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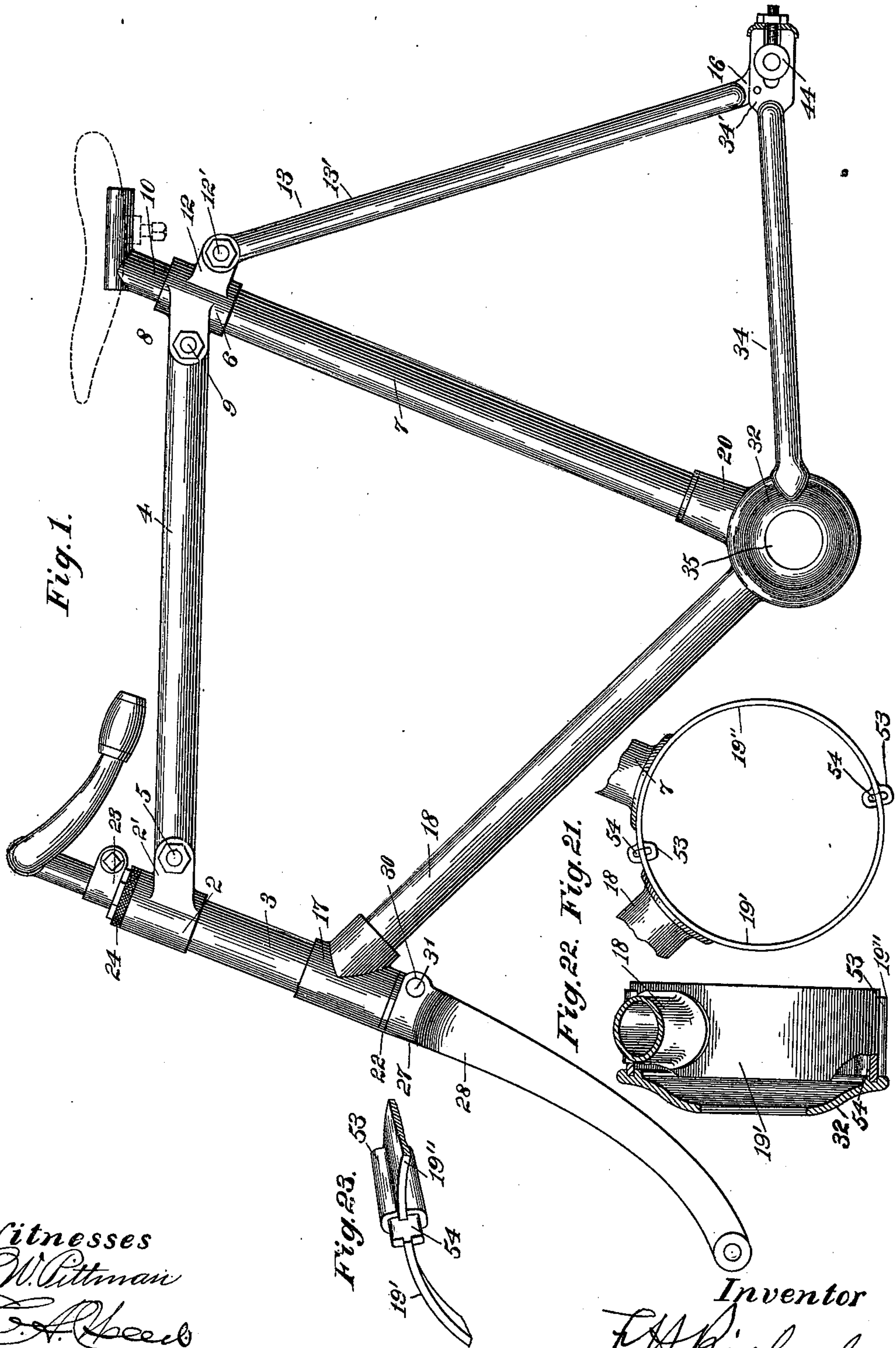
F. H. RICHARDS.  
BICYCLE.

Patented Apr. 16, 1901.

(No Model.)

(Application filed Aug. 13, 1897.)

4 Sheets—Sheet 1.



Witnesses  
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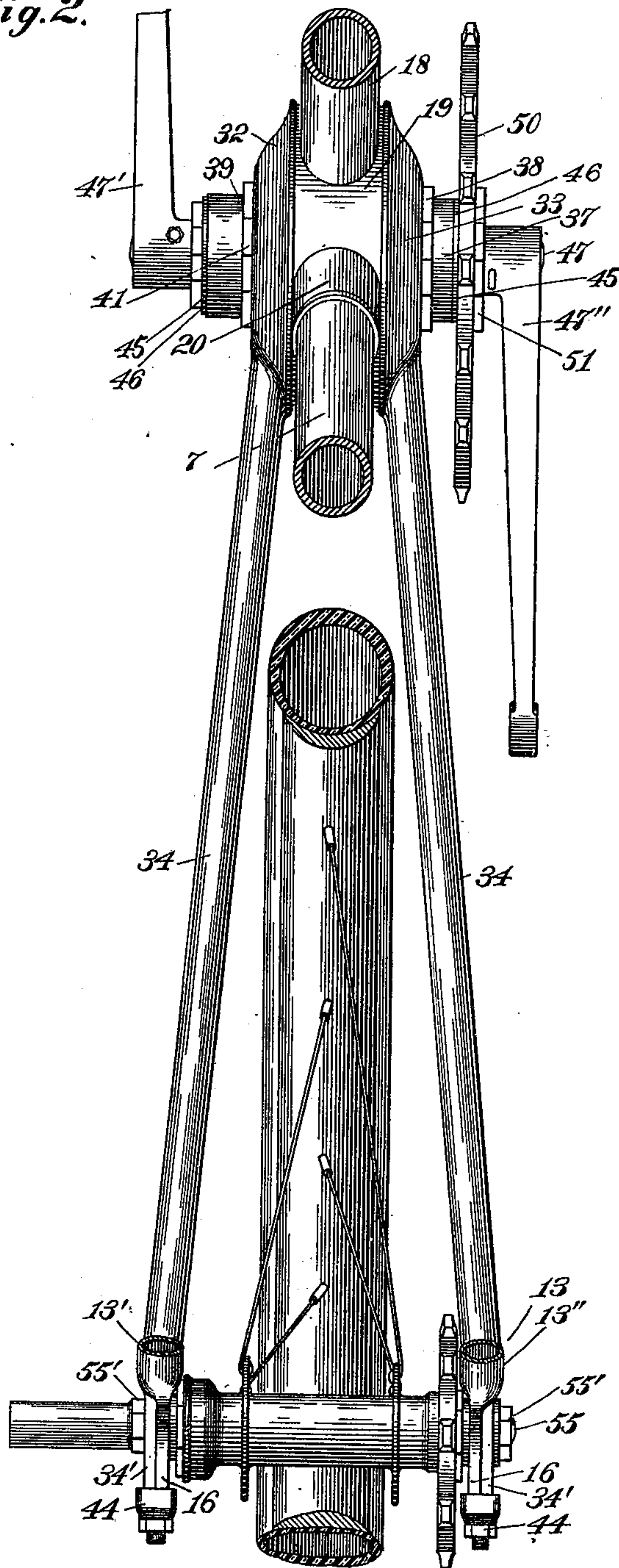
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*Fig. 2.*



Witnesses.

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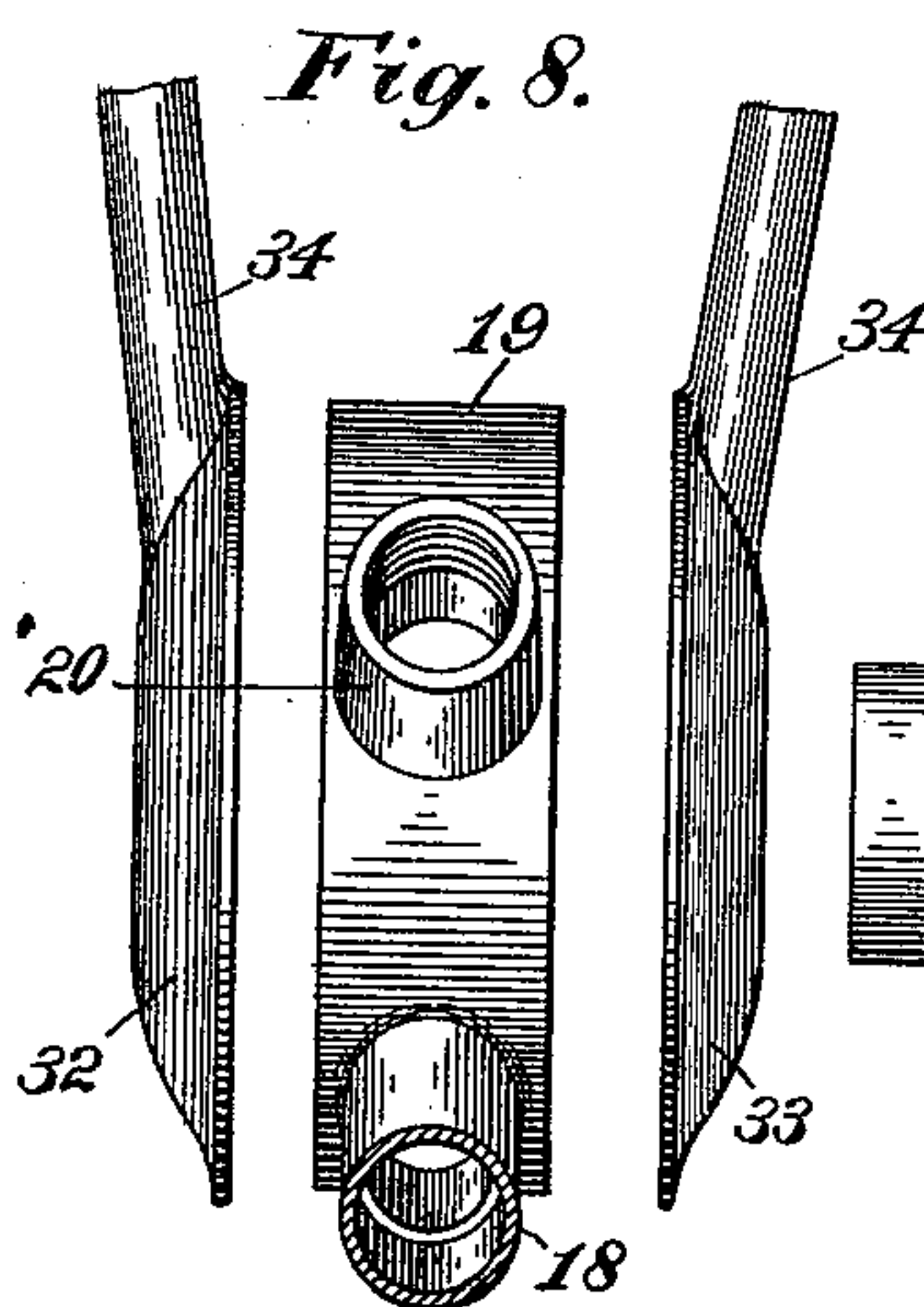
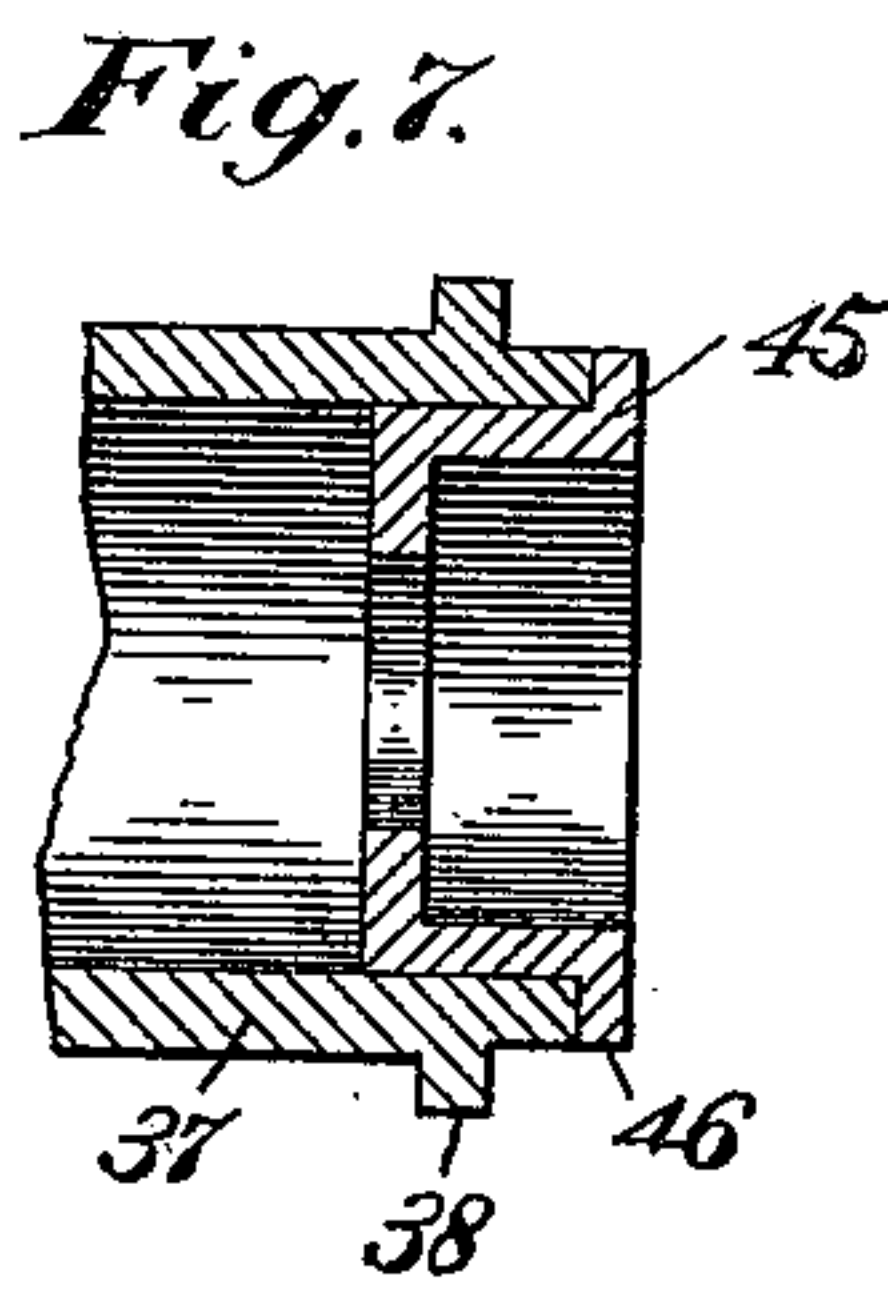
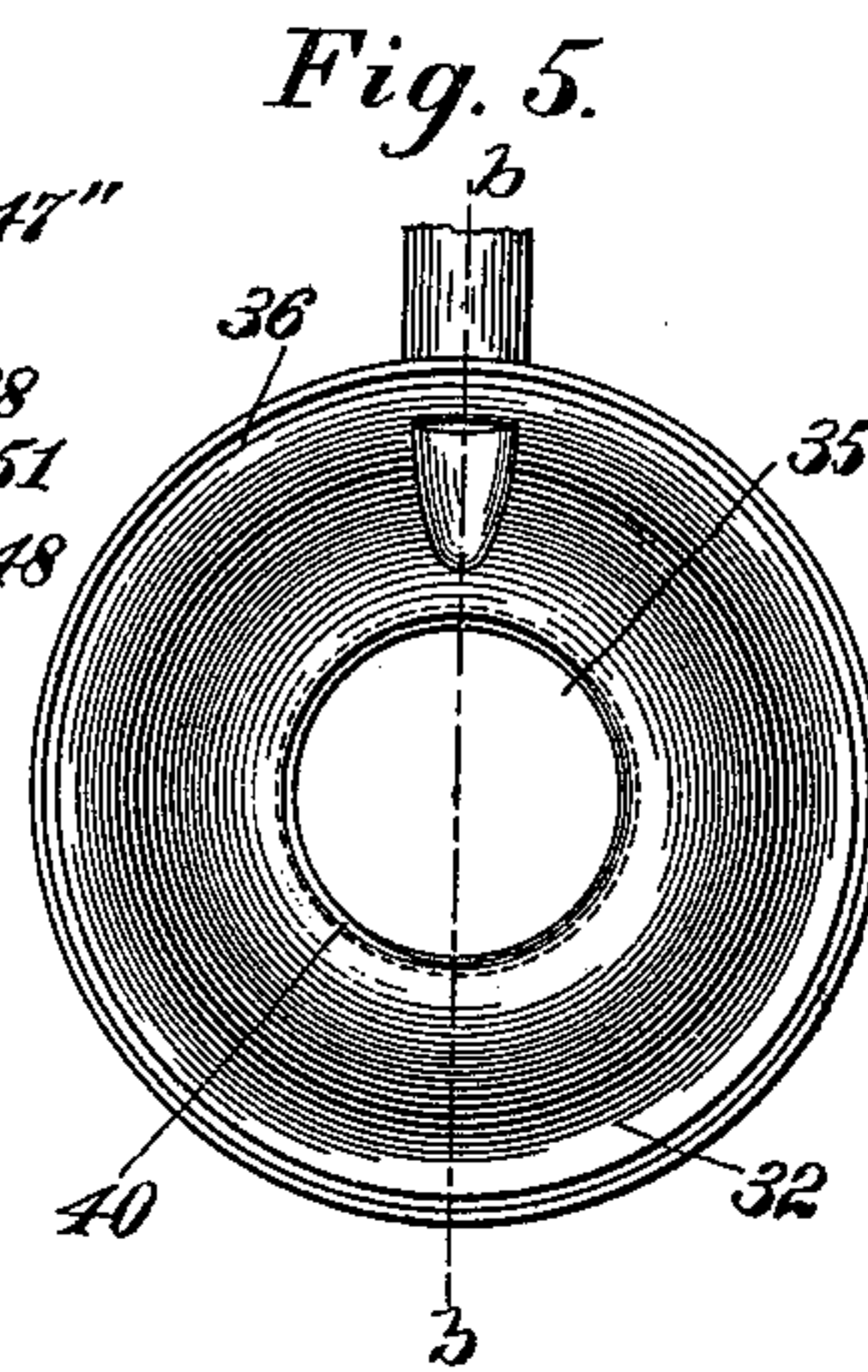
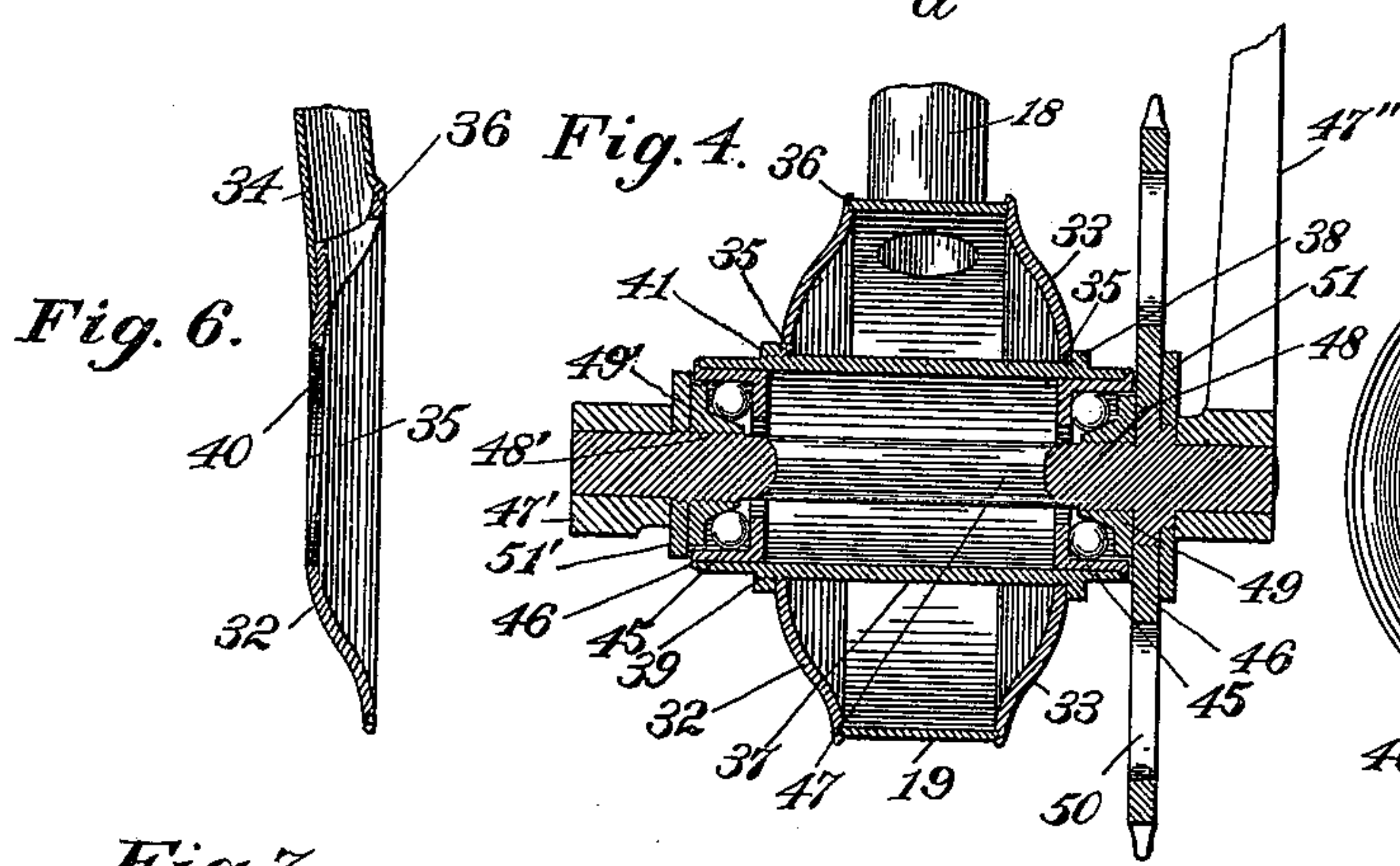
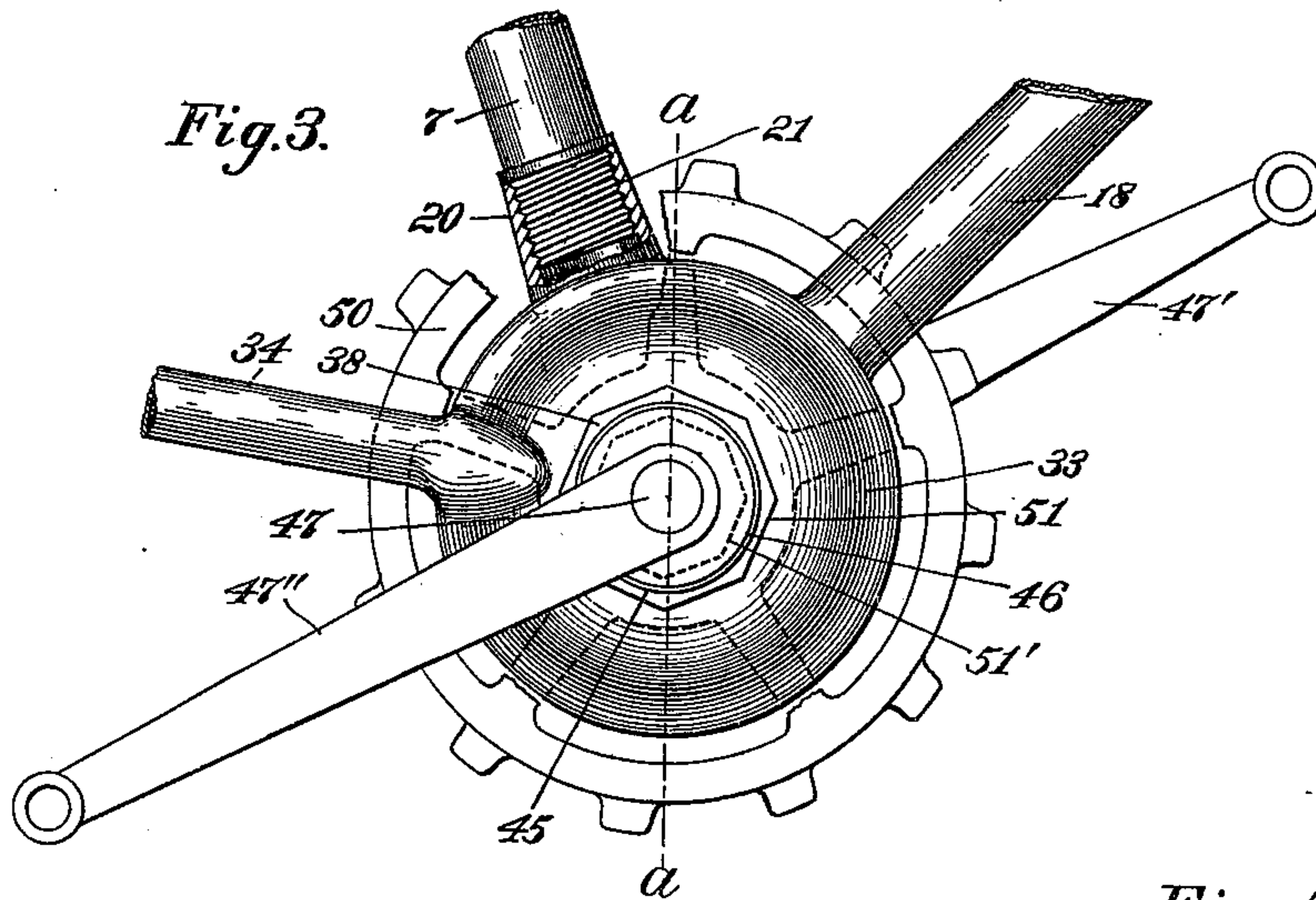
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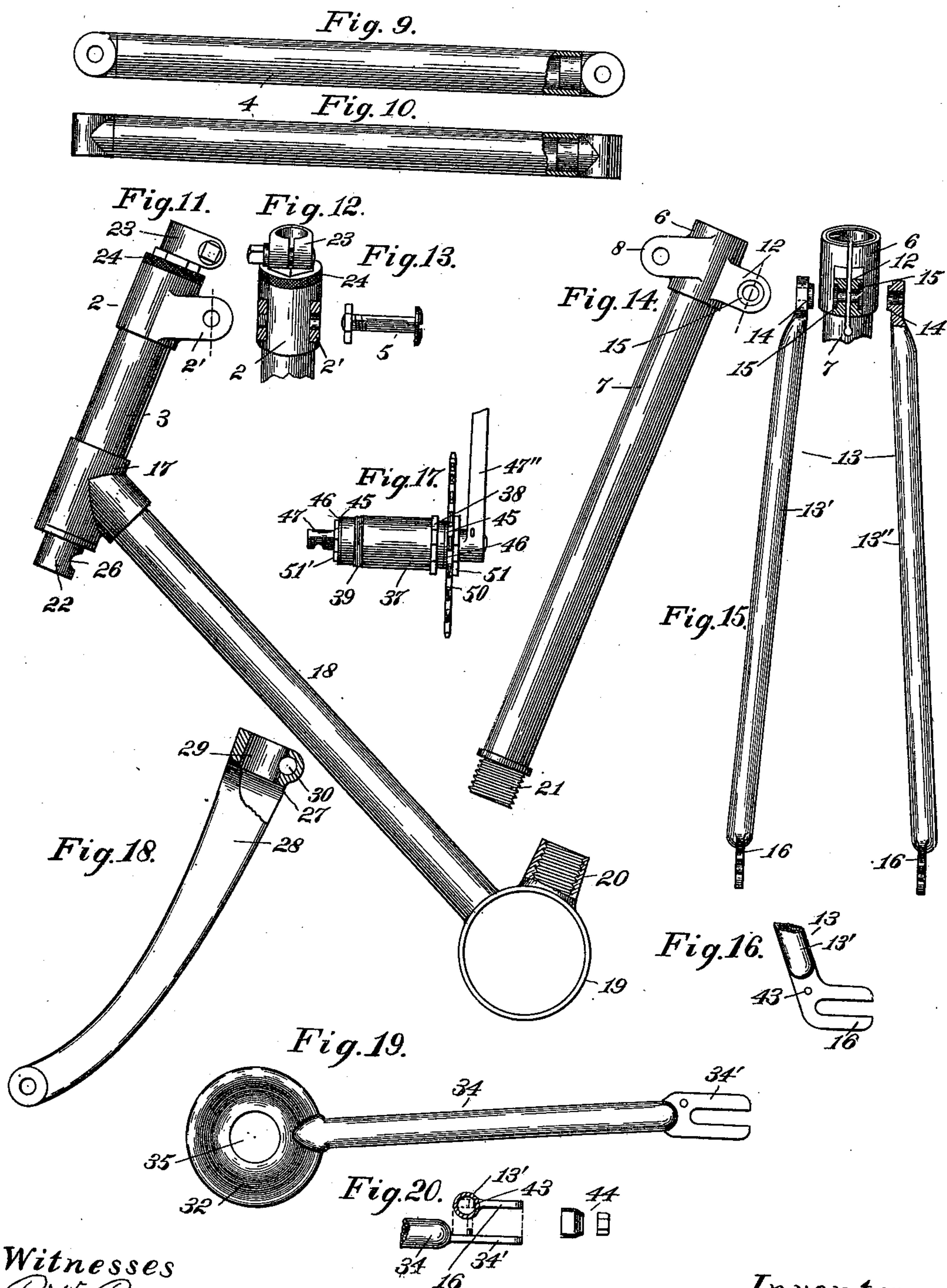
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4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

## BICYCLE.

SPECIFICATION forming part of Letters Patent No. 672,135, dated April 16, 1901.

Application filed August 13, 1897. Serial No. 648,145. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Bicycles, of which the following is a specification.

This invention relates to velocipedes, more especially to that class thereof generally designated as "bicycles."

One of the objects of the invention is to provide an improved vehicle of this character constructed of separable members, whereby the same can be quickly and easily assembled and disassembled without interfering with or affecting the disposition or adjustment of the bearings, and thereby facilitate the transportation of such vehicle.

Another object of the invention is to provide an improved crank-hanger which can be quickly and easily assembled and disassembled relatively to the framing of the wheel.

In the drawings accompanying and forming a part of this invention, Figure 1 is a side elevation of this improved bicycle-framing assembled. Fig. 2 is a plan view of the rear portion of a bicycle with its wheel and a part of the framing shown in section. Fig. 3 is a view of the sprocket side of the crank-hanger and adjacent parts, a part of the framing being shown in section and the sprocket-wheel being partly shown in dotted lines and broken away. Fig. 4 is a transverse sectional view taken in line *a a*, Fig. 3. Fig. 5 is an inside view of the crank-hanger end of one of the rear stays. Fig. 6 is a sectional view taken in line *b b*, Fig. 5. Fig. 7 is a sectional detail view, on an enlarged scale, of a part of the crank-shaft carrier. Fig. 8 illustrates the members of the crank-hanger disassembled. Figs. 9 to 20, inclusive, illustrate various members or parts of the wheel disassembled; and Figs. 21, 22, and 23 illustrate a separable crank-hanger band or annular member.

The main object of this invention is to construct a bicycle which can be easily and quickly taken apart to facilitate the packing of the same for shipment or other transportation and in the assembling and disassembling of which wheel the adjustment of the bearings need not be interfered with, so that the owner will have no difficulty in assembling

the parts correctly and in a simple and thorough manner, and when so assembled said parts will form a rigid and durable structure.

As a preface to a further description of this improved velocipede, it will be understood that the invention is applicable to all kinds of bicycles, and hence does not necessarily have to be embodied in the construction of wheel shown herein.

Bicycles as ordinarily constructed have the framing thereof made as one rigid structure, this usually being accomplished by brazing the tubes in the coupling-lugs, so that it is necessary to provide large crates to accommodate the framing in order to properly ship the wheel, as only the handle-bar, pedal-cranks, seat, and wheels can be disassembled. In this improved bicycle, however, the framing is so constructed that the tubing thereof can be readily and quickly assembled and disassembled, and in one way of accomplishing this result, in the preferred form thereof herein shown and described, the head-lug 2, which in the structure shown herein is preferably rigid with the head 3, is adapted to receive one end of a horizontal brace or tube 4, and for this purpose said head-lug is shown having a bifurcated part 2', into which one end of said brace extends, said members being coupled by a suitable fastening or clamping device 5, such as a bolt and nut, the bolt of which extends through the lug bifurcation and an apertured end of the brace, whereby the base is removably but at the same time firmly clamped in position. The seat-post lug 6 is also shown, preferably, rigidly secured to the seat-post 7 and is provided with two bifurcated parts 8 and 12, one of which is adapted to receive the other end of the horizontal brace or tube 4, which is clamped therein preferably by a similar fastening device 9 to that just described. This seat-post lug is split in the usual way, whereby it is adapted to receive the seat-tube 10, carrying the usual saddle, such seat-tube being clamped therein by a suitable clamping device 12', extending through the other bifurcated part 12 of said lug 6, at which point the upper end of the rear fork 13 is also secured. This rear fork in the present structure is illustrated as formed of separable sides or members 13' and 13'', each provided with a bearing-face 14, adapted to be seated in a counter-



sunk portion 15 of the lug, whereby the shifting of the rear fork is prevented should the clamping device 12' work loose. Each rear fork side or member 13' and 13'', respectively, is provided with a bifurcated lower end extending substantially at right angles thereto. The lower head-lug 17 is preferably rigidly secured to the head and is shown in the drawings as having rigidly secured thereto the lower brace or tube 18, the opposite end of which tube carries one member of the crank-hanger, shown herein as a band or casing of any suitable shape, but illustrated herein as an annular member 19, preferably fixedly secured to said brace and in one form thereof having an interiorly-threaded socket 20, adapted to receive the threaded end 21 of the seat-post 7, whereby before the attachment of the horizontal brace 4 and the rear fork 13 such seat-post can be screwed into the threaded socket 20, and thus firmly secured at this point. This band or annular casing 19 may be, if desired, constructed of a plurality of separable members, shown herein as two members 19' and 19'', one, as 19', rigid with the lower brace 18 and the other, as 19'', rigid with the seat-post 7, or said members may be removably secured to said brace and post by clamping means or provided with threaded sockets similar to the socket 20 for the reception of the threaded end of said brace and seat-post. These member 19' and 19'' may be secured together in any suitable way; but in the construction herein shown one is provided with a pair of slotted sockets 53, one at each end thereof, into which a pair of enlarged ends or heads 54 of the other member are adapted to fit, whereby when said members are in position they form a rigid structure. When this form of connection is used between the members of the annular band, the enlarged socket and head are preferably of less width than the band, whereby the edges of said band can fit into the annular recesses of the side disks or plates hereinafter described. The steering-stem 22, carried by the head 3, having the usual ball-bearings, is provided at its upper end with the usual handle-bar clamp 23 and cone-adjustment 24 and has at one side of its lower end, which projects below the head, a concave or semicircle recess 26. The crown 27 of the front fork 28 is provided with a socket or recess 29, into which the end of said stem fits, said fork-crown having a transverse aperture or opening 30, through which a suitable fastening device 31, such as a cotter-pin, extends and into the semicircle recess of the stem, whereby the front fork is removably but rigidly secured in position. It will be understood that other fastening means may be used for removably coupling the fork and stem.

From the foregoing it will be seen that on disassembling the framing for transportation or other purpose the head 3 and lower brace 18 may be one rigid structure, although it will be understood that such lower brace 18

may also be made detachable from the head in any suitable way, as by a threaded joint or by clamping means, if desired.

In the construction of ladies' wheels in order to have the framing of separable members it is simply necessary to have the upper curved brace detachable from the seat-post, or from both seat-post and head, if desired, and which can be readily accomplished in one way by clamping said curved brace in position at each end in a similar manner to that in which the horizontal tube 4 is secured.

The crank-hanger, which, as above stated, is constructed of separable members and has as one part thereof the band or annular casing 19, above mentioned, comprises a pair of side plates 32 and 33, conforming to the shape of such band, and hence preferably shown herein as disk-shaped, each plate being shown as rigidly secured to and forming a part of each lower rear stay or tube 34. Each of these plates is provided with an axial opening 35 and is preferably dished or bulged outward, and for this purpose is shown as concavo-convex, and has adjacent to its edge an annular recess or groove 36, adapted to receive the edge of the annular band 19, thereby substantially forming therewith a tongue-and-groove joint. Carried by this crank-hanger, and which, to a certain extent, may be considered as forming a part thereof, is a crank-shaft carrier 37, shown as tubular and provided adjacent to one end with a stop-face, such as an adjusting collar or nut 38, fixedly secured thereto, and adjacent to its other end with exterior threads 39, adapted to mesh with interior threads 40 of one of the plates, as 32, whereby when the tubular carrier is in position the inner face of the adjusting-nut 38 will engage the outer face of the plate 33, while the threads 39 and 40, respectively, of the carrier 37 and plate 32 mesh with each other, whereby on turning the nut 38, and thereby the carrier, the plates will be firmly drawn and clamped in position, a suitable check or locking nut 41 being provided to also engage a part of the carrier-threads 39, thereby more securely to lock the plates in position.

From the above it will be seen that one part of the crank-hanger itself constitutes the fastening means for securing all the members of such crank-hanger together and this at one operation by merely turning the carrier, as above set forth. It will also be noted that by this construction and organization of the crank-hanger a relatively large chamber is formed around the crank-shaft carrier, thereby permitting the side plates 32 and 33 to support the pedal-shaft carrier at points relatively a much greater distance apart than the distance between the plates at their peripheral edges, where they engage the annular band 19, so that said carrier is supported at points far enough apart to obtain horizontal stiffness, and the plates are made of sufficient diameter and of such shape, as concavo-



convex, to obtain vertical stiffness, so that by this construction of chamber around the carrier great stiffness and strength and a narrow tread with no increase in weight are made possible. Each stay member 34 is provided with a bifurcated end 34', extending in parallelism with the bifurcated end 16 of one rear fork side or member, so that when the two bifurcated ends are in juxtaposition, being held in such position by a projection carried by one of the bifurcated ends and shown herein as carried by the stay end and entering an aperture 43 of the fork side end, such members will be in position to receive the rear-wheel axle 55 in the usual manner and the chain-adjuster 44, which may be of any suitable construction. The rear-wheel axle nuts 55' constitute not only the means for securing the wheel in position, but also a means for clamping the bifurcated ends of the stay and fork side members together. This improved crank-hanger, it will readily be seen, may be used with various kinds of crank-shaft mechanism; but that shown supported thereby preferably comprises a pair of ball-cups 45, one at each end of the crank-shaft carrier 37 and adapted to carry the usual ball-bearings, and each cup having a flanged end 46 engaging the outer end of said bracket 37. The crank-shaft 47, which carries the pedal-cranks 47' and 47'', one at each end thereof, is shown provided adjacent to one end with a series of exterior threads 48 for the reception of the usual adjusting-cone 49, the removable sprocket-wheel 50, and the lock-nut 51, and adjacent to its opposite end with threads 48' for the reception of the usual adjusting-cone 49' and lock-nut 51'.

From the foregoing it will be seen that on the removal of the pedal-crank 47' and the lock-nut 41 the opposite crank 47'', sprocket-wheel 50, and crank-shaft-carrier 37, together with the bearings and adjusting-cones, can be unscrewed and completely removed from the plates 32 and 33 without interfering with or disturbing the adjustment of such bearings or the other parts of the crank-shaft mechanism and that, if desired, the side plates can then be detached by removing the driving-wheel in the usual way, whereupon the stays can be quickly detached from the rear fork.

In conclusion it will be seen that when it is desired to ship or otherwise transport the wheel it is simply necessary after the removal of the wheels, the seat, and the handle-bar to unclamp the upper horizontal tube 4 from the head and seat-post, remove the cotter-pin 31 from the front fork, the clamping device 12 at the upper end of the rear fork, unscrew the seat-post 7 from the crank-hanger band 20, and then detach the pedal-crank 47' and lock-nut 41, whereby all the parts can be quickly disassembled in a similar manner, if desired, to that shown in Figs. 9 to 20, and then readily packed in a trunk or other suitable means for transportation, and this with-

out disturbing the position or adjustment of the bearings, so that when it is desired to assemble the parts of the wheel this can be quickly done without the necessity of working with the bearings to have them in proper position.

Having thus described my invention, I claim—

1. In a bicycle-framing, the combination of a crank-hanger comprising a band; a pair of axially-bored plates having peripheral flanges for engaging said band; a pedal-shaft carrier having means of securing said band and plates together, and said plates to said carrier, said band being of a width relatively much less than the distance between said plates where they engage the carrier.

2. In a velocipede-framing, the combination of a crank-hanger comprising a band; a pair of axially-bored plates, one of which is threaded; a pedal-shaft carrier extending through said plates and having a stop-face adjacent to one end thereof, and exterior threads adjacent to the other end thereof, the distance between said stop-face and said threaded portion being relatively much greater than the width of said band, whereby said carrier is adapted to engage said plates at points relatively a considerable distance apart, and said plates are adapted to engage said band at points relatively close together and remote from said carrier.

3. In a velocipede-framing, the combination of a crank-hanger comprising a band; a pair of axially-bored plates carried by said band; a pedal-shaft carrier extending through said bores and carried by said plates and adapted to engage said plates and to maintain them in engagement with the band at points relatively remote from said carrier.

4. In a velocipede-framing, the combination of a pedal-shaft carrier, and a casing comprising a pair of axially-bored disks supporting said carrier, and an annular band intermediate of and in engagement with the annular peripheries of said disks at points relatively remote from said carrier, and of less width, but of much larger diameter, than said carrier, thereby forming an enlarged closed chamber around said carrier.

5. In a velocipede-framing, the combination of a crank-hanger comprising a band formed of separable members, and having a means of securing said members together; a pair of axially-bored plates adapted to engage said band at points relatively remote from the pedal-shaft carrier; and a pedal-shaft carrier extending through said plates, and having means adapted to engage said plates at points relatively a much greater distance apart than the distance between said plates at their peripheries where they engage said band.

6. In a velocipede-framing, the combination of a crank-hanger comprising a band having a lower brace connected therewith; a pair of axially-bored side plates in which the band



is seated, each plate having a rear brace connected therewith; a pedal-shaft carrier held in said plates; and means carried by the carrier for securing together, at one operation, 5 said band and side plates.

7. In a velocipede-framing, the combination of a crank-shaft hanger comprising a band formed of separable members, each of said members having a framing member rigidly 10 connected therewith; a pair of axially-bored plates, each having a seat for the edge of the band and also having secured thereto a framing member; a pedal-shaft carrier held in said plates; and means for securing said carrier 15 in position relatively to said plates, and said plates in position relatively to said band.

8. In a velocipede-framing, the combination of a crank-hanger comprising an annular band, a pair of axially-bored plates having 20 seats for the edges of the band, and interlocking means between said band and plates; and a crank-shaft carrier extending through said plates and constituting means for securing said plates in position.

9. In a velocipede-framing, the combination of a crank-hanger comprising an annular band; a pair of axially-bored plates, each having an annular recess adjacent to its outer 30 edge for receiving the edge of said annular band; a crank-shaft held in said plates and having a stop-face adjacent to one end thereof in engagement with one of said plates, and having exterior threads adjacent to the other 35 end thereof; and a lock-nut engaging said threads and the other one of said plates, whereby said plates, annular band, and carrier are held in position.

10. An independent bicycle-framing member comprising an axially-bored, concavo- 40 convex, annular recessed disk; and a brace rigidly connected to said disk at the convex side thereof.

11. A bicycle-framing comprising a pedal-shaft carrier; an annular band remote from 45 and surrounded by said carrier having a socket; a seat-post removably secured to said socket; a rear fork removably secured to said seat-post; a pair of braces removably secured to said rear fork and each having an axially- 50 bored plate at its inner end peripherally engaging said annular band, said plates adapted to support said carrier at points relatively a much greater distance apart than the dis-

tance between their peripheries where said plates engage said band.

12. A bicycle-framing comprising a head; a 55 lower brace rigidly connected therewith; an upper brace removably secured thereto; a seat-post removably secured to said upper member; a crank-hanger comprising an annular band; a pair of axially-bored side plates 60 engaging said band, and a pedal-shaft carrier independent of and surrounded by said band; and engaging said side plates at points relatively a much greater distance apart than the 65 distance between their peripheries where they engage said band; a rear fork removably secured to said seat-post; a pair of rear braces removably secured to said rear fork and each rigidly connected to one of said side plates. 70

13. In a velocipede-framing, the combination with a pair of separable rear braces, each terminating in a bifurcated plate; and a rear 75 fork comprising a pair of separable members, each terminating in a bifurcated plate, of means for locating said braces and rear forks in predetermined positions relative to each other.

14. In a velocipede-framing, the combination of a pair of separable rear braces, each 80 terminating in a bifurcated plate provided with a projection; a rear fork comprising a pair of separable members, each terminating in a bifurcated plate provided with an aperture adapted to receive one of said projections, 85 for locating said rear braces relatively to the rear forks.

15. In a velocipede, the combination of framing comprising a head, an upper brace, a lower brace, a seat-post, a rear fork, and a 90 pair of framing members carrying annular disks at their inner ends; a plurality of said members being detachably connected together; an annular band rigidly secured to the lower end of said seat-post and said lower 95 brace and intermediate said disk; a pedal-shaft carrier surrounded by and independent of said band, and extending through and engaging said plates at points relatively much greater distance apart than the distance be- 100 tween their peripheries where said plates engage said band.

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