June 15, 1926. 1,588,900

W. L. McGRATH

FLEXIBLE LINK FOR VELOCIPEDES AND THE LIKE

Filed Dec. 15, 1922

Fig. 1.

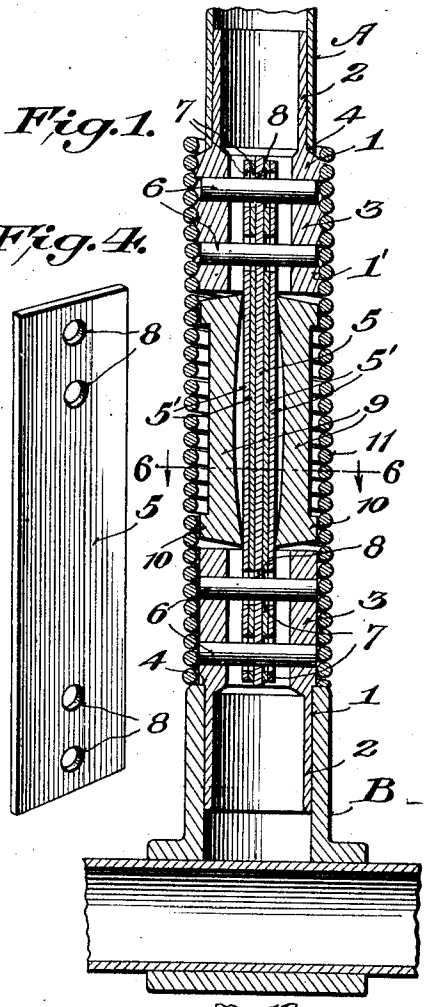


Fig. 2.

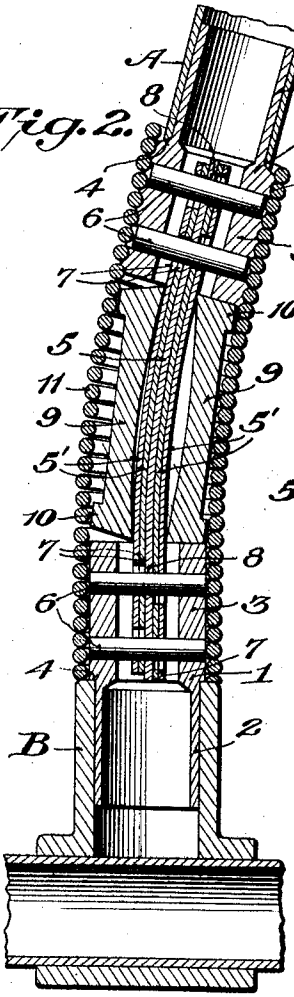


Fig. 4.

Fig. 5.



Fig. 3.

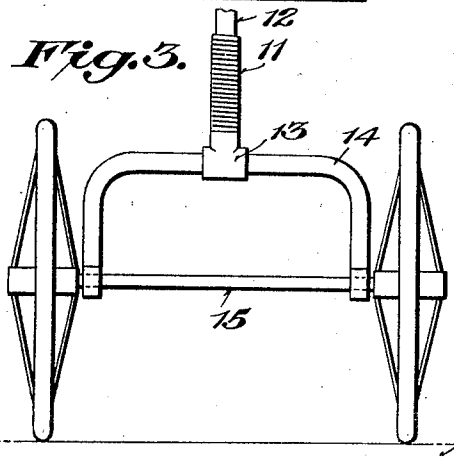
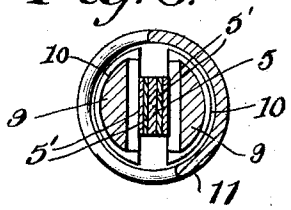


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FLEXIBLE LINK FOR VELOCIPEDES AND THE LIKE.

Application filed December 15, 1922. Serial No. 607,208.

This invention relates to a flexible link for connecting rigid members, and particularly to a link for use in frames for velocipedes of the three-wheeled type commonly used by children.

The type of frame ordinarily employed in the construction of a child's velocipede of the three-wheeled type comprises a rigid main frame member or "backbone" pivotally secured at the forward end thereof to a fork which mounts the front or driving wheel. Usually, the backbone is provided at its rear end with a T-coupling which engages an inverted, substantially U-shaped frame member at the center thereof, the two ends of the U-shaped member being rigidly secured to the rear axle adjacent the inner ends of the hubs of the two rear wheels. This construction provides a velocipede having three separate points of support located in three transversely spaced planes, and when the child propels his vehicle on a straight course the three points of support insure stability. However, when turning a sharp corner at relatively high speed, it is impossible, in the ordinary construction of velocipedes, for the rider to counteract the centrifugal tendency to upset by tilting the vehicle so as to bring the center of gravity of the moving mass to a point where the force of gravity counteracts the centrifugal force, as is common practice on two-wheeled velocipedes; and the object of this invention is to provide a flexible link which may be employed in the frame structure of a three-wheeled velocipede in a manner to result in a flexible frame such that the rider may tilt the front wheel of the velocipede, and will naturally and instinctively do so, to oppose the centrifugal force tending to upset him when the velocipede is turned around a sharp corner. The link is preferably so constituted that said frame will be normally and automatically maintained in an upright position when the vehicle is propelled on a straight course; that will maintain the frame in stable, static equilibrium when standing alone or with a rider; and that is so constructed that it will be impossible for the rider to flex the same beyond the elastic limits of the flexible elements thereof.

A further object of this invention is to provide a flexible link that may be readily installed in the rigid frames of velocipedes now in use and which, when installed, will be out of the way of the rider, either when mounting or when in the saddle.

The invention will be better understood by reference to the accompanying drawings, in which like reference numerals indicate like parts, and wherein—

Fig. 1 is a vertical section illustrating one embodiment of this invention;

Fig. 2 is a similar view showing the link flexed to the right;

Fig. 3 is a rear elevation, detail view illustrating one manner of employing the link to connect the "backbone" to the rear wheels of a velocipede;

Fig. 4 is a view in perspective of one type of leaf spring employed in my flexible link;

Fig. 5 is a view in perspective of a second type of leaf spring employed in this invention, and

Fig. 6 is a transverse section taken on the line 6—6 of Fig. 1.

In the form shown, my flexible link comprises a pair of terminal elements in the form of tubular sleeves 1, 1, of cylindrical cross-section having the relatively thin-walled portions 2, 2 and the thick-walled portions 3, 3, which are flexibly connected, in reversed position, one with the other in a manner to be hereinafter described. Portions 2 are preferably formed with their outside diameters substantially equal to the inside diameters of the rigid parts A, B, of the frame that it is desired to flexibly connect. Shoulders 4, 4 are suitably formed on the exterior surface of sleeves 1 to limit the extent that the same extend into said rigid parts.

Any suitable means may be employed for flexibly connecting sleeves 1 and maintaining them in proper spaced relation. In the illustrated embodiment, a plurality of leaf springs 5 and 5′ are secured at their opposite ends to sleeves 1 by means of suitable pins 6. In order that each of the leaf springs 5 and 5′ may equally resist a flexing force, it is necessary to so mount the same that they may have relative longitudinal movement one with the other. Accordingly, the outer leaf springs 5′ are provided with oblong apertures 7 for engaging pins 6, while the center spring 5, which is preferably heavier than springs 5′ and in the nature of a "backbone" spring, is preferably provided

with circular openings 8 having a diameter substantially equal to that of pins 6.

Any suitable means may be employed to insure against flexure of the link beyond the elastic limit of springs 5 and 5'. Preferably, a pair of stop members 9 are interposed between sleeves 1 for this purpose. Members 9 are beveled at the opposite ends thereof preferably at an angle equal to one-half the angle through which it is desired to flex the connected rigid members. When the link is flexed to its extreme limit, the inner ends of portions 3 of sleeves 1 contact the beveled ends of stops 9, thus positively preventing further flexure of the link, as illustrated in Fig. 2. The inner faces of members 9 are preferably made concave to provide sufficient clearance when the springs are under their maximum flexure, and the arc from which their surfaces is struck bears such a relation to the angle of bevel of the ends of stops 9 that one of the outer leaf springs 5' may contact this curved surface throughout the greater portion of its length when the joint is flexed to its extreme limit. This concave surface prevents springs 5' from forcing stop 9 outwardly from its normal position when the joint is flexed. The outer surfaces of stops 9 are substantially semi-cylindrical in shape, with the ends 10 of substantially the inside diameter of the casing 11, but of reduced diameter at the center portion to permit of free flexure of the casing 11, as shown in Fig. 2.

Any suitable means may be employed for maintaining stops 9 in position relative to sleeves 1 and leaf springs 5. As shown, I may employ a flexible tube or casing in the form of a coil spring 11, having an inner diameter substantially equal to that of sleeve 1, surrounding the various parts, and engaging shoulders 10 of stops 9. Spring 11 facilitates assembly, maintains stops 9 in proper position, supplements the elasticity of leaf springs 5 and increases the sightliness of the joint. In addition it retains pins 6 in place. Any other suitable type of flexible casing or tubing may be employed in place of coil spring 11.

One or both of the terminal elements may be screw-threaded on their external diameter to suit the coils of the casing spring and in order to hold the latter in position. As here shown, only the upper terminal element is so screw-threaded at 1', this effectively answering the purpose in this particular construction.

In Fig. 3 I have illustrated my flexible joint installed in the frame of a child's velocipede of the three-wheeled type, at a point between the lower end of "backbone" 12 and T 13, which latter engages the U-shaped frame member 14 rigidly secured to rear axle 15, though it will be understood that the link may be used at any other suitable place.

The effect of employing my flexible link in the frame of a vehicle of this type is that, when the rider propels the velocipede along a straight course, the elasticity of the link is such that "backbone" 12, which has pivoted to the forward end thereof the forks carrying the front driving wheel and carrying the rider's saddle (not shown), is normally maintained in an upright, stable position. When he wishes to turn a sharp corner, the rider will instinctively and naturally shift his body toward the center of the arc about which he is attempting to turn, thereby flexing the link, as illustrated in Fig. 2, and tilting the front driving wheel. The shifting of the center of gravity of the moving mass inwardly, with reference to the points of support, will effectively counteract the centrifugal force tending to upset the rider, thereby eliminating the danger of injury resulting from a fall. The resiliency of the link automatically returns the "backbone" to upright position when the corner is turned and the rider shifts his body to normal position.

It will be perceived that I have provided a flexible link of simple and rugged construction that may be economically produced and readily installed as an element of the original velocipede frame structure or which may be quickly installed in velocipedes now in use, and which is so positioned as to be out of the way of the rider both when mounting and when in the saddle. And it is particularly noted that this link may be rapidly assembled and put in place as a unit, thus minimizing labor and the chance of improper assemblage or of the parts becoming accidentally disassembled; and that the device requires no adjustment, nor does it alter or change the appearance of the velocipede, a very material matter from a commercial standpoint. It is further to be noted that, after this structure is assembled, it may be dipped as a unit in the enamel.

While my flexible link has been illustrated and described as being particularly adapted for use in velocipede frames, it is to be expressly understood that the same is not limited to this use, but may be advantageously employed wherever it is desired to flexibly connect a plurality of elements.

The invention is capable of receiving a variety of mechanical forms, one of which, for purposes of illustration, has been shown in the accompanying drawings, but it is to be distinctly understood that the drawings are for purposes of illustration only and are not designed as a definition of the limits of the invention, reference being had for this purpose to the appended claims.

What is claimed is:—

1. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a resilient member connecting said elements,

and means interposed between said elements for limiting the flexure of said member.

2. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a resilient member connecting said elements, means interposed between said elements for limiting the flexure of said member, and means for holding said limiting means in place.

3. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a plurality of terminal elements, means flexibly connecting said elements, means interposed between said elements for limiting the flexure of said first-named means, and a flexible member surrounding said last-named means.

4. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, means flexibly connecting said elements, means interposed between said elements for limiting the flexure of said first-named means, and a coil spring surrounding said last-named means.

5. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, means flexibly connecting said elements, means interposed between said elements for limiting the flexure of said first-named means, and a resilient member surrounding said last-named means.

6. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a plurality of sleeves, a plurality of leaf springs connecting said sleeves, means interposed between said sleeves for limiting the flexure of said springs, and a flexible member surrounding said means.

7. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a plurality of sleeves, a plurality of leaf springs connecting said sleeves mounted for relative longitudinal movement one with the other when said link is flexed, means interposed between said sleeves for limiting the flexure of said springs, and a flexible member surrounding said means.

8. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a plurality of leaf springs connecting said elements, a pair of stop members having beveled ends interposed between said elements for positively limiting the flexure of said springs, and means for holding said limiting means in place.

9. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a plurality of leaf springs connecting said sleeves, and a pair of stop members having concave inner faces interposed between said elements for limiting the flexure of said springs.

10. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a plurality of leaf springs connecting said elements, and a pair of stop members having beveled ends for engagement with said terminals and concave inner faces for engagement with said springs.

11. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a plurality of leaf springs connecting said elements, a pair of stop members having beveled ends for engagement with said terminals and concave inner faces for engagement with said springs, and means holding said stop members in place.

12. In a velocipede frame a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a plurality of leaf springs connecting said elements, a pair of stop members having beveled ends for engagement with said terminals and concave inner faces, and resilient means surrounding said members and elements.

13. In a velocipede frame, a backbone having intermediate its length a flexible link comprising a pair of terminal elements, a plurality of leaf springs connecting said elements, a pair of stop members having beveled ends for engagement with said terminals and concave inner faces, said members having semi-cylindrical outer surfaces, and a coiled spring surrounding said members.

14. A flexible link for a velocipede frame comprising a leaf spring, and means for limiting the flexure of said spring as a whole.

15. A flexible link for a velocipede frame comprising a plurality of leaf springs, means providing for relative longitudinal movement between said springs when they are flexed, and means for limiting the flexure of said springs.

16. A flexible link for a velocipede frame comprising a leaf spring assemblage, and means for limiting the flexure of the spring of said assemblage as a whole comprising a pair of stop members.

17. A flexible link for a velocipede frame comprising a leaf spring assemblage, and means for limiting the flexure of said springs comprising a pair of stop members concave on the surfaces adjacent said assemblage.

18. A flexible link for a velocipede frame comprising a leaf spring, means for preventing the flexure of said spring beyond its elastic limit and means for holding said limiting means in place.

19. A flexible link for a velocipede frame comprising a plurality of leaf springs, means

providing for relative longitudinal movement between said springs when they are flexed, means for limiting the flexure of said springs, and means for holding said limiting means in place.

20. A flexible link for a velocipede frame comprising a leaf spring assemblage, means for preventing the flexure of said springs beyond the elastic limit of the same comprising a pair of stop members, and means for holding said limiting means in place.

21. A flexible link for a velocipede frame comprising a leaf spring assemblage, means for limiting the flexure of said springs comprising a pair of stop members concave on the surfaces adjacent said assemblage, and means for holding said limiting means in place.

22. A unitary flexible link comprising a pair of terminal elements, a resilient assemblage connecting the same, means for limiting the flexure of said assemblage, and a flexible covering surrounding said elements, assemblage and limiting means.

23. A unitary flexible link connecting parts of a velocipede frame and comprising a resilient assemblage arranged between said parts, means for limiting the flexure of said assemblage, and a flexible covering surrounding said assemblage and limiting means.

24. A unitary flexible link connecting parts of a velocipede frame and comprising a pair of terminal elements, a resilient assemblage arranged between said elements, and a flexible covering surrounding said assemblage.

25. A unitary link connecting parts of a velocipede frame and comprising a flexible assemblage the parts of which are mounted for relative longitudinal movement.

26. A unitary link connecting parts of a velocipede frame and comprising an assemblage of flat springs mounted for relative longitudinal movement.

27. A unitary link connecting parts of a velocipede frame and comprising an assemblage of flat springs mounted for relative longitudinal movement, and means for limiting the flexure of said assemblage.

28. A unitary flexible link connecting parts of a velocipede frame and comprising a pair of terminal elements, one of said elements having screw-threads formed exteriorly thereof, a resilient assemblage arranged between said elements, and a flexible covering surrounding said assemblage and having engagement with said screw-threads.

29. A unitary flexible link connecting parts of a velocipede frame and comprising a resilient assemblage arranged between said parts, means for limiting the flexure of said assemblage, a flexible covering surrounding said assemblage and limiting means, and means for holding said covering in place.

In testimony whereof I have signed this specification.

WILLIAM L. McGRATH