

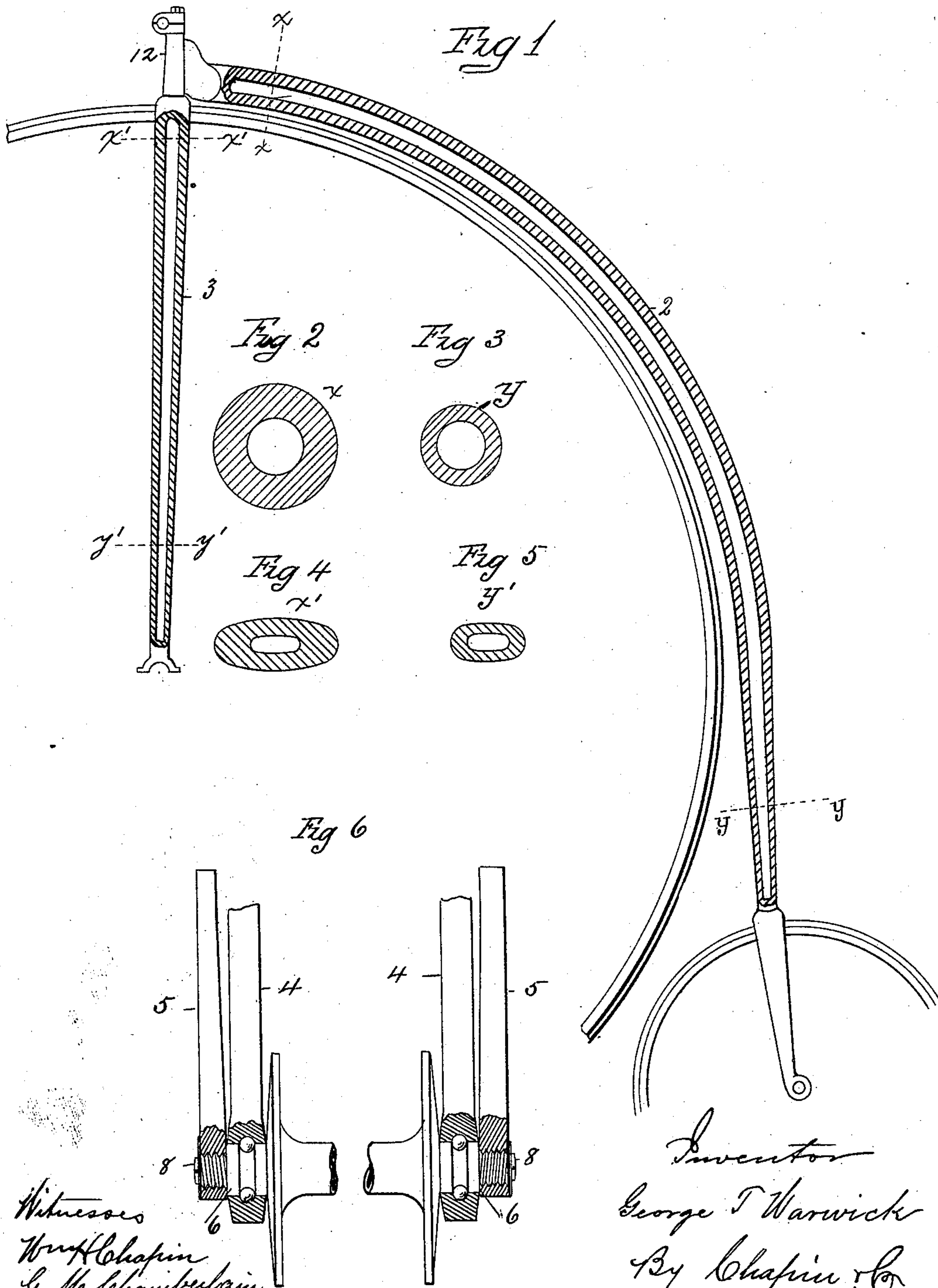
(No Model.)

3 Sheets—Sheet 1.

G. T. WARWICK.
BICYCLE.

No. 362,407.

Patented May 3, 1887.



Witnesses
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Inventor
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(No Model.)

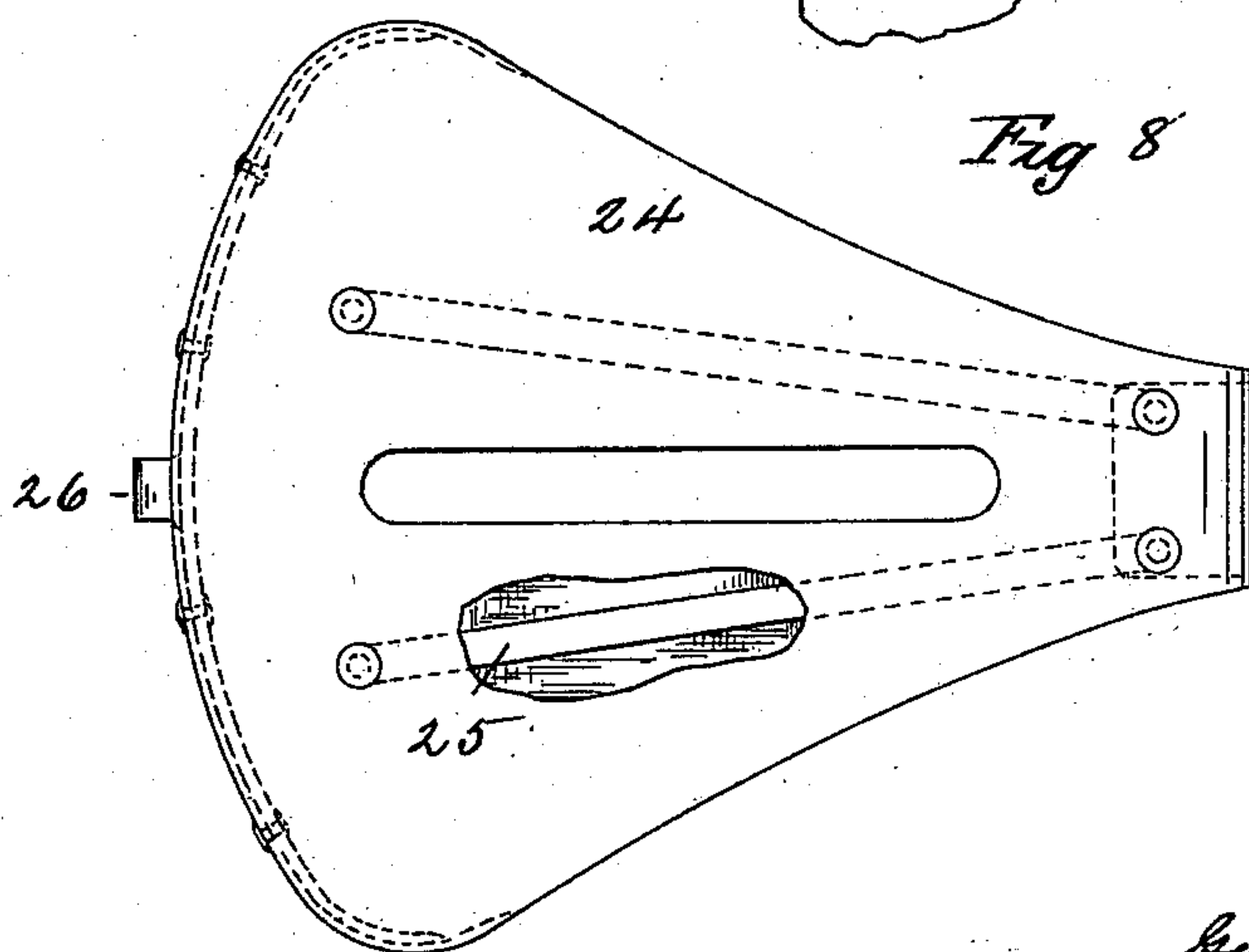
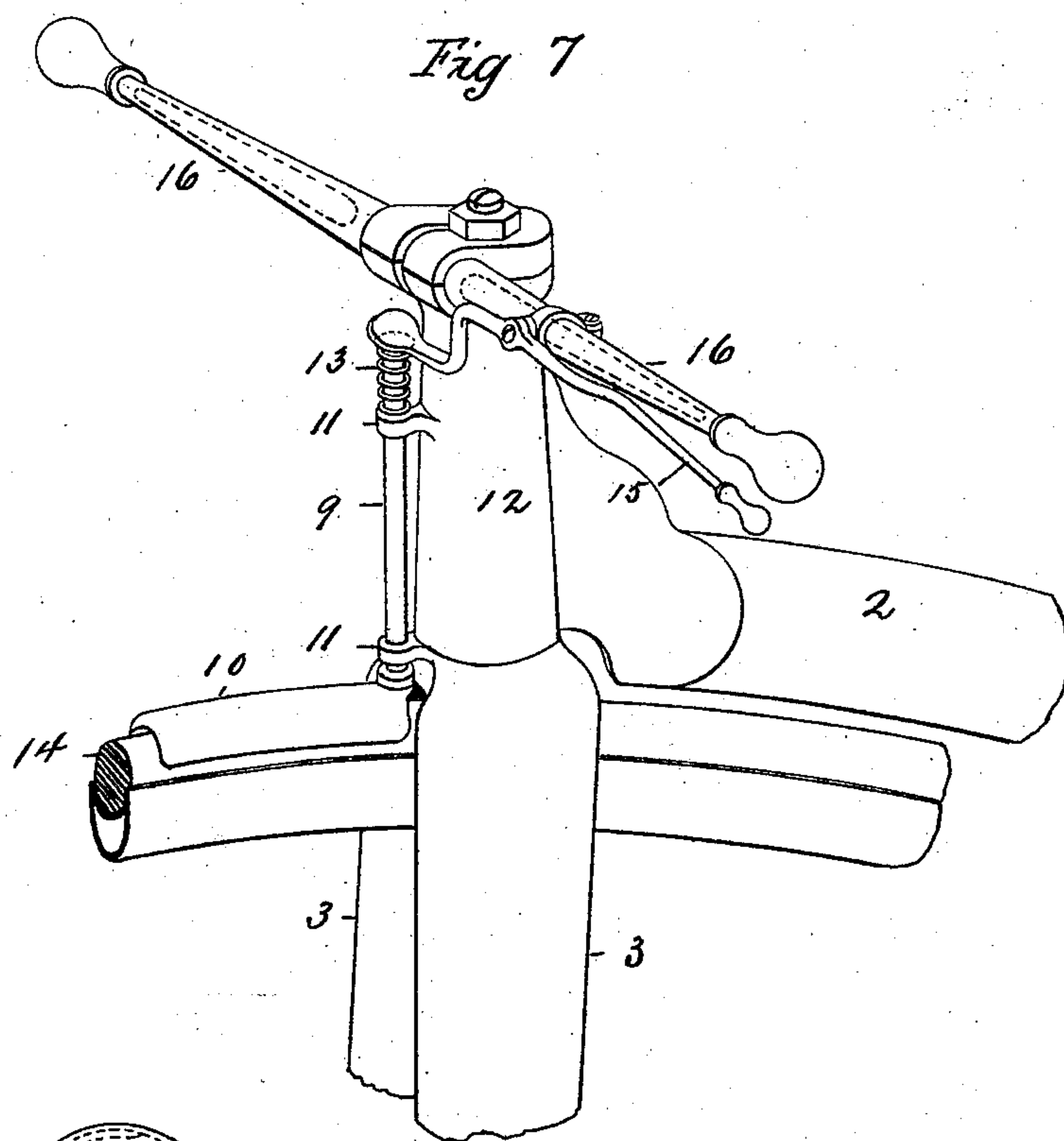
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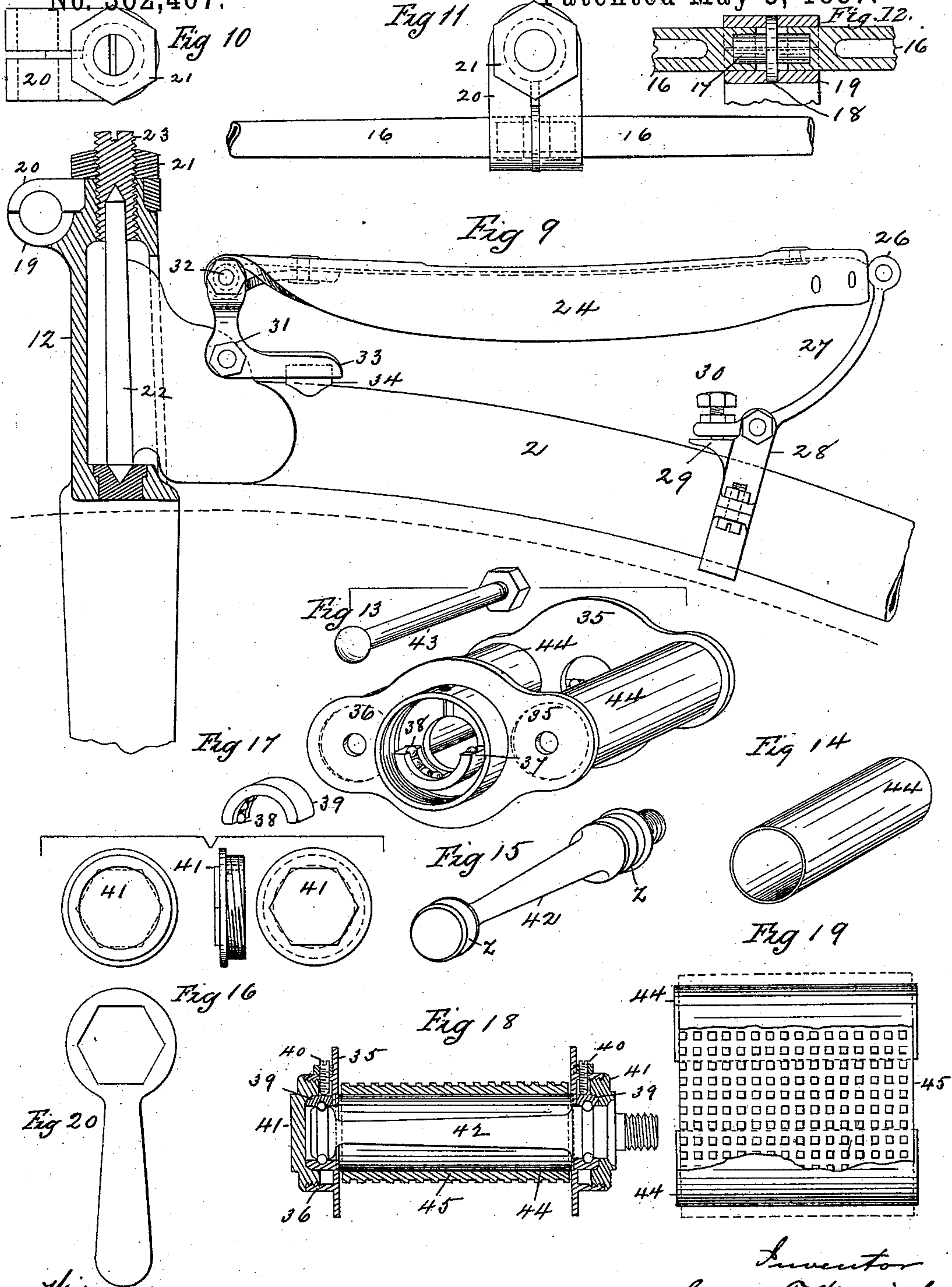
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UNITED STATES PATENT OFFICE.

GEORGE THO. WARWICK, OF SPRINGFIELD, MASSACHUSETTS.

BICYCLE.

SPECIFICATION forming part of Letters Patent No. 362,407, dated May 3, 1887.

Application filed November 6, 1886. Serial No. 218,139. (No model.) Patented in England April 28, 1886, No. 5,759.

To all whom it may concern:

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

This invention relates to improvements in bicycles, and pertains to an improved construction of the backbone thereof, the fork, means for attaching the crank-arms to the axle, the brake, means for attaching the handle-bars to the fork-head, an improved saddle and means of hanging the same, and an improved foot-pedal; and the invention consists in the peculiar construction and arrangement of the above-referred-to parts of the machine and devices connected therewith, all as hereinafter fully described and set forth in the claims.

In the drawings forming part of this specification, Figure 1 is a side elevation showing the backbone, the fork, and a portion of the wheels of a bicycle, said backbone and fork being shown in longitudinal section and illustrating my improvements in the construction thereof. Fig. 2 is an enlarged transverse sectional view of the backbone on the line xx , Fig. 1. Fig. 3 is also an enlarged transverse section of the backbone on the line yy , Fig. 1. Figs. 4 and 5 are enlarged transverse sections of one arm of the fork, respectively, on lines x' and y' in Fig. 1. Fig. 6 is a front elevation, partly in section, of the lower ends of the fork, the crank-arms, and the hub of the wheel, showing portions of the axle. Fig. 7 is a perspective view of the head of the fork, a portion of the backbone, and of the wheel, showing the handle-bars, brake devices embodying my improvements, and a brake-lever attached to one of the handle-bars. Fig. 8 is a plan view of the saddle, a portion thereof being shown broken away. Fig. 9 is a side elevation, partly in section, of the upper part of the fork and the head thereof, the upper end of the backbone, and of the saddle. Figs. 10, 11, and 12 illustrate details of handle-bar construction and means of connecting the latter with the fork-head, all as hereinafter fully described. Fig. 13 is a perspective view of the ends, the longitudinal bars, and one of the

connecting-bolts of the foot-treadle. Fig. 14 is a perspective view of one of the tubular foot-treadle bars. Fig. 15 is a perspective view of the treadle-shaft. Fig. 16 illustrates front, rear, and edge views of detail parts hereinafter described. Fig. 17 is a perspective view of a portion of the ball-bearing of the foot-treadle. Fig. 18 is a longitudinal sectional view of the foot-treadle on the line of the shaft thereof, but showing the latter in full lines. Fig. 19 is a plan view of the two treadle-bars, showing thereon a portion of the foot-treadle covering. Fig. 20 is a side elevation of wrench for turning one of the treadle parts.

My improvements in the construction of the backbone 2 and the fork 3 of a bicycle consist in making those parts tubular, as shown, but with the walls thereof of gradually-diminishing thickness from their upper ends or heads to or nearly to the lower ends thereof. Figs. 2 and 3 illustrate in cross section (enlarged) the difference in the exterior diameter of the backbone at the point on line xx , Fig. 1, near its head, and at the point on line yy , same figure, near its lower end. The arms of the fork 3 are made of the usual elliptical form in cross-section, and are, like said backbone, tubular. Figs. 4 and 5 illustrate (enlarged) cross sectional views of one of said fork-arms, respectively, at lines x' and y' , Fig. 1, wherein is shown that the walls of said arm gradually diminish in thickness from the upper to the lower end of the fork, or substantially so.

By the above-described improved construction of said backbone and fork, said parts are made as light as is consistent with the required strength thereof, and their walls are made thickest where the greatest strain upon them comes, thereby obviating the unnecessary use of material at points where it is not especially required, and so securing lightness of construction and providing the greatest thickness of walls at and near the points where the backbone and fork are subjected to the greatest strain.

To provide improved means for connecting the crank-arms of a bicycle with the axle thereof, the ends of the latter are provided with right and left hand screws, and the crank-

arms are correspondingly threaded and screwed thereon against a proper shoulder on the axle.

Fig. 6 illustrates said improvements, in which 4 indicates the lower ends of the fork, 5 the crank-arms, 6 the axle, 7 the hub of the main wheel, and 8 screws entering the ends of the axle against an ordinary washer, the latter having a bearing against the outer side of the crank-arm. By the employment of the above-described means for attaching said crank-arms 5 to the axle 6 all danger of disconnection or loosening of said arms is obviated, for the force exerted against the cranks to propel the machine tends constantly to screw said arms more and more tightly on the axle.

Fig. 7 illustrates the above-referred-to improvements in brakes for bicycles, the improved brake proper consisting of the post 9, having a brake-shoe, 10, on its lower end, said post being supported in lateral perforated projections 11 on the head 12 of the fork 3, in which supporting-projections said brake-post 9 has a limited longitudinal movement, a spring, 13, between one of said projections and a head on the upper end of said post serving to lift the latter and said brake-shoe away from the surface of the wheel-tire 14. To operate the brake to forcibly move it against the wheel-rim, a brake-lever, 15, is provided, which is pivoted by a suitable sleeve, as shown, or other equivalent means, to one of the handle-bars 16, one arm of said lever extending toward the end of said handle-bar within easy reach of the fingers of the rider, and the shorter arm of said lever extending over and adapted to swing against the upper end of the brake-post 9, whereby the latter is operated, as aforesaid.

The above-described improved brake devices provide those that are more simple in construction and more directly acting than those heretofore made.

The above-referred-to handle-bar construction of a bicycle consists in constructing the handle-bars of tapering tubes, whose walls are of gradually-decreasing thickness from the fork-head to their ends, and in uniting said bars by brazing or otherwise suitably securing their larger ends to the ends of a centrally-located plug, 17, having a collar, 18, thereon, (see Fig. 12,) suitable handles being attached to the ends of said bars. The handle-bars united to said plug, as described, are secured to the fork-head 12, on which is a bracket-bearing, 19, having a circular groove therein, by placing said plug portion of the handles on said bracket, the collar 18 entering said groove therein, whereby any endwise motion of the handles in said bearing is prevented. The handles are clamped to the bearing 19 by a slotted clamp-block, 20, the slot therein corresponding in position with the aforesaid groove in the bearing 19, said collar 18 entering said slot in the clamp-block, as well as the groove in said bearing. The clamp-block 20 is secured to the fork-head 12 by a nut, 21, as shown.

The above-described tapering tubular construction of the handle-bars, with their uniting plug, provides convenient means for attaching the same to and detaching the same from the fork-head, and less danger exists of breaking the bars accidentally when the machine is overturned; and should one of the handle-bars get broken, the broken part is easily removed from the said central plug, 17, and another handle can be secured thereon in place of the broken one.

The upper end of the spindle 22 of the backbone is secured in the fork-head by a screw, 23, the lower end of which receives the upper end of said spindle. Said screw 23 is screwed into the upper end of the fork-head, and on its upper end is screwed the nut 21, which holds the said clamp 20 in place on the handle-bar plug, as described. The said screw 23 therefore serves the double purpose of providing a bearing for the upper end of said spindle and as a screw-stud for the nut 21.

The above-referred-to improved bicycle-saddle construction embodies therein a seat, 24, (shown in plan view in Fig. 8 and in side elevation in Fig. 9,) which seat is constructed of leather or other similar material, and to the under side of the same are secured two metallic re-enforcing strips, 25, by riveting the ends or other suitable means, to prevent the elongation of the seat by stretching, said strips being secured on either side of a longitudinal slot in the seat, as shown in Fig. 8, in which figure one of said strips is shown through a broken-away portion of the seat, and the other is shown in dotted lines. The rear end of the seat 24 is secured by riveting or otherwise to a metallic circular strip, as shown in Fig. 8, having a boss, 26, thereon, and said boss is pivotally connected to the upper end of a rigid metallic arm, 27, the latter being pivoted near its lower end to a clamp-ring, 28, secured on the backbone 2 of the bicycle; or said arm 27 may be pivoted to a suitable boss formed on said backbone and integral therewith. A short arm, 29, extends laterally from one side of said ring 28, and the lower end of the arm 27 extends over the upper side of said arm 29, and has an adjusting-screw, 30, therein, the lower end of which has a bearing on said arm 29, whereby, by turning said screw, the arm 27 or the rear support for the saddle has its upper end swung to such position as may be desirable to impart the desired longitudinal tension to the seat 24. A set-nut, as shown, on screw 30 serves to lock the latter in any position to which it may be turned.

It is obvious that when the arm 27 shall be pivoted, as aforesaid, on a boss on said backbone, integral therewith or brazed thereto, the point of the adjusting-screw 30 may bear directly on the backbone, and when the latter is constructed with the above-described thick walls at the place where the saddle is secured to it no danger of crushing or indenting the side of the backbone by the pressure of said screw thereupon need be apprehended.

The front end of the seat 24 of the saddle is secured to the end of the vertical arm of the elbow-lever 31, the end of said arm being bifurcated and having a bolt, 32, passing transversely through its bifurcated parts, around which said front end of the saddle-seat is secured, as shown. The elbow-lever 31 is pivoted to the head of the backbone, as clearly shown in Fig. 9, and its horizontal arm 33 extends over the backbone 2, and is provided with a socket in its under side to receive a spring, 34, of rubber preferably, (although a metallic spiral or other formed spring may be used,) which forces the end of said arm 33 away from the backbone, and is so elastic as to impart an easy motion to the saddle when ridden upon.

The above-referred to improved foot-treadle is constructed, as hereinafter described, with improved ball-bearings therefor and an improved covering, on which the foot rests. The end plates, 35, of the foot-pedal are each of them provided with a projecting collar, 36, which is internally screw-threaded, and within said collar, but separated from it, is a grooved segment of a collar, 37, of less diameter than the collar 36, but concentric therewith, which segment 37 partly surrounds the shaft-hole through the end plate, 35, and the groove therein is adapted to receive a series of bearing-balls, 38. A detached segment of a ring, 39, corresponding in form to the said segment of a collar, 37, and likewise grooved internally to receive said bearing-balls 38, is adapted to be placed within said collar 36, to form, when secured therein, as hereinafter described, a complete grooved ball-bearing. A screw, 40, passes through the collar 36 against the side of said segment 39, and rigidly holds the latter in position against the segment of a collar, 37, a set-nut being placed on said screw, as shown, to prevent its becoming loosened.

A screw-cap, 41, (shown in front, rear, and edge views, in Fig. 16,) is adapted to be screwed into the collar 36, as shown in Fig. 18, thereby tightly closing the ball-bearing on the outer end plate of the pedal and keeping all dust from entering the bearing. The shaft 42 of the pedal is placed in the latter, in the position shown in Fig. 18—that is to say, with the ball-bearing grooves $\approx \approx$ concentric with the grooves in the aforesaid parts 39 and 37, in which the balls 38 are held, whereby said shaft is given a bearing solely on said balls. A screw-cap, substantially like said cap 41, is screwed into the collar 36 on the rear end of the pedal, but is suitably perforated to allow said shaft to pass through it, and it screws against a suitable collar on said shaft, to prevent the entrance of dust, the rear end of the shaft 42 being screw-threaded, as shown, to provide for attaching the pedal to the crank-arms of the bicycle. The said removable grooved segment provides for the introduction of the shaft into the pedal and then for placing said segment, with the balls therein, onto the shaft, and subsequently securing

said segment, as before described. The construction of the foot-treadle with said ball-bearings obviates any perceptible frictional resistance to the usual oscillating movement which is imparted to the pedal when the foot is acting thereon in the ordinary way.

The end plates, 35, of the pedal are united by two bolts, 43, one of which is shown in Fig. 13, which bolts pass through the said plates and through two tubular pedal-bars, 44, the ends of which are slightly let into the inner sides of said end plates to assist in retaining said bars in a proper position, over which bars and around the same, between the end plates, is placed a covering for the pedal, consisting of an endless apron, 45, made preferably of rubber and having a roughened surface, as shown in Figs. 18 and 19, said covering 45 being made of an elastic material and roughened, as aforesaid, providing an easy bearing for the foot and one which so conforms itself to the surface of the shoe sole as to peculiarly adapt it to the requirements of a foot-pedal covering.

Fig. 20 illustrates in side elevation a wrench which is adapted to fit onto the end of the screw-cap 41, for turning the latter in the collars 36 on the end plates, 35, of the pedal.

What I claim as my invention is—

1. A tubular backbone for a bicycle, having walls of decreasing thickness from the head or neck thereof to or nearly to its lower end, substantially as set forth.

2. A fork for a bicycle, having tubular arms the walls of which are of decreasing thickness from the fork-head to or nearly to their extremities, substantially as set forth.

3. The handle-bars of a bicycle, constructed from tapering tubes having walls which are of decreasing thickness from the fork-head toward their extremities and united by a cylindrical plug to which their larger ends are secured, said plug having thereon a projecting collar, combined with a bracket-bearing on the side of the fork-head to receive said plug and having a slot therein to receive the collar on the latter, and a clamp-block secured over said bracket-bearing, having a slot therein in which said collar also engages, substantially as set forth.

4. The handle-bars of a bicycle, constructed from tapering tubes having walls which are of decreasing thickness from the fork-head toward their extremities, substantially as set forth.

5. A bicycle-saddle consisting of a seat, 24, of leather or similar material, an arm, 27, pivoted at a point between its ends to the backbone of the machine, the upper end of which is connected to the rear end of said seat and having an adjusting-screw, 30, in its lower end, an elbow-lever, 33, pivoted to the head of the backbone, having one arm connected to said seat, and its second arm extending over the backbone, and a spring interposed between the latter and said second arm, substantially as set forth.

6. A bicycle-saddle consisting of a seat, 24, of leather or similar material, having two metallic re-enforcing strips, 25, secured to the under side thereof, an arm, 27, pivoted at a point 5 between its ends to the backbone of the machine, the upper end of which is connected to the rear end of said seat and having an adjusting screw, 30, in its lower end, an elbow-lever, 33, pivoted to the head of the backbone, having one arm connected to said seat and its second arm extending over the backbone, and a spring interposed between the latter and said second arm, substantially as set forth.

7. A seat for a bicycle saddle, constructed 15 from flexible material, substantially as described, and provided with the flexible metallic re-enforcing strips 25, secured to the under side thereof, substantially as set forth.

8. A foot-treadle for bicycles, provided with 20 end plates, 35, each having a collar, 36, and a grooved segment of a collar, 37, within the latter, combined with the removable grooved

ring-segment 39, the annularly-grooved shaft 42, a series of balls fitting said grooved segments and providing a bearing for said shaft 25 near each end thereof, and a suitable cap, substantially as described, screwing into said collar 36, substantially as set forth.

9. A bicycle-saddle consisting of a seat, 24, of leather or similar material, an arm, 27, pivoted at a point between its ends to the backbone of the machine, the upper end of which is connected to the rear end of said seat, an elbow-lever, 33, pivoted to the head of the backbone, having one arm connected to said seat 35 and its second arm extending over the backbone, and a spring interposed between the latter and said second arm, substantially as set forth.

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