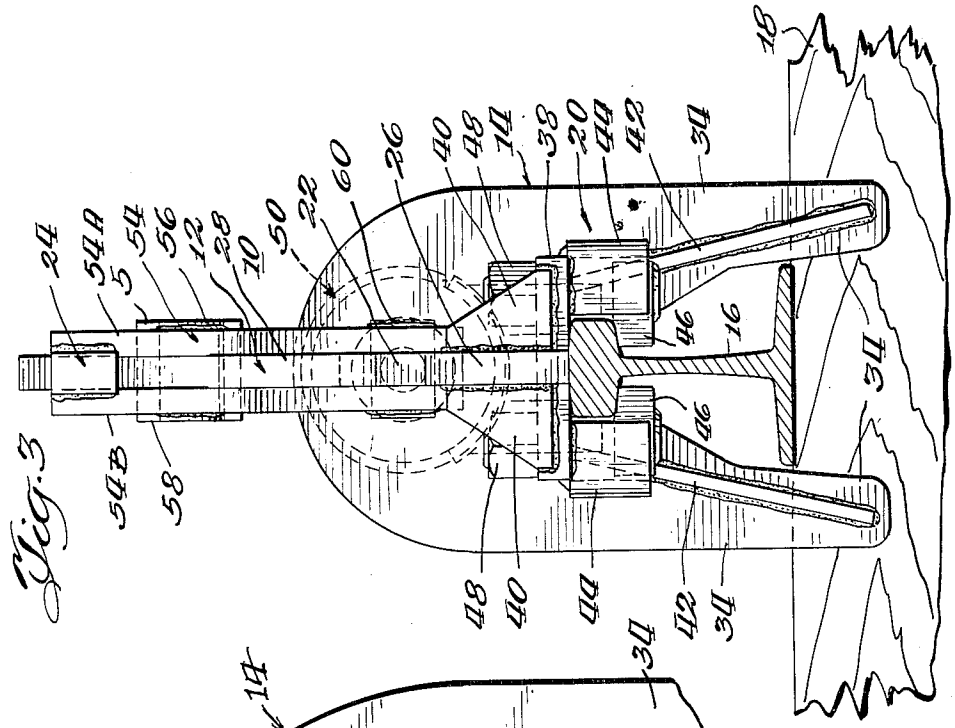


Fig. 3

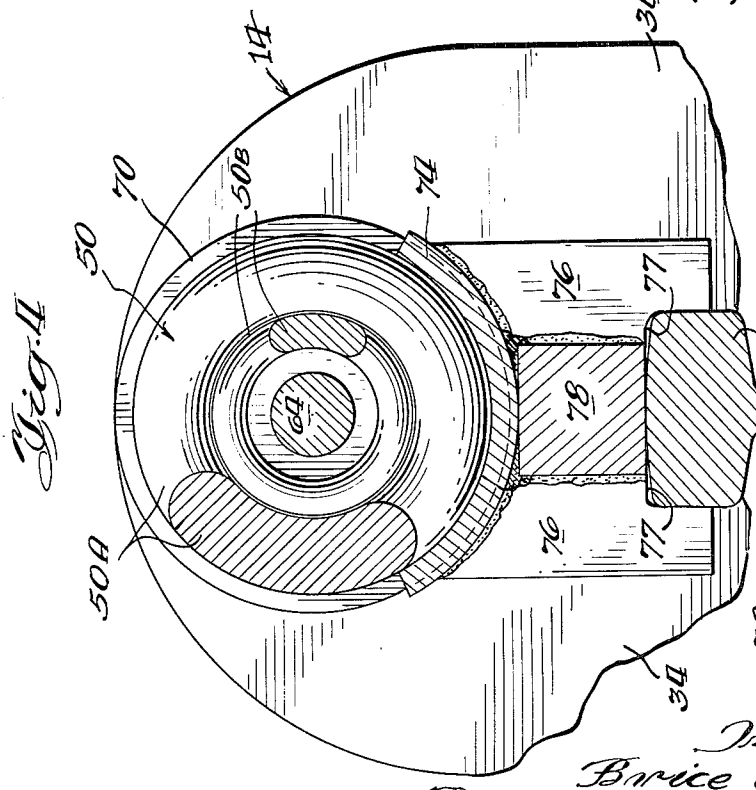


Fig. 4

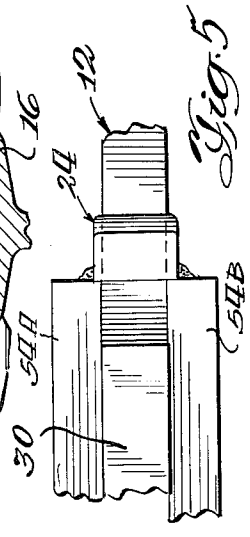


Fig. 5

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3,215,091

WHEEL BUMPER

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Filed June 9, 1964, Ser. No. 373,642
10 Claims. (Cl. 104—259)

The present invention releates to wheel bumpers of the type adapted to be installed on railroad rails and to be engaged by a wheel of the car in order to stop movement of the car.

Devices of the character to which the present invention relates are generally installed in pairs, one upon each rail, for simultaneous engagement by the wheels to effect stopping of the car. The present invention is applicable to devices of the character adapted slidably to be mounted on the rails and with portions extending down into the road bed to provide what is called a cushion stopping, or the invention may be applied to devices which are substantially fixedly secured to the rails.

An object of the present invention is the provision of a new and improved wheel stopping means which includes abutment means resisting movement of the car first by resilient means and then, effectively, by shock pad means comprising substantially non-yieldable shock absorbing material, the latter being fully effective when the spring means has been fully compressed.

A further object of the present invention is the provision of a new and improved wheel stopping device having a pair of longitudinally and vertically spaced wheel abutments of which one includes spring means and shock absorbing pad means for effecting stopping of a wheel and the other of which is a rigid part of the device.

Another object of the present invention is the provision of a wheel stopping means such as set forth above including a lower and front rigid abutment and an upper and rear abutment of which the latter is effective to stop a car wheel first by resilient means and then by substantially non-yielding shock absorbing pad means.

A further object of the present invention is the provision of a new and improved wheel stop including resilient and shock pad means for effecting stopping of the wheel and in which the wheel operates on said means through a lever system arranged so that the effectiveness of the spring and shock pad means is increased.

In brief, the wheel bumper of the present invention includes a plate seated upon the rail and having a generally triangular configuration. The plate has a first abutment at an angle of about 45° located at its front end a short distance above the top of the rail. The portion of the plate above and to the rear of said abutment is curved away so as to be clear of a wheel engaged by the abutment. A second abutment is mounted on the plate above and to the rear of the first and it is movably supported on the plate by means including a lever pivotally mounted on the plate and having an abutment supporting portion for supporting said second abutment in said cut away portion for engagement by a wheel, the abutment being so supported that it is clear of the abutment plate when both abutments are engaged by a wheel. Means are provided for opposing movement of said lever when said second abutment is engaged by a wheel. The last mentioned means includes helical spring means compressible by the lever, an axially aligned centrally apertured shock pad interposed between the spring means and plate and through which the spring reacts against the plate. It is preferred that the lever be of the motion multiplying type having a spring means compressing second portion with a longer effective lever arm, such as twice the length of the effective length of said abutment supporting portion. The second portion of the lever is connected to a rod

passing axially through the spring means and pad. A thrust plate actuated by the rod acts on the spring means. A cradle is secured to the plate underneath the spring means for supporting the latter and a slot in the plate for guiding the rod as it is actuated by the lever.

Other objects and advantages of the present invention will become apparent from the ensuing description of an illustrative embodiment in the course of which reference is had to the accompanying drawing, in which:

FIG. 1 is a side elevational view of a wheel bumper constructed in accordance with the present invention and in which the upper of the two abutment means incorporated in the device is engaged lightly by a wheel;

FIG. 2 is a view similar to FIG. 1, but partly in section, and illustrating the wheel bumper when heavily engaged by a wheel so that both abutment means are effective and the shock of impact is transmitted through the shock pad means;

FIG. 3 is a front elevational view of the wheel bumper;

FIG. 4 is a fragmentary enlarged cross sectional view taken along the line 4—4 of FIG. 2; and

FIG. 5 is a fragmentary plan view taken along the line 5—5 of FIG. 1 but omitting the car wheel.

The wheel bumper of the present invention, indicated as a whole by reference character **10**, includes a wheel abutment structure including a vertically disposed metal plate **12**. The device includes also a rail straddling bracket structure indicated by the reference character **14** extending outwardly at opposite sides of the rail and downwardly to below the base of a rail **16** mounted on spaced apart ties **18** in usual manner. The device also includes holding and guiding means **20** engaging the opposite undersides of the rail head to hold the abutment slidably vertically upon the rail and to guide it when it is moved under car wheel impact.

It should be understood that while only one stop has been illustrated two stops will be used in installation, one stop on each rail. The stops will also be arranged to abut against a single tie so that both the stops will be simultaneously engaged by the wheels of a car.

The wheel abutment plate **12** includes, in the main, a single piece of metal plate of desired thickness, such as about one inch. The wheel bumper includes two space apart wheel abutments, one of which is a front and lower abutment **22** formed by the plate **12**, and the second is a novel movable abutment **24** constructed and arranged in accordance with the present invention. The lower abutment **22** is at the front edge of plate **12** and fairly near the upper surface of the rail and is at an angle of about 45° to it. Actually, the two abutments are so located that a wheel striking both has no tendency to rise along the stop and produces a downwardly acting component tending better to hold the wheel bumper on the rail. The upper abutment **24** rises to a height slightly less than the radius of a new wheel. The construction is relation to the abutments will be considered in greater detail hereinafter following a further description of other components of the wheel bumper.

The plate **12** is illustrated as generally triangular in shape. It has a vertical front edge **26** below abutment **22** and a curved forward upper portion **28** disposed to the rear of the upper abutment **24** and arranged to be clear of the wheel and upper abutment at all times. It has an inclined rear edge **30** terminating in a rear vertical edge **32** abutting against the bracket **14**, which is constructed as a U-shaped saddle having legs **34** straddling the rail and engaging a tie **18**. At the underside of the plate **12** are provided a pair of plates **36** and **38** seating upon the rail and abutting against each other and the former of which abuts against the front of the saddle or bracket **14**. Added rigidity is provided by triangular braces **40** welded to plate **12** and to the plates **36** and **38**.

Further strength is provided by diagonal braces 42 abutting the legs 34 of the bracket and secured to the underside of plate 36 and also abutting against inwardly facing channels 44, forming part of the holding means 20, secured to the underside of plate 38 at opposite sides of the rail and receiving bevel headed bolts 46 engageable with the undersides of the rail head and tightened by the nuts 48, located above plate 38, so that the wheel bumper is effectively, but slidably guided on the rail.

As previously indicated, the wheel bumper of the present invention includes the two abutments 22 and 24, of which the former is formed integrally with the plate 12 and of which the latter is constructed and arranged to provide, first, resilient stopping of the wheel by spring means, indicated as a whole by reference character 50, followed by stopping by means of shock pad means 52 comprising substantially non-yieldable shock absorbing material. The spring means and shock pad are made more effective by means of a lever 54 interconnecting the abutment 24 and the spring means and shock pad. The lever 54 is mounted for pivotal movement upon a shaft 56 extending through the plate 12 and an arcuate bearing piece 58 secured, as by welding, to the plate to the rear of shaft 56. The lever actually includes lever arm portions 54A and 54B at opposite sides of the plate. The upper abutment 24 is mounted at the upper forward portions of the lever arms 54.

The spring means 50 and pad 52 are brought into operation by the lower portion of the lever 54, which is provided with a cross shaft 60 movable in a slot 62 at the rear of the plate 12. The spring means 50 is adapted to be actuated by a rearwardly extending rod 64 secured to a socket structure 66 through which the shaft 60 rotatably extends and provided with a circular external surface 66A guided in the slot 62 to effect substantially linear reciprocation of rod 64.

The spring means 50 includes a heavy outer spring 50A and a lighter inner spring 50B, both encircling the rod 64. The outer ends of the springs are engaged by a plate 70 loosely encircling the rod and actuated by the spherical face of a washer-like element 72 secured to the outer end of the rod 64 where it projects through the plate 70. The springs are guidingly supported at their undersides by an arcuate cradle 74 supported by vertical guides 76 shouldered at 77 (see FIG. 4) partially encircling the rail head and by a longitudinal plate support 78 seating upon the rail and extending from guides 76 into abutting engagement with the bracket 14.

The shock pad 52 loosely encircles the rod 64 and it is located between the bracket 14 and a thrust plate 80, also loosely encircling rod 64 and abutted by the front ends of springs 50A and 50B.

The arrangement of the upper abutment 24, a spring means 50 and pad 52 and the lever and rod interconnecting them is such that lighter impacts resulting from wheels striking the abutment are absorbed by the spring means. In the case of heavier impacts both springs 50A and 50B are fully compressed and the impact is transmitted through the shock pad 52 to the abutment plate. If desired, only one of the springs, such as 50A, could be fully compressed. Furthermore, the arrangement is characterized by the fact that the spring means are fully compressed when there is still some clearance between the upper abutment 24 and plate 12, the clearance being about 3/8 inch.

As a result, when the spring means is fully compressed the only effective contact between the upper abutment and the abutment plate 12 is through the shock pad 52.

The shock pad 52 is made of some substantially non-yieldable, shock absorbing material, such as one made of a multiplicity of layers consisting of fabric embedded in rubberlike material sold under the tradename "Fabreeka," which has excellent shock absorbing characteristics and is substantially non-compressible and does not yield in the manner of ordinary rubber and the like.

In operation, cars moving at relatively low speeds will

engage only the upper abutment 24. Also, when the upper abutment is lightly engaged the wheel stopping is effected resiliently by the spring means 50, which are compressed by the lever arm 54. The latter has an effective lever arm ratio such as two to one between the pivot axis and the rod 64 and the abutment, whereby a lighter spring can be utilized to absorb heavier impacts. In the event of cars moving at greater speeds and resulting heavier impacts applied to the wheel bumper, the abutment 24 and lever 54 are moved substantially to the positions of FIG. 2 where the springs 50A and 50B are substantially fully compressed and the shock of impact from the upper abutment is applied to the wheel bumper by the shock pad 52 with abutment 24 spaced from plate 12. At this time the lower abutment 22 is also engaged by the wheel, this engagement applying a downward component on the front of the stop, thus reducing overturning moment applied to the stop. The resultant of the forces applied to both abutments being directed downwardly and rearwardly, as heretofore explained.

In operation, it has been observed that cars stopped by the wheel bumper did not have any tendency to jump or rise above the tip of the rails as they do with other wheel stops and the stopping action was very smooth—even at speeds of seven to ten miles an hour.

These results are achieved by the described arrangement including the upper abutment and lever with the combination of the spring means and substantially non-yielding shock pad. The design is such that the tread of a new wheel strikes the lower abutment when the moving abutment is 3/8 inch from the vertical plate and the spring means fully compressed. The tendency of the car to rise on the lower abutment is minimized by the participation of the shock pad in the final shock absorbing operation.

As previously indicated, the present invention may be applied to a slidably mounted wheel bumper, as illustrated and described above. When so applied the wheel stopping impact is transmitted to a tie through the legs 34 of the rail straddling bracket 14. However, the invention may advantageously be used also with wheel stopping devices that are fixedly secured to the rails as by bolts or loops encircling the rails, in accordance with the disclosure of Patent 2,737,125, S. W. Hayes.

While the present invention has been described in connection with the details of an illustrative embodiment these details are not intended to be limitative of the invention except insofar as set forth in the accompanying claims. For example, it should be understood that the wheel bumper may be more or less fixedly secured to the rails as by bolting or by loop type engagement with the rails.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A wheel bumper adapted to be seated upon a rail, including in combination, a vertically disposed member seated upon and rising above the top of the rail and having a first car wheel abutment located at its front end a short distance above the top of the rail, and a second abutment movably mounted on said member somewhat to the rear and substantially higher than the first abutment for engagement by a car wheel before the wheel engages the first abutment.

2. A wheel bumper adapted to be seated upon a rail, including in combination, a vertically disposed member seated upon and rising above the top of the rail and having a first car wheel abutment located at its front end a short distance above the top of the rail, a second abutment movably mounted on said member somewhat to the rear and substantially higher than the first abutment for engagement by a car wheel before the wheel engages the first abutment, and means opposing movement of the second abutment.

3. A wheel bumper adapted to be seated upon a rail, including in combination, a vertically disposed member seated upon and rising above the top of the rail and hav-

ing a car wheel abutment located at its front end above the top of the rail a distance approximating the radius of a car wheel, means movably mounting the abutment on said member with the abutment spaced from said member for engagement by a car wheel, and means including resilient means opposing movement of said abutment.

4. A wheel bumper adapted to be seated upon a rail, including in combination, a vertically disposed member seated upon and rising above the top of the rail and having a car wheel abutment located at tis front end above the top of the rail a distance approximately the radius of a car wheel, means movably mounting the abutment on said member with the abutment spaced from said member for engagement by a car wheel, and means including series arranged mechanical spring means and shock absorbing pad means opposing movement of said abutment, the spring means being fully compressed with the abutment remaining spaced from the member.

5. A wheel bumper adapted to be seated upon a rail, including in combination, a vertically disposed member seated upon and rising above the top of the rail and having a car wheel abutment located at its front end above the top of the rail a distance approximately the radius of a car wheel, means movably mounting the abutment on said member with the abutment spaced from said member for engagement by a car wheel, and means including compressible spring means and motion multiplying lever means interconnecting said abutment and spring means for opposing movement of the second abutment.

6. A wheel bumper, including in combination, a plate seated upon the rail and having a generally triangular configuration, said plate having an abutment at an angle of about 45° relative to the rail surface located at its front end a short distance above the top of the rail, the portion of the plate above and to the rear of said abutment being curved away so as to be clear of a wheel engaged by the said abutment, a second abutment, means including a lever pivotally mounted on said plate for supporting said second abutment in said curved away portion for engagement by a wheel, the abutment being so supported that it is free of the abutment plate when both abutments are engaged by a wheel, and means for opposing movement of said lever when said second abutment is engaged by a wheel, said last mentioned means including spring means adapted fully to be compressed by the lever while the second abutment is clear of the plate and a shock pad interposed between the spring means and plate and through which the spring reacts against the plate.

7. A wheel bumper, including in combination, a plate seated upon the rail and having a generally triangular configuration, said plate having an abutment at an angle of about 45° relative to the rail surface located at its front end a short distance above the top of the rail, the portion of the plate above and to the rear of said abutment being curved away so as to be clear of a wheel engaged by the said abutment, a second abutment, means including a lever pivotally mounted on said plate and having an abutment supporting portion for supporting said second abutment in said curved away portion for engagement by a wheel, the abutment being so supported that it is free of the abutment plate when both abutments are engaged by a wheel, and means for opposing movement of said lever when said second abutment is engaged by a wheel, said last mentioned means including spring means adapted fully to be compressed by the lever while the second abutment is clear of the plate and a shock pad interposed between the spring means and plate and through which the spring reacts against the plate, said lever having a spring means compressing portion with an effective lever arm length twice that of the effective length of said abutment supporting portion.

8. A wheel bumper, including in combination, a plate seated upon the rail and having a generally triangular configuration, an abutment, means including a lever pivotally mounted on said plate and having an abutment supporting portion for supporting said abutment for engagement by a wheel, the abutment being so supported that it is clear of the abutment, and means for opposing movement of said lever when said abutment is engaged by a wheel, said last mentioned means including spring means adapted fully to be compressed by the lever while the abutment is clear of the plate and a shock pad interposed between the spring means and plate and through which the spring reacts against the plate, said lever having a spring means compressing portion with an effective lever arm length greater than the effective length of said abutment supporting portion.

9. A wheel bumper, including in combination, an abutment plate seated upon the rail and having a generally triangular configuration, said plate having an abutment at an angle of about 45° located at its front end a short distance above the top of the rail, the portion of the plate above and to the rear of said abutment being curved away so as to be clear of a wheel engaged by the said abutment, a second abutment, means including a lever pivotally mounted on said plate and having a first abutment supporting portion for supporting said second abutment in said curved away portion for engagement by a wheel, the abutment being so supported that it is free of the abutment plate when both abutments are engaged by a wheel, and means for opposing movement of said lever when said second abutment is engaged by a wheel, said last mentioned means including helical spring means, an axially aligned centrally apertured shock pad interposed between the spring means and plate and through which the spring reacts against the plate, said lever having a spring means compressing second portion with an effective lever arm greater than the effective length of said abutment supporting portion, a rod passing axially through the spring means and pad and connected to the second portion of the lever, a thrust plate actuated by the rod and acting on the spring means, a cradle secured to the abutment plate and being located underneath the spring means for supporting the latter and slot in the plate for guiding the rod.

10. A wheel bumper, including in combination, a plate seated upon the rail and having a generally triangular configuration, an abutment, means including a lever pivotally mounted on said plate and having a first abutment supporting portion for supporting said abutment for engagement by a wheel, the abutment being so supported that it is clear of the plate when engaged by a wheel, and means for opposing movement of said lever when said abutment is engaged by a wheel, said last mentioned means including helical spring means, an axially aligned centrally apertured shock pad interposed between the spring means and plate and through which the spring reacts against the plate, said lever having a spring means compressing second portion with an effective lever arm length twice that of the effective length of said abutment supporting portion, a rod passing axially through the spring means and pad and connected to the second portion of the lever, a thrust plate actuated by the rod and acting on the spring means, a cradle secured to the first mentioned plate and being located underneath the spring means for supporting the latter and a slot in the plate for guiding the rod.

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