May 12, 1931. E. F. OHLENDORF 1,805,414

BUMPER MECHANISM

Filed March 26, 1930 4 Sheets-Sheet 1

Fig. 1.

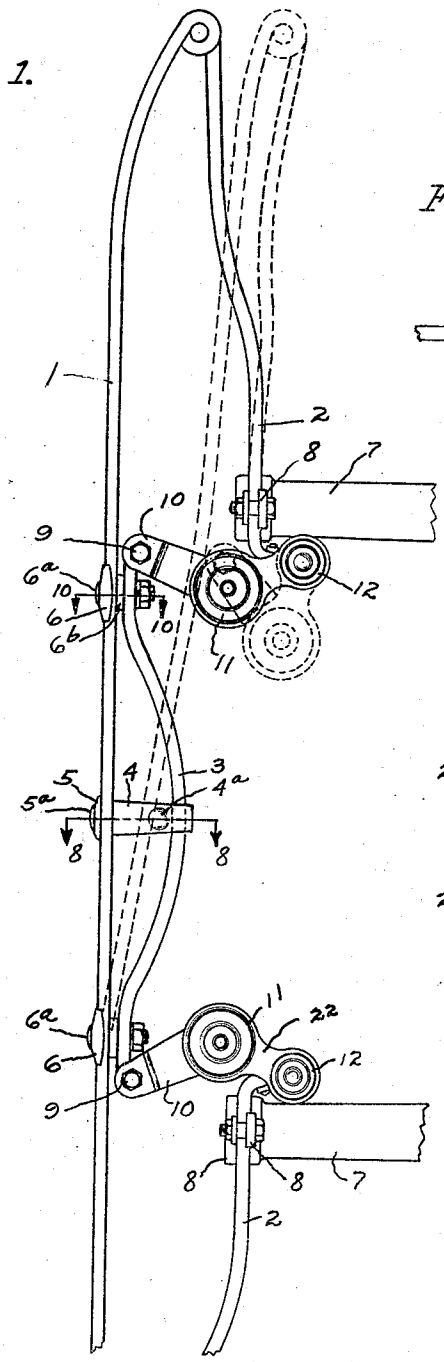


Fig. 15.

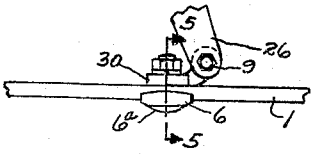
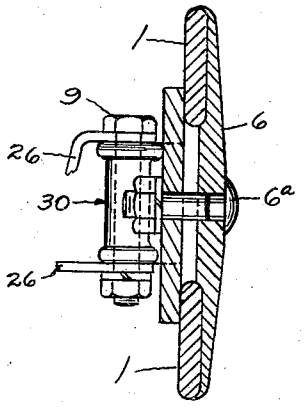


Fig. 16.



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Fig. 2.

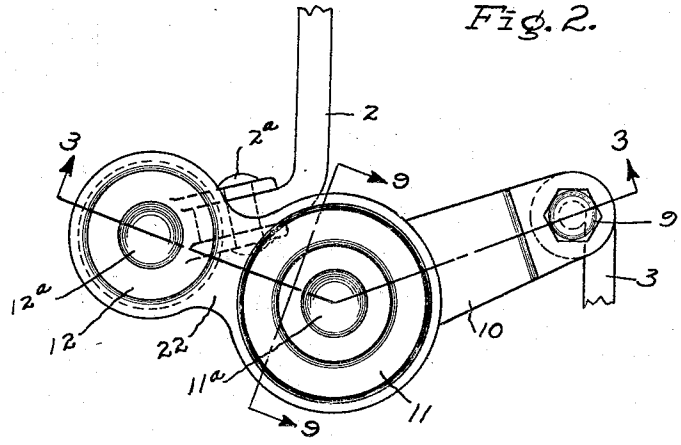


Fig. 3.

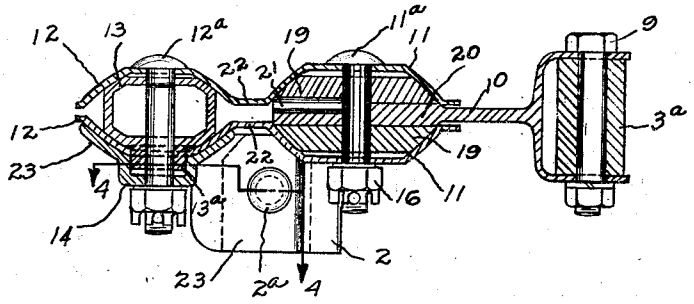


Fig. 4.

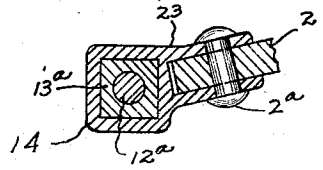
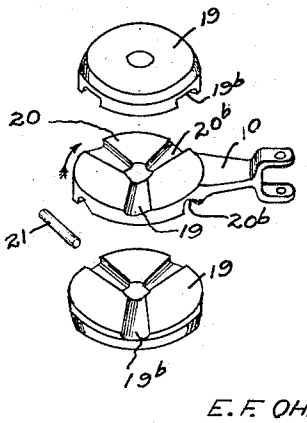


Fig. 5.



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Fig. 6.

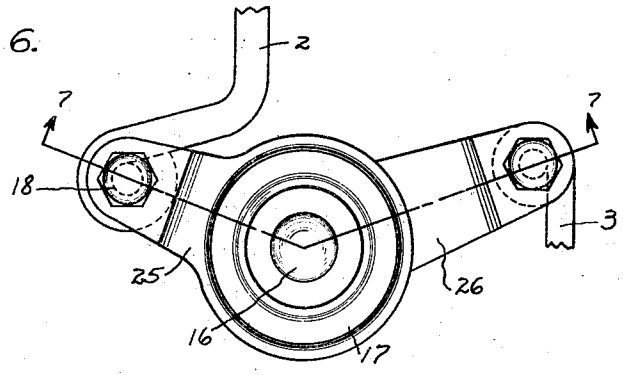


Fig. 7.

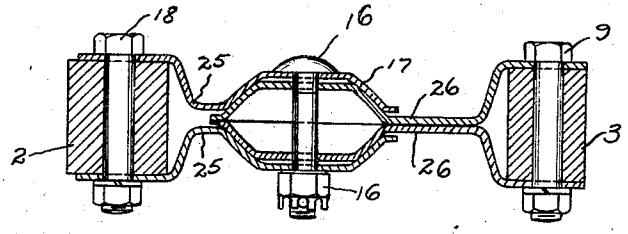


Fig. 8.

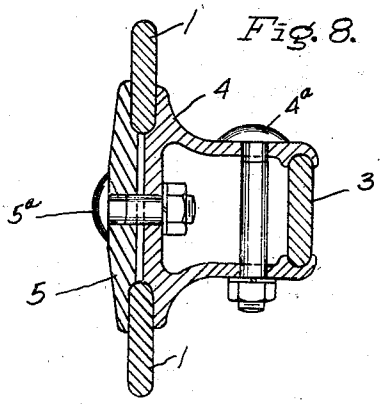
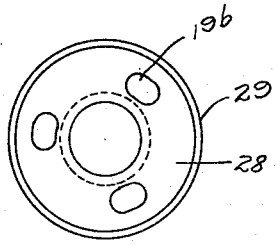


Fig. 14.



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Fig. 9.

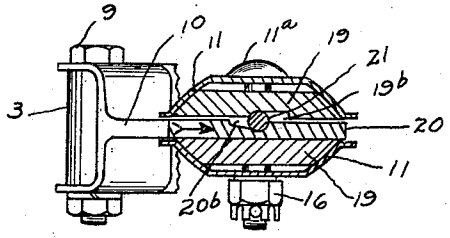


Fig. 11.

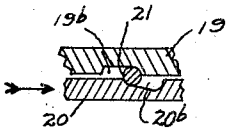


Fig. 10.

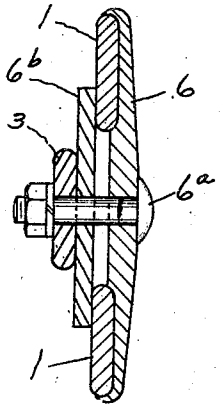


Fig. 12.

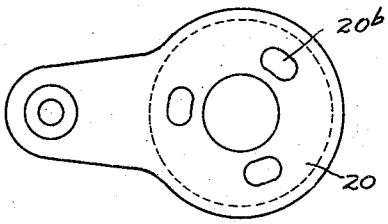
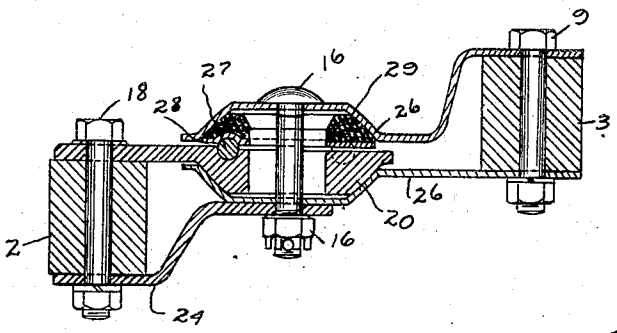


Fig. 13.



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UNITED STATES PATENT OFFICE

EMIL F. OHLENDORF, OF MOLINE, ILLINOIS

BUMPER MECHANISM

Application filed March 26, 1930. Serial No. 439,196.

This invention relates to a bumper for vehicles and particularly to the type designed for mechanically propelled vehicles using a transversely disposed spring bar which yields under impact and automatically assumes normal position.

An important feature of the invention is the provision of connections between the bumper and vehicle whereby it is possible to give a bumper a much higher temper than is now practicable, whereby the resistance offered on the return movement by the connections will be slightly less than the energy stored up in the bumper bars so that the latter will automatically return the parts to normal position.

For a full understanding of the invention and the merits thereof reference is to be had to the accompanying drawings and the following description in which corresponding and like parts are designated by similar reference characters.

In the accompanying drawings:

Figure 1 is a top plan view of a bumper illustrative of an embodiment of the invention, the dotted lines indicating the position of the parts when an end of the bumper yields under impact.

Figure 2 is an enlarged detail view of a resistance connection between the front and rear bars comprising the bumper.

Figure 3 is a detail sectional view on the line 3—3 of Figure 2, looking in the direction indicated by the arrow heads.

Figure 4 is a detail sectional view on the line 4—4 of Figure 3.

Figure 5 is a detail perspective view of one of the members of the twin resistance, the parts being separated.

Figure 6 is a view similar to Figure 2, of a modification.

Figure 7 is a sectional view on the line 7—7 of Figure 6.

Figure 8 is an enlarged sectional view on the line 8—8 of Figure 1.

Figure 9 is a detail sectional view on the line 9—9 of Figure 2.

Figure 10 is an enlarged sectional view on the line 10—10 of Figure 1.

Figure 11 is a fragmentary sectional view of the head and one of the blocks coacting therewith, showing the roller at the limit of its movement in an opposite direction to the position shown in Figure 9.

Figure 12 is a plan view of the friction arm as shown by Figure 13. This view shows the location and the outline of the grooves for the steel balls.

Figure 13 is a sectional view on the line 7—7 of Figure 6 and shows a modification.

Figure 14 shows a plan view of the friction block utilizing a rubber and fabric composition forming the friction surface. It also shows the mating grooves for the steel balls.

Figure 15 shows a pivot connection for the resistance units when the truss bar 3 is dispensed with.

Figure 16 is a sectional view on the line 5—5 of Figure 15.

In the embodiment of the invention illustrated, the bumper includes members or bars 1 and 2, an intermediate brace 3, and clamps connecting the brace 3 with the member 1. As shown most clearly in Figures 3, 8 and 10, the member 1 comprises companion bars which are gripped between two parts. The brace 3 consists of a single bar and is clamped at its ends and at a middle point to the bars 1. The middle clamp includes a body 4, plate 5, and connecting bolt 5*a*. The brace 3 is clamped between arms of the body 4 by means of a bolt 4*a*. The end clamps comprise plates 6, 6*b* and bolt 6*a*. The bars 1 are clamped between the plates 6, 6*b* and the bolt 6*a* passes through the bar 3 and holds it against the plate 6*b*.

In the form shown in Figure 1 and the detail views thereof, two resistance units are included and are designated generally by the reference numerals 11 and 12. In the modification shown in Figures 6 and 7, one resistance unit is employed and is designated generally by the numeral 17. The twin resistance units contemplate a shank 10 forked at one end and provided at its opposite end with a head 20 of circular outline and formed in opposite faces with radial grooves 20*b*. Blocks 19 are placed against opposite sides of the head 20 and are retained in place by means of a bolt 11*a* which passes through corre-

sponding openings formed in the parts 19 and 20. Radial grooves 19*b* are formed in the faces of the blocks 19, adjacent the head 20, and corresponding grooves 20*b* are formed in both faces of the head 20. The mating grooves 19*b* and 20*b* receive rollers 21. The radial grooves 20*b* formed in opposite faces of the head 20 are staggered. The edges of the blocks 19 are beveled, as indicated most clearly in Figure 3 of the drawings, to match that portion of the plates 22 disposed at the sides of the member 10. The plates 22 are similar and each has opposite ends of circular outline and pressed outwardly in the same direction to form concavo-convex elements, said plates, when assembled, being disposed with their hollow or concave sides facing, as indicated most clearly in Figure 3 of the drawings. The head 20 and blocks 19 at the sides thereof are received between the concavo-convex portions 11 of the plates 22 and are connected by means of the bolt 11*a*. A block 13 is received between the concavo-convex portions 12 of the plates 22 and is held in place by a bolt 12*a* passing through the parts 12 and 13. Opposite faces of the block 13 are beveled to correspond with the outline of the concave faces of the elements 12. A non-circular or square projection 13*a* is formed upon a side of the block 13 and is accommodated in a socket 14 formed upon the adjacent element 23 and, in this manner, the block 13 is prevented from turning. The socket 14 preferably forms part of the element 23 which consists of a bracket secured to the bar 2 or direct to a bracket 8 on the car frame horn.

The single resistance unit 17 illustrated in Figures 6 and 7, consists of two pairs of plates 25 and 26 which are formed at one end for attachment to the bars 2 and 3 or have one end pivoting in an eye on the bracket 8, and which have their opposite ends of circular formation and pressed laterally into concavo-convex form and interfitted and connected by means of a bolt 16, as shown most clearly in Figure 7. The frictional engagement of the circular ends may be regulated by tightening the connecting bolt 16 more or less, as will be readily appreciated. The parts normally occupy the position indicated by full lines in Figure 1, and when the bumper yields under contact, the parts assume the position indicated by dotted lines in said figure, both members comprising the unit rotating and the resistance between the surfaces in contact reacting upon the bumper to retard its movement, both in yielding under impact and in returning to normal position when relieved of the force of impact. It should be stated that the resistance unit can be so adjusted that when forced back, the resistance will be slightly less than the energy stored up in the spring bars and the excess of energy thus stored reacts to return the parts to normal position. For illustration, it is assumed that one thousand pounds stress will be required to move the bumper bars backward without any resistance of the units. The resistance units can be set to sustain a force of eight hundred pounds. The difference of two hundred pounds would be sufficient to return the bumper to normal position. It will thus be understood that about eighty per cent is absorbed to prevent a dangerous rebound. As indicated most clearly in Figure 1 of the drawings, the resistance units are mounted away from the wheels and the joints are such as to prevent rattle. The elements comprising the units may be stamped from sheet metal of suitable gauge to withstand the stresses and wear incident to a device of the nature stated.

It is to be observed that the resistance unit, whether of the friction, hydraulic, or other type, is mounted between the front and rear bumper members and may be pivoted to the rear bumper member or to an eye provided on the frame of the chassis and formed with the horn 8 attached to the side frame bar 7.

As shown most clearly in Figure 5, the roller receiving grooves 19*b* and 20*b* gradually widen from the center outwardly. The shoulders at the sides of the grooves are abrupt, as indicated in Figures 9 and 11, and form stops to limit the movements of the rollers in each direction. Figure 9 shows the normal position of the rollers 21. When the bumper is forced back, the head 20 rotates in the direction of the arrow in Figures 9 and 11 and the rollers move in the grooves 19*b* and 20*b* until they reach the abrupt walls at one side of the grooves, as indicated in Figure 11. A continued movement of the head 20 causes a like movement of the blocks 19. On the rebound of the bumper the reverse takes place. Before there is any movement of the blocks 19 with the head 20, the rollers move to the opposite side of the grooves. This reduces the friction between the elements 19 and 11 and, in consequence, the resistance on the rebound is less than the resistance offered when the bumper is forced back by impact with an object.

The modification as shown by Figure 13 utilizes steel balls 27 in place of rollers. A single friction block 29 is used, the lower part of the plate 20 forming the frictional contact with the plates 26. The bottoms of the slots 20*b* are inclined, thus functioning in the same way as the grooves 20*b*, Figure 5. These grooves for the steel balls are also shown by Figure 12. The friction block has corresponding grooves as shown by 19*b*, Figure 14. These grooves are formed in a circular steel plate 28, to which a rubber and fabric composition 29 is vulcanized or otherwise fastened. This structure as shown by Figure 13 produces a simplified means of confining the balls as compared to rollers.

When the truss bar 3 Figure 1 is to be dis-

pensed with, a modified pivot connection for the resistance unit is shown by Figure 15. A single pivot block 30 having an extended section to form a clamping surface for the bolt 6*a*, is used. The bolt 9 passes through the plates 26 and the hinge section of the clamp 30, thus making a pivot mounting for the resistance unit. This is more clearly shown by the sectional drawing Figure 16.

What is claimed is:

1. In bumper mechanism, a rotary friction unit comprising a member having a head the sides of which are outwardly convex in every direction, a companion member comprising concavo-convex elements embracing the converging sides of the first mentioned member, and a pivot connection between the coacting elements to maintain frictional engagement between the parts.

2. In bumper mechanism, a resistance unit comprising plates having opposite end portions of approximately concavo-convex form and disposed with its hollow or concave sides facing inwardly, and elements of corresponding shape gripped between the concave sides of the end portions of the first mentioned member.

3. In bumper mechanism, a member provided with a head of approximately circular outline, blocks at the sides of the head, and a member comprising spaced concavo-convex elements having the said head and blocks disposed therebetween.

4. In bumper mechanism, a member having a head of approximately circular outline, blocks at the sides of the head, rotary elements between the head and blocks, a member including spaced elements of concavo-convex form and having the said head and blocks therebetween, and a pivot connection between the several parts.

5. In bumper mechanism, a rotary friction unit comprising complemental plates formed with concavo-convex portions, a block therebetween and held from rotation, and a pivot connection between the block and concavo-convex portion.

6. In bumper mechanism, a twin resistance unit including a member having a head of circular outline, blocks at the sides of the head, rollers between the head and blocks and disposed in mating radial inclined grooves formed therein, plates having opposite end portions of concavo-convex formation, the said head and blocks being received between corresponding end portions of the plates, a block disposed between the opposite end portions of the plates, means for preventing rotation of the block, and adjustable pivot fastenings connecting the several parts whereby to regulate the frictional contact of the engaging surfaces.

7. In a bumper mechanism, a resistance unit mounted on the rear bumper bar, and pivotally connected to the front bumper bar.

8. In a bumper mechanism, a resistance unit pivotally mounted on the rear bumper bar and pivotally connected to the front bumper bar.

9. In a bumper mechanism, front bumper bars, a rear bumper bar terminating at the frame horn clamps and forming an eye, and resistance unit links pivoting in said eye.

10. In a bumper mechanism, a truss bar curved back at its center, its ends each terminating in an eye and resistance unit links pivoting in said eyes, and clamps supporting said truss bar at its center and ends.

11. In a bumper mechanism front and rear bumper bars, a truss bar supporting the front bumper bars and a clamp holding said truss bar, said clamp consisting of an upper and lower lip, a tie section connecting the two lips, a bolt clamping the upper and lower lips, a clamping plate and a second bolt clamping the front section of the clamp to front bumper bars.

12. In a bumper mechanism a resistance unit having a resistance block consisting of a steel base having grooves to receive steel balls and a fibrous compound vulcanized or otherwise fastened to said base.

13. In a bumper mechanism front and rear bumper bars, brackets clamped to the front bumper bars and resistance units having links, said links pivoting in said brackets.

14. In a bumper mechanism, a resistance unit, including a member having a head of circular outline, grooves having inclined bases formed on one face and a convex friction surface on the opposite face and an extended section to form a pivot connection.

15. In a bumper mechanism a resistance unit including a friction member having a head of circular outline, a block at the side of the head, balls disposed in inclined grooves formed in the head, mating grooves in the block, plates having end portions of concavo-convex formation, an extension on the friction circular member to form a pivot arm, a supporting strap, and an adjustable pivot fastening to regulate the frictional contact of the engaging surfaces.

16. In a bumper mechanism, the combination of front and rear bumper bars, a resistance unit offering greater resistance when rotated in one direction than in the reverse direction, said resistance unit being pivotally mounted between the front and rear bumper bars.

17. In a bumper mechanism the combination of a front bumper bar, and a resistant unit consisting of companion sections pivoted to each other, one section being pivotally mounted on the vehicle and the other pivotally connected to the front bumper bar.

In testimony whereof I affix my signature.

EMIL F. OHLENDORF [L. S.]