

Jan. 18, 1927.

S. H. SHAW

1,615,045

BUMPER

Filed July 13, 1922

4 Sheets-Sheet 1

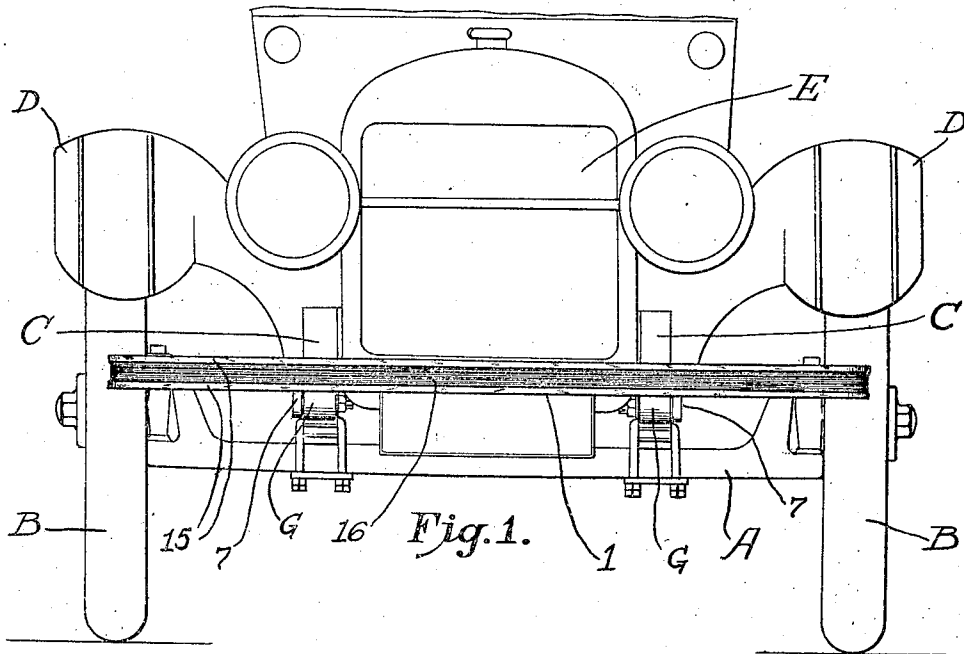
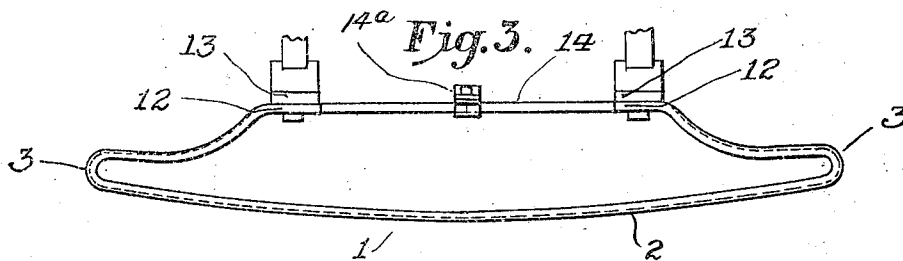
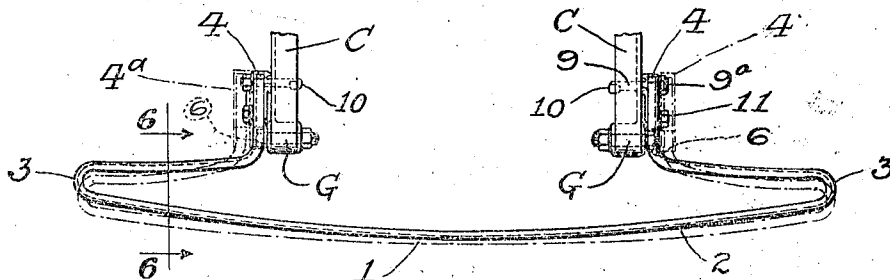


Fig. 2.



WITNESSES:

Edw. R. Brown

H. Muchmore

INVENTOR

SAMUEL H. SHAW

By *this* ATTORNEY
Spencer & Co.

Jan. 18, 1927.

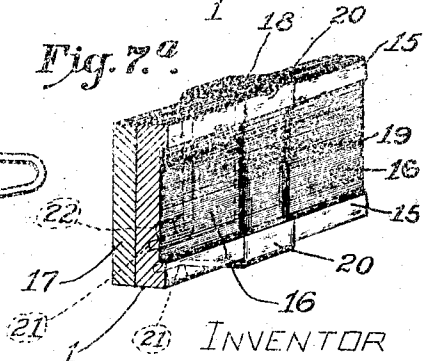
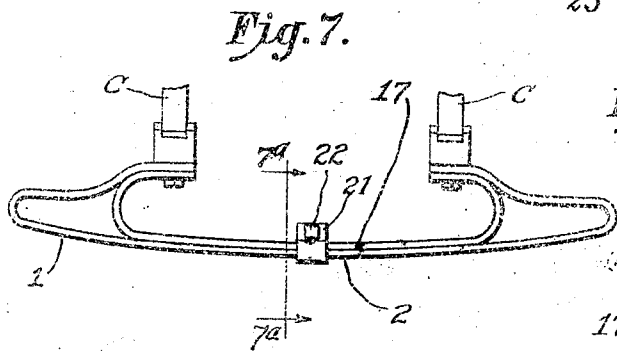
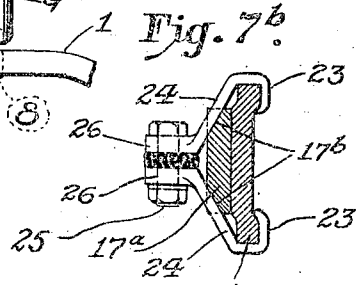
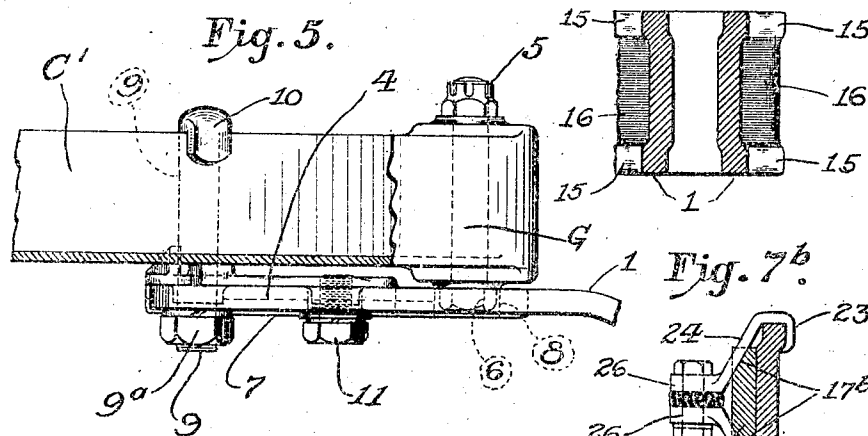
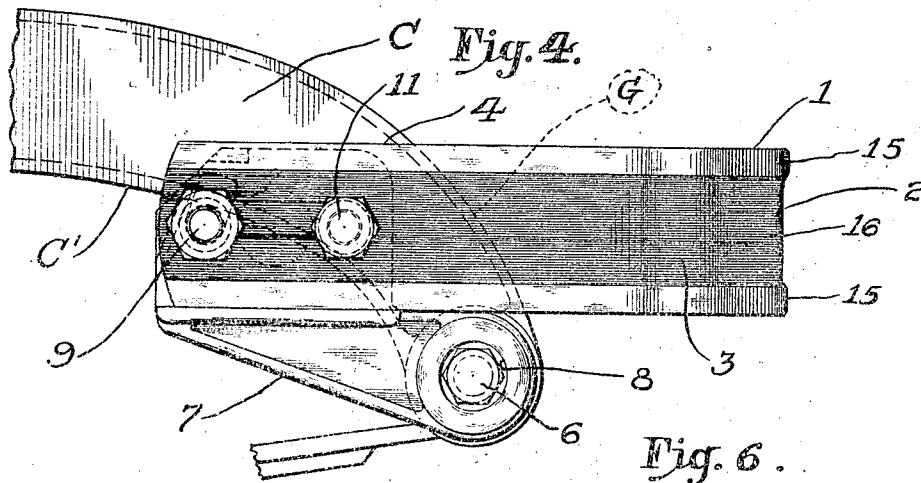
S. H. SHAW

1,615,046

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4 Sheets-Sheet 2



WITNESSES:

Albert B. Brown
H. M. M. M. M.

INVENTOR
SAMUEL H. SHAW
BY *his* ATTORNEY
Frederic P. Curtis

Jan. 18, 1927.

S. H. SHAW

1,615,046

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Fig. 8.

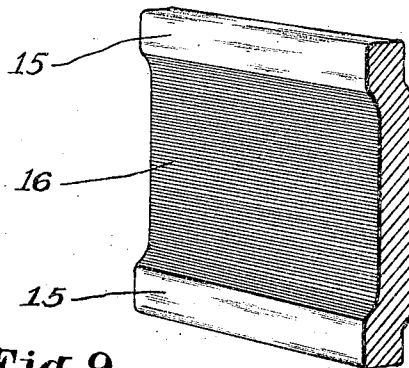
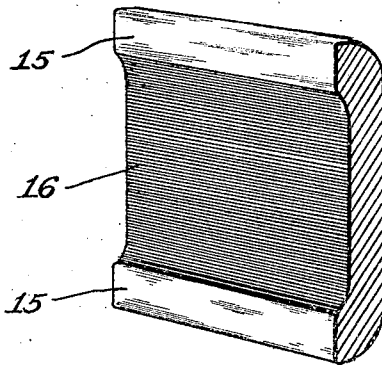


Fig. 9.



WITNESSES:

Edw. R. Sumner
H. Muchmore

INVENTOR

SAMUEL H. SHAW

BY *his* ATTORNEY
Hermann T. Smith

Jan. 18, 1927.

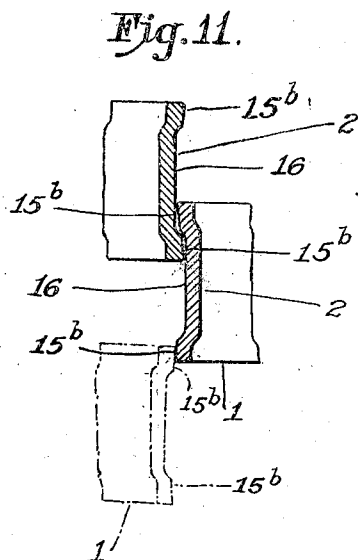
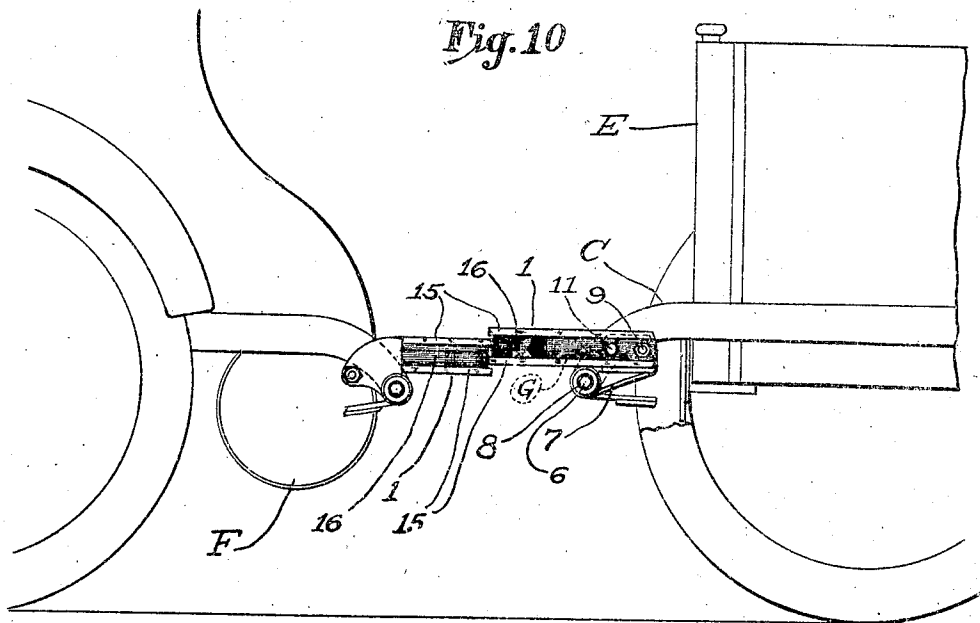
S. H. SHAW

1,615,046

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4 Sheets-Sheet 4



WITNESSES
Elbert R. Brimmer
H. Muehlman

INVENTOR
SAMUEL H. SHAW
BY *his* ATTORNEY
Freeman D. Cuntz

UNITED STATES PATENT OFFICE.

SAMUEL H. SHAW, OF NEW YORK, N. Y., ASSIGNOR TO UNIVERSAL SHOCK ELIMINATOR, INC., OF LONG ISLAND CITY, NEW YORK, A CORPORATION OF NEW YORK.

BUMPER.

Application filed July 13, 1922. Serial No. 574,638.

This invention relates to bumpers, so-called, such as are used on motor cars to receive the shock of impact with other cars or obstacles on the road. This invention relates to such articles which are sometimes called impact bars, and more particularly to the type known as spring bar or flat spring bar bumpers, in which the impact shock is absorbed by the resiliency of the bumper as distinguished from the types having a rigid bar with a coil spring or similar attaching device to absorb the shock of impact solely in the attaching means or junction of the device with a rigid part of the vehicle.

More particularly this invention relates to improved features of construction of the resilient or impact flat spring bar having for its objects economy in production, durability, lightening of construction, increased strength, and other features the advantages of which will appear from the more detailed specification. Also a particular feature incident to the practice of my invention is the prevention of slipping of the flat spring bar forming the outer impact member, so as to assure a direct reaction on the spring parts of the bumper by having the impact surface held against up or down slipping on the object with which it contacts.

While the construction embodying my invention realizes several or all of the objects set forth, a particular embodiment herein-after specifically described, includes a resilient front impact bar which on its outer vertical face has upper and lower marginal surfaces in one plane, with the intermediate surface slightly depressed adjacent to the flat top and bottom border. Such deformation of the outer vertical surface of the spring bar permits a corresponding deformation of the rear surface of the bar, with a resultant equal strength against horizontal impact, with less weight of bar than if made of plain stock with two parallel plain sides. But in addition it provides a narrow border at top and bottom forming only a small fraction of the total surface which need be ground and polished, and as is usual in the finish of this class of product, the surface, which is nickel-plated, is very materially reduced in area, thus providing a substantial economy in various operations mentioned in manufacture. As this type of bumper is used on the front of automobiles, and also on the rear, they are constantly exposed to

the elements and also exposed to rough usage by impact and scraping on objects, so that minimizing the amount of surface subjected to a fine polish my construction has many advantages in durability and retaining its appearance in spite of its regular usage, with the obvious economy.

As these bumpers extend either forward or to the rear beyond the other parts of the vehicle, for the object of shielding other parts of the vehicle against accidental impact, the overhanging weight of the bumper subjects the attachment to the rigid part of the vehicle to considerable vertical strain, so that any reduction in weight, without sacrificing the stiffness against impact or without sacrificing resiliency to absorb impact, relieves the other parts of the vehicle as well as the means of attachment in direct proportion to the saving in the weight of the impact bar.

While various modifications may be made either to accommodate different sizes or different designs in general, the advantages will be apparent from the description of specific embodiments of the invention shown in the accompanying drawings, in which:

Fig. 1 is an elevation showing a front view of a motor car equipped with a bumper containing the invention.

Fig. 2 is a plan view of a bumper showing attachment and with fragmentary front end illustration of the motor car frame horns.

Fig. 3 is a plan view of a bumper with means of attachment to the vehicle, slightly modified.

Fig. 4 is a side view, on enlarged scale, of a bumper with vehicle frame horn and bracket attachment.

Fig. 5 is a plan view, partly in section, of the attaching means shown in Fig. 4 on one frame horn.

Fig. 6 is a vertical section, on an enlarged scale, on the line 6-6, Fig. 2.

Fig. 7 is a plan view of a modified form of the bumper, with compound spring members. Fig. 7^a is a perspective view of a middle section showing the clamp connection between double spring members, on enlarged scale. Fig. 7^b is a section showing a modified form of clamp.

Fig. 8 is a perspective view of a short section of the spring bar member of the bumper, on enlarged scale.

Fig. 9 is a similar view showing a spring

bar member of slightly varied cross-section.

Fig. 10 is a side elevation of the rear end of one and the front of another car, showing respective rear and front spring bumpers in engagement as in collision.

Fig. 11 is a section on enlarged scale, of the spring bar members as they would engage in collision, indicating in dotted lines an alternate position of engagement.

10 The spring bar 1 constitutes the main or outer member of the bumper with the impact section 2, reversed bent ends 3—3 and attaching arms 4.

15 The motor car comprises the axle A, wheels B—B, frame sills C—C, fenders D—D, radiator E, tank F.

The sills C—C each have at their forward end a horn 4 with a spring bolt 5 having a bolt-head 6. A bracket 7 is formed with a hole 8, hexagonal if desired, to fit over the head 6 of the spring bolt 5, while a hook-bolt 9 with hook 10 passes through the opposite end of bracket 7, and may also, as shown, pass through the end 4 of the spring bar, so that the tightening of the nut 9^a of the hook-bolt securely clamps the bracket 7 to the side of the horn G and the forward end of the sill by the engagement of hook 10 with the flange C'. A second bolt 11, which in the form shown is a lag bolt, serves to clamp the end of the spring bar member at a second point to the attaching bracket. As shown in Fig. 2, the main impact bar section may be sprung out so that the arms 4 take the position 4^a, thereby permitting the positioning of the hole 8 in the attaching bracket, over the head 6 of spring-bolt 5, and with this in secured position the hook-bolt 9 is readily attached, so that setting up of the one nut 9^a firmly positions and secures the spring bar member to the horn of the car sill or frame. As shown in Fig. 3, the inner ends of the spring bar member may be bent to a position transverse of the vehicle as at 12—12, engaging bearings 13—13 attached to the horns, and they may also extend transversely of the vehicle between the horns as shown, to form a transverse bar 14 with its engaging ends secured by a bolt 14^a, thereby forming a transverse strengthening bar or tie rod as a contiguous member of the bumper. This transverse bar may also be welded at its abutting ends, forming a complete unit admirably resisting any spreading effect of horns by the deflection caused by impact of the main spring bar member.

60 The main impact or engagement portion of the spring bar of the bumper, that is the section 2, is formed with an outwardly facing channel profile for the various purposes and advantages that will now be more specifically set forth. This front surface profile, generally of a channel form, may be

produced by milling flat bar stock, leaving 65 the back surface of the spring bar plain. It may be formed by rolling the bar into the section as shown in Fig. 8; or by any suitable fabricating method, sections as shown in Figs. 8 and 9 or other variations, may be 70 provided for the spring bar of the bumper which in each case have a top and bottom border 15—15 and an intermediate depressed surface 16. The formation of the section of the spring bar or impact bar as shown, provides a top and bottom border with an area 75 for polishing which is only a small fraction of the total surface which would otherwise have to be polished in order to nickel-plate or otherwise suitably finish the bar in the 80 manner that has heretofore been prevalent. Having the top and bottom borders with parallel surfaces in the same plane, the grinding as an initial operation to prepare the surface, involves only a small fraction 85 of what would otherwise have to be ground in case of a perfectly plain front profile, but the depressed or convex intermediate surface constituting the major portion of the front of the spring bar lends itself most 90 advantageously to any suitable anti-rusting treatment, and to finishing as by enameling, and the formation of the profile subjected to the grinding and other finishing treatment, assures a uniform demarcation between the 95 finish on the upper and lower bands and the intermediate face or surface, thereby permitting facility and cheapness of finish with uniformity in the completed article.

By the formation of the offset top and bottom, to the limited extent shown and described, the resiliency of the spring bar is not impaired, but greater stiffness and resistance to indentation or twisting and bending, is greatly increased. At the same time 100 relatively greater stiffness, with all the desired flexibility is obtained as compared with a heavier bar having plain front and rear surface. The relatively protruding top and bottom borders, constitute a protection for 105 the finish of the intermediate surface of the bumper, so that in use such a construction is of substantial advantage, in addition to the relative lightness and greater resiliency, as well as the strengthening of the spring bar 110 member, weight for weight as compared with a plain surface bar.

In operation, the impact of this improved bumper involves an engagement with any part of another vehicle with the advantage 120 of holding the engagement upon impact instead of a tendency to slip up or down, which occurs with a plain surface. When such bumper engages the rear bumper of another car, as shown in Fig. 10, of similar 125 profile, the engaging borders registering with the respective intermediate depressed surface of the other bumper, as more par-

ticularly shown in Fig. 11, prevents any tendency to force one of the bumpers up, and therefore minimizes the vertical strain on the brackets and clamps, securing the bumpers to the relatively rigid parts of the vehicle. This characteristic insures the transmission of the impact more uniformly in a direct line and horizontally to the mass of the vehicle through the rigid parts of the structure best adapted to meet the shock of collision. It also prevents the slipping contact of bumpers, thus minimizing the chance of a front bumper under-running the rear bumper of a car and striking parts of a vehicle, such as the gasoline tank frequently carried, as in position F in Fig. 10.

Should it be desired to stiffen the bumper by an additional member such as 17, shown in Fig. 7, the profile form as shown in Fig. 7^a permits the uniform engagement of the back side of the main spring bar 1, with the supplementary bumper member 17, and a clamp 18 with a depressed front bar section 19 provides a finish as well as a secure clamping hold with the borders 20—20 on the clamp fitting over the borders 15—15 and registering therewith, while in the rear clamp ends 21—21 are secured together in the usual manner by bolt 22. If a main bumper member with cross-section as shown in Fig. 8 is used, then a supplementary bumper member 17^a of lesser width may be used to engage the restricted plain surface on the rear of the main member, and at the same time providing greater horizontal stiffness with less weight, thus more advantageously serving the purpose of a secondary bumper spring. This latter construction lends itself to a middle clamp to hold the two members together, with top and bottom hooks 23—23 and arms 24—24 engaging slight recesses in the top and bottom edge of member 17^a, which serve to centrally position the clamp and hold it against displacement, while the beveled surfaces in the notches 17^b—17^b provide wedge engagement so that the tightening by bolt 25 drawing ears 26—26 together, assures a permanent and effective uniting of the two members without the loss of strength, which would otherwise be entailed by perforating spring bar members and bolting them together.

The section of the bars as herein described, while conforming to what is generally known as a channel section, involves but a slight depression, or surface profiling in the direction of the length of the bar, which may be easily formed by rolling. The offsetting of the edges, or the longitudinal portions forming the protruding strips of the impact surface, are not such as to constitute a stiffening flange that would prevent resiliency, but are only sufficient to increase the strength as compared with a flat bar, and at the same time provide the rela-

tive projecting borders and relative depressed intermediate surface or surfaces, and to provide borders of sufficient width for stiffness and for the purpose of accommodating the grinding and polishing without having the tools therefor interfere with the intermediate surface. Thus for the various objects, simplicity of manufacture is provided with the resulting strengthening of the bar without impairing its elasticity for the purpose of absorbing the shock and carrying and distributing the strain of impact to the desired substantial parts of the vehicle without injury. The protection for the radiators and lamps in the front, as well as the tank or highly finished parts in the rear, as well as relieving all parts of the vehicle of shock, is thus admirably attained.

While the forms of spring steel impact bars as shown, or modifications, with the many advantages as herein described, may be combined with a supplemental spring bar as shown in Fig. 7, and with the modified form of attachment to the permanent parts of a vehicle, or may be supplemented by various arrangements of additional spring members, it will be noted that the particular characteristics of the section of the front profile of the spring bar, lend themselves particularly to the use of a single transverse bumper member such as shown in Figs. 2 and 3, because of the added strength and resiliency due to its form.

Spring impact bars heretofore used have been made of plain, smooth-face spring bar stock which is tempered, and to suitably finish the same the entire front side or profile involves the grinding of a surface the entire width of the front of the bar. Scale, due to the necessary heat treatment more or less interferes with the grinding, which in any event is a costly operation, but is necessary to provide the surface condition for proper treatment in order to nickel-plate the front of the bar, which is usual. By the provision of a top and bottom border with intermediate depressed surface, there is not alone a saving of material and added strength compared with weight, but the front profile presents a greatly diminished surface requiring grinding, which in practice represents in the neighborhood a saving of three-quarters of the work in the finishing of the bars by reducing to that extent the surface to be ground, polished and finished as by nickeling. The intermediate depressed front surface may be japanned in black or any desired color, to match the finish of the other parts of the car, and in any event lends itself to a dull and relatively cheap treatment of the surface for the desired preservation of the surface for weathering, and also to protect the surface in performing its natural function of impact and unavoidable scraping of the outer or extreme surface of the

bumper when contacting with obstacles. While greatly cheapening cost of production, the use of the improvements herein described, is advantageous for wearing qualities by minimizing the chance of denting the surface, bending the end or scratching or generally marring the finish, so that these bumpers will greatly outwear the forms heretofore used, both structurally and in maintaining their predetermined appearance, without the necessity of frequent re-finishing. In the case of accident the intermediate broad surface may be readily enameled, while the upper and lower polished borders being widely separated will maintain their appearance owing to their finish radically contrasting with the intermediate dark or colored band of relatively dull finish.

By providing a cross-section of bumper bar as herein described, the structural advantages are obtained such as stiffening without interfering with flexibility, and also strengthening and stiffening the top and bottom edges without increasing the weight compared with bars heretofore used, or by obtaining these advantages and equal strength with a diminution of weight as compared with the plain bar. In addition it materially insures the functioning of bumpers for the purpose for which all bumpers are intended, which briefly referred to in the description of Figs. 10 and 11, will be more fully appreciated by the following. In order that bumpers on motor cars should effectively absorb the shock of impact, the bumper on the rear of a car must be engaged by the front bumper on a following car colliding with it. Uniformity of height of bumpers is therefore prescribed and is being more and more generally complied with by making the brackets carry the bumpers at a uniform height, but original design and equipment is in practice subject to a universal variation of load which depresses the vehicle springs, and is also subject to variation of tire deflation, which in road use precludes exact registering of bumper engagement, and which with the slight vibration and road inequalities will always present a condition of variation of an inch or two between the height of a rear bumper and the front bumper of a following car. Much of the failure of proper functioning of bumpers is caused by slipping of the smooth surfaces of bumpers, one over-riding the other with temporary failure to properly absorb impact and frequently permanently dislocating the impact bar. As illustrated in Fig. 11, the border surfaces 15^b—15^b may be slightly inclined toward the middle surface, so that in the event of disalignment or non-registering of colliding bumpers, such as illustrated in dotted lines, even a partial engagement, at the edge will in all cases tend

by the pressure of impact, as well as the slight vibration, to cause the bumpers to slide into proper contact, that is to nest together, or, in other words, to assume relative position which will assure transmission of the impact of engagement to be properly transmitted to the bumper, carried through the resilient parts of the bumper structure and the shock thus absorbed to the full extent of the resiliency and cushioning effect predetermined by the design of the bumper, thus greatly assuring the proper functioning for which automobile bumpers are intended.

While various modifications may be made from what has been herein shown and specifically described, without departing from my invention, what I claim and desire to secure by Letters Patent is:

1. An automobile bumper having a spring impact bar supported with one of its relatively broad sides forming the impact face having a plurality of parallel smooth-finished surface bands extending lengthwise of the impact face, said band faces aggregating in width a quarter or more of the impact face of the bar with the band faces substantially in a common plane offset from the remaining impact surface of the bar adjacent said bands, said offset being slight and a small fraction of the width of the impact face of the bands.
2. An automobile spring bar bumper consisting of a flat thin resilient bar having its back flat for substantially the entire width and having its impact side formed to a profile with two flat faced impact bands respectively near top and bottom of the impact side of the bar and of an aggregate impact face width approximating one-quarter or more of the total width of the bar, and an intermediate impact face offset from the common plane of the bands a fractional extent of the thickness of the bar.
3. An automobile bumper comprising a resilient transverse thin impact bar and means for securing reverse ends of the same to the end of the vehicle, having a flat rear face and an equally broad vertical impact face with a plurality of parallel smooth finished surface strips extending longitudinally of the bar and aggregating in width a quarter or more of the breadth of the impact face, and unfinished areas of impact surface adjacent said flat strips offset from the common plane of said strips an extent equal to a small fraction of the thickness of the bar.
4. A spring bar bumper comprising a broad and thin bar, having on its impact face slightly raised flat surfaced borders of lesser area than the intervening impact face, said intervening impact surface offset from the common plane of the borders a small fraction of the thickness of the bar, return bent ends on said bar engaging clamping

means on rigid extensions of said vehicle, and a straight bar or tie rod interconnecting the clamped ends of said bar.

5 5. A spring bar bumper comprising a broad and thin bar, having on its impact face slightly raised flat surfaced borders of lesser area than the intervening impact faces said intervening impact surface offset from the common plane of the borders a small
10 fraction of the thickness of the bar.

6. An automobile bumper having an impact bar supported on edge and having a flat

back the full width of the bar and on its impact face a plurality of parallel bands extending lengthwise of the face and of lesser
15 width than the bar and having a flat smooth finished face, adjacent impact surface areas with unfinished surface and offset slightly from the common plane of the finished surface bands.
20

In testimony whereof, I have signed my name to this specification this 7th day of July, 1922.

SAMUEL H. SHAW.