

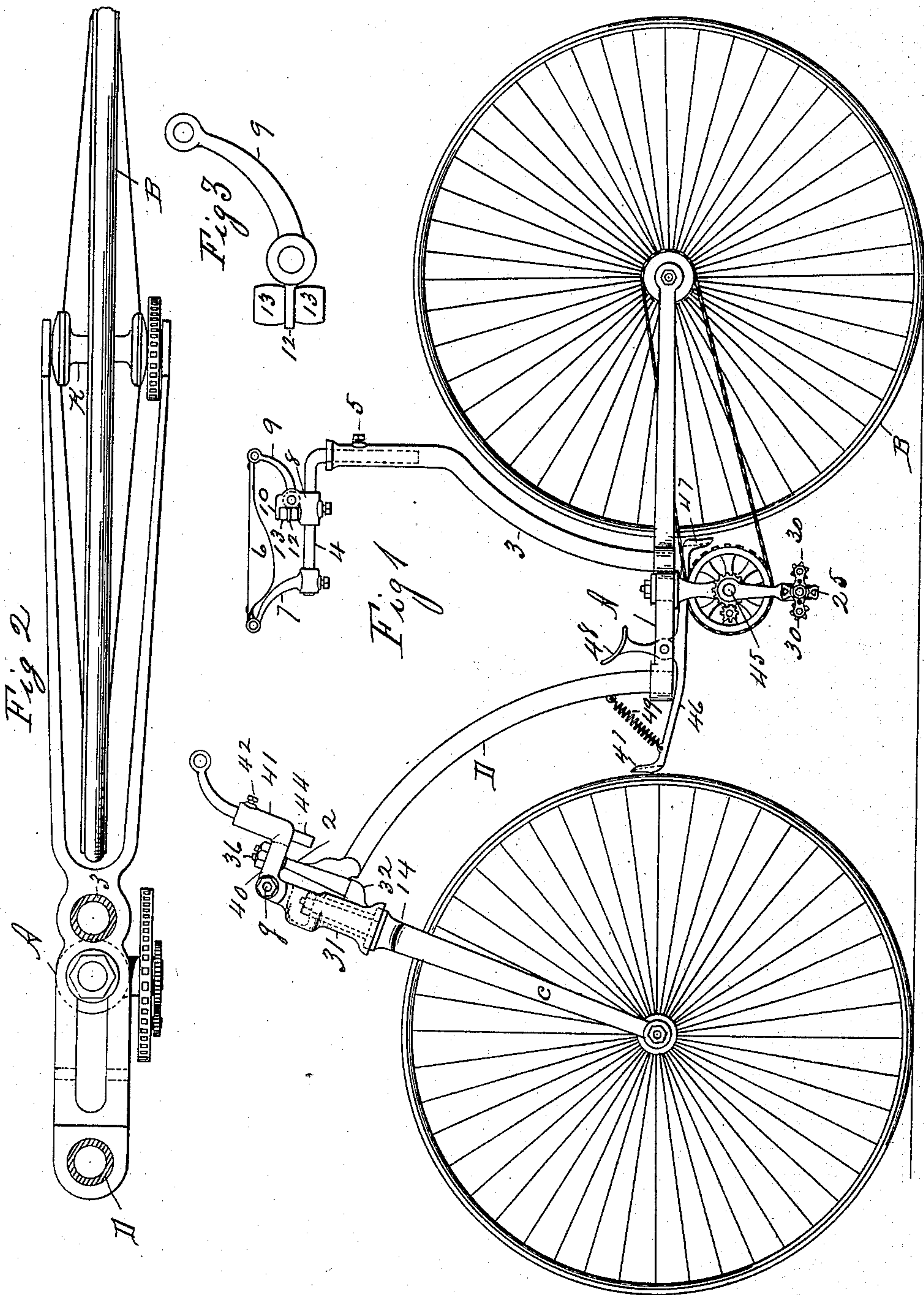
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4 Sheets—Sheet 1.

G. T. WARWICK.  
VELOCIPÈDE.

No. 384,945.

Patented June 19, 1888.



Witnesses  
G. M. Chamberlain  
Wm. Chapin

Inventor  
George T. Warwick  
By his Attorneys Chapin & Co.

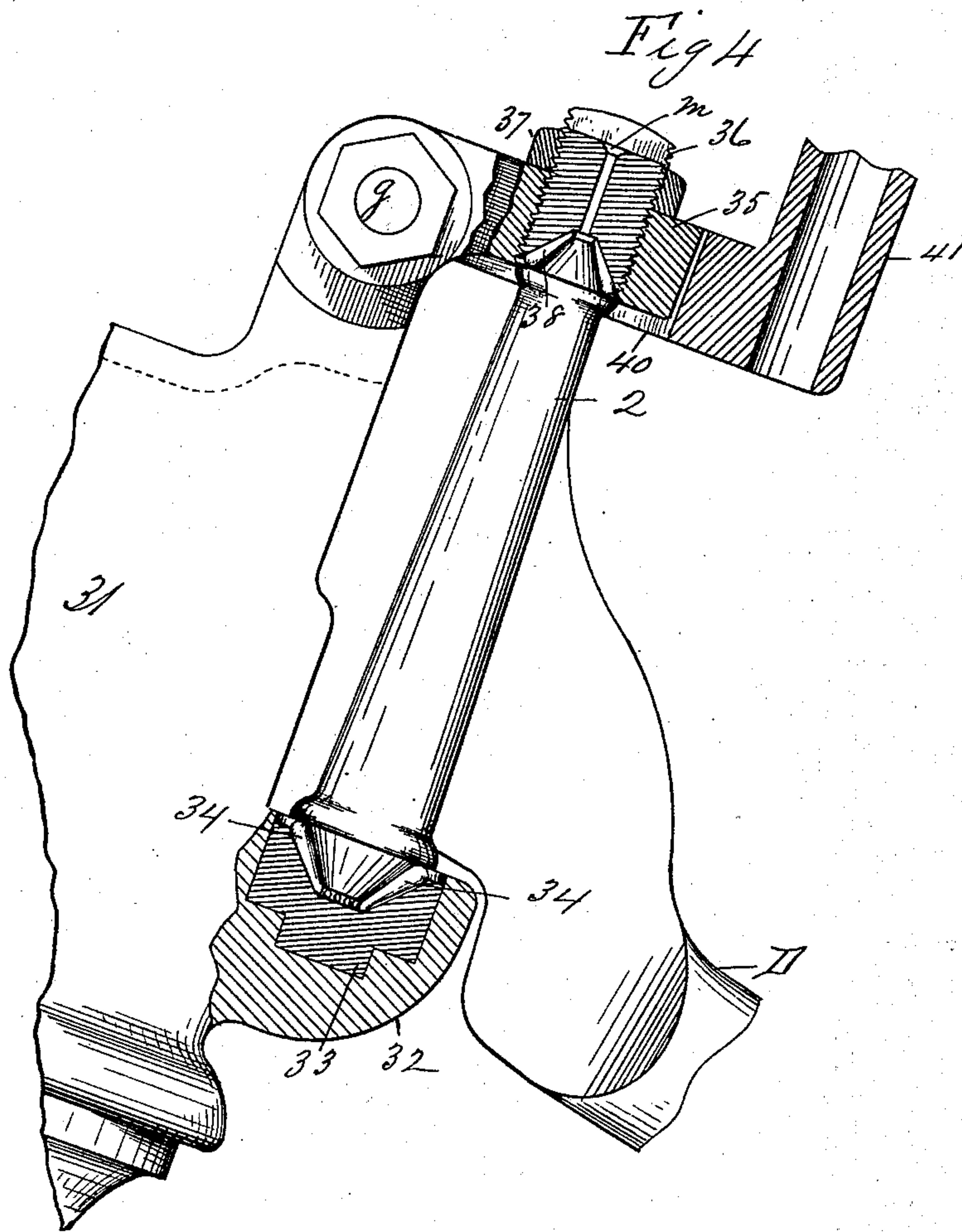
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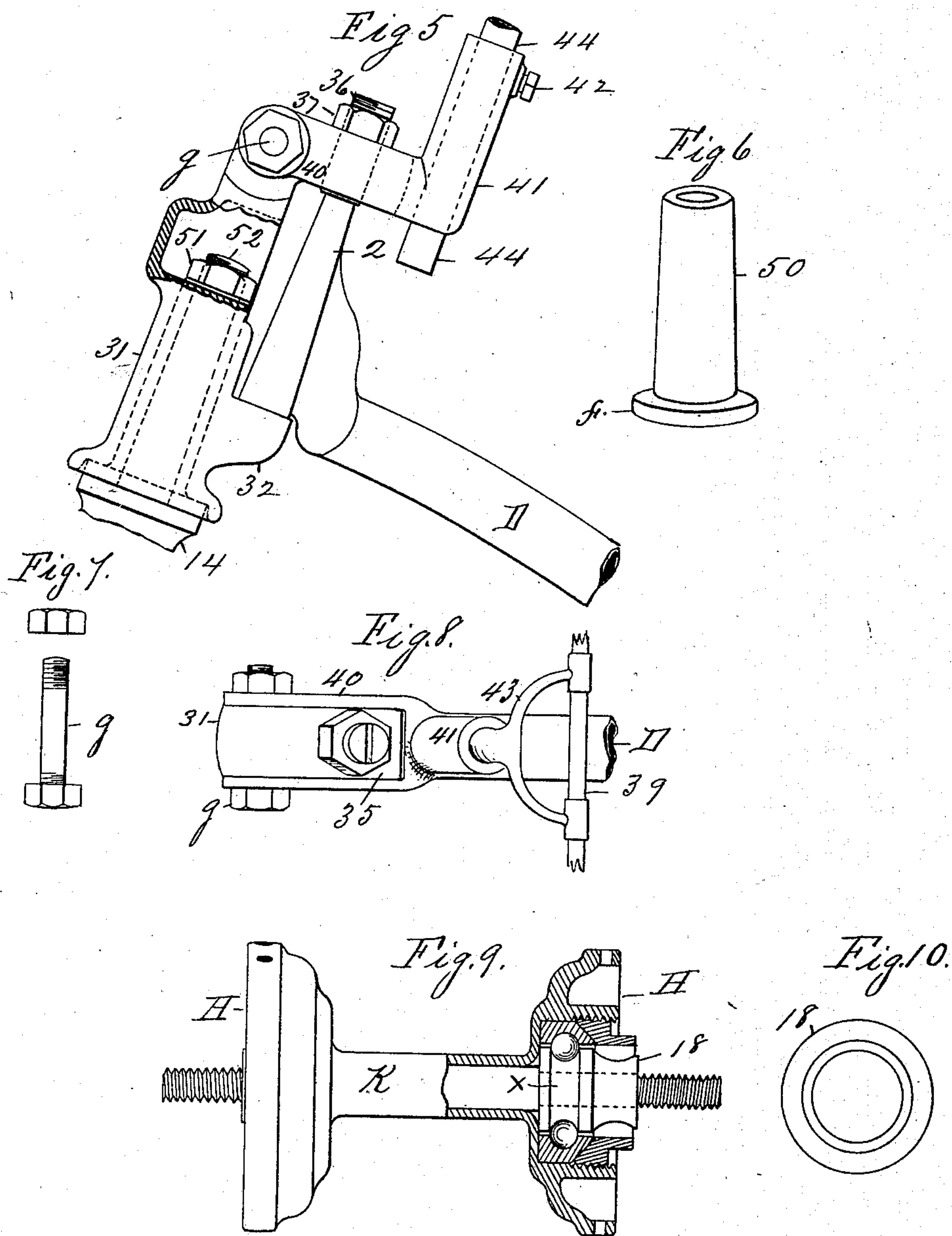
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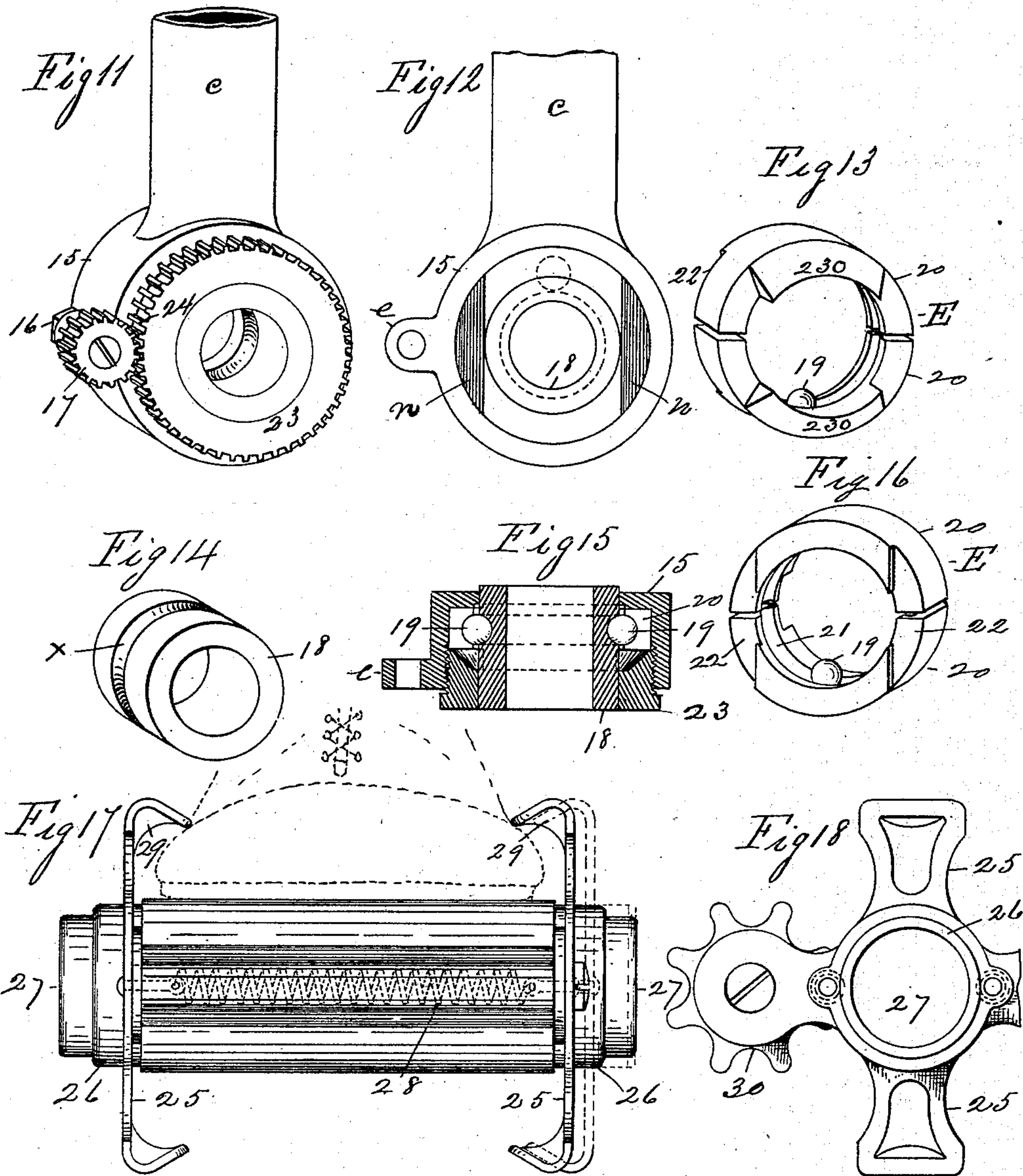
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# UNITED STATES PATENT OFFICE.

GEORGE T. WARWICK, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO THE  
WARWICK CYCLE MANUFACTURING COMPANY, OF SAME PLACE.

## VELOCIPEDÉ.

SPECIFICATION forming part of Letters Patent No. 384,945, dated June 19, 1888.

Application filed May 18, 1887. Serial No. 238,589. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE T. WARWICK, a citizen of England, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Velocipedes, of which the following is a specification.

This invention relates to velocipedes, and pertains to improvements in the details of the construction thereof, all as hereinafter fully described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation of a velocipede embodying my improvements. Fig. 2 is a plan view of the frame and the rear wheel, the backbone and the saddle-post being shown in cross section. Fig. 3 is a side elevation of the rear supporting-arm of the saddle and of the springs connected therewith. Fig. 4 is a side elevation, partly in section, of portions of the fork-head, handle-bar frame, and backbone, and the backbone-spindle. Figs. 5 to 18 illustrate detail parts, hereinafter fully described.

In the drawings, A is the frame of the velocipede, of suitable metallic construction, in the rear end of which is hung, on a suitable axle, the rear wheel, B, of the vehicle. The backbone D is rigidly secured by one end to the forward end of said frame, and has on its upper end the usual spindle, 2. A saddle-post, 3, has its lower end rigidly secured to said frame A, as shown, having a socket in its upper end. A metallic arm, 4, having one end entering said socket in the post 3, is secured to the latter by a set-screw, 5, whereby provision is made for holding the saddle at different elevations. Said saddle consists of a seat, 6, of leather or of similar material, having one end attached to the metallic arm 7, which is secured in turn to said arm 4. The said saddle is securely attached to the frame A by means of said post 3 and the arm 4, the latter having secured thereon a spring-box, 8, having an overhanging top, 10. The lower end of a rigid metallic arm, 9, to which the rear end of the saddle-seat 6 is attached, is pivoted in said spring-box, and has thereon a plate, 12, extending substantially in a plane with the top and bottom of said spring-box. Two springs,

13, preferably of rubber, are inserted in said box 8, between which said plate 12 on arm 9 extends, and said springs are tightly forced into said box in such manner as to cause said plate to be compressed tightly between said springs, and thus arranged whichever way the upper end of arm 9 swings it meets the resistance of one of said springs, thereby providing a rear support for the saddle seat having great ease of motion.

Improved ball-bearings for the ends of the fork 14 and the axle of the front wheel and for the rear wheel (also applicable to the pedals, if desired) are constructed as follows, Figs. 11 to 16 illustrating detail parts of said ball-bearings, and Fig. 9 showing the manner of the application thereof to the bearings of the rear wheel of the vehicle:

In Figs. 11 and 12 are shown the lower ends of the arms *c* of the fork 14, Fig. 12 being a front elevation and Fig. 11 a perspective view. On the lower end of each of said fork-arms is formed a cylindrical case, 15, in which are contained the ball-bearing devices below described.

Fig. 9 is a side elevation, partly in section, of the axle-box K (showing the outer screwed ends of the axle) of the rear wheel of a velocipede or bicycle, the enlarged ends H of which constitute cases serving the same purposes as said cases 15 on the fork-arms. Said case 15 has a perforated arm, *e*, extending laterally from one side thereof, as shown, in which is placed a stud, 16, on which is hung a pinion, 17.

In Fig. 12 the case 15 is shown with an axle-sleeve, 18, (shown in perspective view in Fig. 14,) therein in a groove, *x*, around said sleeve, there being shown a ball indicated by dotted lines. On the base of said case 15 are two projections, *n*, (see Fig. 12,) on the opposite sides of said sleeve 18. The sleeve 18, having the said annular groove *x* therein, is made preferably of hardened steel, and is suitably secured on an axle so that it rotates with the latter; or, if preferred, the axle may be grooved, as is said sleeve, and made of proper diameter, thereby obviating the use of the sleeve. When said sleeve is employed and secured to an axle, as aforesaid, it performs



the function of the surface of the axle in its action against the bearing-balls 19, below referred to.

A ball-case, E, (shown in perspective view in Figs. 13 and 16 and in section in the case 15 in Fig. 15,) is provided, which is adapted to be placed within the case 15. Said case E consists of an internally-grooved transversely-divided ring, consisting of the parts 20. Said two parts 20 of the case E have an annular groove, 21, in their inner surfaces, and when placed in the case 15 the annular groove 21 is brought opposite the annular groove *x* in the sleeve or axle above described, and in said two annular grooves is placed a series of hardened metallic bearing-balls, 19. Said two parts 20 of the ball-case E are made preferably of hardened steel, and on the rear side thereof (see Fig. 16) are formed two depressions, 22, which receive the projections *n* on the base of the case 15 when the parts 20 are placed therein, so that said parts will thereby be prevented from rotation within the case when the said balls roll in the annular groove 21 therein.

Fig. 16 shows the rear side of the ring-case E, and Fig. 13 the front side. On the front side of each of the parts 20 of the case E is a lateral projection, 230, having a beveled side, as shown. The normal position of the said parts 20, when the latter inclose a sleeve or an axle and the series of balls 19, is that shown in Figs. 13 and 16—that is to say, with their adjoining ends separated to allow of drawing said parts toward each other to take up the wear of balls or grooves and keep the bearing parts face to face. Said case E having been placed in the case 15, as aforesaid, a ring-nut, 23, is screwed into case 15, as shown in Figs. 15 and 16, against the said beveled projections on the parts 20 of said ball-case E, the inner edge of said ring-nut being correspondingly beveled to fit said projections 230, whereby the parts 20 are forced toward each other. Said ring-nut has the border of the flange on its outer end toothed, as shown in Fig. 11, and it engages with said pinion 17, which is secured to the case 15, as above described. The purpose of said pinion engagement with the ring-nut 23 is to provide means for turning said nut slightly for nice adjustments by rotating the pinion 17 by means of any suitable instrument, and the pinion is rigidly secured on its stud after such adjustments by turning the screw 24 tightly against it, said screw entering the end of the stud on which said pinion turns. If preferred, the ring-nut 23 may be made without said toothed or geared border, and the pinion 17 may be omitted from the case 15, and dependence for holding the ring-nut in place in the latter be had upon the tightness of the fit of the screw between said nut and the interior of the case.

To provide improved means for retaining the foot of the rider of the vehicle on the pedal, the latter is constructed as shown in Figs. 1, 17, and 18, the latter-named figure being an

end view with one of the roller-supporting arms broken off, and Fig. 17 being a side view of the pedal having my improvements applied thereto, and showing in dotted lines thereon the end of a boot. The said pedal improvements consist in hanging on the opposite ends of the pedal a metallic foot-grip, 25, having its ends turned inward, as shown in Fig. 17, and having a free movement on the end of the pedal toward and from the center of the latter. Said foot-grips are provided with suitable collars, 26, which fit suitably on said ends 27 of the pedal, and they are united by two spiral springs—one on each side of and parallel with the center shaft of the pedal—one of which springs, 28, is shown in dotted lines in Fig. 17. That portion of the foot-grip 29 under the bent portion thereof may, if desired, be filled with rubber, leather, or other similar yielding material to provide a yielding bearing against the boot. The said springs 28, which are attached between the two foot-grips 25, cause the latter to be held against suitable stops on the center bar of the pedal, and when the rider places his foot on the latter he forces the toe of the boot between said grips, thereby forcing them more or less apart against the retracting action of said springs, and thereby the grips are held in engagement with the opposite sides of the boot, and the feet of the rider are more constantly retained on the pedal, but not so rigidly as to prevent their easy disengagement at the pleasure of the rider. The ordinary rubber rollers on each side of the center bar of the pedal, one of which, 30, is shown in Fig. 18, or any other suitable foot-bearing, may be used in connection with the above-described foot-grip.

Roller-bearings for the backbone-spindle 2 within the fork-head 31 are provided and constructed as follows, and thereby the utmost ease of rotary movement between said parts is secured:

Fig. 4 shows a portion of the fork-head 31, on the rear side of which is a short arm or boss, 32, (shown in section in said figure,) in which is placed a steel or bronze-metal step, 33, having a spindle-seat therein having flaring sides, as shown. The lower end of the spindle 2 is of corresponding form to said seat and has interposed between it and the sides of the seat a series of hardened-metal rollers, 34. The upper end of the fork-head 31 has a rearwardly-extending arm, 35, and in said arm is fitted a short screw-bolt, 36, having a set-nut, 37, on its upper end, as shown, and an oil-hole, *m*, through it. The lower end of the bolt 36 has a seat formed therein of suitable form to receive the cone-shaped upper end of the spindle 2, and between the sides of the said end of the spindle and said seat in the end of bolt 36 are placed a series of hardened-metal rollers, 38, thereby forming a bearing for the upper end of said spindle, substantially the same as is provided for the lower end thereof, as above described.

An improved handle-bar holder and frame



for the handle-bar 39 are provided, and said parts are constructed as shown in Figs. 4, 5, and 8. A bifurcated handle-bar-holder frame, 40, is pivotally attached to the upper end of the fork-head 31 by a bolt, *g*, and incloses between its bifurcated end said arm 35, but is capable of swinging free of the latter and of being fixed in different positions by the bolt *g*. Said holder-frame has a tubular extension, 41, thereon at right angles to its bifurcated part, having a set-screw, 42, through one side.

The handle-bar holder 43 has a leg, 44, which enters said tubular extension 41, and is secured therein by said set-screw 42, and the handle-bar 39 is secured in the usual arms (see Fig. 8) on said leg 44.

By means of the above-described handle-bar connections the rider of the vehicle can adjust the handle-bar toward and from him, and can raise or lower it to bring it to the most advantageous position and one best suited to his stature.

By reference to Fig. 1 the relative arrangement of the wheels of the vehicle and the frame thereof is shown, the rear wheel, B, having a sprocket-wheel and chain connection with a crank-shaft, 45, hung under the frame A, whereby the velocipede is propelled. A brake-bar, 46, is pivoted in frame A, having a shoe, 47, on either end capable of simultaneous engagement with the tires of both wheels, by means of an upwardly-projecting arm thereon having a foot-rest, 48, thereon, against which the rider pushes to swing the brake. A spring, 49, connected between the brake and the backbone D, holds the brake-shoes away from the wheels.

To provide an improved yielding or spring connection between the fork 14 and the fork-head 31, whereby any sudden shock is obviated should the front wheel strike some obstacle, the fork-head has fitted into the socket in its lower end, which receives the fork-spindle 52, a rubber thimble or bushing, 50, (see Fig. 6,) through which said fork-spindle passes, and by the nut 51 thereon it is drawn forcibly into and held in said thimble and head in the position shown in Fig. 5, whereby the body of said thimble and its flange *f* are interposed completely between the fork-spindle within the head and the inner surface of the latter, so

that whatever strain may be brought upon the front wheel and its fork it encounters the counteracting effect of the spring action of said rubber thimble, and all shock is avoided and the tendency to breakage of the parts is greatly lessened.

What I claim as my invention is—

1. A velocipede-saddle consisting of a seat, 6, of leather or similar material, a spring-box, 8, attached to the frame of the machine beneath the seat, a rigid arm, 9, pivoted to and having one end extending into said spring-box and its upper end extending upward and connected with the rear end of said seat, two springs inclosed in said box, between which the lower end of said arm extends, and an arm, 7, attached to said frame and having the forward end of said seat connected thereto, substantially as set forth.

2. A ball-bearing for velocipedes and analogous vehicles, consisting of the cylindrical case 15, having the internal projections, *n*, the sleeve 18, extending through said case, having an annular groove therein, the ball-case E, consisting of an internally-grooved transversely-divided ring having the beveled projections 230 thereon and the depressions 22, a series of balls inclosed in said ring, having a bearing in the annular groove in said sleeve, and a ring-nut, 23, having one end beveled and a screw-connection with the interior of said case 15, and engaging with said ball-case, whereby its parts are drawn together, combined and operating substantially as set forth.

3. The combination, with a velocipede fork-head having a socket in its lower end, of a fork having a spindle thereon entering said socket, and a rubber thimble, 50, interposed between said spindle and the inner sides of said socket, substantially as set forth.

4. The handle-bar holder 44, combined with the holder-frame 40, having a socket to receive the end of said holder, and having a pivotal connection with the upper end of the fork-head, and a set screw or screws to lock said holder in the frame and permit of its adjustment therein, substantially as set forth.

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Witnesses:

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