

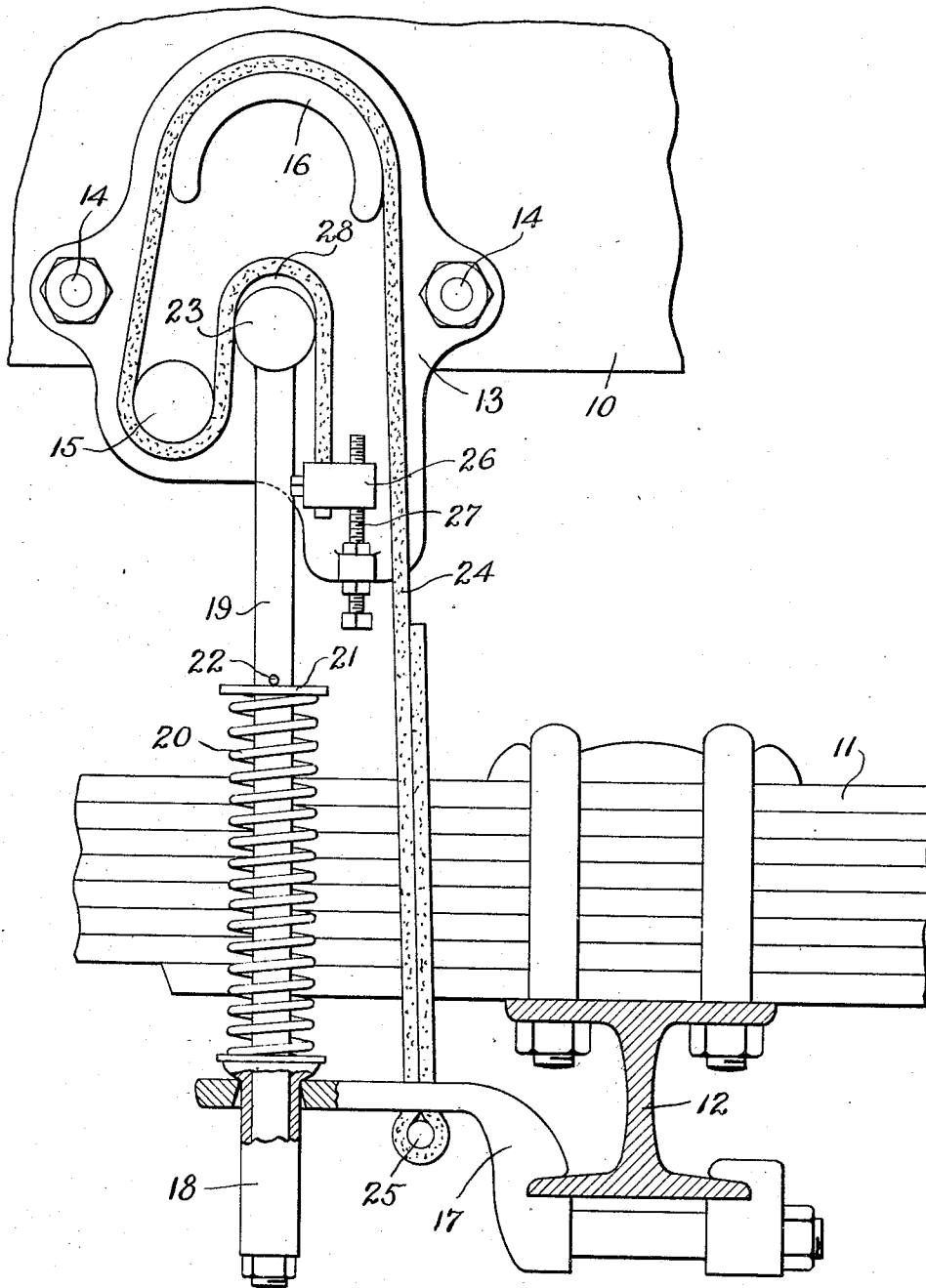
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SHOCK ABSORBER

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UNITED STATES PATENT OFFICE

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SHOCK ABSORBER

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This invention relates to shock absorbers for vehicles, and has for its object the provision of improved means for overcoming the rebound which follows the compression of the vehicle spring.

More specifically one object of the invention is to provide a shock absorber which shall offer maximum resistance to rebound at the time the force of the spring is greatest, the resistance decreasing with the decrease in the force of the spring.

Other objects and advantages will appear from the following description.

The invention is exemplified in the combination and arrangement of parts shown in the accompanying drawing and described in the following specification, and it is more particularly pointed out in the appended claims.

In the drawing, the figure is a somewhat diagrammatic elevation showing one embodiment of the present invention.

The numeral 10 designates a vehicle frame or body having a supporting spring 11 mounted on the vehicle axle 12. A bracket 13 is secured to the frame 10 by bolts 14 or other suitable attaching means and is provided with a pin 15 and an arcuate flange or ear 16. A bracket 17 is secured to the axle 12 and is perforated to receive a sleeve 18 which is so mounted on the bracket that it may have limited swinging movement thereon. A push rod 19 extends through the sleeve 18 and is surrounded above the sleeve by a helical spring 20. The lower end of the spring 20 rests upon the upper end of the sleeve 18, while the upper end of the spring 20 engages a washer 21 held against upward movement on the rod 19 by a pin 22. The upper end of the rod 19 carries a laterally extending cylindrical T-head 23. A flexible band or strap 24 has its lower end secured to the bracket 17 by a pin 25 and extends upwardly over the flange 16 and thence downwardly around the pin 15 and upwardly over the T-head 23. The end of the strap 24 is secured to a block 26 which is attached to the bracket 13 by any suitable adjusting means, such as a threaded bolt 27. Any suitable form of adjustable attachment may be used for this pur-

pose. When the parts are in normal position of rest the block 26 is preferably adjusted to provide a slight amount of slack in the strap 24, as indicated at 28. Of course, this slack will not appear at the point 28, but is diagrammatically shown at this point as it assists in indicating the effect of the slack in that the slack permits a limited amount of vertical movement of the push rod 19 without exerting tension on the strap 24. Because of this limited free movement the vehicle will travel over small uneven places on the road without calling the shock absorber into operation. When, however, the spring 11 is compressed toward the body 10 by an amount sufficient to raise the T-head 23 to draw the strap 24 taut, further compression of the spring will raise the T-head 23, tending to raise the central portion of the loop passing over the T-head. At the same time the end 25 of the strap 24 will be raised which allows a certain amount of slack, but since the strap is doubled over the T-head 23 the tendency of the T-head to take up the slack is twice as great as the amount of slack afforded by the upward movement of the part 25. The T-head 23 will therefore be restricted in its upward movement so that the actual movement of the T-head relative to the frame 10 will be equal to half the upward movement of the spring 11. This will compress the spring 20, causing the T-head to bear against the loop in the strap and draw the strap tightly about the pin 15 and the arcuate friction ear 16. This tension on the strap will tend to prevent the strap from sliding over the friction ear 16 so that when rebound begins the frictional resistance between the strap 24 and the ear 16 will oppose the force of the rebound. This frictional resistance will depend upon the tension in the strap 24 which is produced by the compression of the spring 20. It will be apparent that the greatest compression of the spring 20 will occur when the vehicle spring is compressed the greatest amount so that the frictional resistance to the rebound will be greatest at the beginning of the rebound and will gradually decrease until it is entirely removed when the spring reaches its normal position.

That is, the shock absorber offers the greatest resistance to the rebound of the spring at the time that the force of the spring tending to rebound is the greatest and this resistance gradually decreases as the force of the spring tending to produce rebound decreases. This is exactly the reverse of shock absorbers now upon the market in which a spring or other resistance member is gradually tightened by the rebound movement so that the resistance is increased as the force of the spring decreases.

The advantage of the arrangement of the present invention over those now in use, will be apparent. A gradually increasing resistance to the rebound which becomes greatest at the end of the rebound movement tends to produce a much more sudden check and consequent jar than does the present invention in which the rebound is prevented at its inception and the resistance to the rebound is gradually decreased, thus avoiding shock and jar. The frictional resistance to the rebound movement during the time of greatest compression of the spring prevents acceleration of the relative movement of the separating parts so that when the parts have reached their normal position they are not thrown violently past this position by accumulated momentum, since the accumulation of excessive momentum is prevented prior to the time the parts reach their normal position. The present invention therefore operates to prevent violent rebound rather than to arrest the rebound after the parts have attained a high relative velocity in a rebound direction. After the parts have reached their normal position no further resistance to separation is offered. It will be seen from the figure of the drawing which shows the parts in normal position that separation will merely move the T-head downwardly away from the strap 24, and if the T-head reaches its limit of downward movement due to engagement with the pin 15, the push rod 19 may move to permit further separation. It is apparent that the device offers no positive restriction to separation of the parts after they have reached their normal position.

We claim:—

1. A shock absorber comprising a flexible friction member for resisting rebound of a spring, and a push rod over which said flexible member slides for taking up slack in said flexible member, said push rod being adapted to be mounted on a bracket fixed to said spring.

2. The combination with a vehicle spring, of a flexible member, a friction device engaged by said flexible member, a head over which said flexible member slides for exerting tension on said flexible member, and a spring for exerting force on said head, said flexible member being doubled about said

head to multiply the amount of slack of said flexible member taken up by a given movement of said head and said push rod being adapted to be mounted on a bracket fixed to said spring.

3. In combination, two relatively spring-held members, a flexible device extending between said members, a friction device over which said flexible device moves, and a spring-held head connected with one of said members and engaging said flexible device so that said flexible device is subjected to spring pressure of said head when said members are moved relative to each other, said flexible device being doubled about said head and slidable thereon to multiply the slack of said flexible device required for a given movement of said push rod, and said flexible device having increased tension exerted thereon as the members move toward each other.

4. The combination with a vehicle frame having a spring support, of a shock absorber for preventing rebound of said frame and support, said shock absorber comprising a flexible member connecting said frame and support and passing over a friction device, and a spring-held head for exerting tension on said flexible member when said frame and support move together, the amount of force so exerted being greatest at the time of closest approach of said frame and support.

5. The combination with a vehicle frame and a spring support therefor, of a shock absorber comprising a flexible member connecting said frame and support and passing about a friction device, a spring-held head engaging said flexible member and pressed thereagainst by the approach of said frame and support, a push rod for supporting said head, said flexible member being doubled about said head to multiply the amount of slack required for a given movement of said head, and an adjustable connection for said flexible member to take up slack therein.

6. The combination with spring-held vehicle frame members, of a shock absorber for limiting rebound of said frame members, said shock absorber comprising a flexible member attached to one of said vehicle frame members, a friction guide mounted on the other of said vehicle frame members and engaging said flexible member, and a spring-held tensioning device for said flexible member mounted on one of said vehicle frame members and engaging said flexible member for exerting tension on said flexible member proportional to the relative displacement of said vehicle frame members to cause said flexible member to resist rebound of said frame members relative to each other by a force proportional to the relative displacement of said vehicle frame members.

7. The combination with a pair of spring-held vehicle frame members, of a flexible

member attached to one of said frame members, a pair of frictional guides attached to the other of said frame members, said flexible member being trained about said guides, a push rod mounted on the first of said frame members and supporting a contact portion engaging said flexible member, said flexible member being doubled about said contact portion, and a spring for holding said contact portion in engagement with said flexible member, said spring being arranged to be placed under strain by relative displacement of said vehicle frame members.

8. The combination with a pair of spring-held vehicle frame members, of a flexible member attached to one of said frame members, a pair of frictional guides attached to the other of said frame members, said flexible member being trained about said guides, a push rod mounted on the first of said frame members and supporting a contact portion engaging said flexible member, said flexible member being doubled about said contact portion, a spring for holding said contact portion in engagement with said flexible member, said spring being arranged to be placed under strain by relative displacement of said vehicle frame members, and means for adjusting the tension in said flexible member to permit a limited amount of slack in said flexible member when said vehicle frame members are in normal position relative to each other.

9. In a shock absorber for checking the movement of two members relative to each other comprising a bracket on one of said members, a flexible element adjustably connected thereto, a bracket on the other of said members, a push rod mounted in an opening in said last-mentioned bracket and being retained therein by the engagement of said push rod with the flexible element, and means for fastening said flexible element to said second-mentioned bracket.

10. A shock absorber for checking the movement of a spring relative to the frame upon which it is mounted comprising a bracket adapted to be attached to the spring, and a second bracket adapted to be attached to the member upon which the spring is mounted, an opening in said second-mentioned bracket, a sleeve mounted therein, a push rod slidably mounted in said sleeve, means for yieldingly urging said push rod through said sleeve in one direction, a stop for limiting the movement of the push rod in the same direction, a flexible member operatively connected between said brackets and trained over a plurality of fixed members on one of said brackets and adapted to be engaged by said push rod to check the movement of said spring relative to the member on which it is mounted.

11. A device as claimed in claim 10 in

which the sleeve is limited in its movement through said opening in but one direction.

In testimony whereof we have signed our names to this specification on this 23rd day of March, A. D. 1927.

JOHN G. FOX.

HENRY HELMHOLTZ.

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