No. 699,376. Patented May 6, 1902.

C. W. ERRICK.

SPRING FRAME FOR BICYCLES.

(Application filed Feb. 11, 1902.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

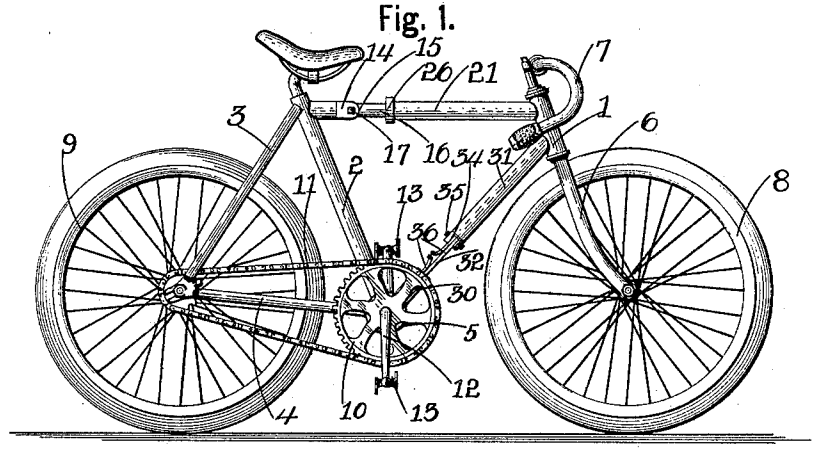



Fig. 2.

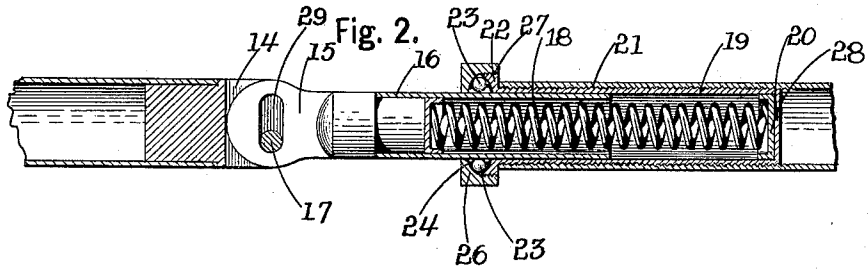



Fig. 3.

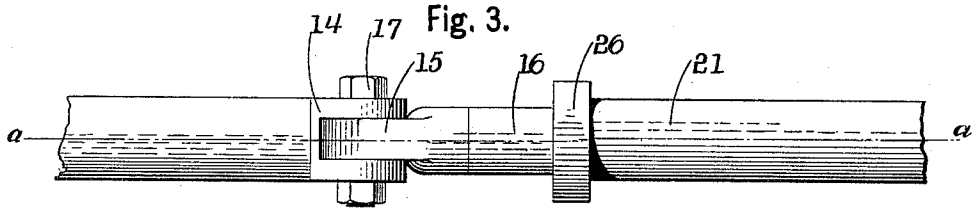



Fig. 4.

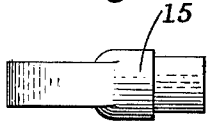



Fig. 5.

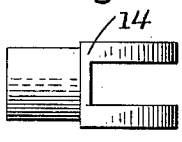



Fig. 6.

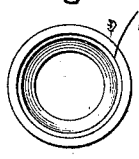



Fig. 7.

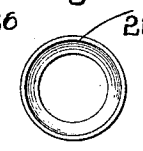



Fig. 8.




Fig. 9.

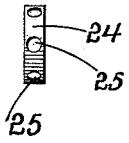
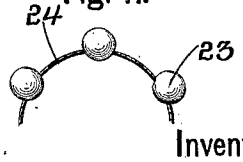



Fig. 10.




Fig. 11.




Witnesses.

L. M. Sangster

Geo. A. Neubauer

Inventor.

By Charles W. Errick,

A. J. Sangster,

Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 699,376. Patented May 6, 1902.

C. W. ERRICK.

SPRING FRAME FOR BICYCLES.

(Application filed Feb. 11, 1902.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 12.

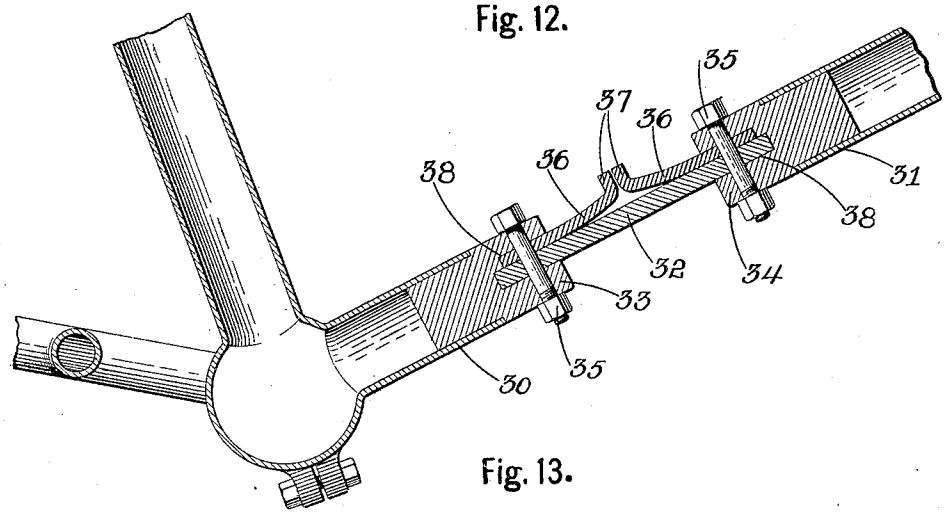



Fig. 13.

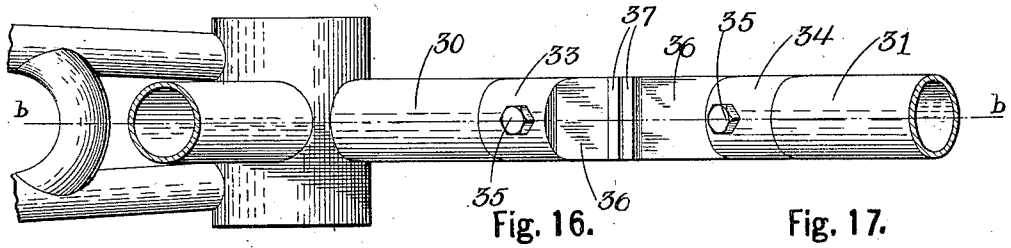
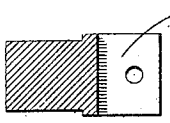



Fig. 16.

Fig. 17.



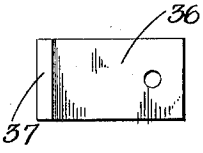




Fig. 14.

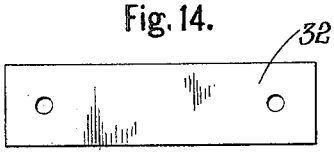



Fig. 15.

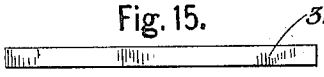



Fig. 18.

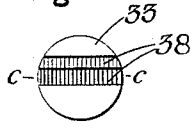



Fig. 19.

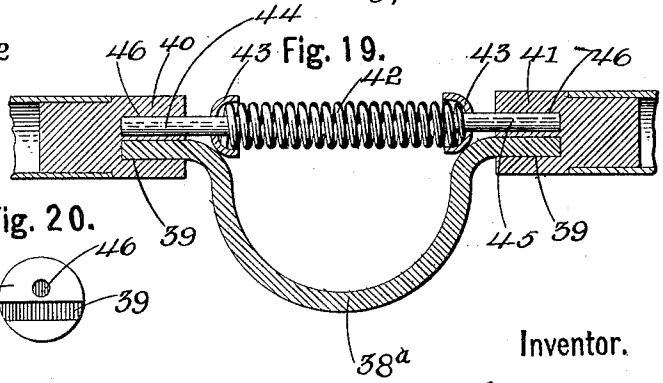



Fig. 20.




Witnesses.

L. M. Sangster

Geo. A. Neubauer

Inventor.

By Charles W. Errick.

A. J. Sangster Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

CHARLES W. ERRICK, OF NORTH TONAWANDA, NEW YORK.

## SPRING-FRAME FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 699,376, dated May 6, 1902.

Application filed February 11, 1902. Serial No. 93,491. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. ERRICK, a citizen of the United States, residing at North Tonawanda, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Spring-Frames for Bicycles, of which the following is a specification.

This invention relates to an improved spring-frame for bicycles; and the object of the invention is to arrange springs in the upper and lower forward tubes of the frame, so that said tubes will yield in a vertical direction, and thereby partially absorb the vibration of both the seat and handle-bars.

The invention also relates to certain details of construction, all of which will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a bicycle having my improved frame. Fig. 2 is a central vertical section of the top frame-tube of my improved bicycle-frame on line *a a*, Fig. 3. Fig. 3 is a top plan view of a fragment of the bicycle-frame. Fig. 4 is a detached top plan view of the slotted lug. Fig. 5 is a detached top plan view of the bifurcated lug. Fig. 6 is a detached view of the ball-bearing case. Fig. 7 is a detached end view of the casing. Fig. 8 is a view of the circular spring-seat fitted in the casing. Fig. 9 is an edge view of the ball-retaining ring. Fig. 10 is a side view of the ball-retaining ring. Fig. 11 is an enlarged fragment of the ball-retaining ring with the ball in place. Fig. 12 is a vertical longitudinal section through a fragment of the lower portion of the frame on line *b b*, Fig. 13. Fig. 13 is a fragmentary top plan view of the lower portion of the frame. Fig. 14 is a detached plan view of the flat spring. Fig. 15 is a detached edge view of the flat spring. Fig. 16 is a section on line *c c*, Fig. 18. Fig. 17 is a plan view of one of the bent springs. Fig. 18 is an end view of one of the lugs to which the flat springs are fastened. Fig. 19 is a fragmentary section through a modified form. Fig. 20 is an end view of one of the lugs in the modified form.

In referring to the drawings for the details of construction like numerals designate like parts.

In the accompanying drawings I have shown my improved spring-frame applied to a bicycle, although it is equally adaptable to tricycles and other forms of vehicles.

The frame is provided with the usual head 1, seat-post tube 2, upper rear stay-tubes 3, lower rear stay-tubes 4, crank-hanger 5, front forks 6, and handle-bars 7. The usual front and rear wheels 8 and 9 are journaled in the frame, and the rear wheel is driven from the crank-hanger by foot-power, such as the sprocket 10, connecting the chain 11, and the cranks 12 and pedals 13 shown.

The upper front tube and lower front tube in my improved frame are formed in sections which are joined by springs so as to have a yielding vertical movement relatively to each other when the bicycle is traveling.

The preferable construction of the upper front tube is shown in Figs. 1, 2, and 3. A bifurcated lug 14 extends horizontally forward from near the upper end of the seat-post tube 2, and the rear extreme of a lug 15, rigidly attached to a short section of tube 16, is pivoted between the bifurcations by a bolt 17 or other fastening device. The tube 16 forms a casing and support for the rear part of a spiral spring 18.

A tubular casing 19, having a closed forward end 20, is exteriorly screw-threaded and is screwed into the rear end of the forward portion 21 of the upper front frame-tube. The rear extreme of the casing 19 is enlarged to form a flange 22, the inner rear surface of which is of curved cross-section, substantially as shown in Fig. 2, to constitute a bearing-surface for a series of antifriction-balls 23. The balls are held in place by a ball-retaining ring 24, which is in the form of a band having a series of circular openings 25 at equal intervals. (See Figs. 9 and 10.) An outer bearing-case 26 is fitted upon the rear extreme of the casing 19, having a screw-threaded flange 27, which screws upon the outer screw-threaded surface of the flange 22 of the casing. (See Fig. 2.) The balls 23 bear against the periphery of the tube 16. The object of this construction is to provide a means for radially adjusting the balls toward or from a common center, and thus vary the size of the annular bearing contact to take up any play of the tube 16, and thereby pre-

vent any rattle and at the same time permit said tube 16 to slide easily in the casing 19. This provides both an antirattling device for the parts of the upper tube and an antifrictional device for the slidable spring-supporting parts. The forward portion of the spring 18 is supported in the casing 19, a circular seat 28, of rubber, leather, or other suitable material, for the extreme forward end of the spring being placed in the casing, substantially as shown in Fig. 2. The tension of the spring can be varied by the longitudinal adjustment of the casing 19 in the forward portion 21, the casing being adjusted by rotation, owing to the exterior screw-thread on the casing and the interior screw-thread in the portion 21. Provision is made to permit the rear spring-supporting member, which comprises the lug 15 and tube 16, to adjust itself vertically with respect to the bifurcated lug 14, and thus maintain itself in horizontal alinement. This is accomplished by making the opening in the lug 15, through which the fastening-bolt 17 passes, in the form of a vertically-elongated slot 29. (See Fig. 2.) The object of this is to provide sufficient vertical adjustment for the rear spring-supporting member to enable said member to receive the thrust of the spring in direct alinement at all parts of possible compression instead of at an angle.

The lower forward tube is formed in two sections 30 and 31, the section 30 being rigidly brazed or otherwise secured to the crank-hanger and the section 31 being rigidly secured by brazing or other means to the head-tube of the frame. The adjacent ends of these sections are joined by a flat spring 32, the respective ends of which are rigidly fastened to lugs 33 and 34, secured to the ends of the sections by bolts, rivets, or other fastenings 35. I also may employ two springs 36 to relieve the spring 32 when bent to a certain point, and thus lessen to a great degree the danger of breaking the spring 32. The springs 36 are formed substantially as shown in Fig. 12, having their adjacent ends bent up, as shown at 37 in said Fig. 12. The lugs 33 and 34 are each provided with recesses or sockets 38 for the reception of the ends of the spring 32 and the springs 36, substantially as shown in Figs. 12, 16, and 18, the ends of the springs 36 being superimposed upon the ends of the spring 32. When the spring 32 is bent to a certain point, the ends 37 of the springs 36 come in contact, and thereby bring these springs 36 into tensioning relation and also relieve the spring 32.

A modification of the spring mechanism for the upper front tube is shown in Figs. 19 and and 20, which consists of a curved spring $38^a$, the ends of which are secured in sockets 39, in lugs 40 and 41, attached to the sections of the top frame-tube, and a coiled spring 42, the ends of which fit in cups 43, mounted on horizontal bars 44 and 45, projecting from the lugs 40 and 41. The bars 44 and 45 are fitted in sockets 46, of circular cross-section, in the lugs 40 and 41 and project toward each other. The ends of the spring 42 fit around the outer ends of the bars 44 and 45 and also seat in the dished cups 43, so that the spring is retained firmly in place. The object in employing both a coil-spring and a curved spring in this modified construction is to provide means for tensioning the sections of the upper tube longitudinally with respect to each other and also vertically, the coil-spring supplying the longitudinal tension and the curved spring the vertical tension.

The advantage of the construction shown is that both the upper and lower front bars can bend or yield vertically under tension, that the springs materially assist each other, and that the vibration is absorbed in both the upper and lower tubes, thereby materially reducing the same.

I claim as my invention—

1. A spring-frame for bicycles having the upper and lower forward frame-tubes in sections, one section of the upper tube having both pivotal and vertical adjustment with respect to the frame and telescoping in another section, a coil-spring between the sections of said upper tube and a flat spring between the sections of the lower tube, substantially as set forth.

2. A spring-frame for bicycles having the upper and lower forward frame-tubes in sections, a coil-spring between the sections of the upper tube, a flat spring between the sections of the lower tube and two springs having their outer ends superposed upon the flat spring and their inner ends bent up and normally in proximity, substantially as set forth.

3. A spring-frame for bicycles having the upper forward tube composed of a pivotal portion and a rigid portion, a coil-spring interposed between said portions, a sectional lower tube and a flat spring between the sections of said lower tube, substantially as set forth.

4. In a spring-frame for bicyles, an upper forward tube composed of a pivotal rear portion, a rigid front portion, a casing screwing into said front portion, a coil-spring having its ends in the rear portion and casing, a lower tube in sections and a spring connection between said sections, substantially as set forth.

5. A spring-frame for bicycles having a sectional upper tube composed of a rigid front portion, a casing longitudinally adjustable in said front portion, a pivotal rear portion telescoping in the casing, a coil-spring in the casing and rear portion, a sectional lower tube and a spring connection between the sections of the lower tube, substantially as set forth.

6. A spring-frame for bicycles having a sectional upper tube composed of a rigid front portion, a casing longitudinally adjustable in said front portion, a pivotal rear portion telescoping in the casing, a coil-spring in the casing and rear portion, a ball-bearing device

supported from the casing having the balls contacting with the telescopic part of the rear portion, a sectional lower tube and a spring connecting the sections of said lower tube, substantially as set forth.

7. A spring-frame for bicycles having an upper tube composed of a front section and a rear section, a casing fitting in the rear end of said front section and having a flange at its rear extreme, one surface of which is beveled to form a bearing, an outer bearing-case screwing on the flange, a series of balls between the flange-bearing surface and the outer bearing-case; the rear section telescoping in the casing, a coil-spring supported in the casing and rear section, a lower tube in sections and a spring connecting the sections of said lower tube, substantially as set forth.

8. A spring-frame for bicycles and the like having a sectional upper tube; one section having a vertically-elongated slotted connection with the frame whereby both pivotal and vertical adjustments are obtained and another section being rigid with the frame, a coil-spring between said sections, a sectional lower tube, and a spring between the sections of the lower tube, substantially as set forth.

9. In a spring-frame, a seat-post tube, a bifurcated lug extending forwardly from the upper extreme of the seat-post tube, a sectional upper frame member, one section of which is rigid and another section telescopes in said rigid section, a vertical slotted lug extending from said telescoping section and pivoted to the bifurcated section, a coil-spring between the sections, a sectional lower tube, and a spring between the sections of the lower tube, substantially as set forth.

10. A spring-frame for bicycles and the like having a sectional upper tube; one section having a vertically-elongated slotted connection with the frame whereby both pivotal and vertical adjustments are obtained and another section being rigid with the frame, a coil-spring between said sections and a sectional lower tube having yieldingly-joined sections, substantially as set forth.

11. In a spring-frame, a seat-post tube, a bifurcated lug extending forwardly from the upper extreme of the seat-post tube, a sectional upper frame member, one section of which is rigid and another section telescopes in said rigid section, a vertical slotted lug extending from said telescoping section and pivoted to the bifurcated section, a coil-spring between the sections and a sectional lower tube having yieldingly-joined sections, substantially as set forth.

12. A spring-frame for bicycles having an upper frame-tube in sections, one section of said upper tube having both pivotal and vertical adjustment with respect to the frame and telescoping in another section, a coil-spring between the sections of said upper tube and a sectional lower frame-tube having yieldingly-joined sections, substantially as set forth.

CHARLES W. ERRICK.

Witnesses:
L. M. SANGSTER,
GEO. A. NEUBAUER.