

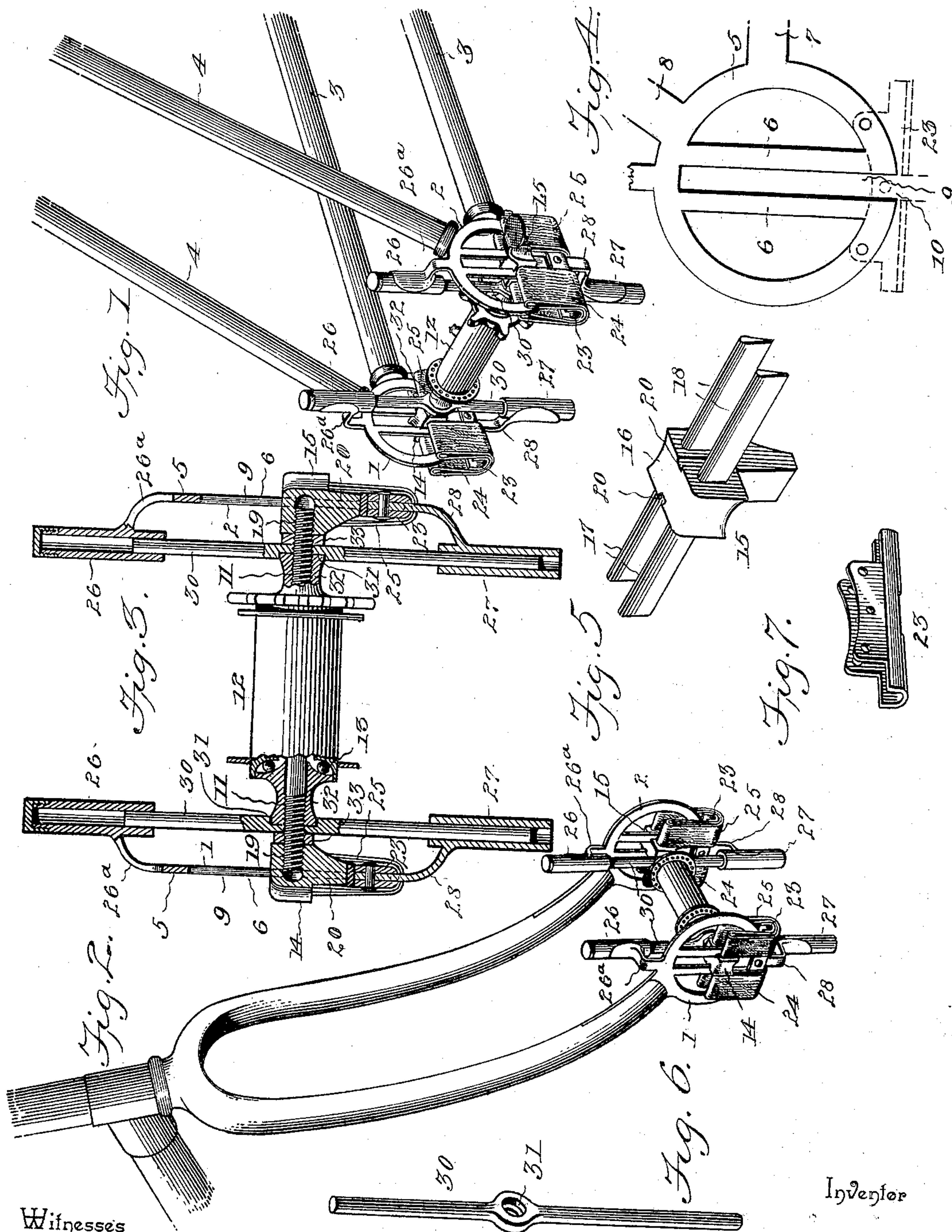
**No. 628,864.**

**Patented July 11, 1899.**

W. B. SPENCER.  
CUSHION ATTACHMENT FOR BICYCLES.

(Application filed Oct. 28, 1897.)

(No Model.)



Witnesses

Est. Monroe  
H. J. Benbrook

By His Attorneys,

W<sup>m</sup>. B. Spencer,

Chas. Snow & Co.



# UNITED STATES PATENT OFFICE.

WILLIAM B. SPENCER, OF CHICAGO, ILLINOIS.

## CUSHION ATTACHMENT FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 628,864, dated July 11, 1899.

Application filed October 28, 1897. Serial No. 656,666. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM B. SPENCER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Cushion Attachment for Bicycles, of which the following is a specification.

My invention relates to improvements in cushion attachments for bicycles of the pattern known to the art as "safety-bicycles;" and it relates more particularly to improvements in that class of cushion devices an example of which is disclosed by Letters Patent No. 608,235, issued to me August 2, 1898, in which the bicycle-frame is sustained under yielding tension by the action of elastic springs. In cushion devices of this class it is necessary to so suspend and sustain the axle of the bicycle-wheel that it will not be subject to deflection in either a vertical or horizontal line when the machine is deflected from its line of travel—as, for example, in turning corners or curves. It is also desirable to so suspend the wheel-axle that while the bicycle-frame is capable of vertical yielding motion it will always maintain its true and proper relation to the fork of the frame, and, furthermore, it is desirable to dispose the cushion devices in exceedingly compact relation to the bicycle-frame and the wheel in order to avoid interfering with the rider in mounting or dismounting. Furthermore, in this art it is desirable that the points of suspension or support for the wheel-axle shall be so arranged as to secure a uniform distribution of the spring-tension for such cushion devices in order that the bearing or block for the wheel-axle may be kept from tilting and binding unduly in the guide device for the cushion-suspension mechanism.

It is the object of my present improvement to attain these ends by an exceedingly simple and efficient construction which may be embodied in the structure of bicycles during the manufacture thereof or which may also be built into or attached to bicycles already constructed at a minimum expense.

To the accomplishment of these ends my invention consists in the novel combination of elements and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the same in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a perspective view of my improvement applied to the rear hub and fork of an ordinary safety-bicycle frame, the rear forks only of such frame being shown. Fig. 2 is a perspective view of part of a front bicycle-fork and the front-wheel hub, showing my cushion applied in operative relation thereto. Fig. 3 is a vertical transverse sectional view taken centrally through the structure shown by Fig. 1. Fig. 4 is a face detail view of the fork-plate to be attached to the bicycle-fork. Fig. 5 is a detail perspective view of the axle bearing or block. Fig. 6 is a detail view of the guide-stem by which the wheel-axle is held from displacement in a vertical plane. Fig. 7 is a detail view of the clip-plate to which the lower ends of the cushion spring-bands are attached.

Like numerals of reference denote corresponding parts in all the figures of the drawings.

In Fig. 1 of the drawings I have shown my improved cushion for a bicycle-frame used in connection with the rear forks and the hub of the rear wheel, while in Fig. 2 the cushion is shown in connection with the front or steering fork and the hub of the front wheel; but in both constructions the cushion is essentially the same in so far as the leading features of the device are concerned.

In Figs. 1 and 3 the numerals 1 2 designate the frame-plates, 3 the members of the horizontal rear fork, and 4 the members of the upwardly-inclined rear fork, which extends upwardly and attaches to the seat-post socket in the usual or any approved manner. The frame-plates 1 and 2 are duplicates of each other, and each frame-plate consists of an annulus 5, the parallel vertical guides 6 6, and the radial arms or lugs 7 8, which protrude beyond the annulus 5 and lie at different angles thereto to accommodate or adjust themselves to the members of the horizontal and inclined rear forks 3 4 of the bicycle-frame. The radial protruding arms 7 8 for the frame-plates are united to the rear forks in any suitable or approved manner—as, for instance, by means of couplings, as shown by Fig. 1—



or said radial arms may be brazed or otherwise united to the forks. The frame-plates 1 2 are so united to the rear forks as to have their arms 7 8 parallel to each other, so as to have the frame-plates and the bicycle-forks in proper relation under all conditions of service, and said frame-plates are so positioned on the forks of the frame that the parallel guides 6 6 are always in vertical positions. I attach importance to the described construction of the frame-plates, because such construction enables the frame-plate to be struck up or otherwise wrought from a single piece of metal, thus producing the frame-plate economically in a manner to provide for its assemblage and attachment to the bicycle-forks. The lower part of the annulus, forming a part of the frame-plate, is open or divided, as at 9, between the lower terminals of the vertical parallel guides 6 6 to provide the opening or throat 10, and this construction possesses utility in that provision is made for the ready removal and replacement of the axle block or bearing.

11 designates the axle, 12 the hub of the rear wheel, and 13 the ball-bearing cup within the hub of the rear wheel. The rear-wheel hub and the ball-bearing therefor are of the usual or any preferred construction, and at its ends the axle 11 is externally threaded to accommodate the bearings or blocks 14 15. Each bearing or block is a single piece of metal, preferably a casting or drop-forging of the character shown by Fig. 5 of the drawings, and said bearing or block comprises a body 16, two pairs of arms 17 18, and a threaded socket 19, which is closed on the outer side or face of the body and which is open on the inner side or face for the reception of the threaded end of the axle.

The construction of the bearing or block with the threaded socket therein provides for the easy and ready attachment of the block to the axle without the employment of threaded pins or other fasteners, and said block or bearing may also be readily detached and applied in a moment's time. The arms 17 form a pair, which protrude from the body 16 on one side of the axle-socket 19 and at right angles thereto, while the other pair of arms 18 protrude from the other side of the block-body and at right angles to the axle-socket therein. In its opposite sides or faces the body of the axle block or bearing is provided with the grooves or channels 20 20, and the vertical guides 6 of the frame-plate are fitted in said grooves or channels of the axle-block in a manner to permit said guides and the frame-plate to play vertically in the grooves or channels of the axle-block. By dividing the annulus of the frame-plate in the line of the space between the vertical guides, so as to form the throat 10, the axle-block may be readily introduced into the frame-plate or withdrawn therefrom, and as the axle-blocks are attached to the axle of the wheel-hub such removal and replacement of the axle-blocks

with facility into or from the frame-plates enable the wheel to be disconnected from or applied to the bicycle-frame, whenever desired, for the purpose of inspection or repairs. The throat 10 at the lower side of the arched frame-plate is designed to be closed by means of the clip-plate 23, which is adapted to cooperate, in connection with the arms 17 18 of the axle-block, in sustaining the elastic spring-bands and also furnish a means to limit the vertical play of the axle-block in a downward direction within the frame-plate. This clip-plate 23 I prefer to strike up from a single piece of metal in substantially rectangular form and with a central slot, and said clip-plate is doubled or folded upon itself centrally along the line of the longitudinal slot therein. The folded and slotted clip is applied or fitted edgewise against the lower part of the frame-plate, so as to span the opening or throat 10 therein and to have its ends project beyond the edges of the arched frame-plate, the slot of the clip-plate lying in the vertical plane of the throat or opening 10 between the parallel guides of the frame-plate. The clip-plate is provided with transverse openings, through which may be passed suitable rivets or other fasteners to attach the clip-plate rigidly to the frame-plate; but the parts may be united in any other suitable manner preferred by the skilled mechanic. The clip-plate occupies a position below and parallel to the pairs of arms 17 18 of the axle-block, and said clip-plate lies in a vertical plane between the pairs of arms 17 18. The arms of the axle block or bearing and the clip-plate are operatively connected together by the elastic spring-bands 24 25, one or more pairs of which may be used, according to the weight to be sustained by the bicycle. I have shown the springs 24 25 as consisting of doubled bands of elastic material, such as rubber or its equivalent, and the spring 24 is arranged on one side of the longitudinal axis of the axle, so as to have its middle portion fit around one end of the clip-plate and its end portions applied to the pair of arms 17 on one side of the axle-block. The other spring 25 is fitted around the opposite end of the clip-plate, and its ends are attached to the other pair of arms 18 on the opposite side of the axle-block. It will thus be seen that the springs on each side of the axis of the axle are complete and independent and that they are disposed in the same vertical planes and in lines parallel to the axle. This construction provides for the compact disposition of the parts in a neat manner, enables a large mass of rubber to be employed to give more or less resistance or cushion, according to the weight to be sustained and without producing a bulky appearance objectionable to the sight, secures an equal and uniform distribution of the weight, and also obviates the tendency of the axle-block to tilt or work sidewise, thus reducing to a minimum any tendency of the axle-block to bind or "cramp" in the guides



of the frame-plate. The elastic spring-bands may be easily slipped out of place by simply removing them from the arms of the axle-block and the clip-plate, thus providing for their ready replacement in case they become worn, and said provision for removing or replacing the springs enables the number of springs to be varied as occasion may require, in order to adapt the bicycle to be ridden by light or heavy weight riders. It will be understood that I may increase the number of elastic bands used on either side of the axle and that the elastic bands on each side of the plane of the axle may be disposed in one, two, or more groups, as may be desired.

In connection with each frame-plate I employ two vertical tubular guides or sockets 26 27, and said guides or sockets 26 27 are arranged above and below, respectively, the frame-plate and the axle. These sockets 26 27 are in vertical alinement with each other, and they lie in the vertical plane of the axle. The upper socket 26 is attached to and sustained by the frame-plate 1 or 2 through the medium of a bent arm 26<sup>a</sup>, which is struck up from or otherwise made integral with the arched frame-plate, and said arm 26<sup>a</sup> is bent so as to project from the inner face of the frame-plate. The arm 26<sup>a</sup> is united to the guide or socket 26 by brazing or in any other suitable way. The other tubular socket or guide 27 is united rigidly to a pendent arm 28, which is bent outwardly and then upwardly to pass through the slot in the clip-plate, and the arm 28 is fastened rigidly to the clip-plate by a rivet, screw, or in any other suitable manner.

In connection with the vertically-alined sockets or tubular guides I use the vertical guide-stem 30, the ends of which are fitted in the tubular sockets or guides 26 27, so as to be held or restrained thereby against deflection out of a vertical position and to insure its holding the wheel-axle against deflection in a vertical plane. This vertical guide-stem is provided with a central annular cavity 31, forming a seat for the adjusting-cone 32 of the ball-bearing 13 for the rear-wheel hub, and said vertical guide-stem at its cavity or seat has a transverse opening, through which passes the threaded part of the axle, so as to enable the axle to be attached to its block or bearing, which lies outside of the line of the guide-stem. On the threaded part of the axle is fitted a take-up nut 33, which bears against the guide-stem, and the adjusting-cone 32 is also fitted adjustably on the axle, so that it may be moved to compensate for the wear on the ball-bearings of the wheel-hub.

In adjusting the bearing-cone for the wheel-hub the clip-plate 23 and the lower tubular guide 27 are removed, and the frame-plate is raised or the axle lowered to withdraw the upper end of the stem 30 from the upper tubular guide, thus disconnecting the frame-plate and the stem 30. The cone may now be adjusted relatively to the ball-race, and

the stem is then moved against the protruding end of the cone for said cone end to enter the socket of the stem. The jam-nut 33 is screwed on the axle against the guide-stem, and the axle-block or cross-head is also screwed on the axle against the nut, after which the frame-plate is slidably fitted to the axle in position for the guide 26 to fit over the upper end of the stem. The lower tubular guide is now slipped over the lower end of the stem, the clip-plate fastened to the frame-plate, and the spring-bands adjusted to the cross-head and the frame-plate.

From the foregoing description, taken in connection with the drawings, it will be seen that I have provided the frame-plates and the guides therefor on both sides of the fork. The axle-blocks, in connection with the vertical guides of the frame-plates, serve to sustain the axle and the wheel-hub in such relation to the fork that the axle and wheel cannot become displaced in a horizontal line, while the employment of the vertical guide-stems, in connection with the tubular guides or sockets in their operative relation to the axle, prevent the axle and the wheel-hub from being deflected in a vertical direction. The parts are very simple in construction, compact in their arrangement, so as to present a neat appearance, and they enable easy and ready access to be had to all the parts to provide for their easy and quick adjustment.

In the embodiment of the invention indicated by Fig. 2 the frame-plates are each constructed with a single arm or lug, thus providing for the proper application or union of the frame-plates with the members of the front fork; but in all other respects—such as the construction of the cross-heads or axle-blocks, the clip-plates, the guides, and the springs—the device shown by Fig. 2 is substantially the same as the device represented by the other figures of the drawings.

While I have shown and described the improved cushion device as especially adapted for service in connection with the front or rear forks of a bicycle, I do not strictly limit myself to this precise construction, because I am aware that the cushion-support may be used in other arts, such as in childrens' carriages or other vehicles, without departing from the invention. Therefore while I have shown and described the device in connection with a bicycle-frame for which it is especially designed I reserve the right to apply and use the cushion-support in other relations or arts where it may be employed advantageously.

It is evident that changes in the form and proportion of parts may be made by a skilled mechanic without departing from the spirit of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a safety-bicycle frame, the combination with a movable frame-plate, an axle, and



a wheel-hub provided with a bearing-cone, of a cross-head slidably fitted to the frame-plate and attached to the axle, a vertical stem clamped between the cross-head and the hub-  
 5 bearing cone and attached to the axle at a point intermediate of its length, guide-tubes attached to the frame-plate and slidably fitted on the guide-stem, and cushion devices connected with the frame-plate and the cross-  
 10 head and wholly disconnected from the guide-stem or the tubes, substantially as described.

2. In a safety-bicycle frame, the combination with an axle, a wheel-hub having a bearing-cone, and a frame-plate with a guideway  
 15 open at the lower edge of said plate, of a cross-head slidably fitted to the guideway of the plate and attached to the axle, a vertical stem clamped between the cross-head and the hub-bearing cone and attached to the axle, a  
 20 clip-plate fastened removably to the frame-plate across the throat or opening in the guideway thereof and having a guide-tube which slidably embraces one end of a vertical stem,  
 25 another guide-tube fast with the frame-plate and slidably fitted to the vertical stem, and

cushion devices between the cross-head and said clip-plate which is attached to the frame-plate, substantially as described.

3. In a cushion attachment for bicycles, a frame-plate having the parallel bars forming  
 30 a guideway and the opening in the vertical plane of the space between said bars, and a clip-plate secured removably to the frame-plate to close the opening therein and having  
 35 its ends extended beyond the edge of said frame-plate, in combination with a cross-head fitted slidably to the guideway of the frame-plate and having the arms arranged in pairs  
 40 on opposite sides of the frame-plate, and the cushion spring-bands looped around the extended ends of the clip-plate and having their  
 bights fitted to the arms of the cross-head, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in  
 45 the presence of two witnesses.

WILLIAM B. SPENCER.

Witnesses:

JOHN H. SIGGERS,  
 HAROLD H. SIMMS.