

No. 640,068.

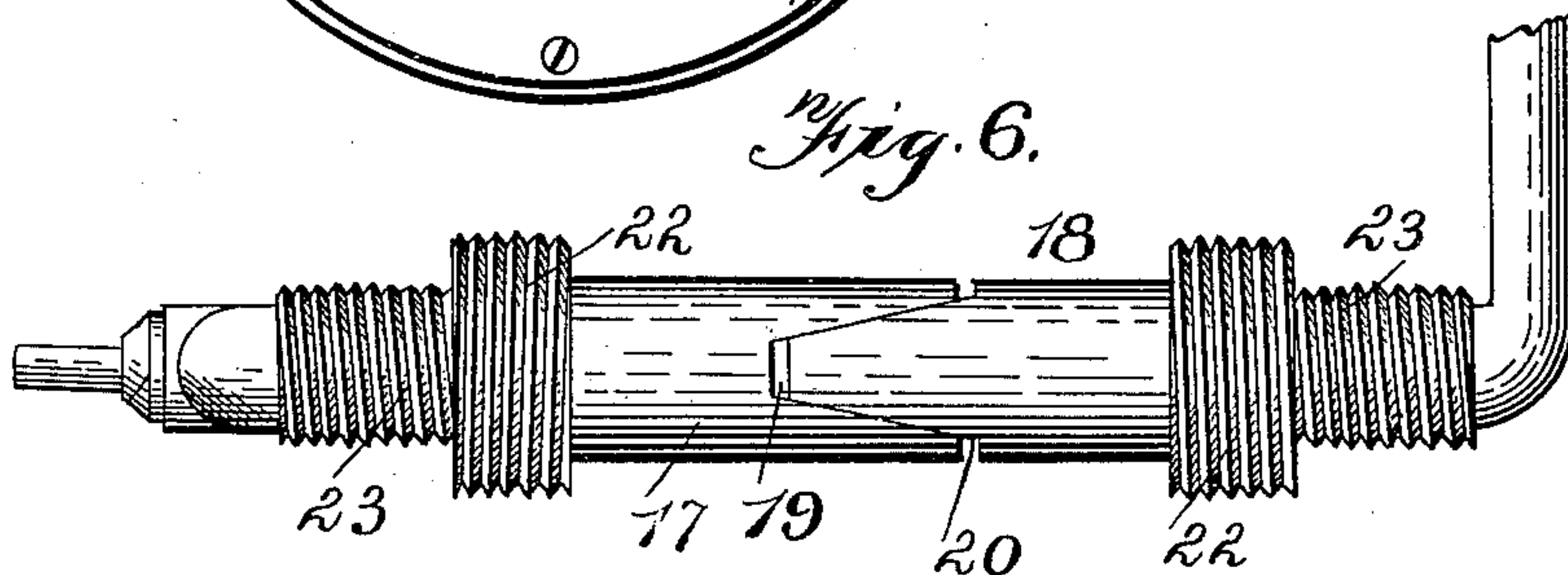
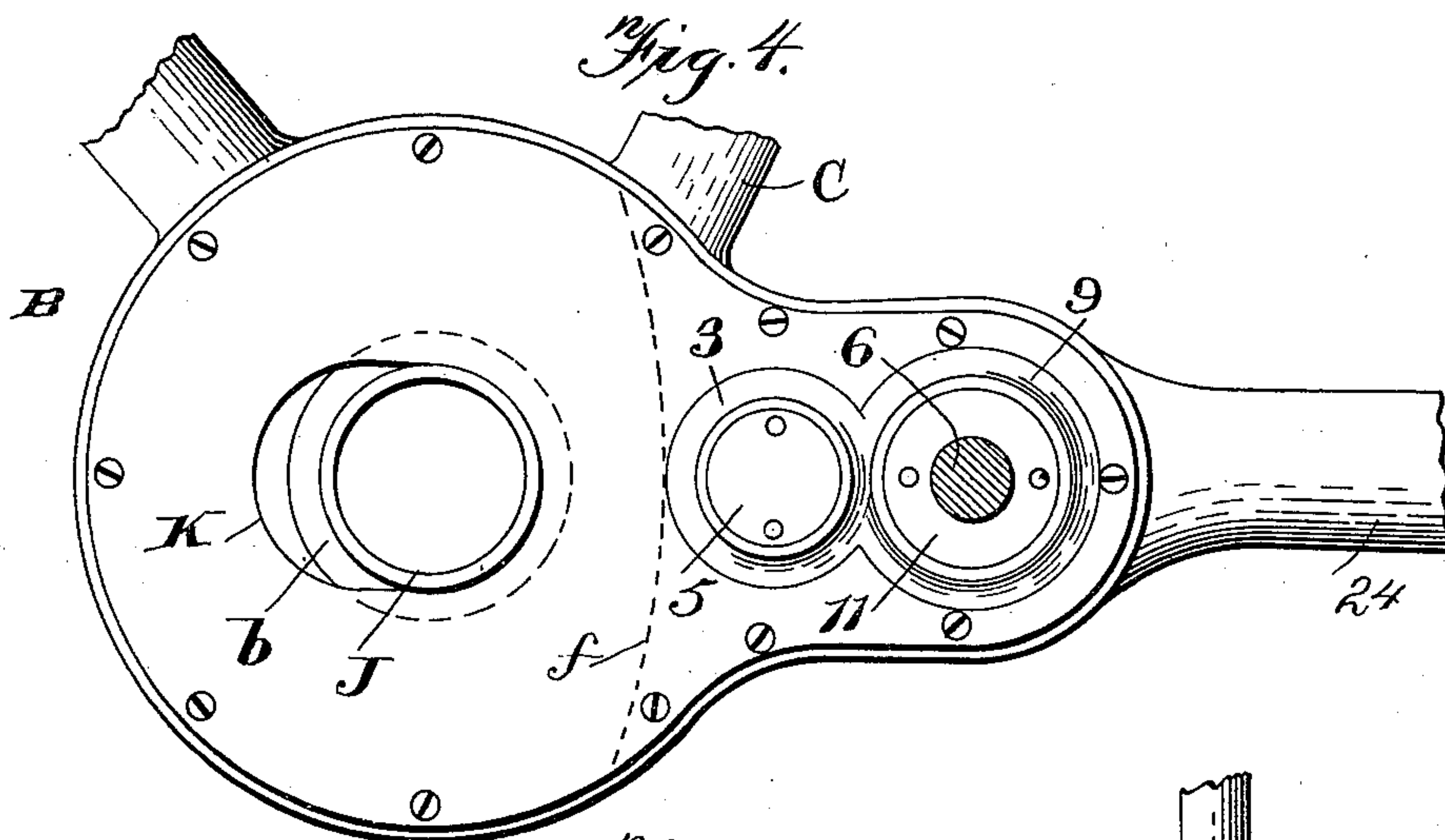
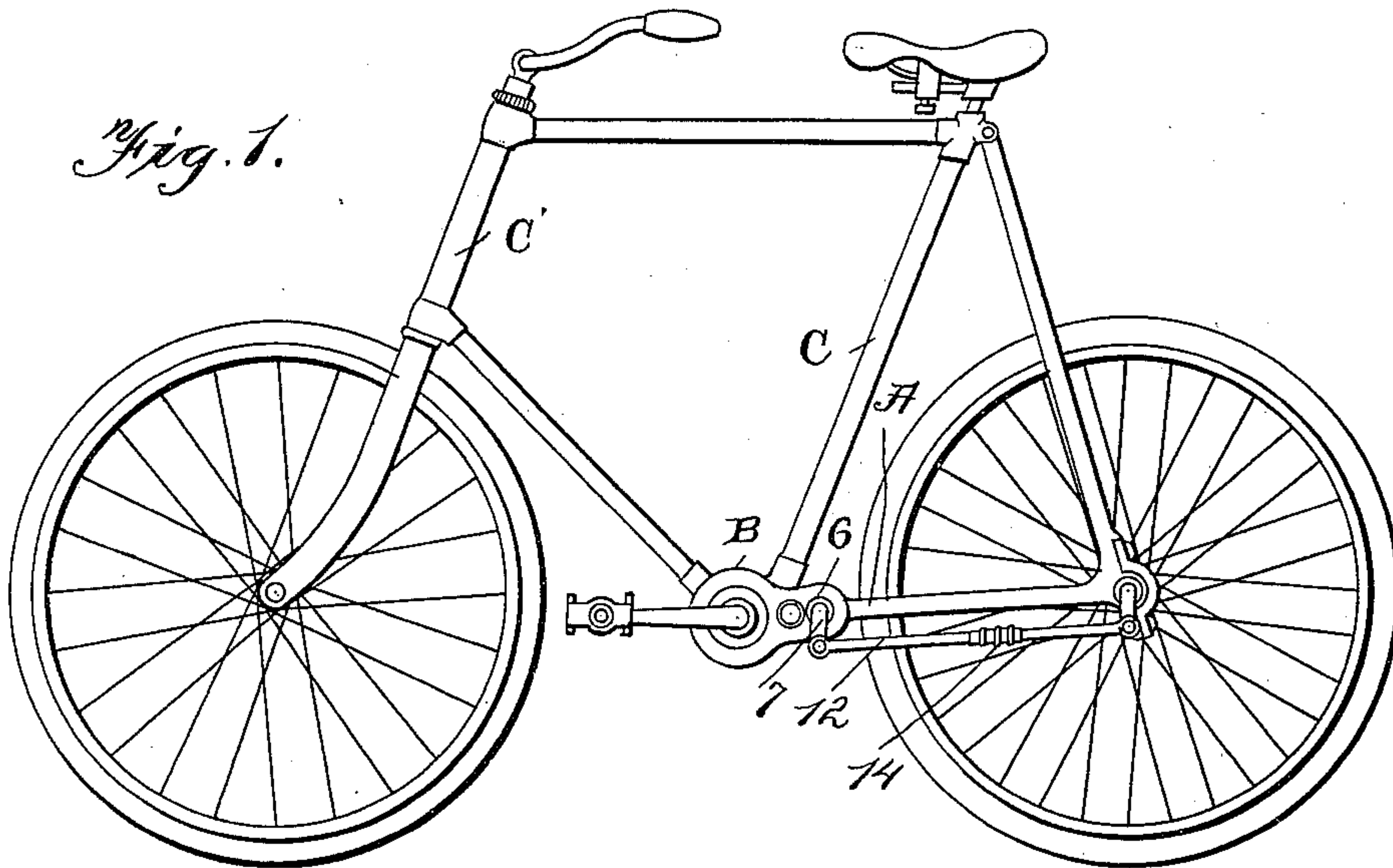
Patented Dec. 26, 1899.

W. H. F. YOUNG.  
BICYCLE.

(Application filed Jan. 12, 1899.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES

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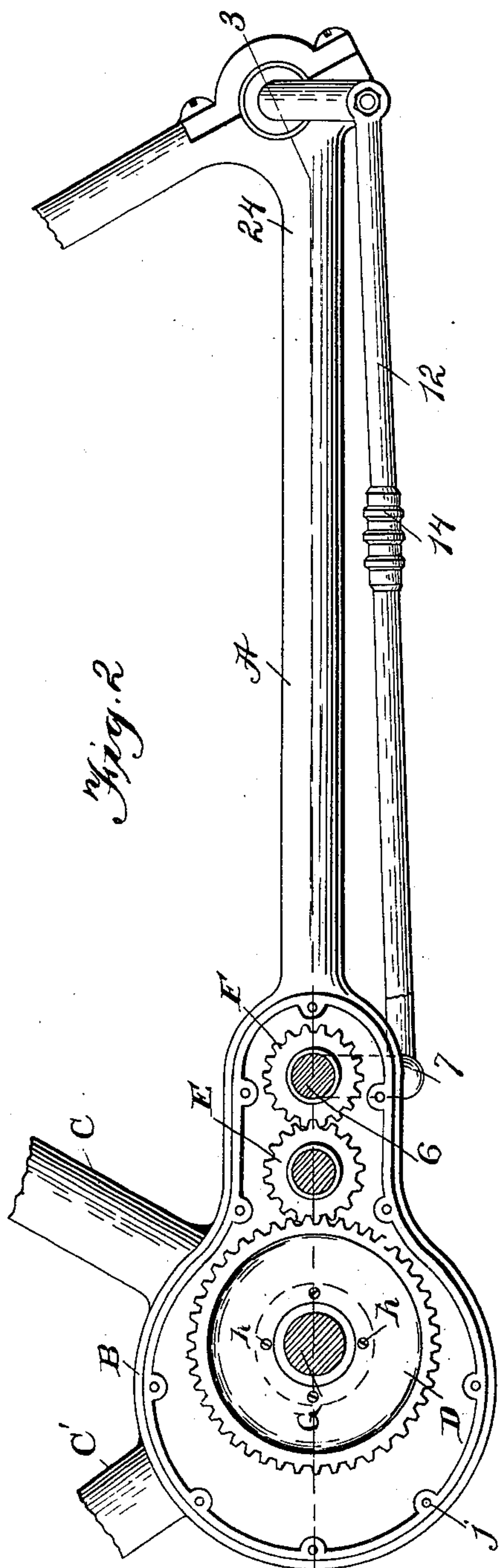


Fig. 2

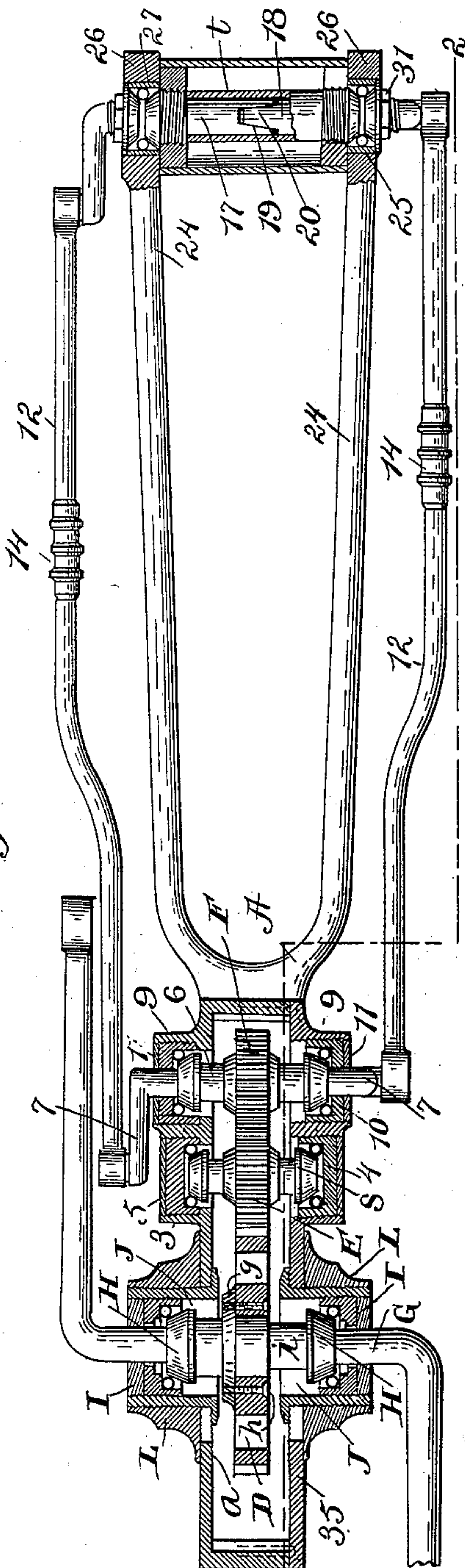


Fig. 3

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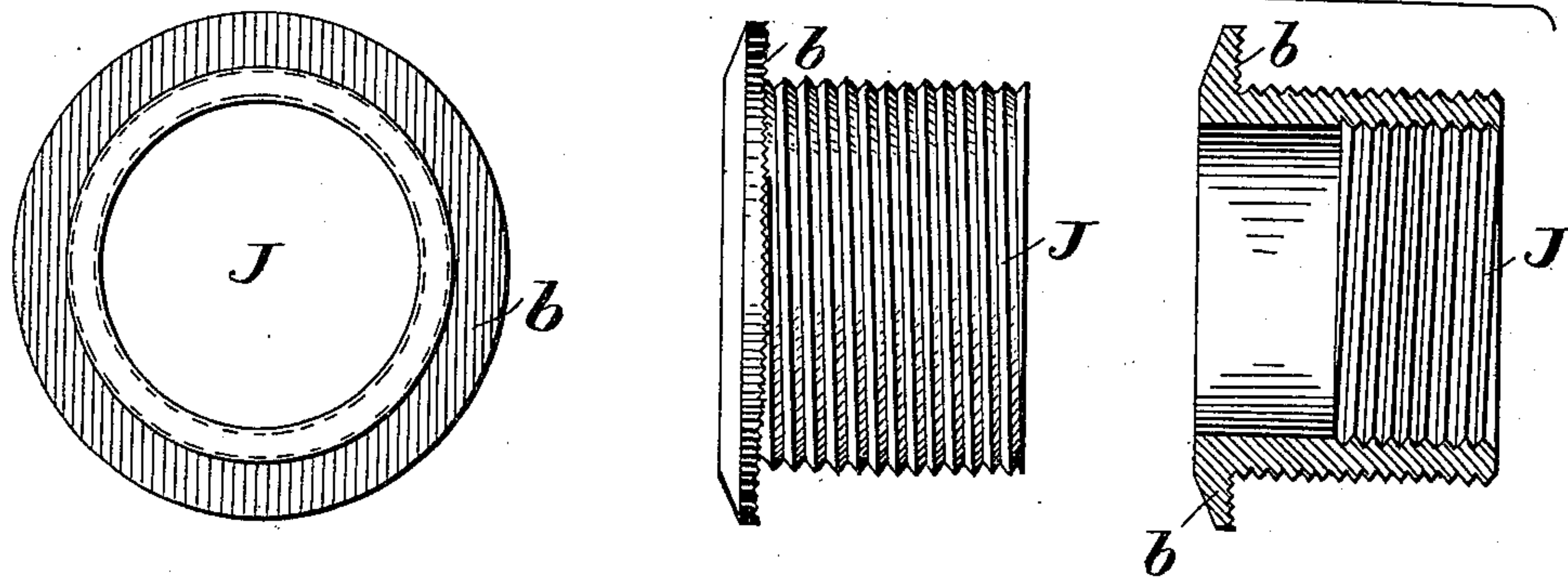
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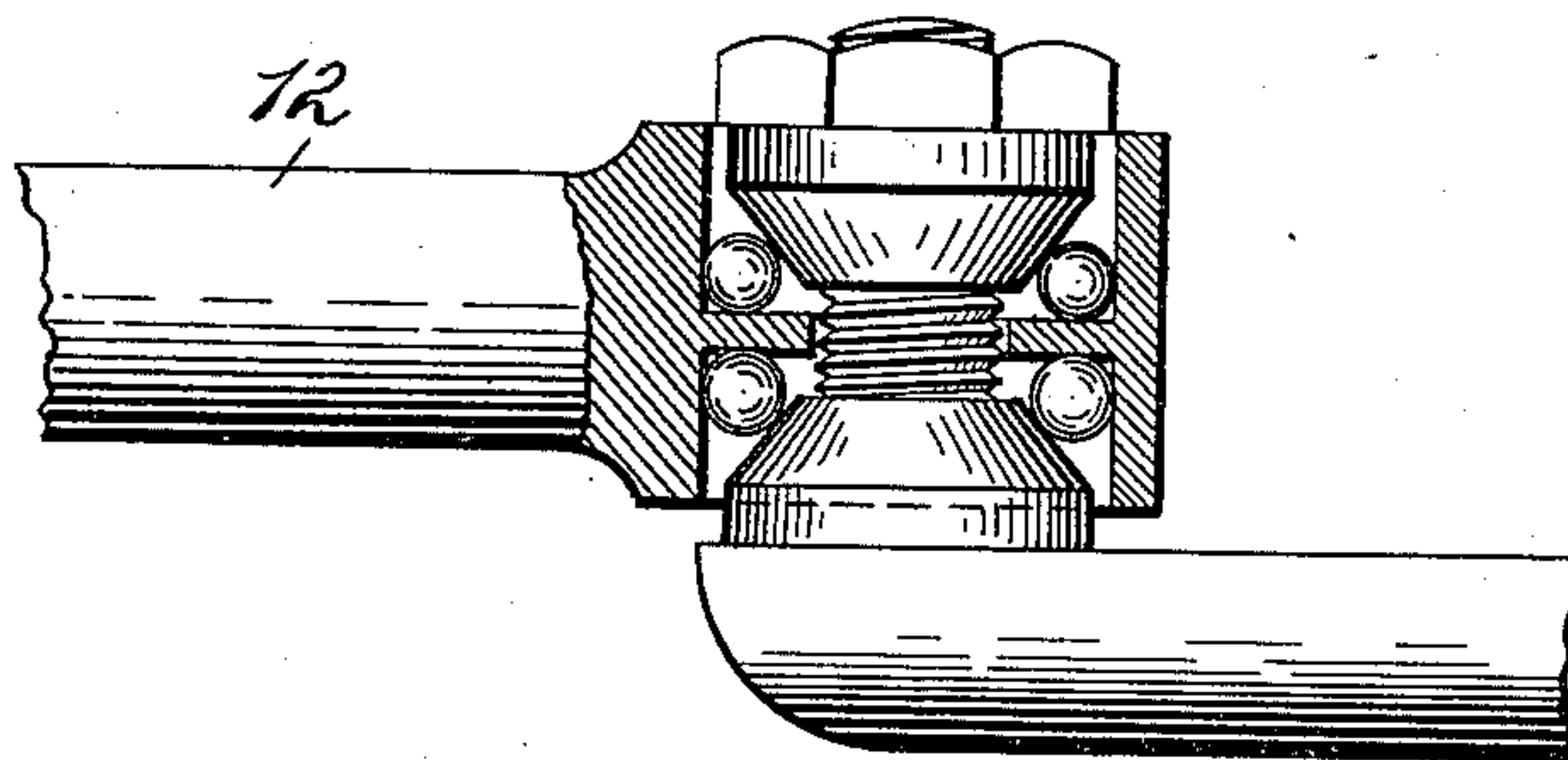
(Application filed Jan. 12, 1899.)

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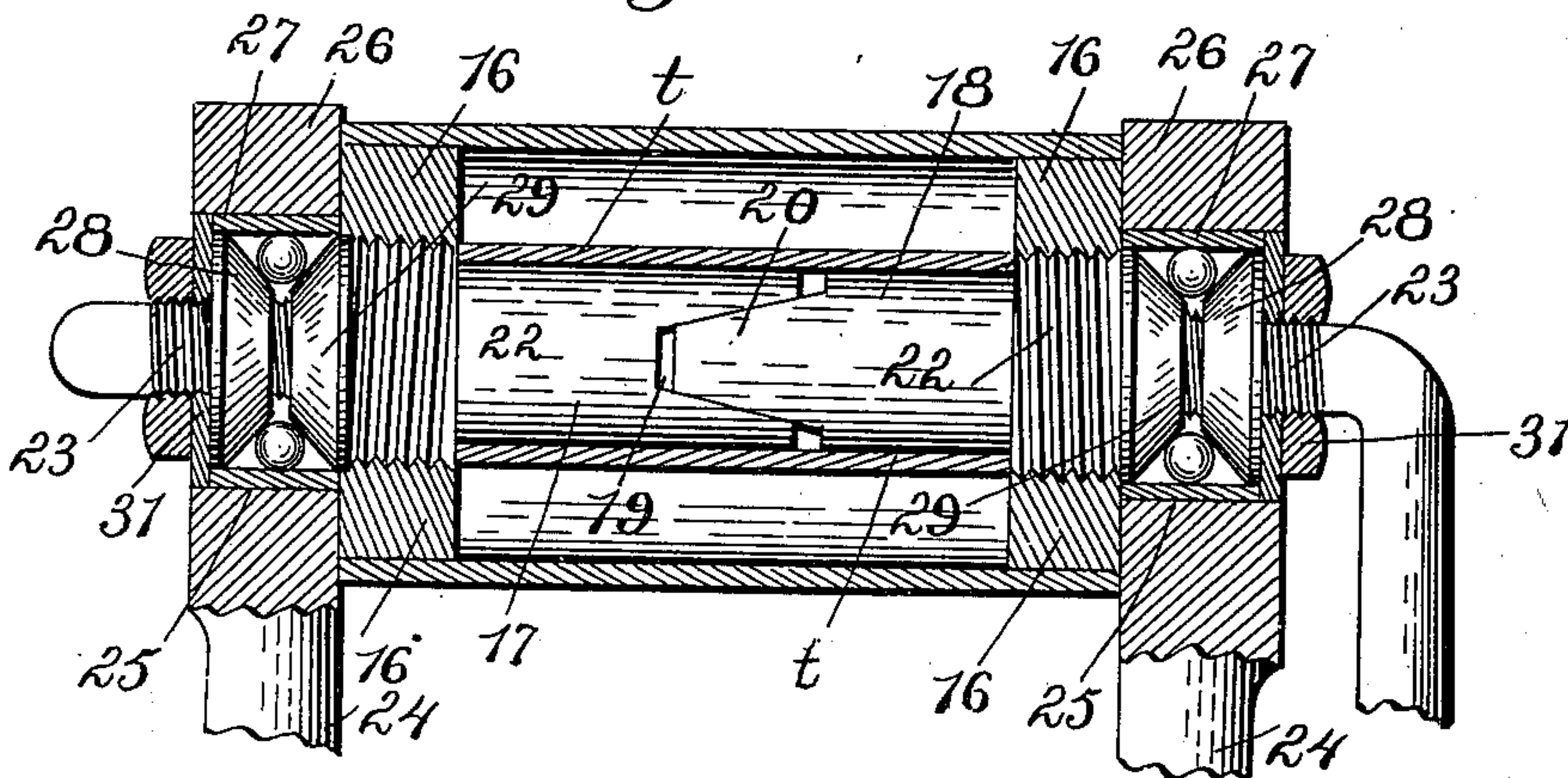
*Fig. 5.*



*Fig. 7.*



*Fig. 8.*



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# UNITED STATES PATENT OFFICE.

WILLIAM H. F. YOUNG, OF MUNCIE, INDIANA.

## BICYCLE.

SPECIFICATION forming part of Letters Patent No. 640,068, dated December 26, 1899.

Application filed January 12, 1899. Serial No. 701,927. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. F. YOUNG, a citizen of the United States, residing at Muncie, in the county of Delaware and State of Indiana, have invented new and useful Improvements in Chainless Bicycles, of which the following is a specification.

My invention relates to improvements in chainless bicycles, and pertains to a bicycle-gearing situated in a casing and crank-arms connected therewith and to the rear wheel through the medium of pitmen, in a manner to be fully described hereinafter, and particularly pointed out in the claims.

One object of my present invention is to provide means for changing the size of the gear by means of an adjustable crank-shaft, to which the crank-shaft gear-wheel is removably connected for that purpose.

A further object of my present invention pertains to the use of a two-part crank-shaft for the hub of the rear wheel and the manner in which the same is held in position therein.

A further object of my present invention is to provide bearings for the crank-shafts which are adjustable toward and from the other gear-wheels in the casing, whereby the said crank-shaft can be adjusted toward and from the gearing in the casing for admitting different-sized gear-wheels for changing the gear of the machine.

The object of my present invention also pertains to the construction and arrangement of parts which will be hereinafter fully described.

In the accompanying drawings, Figure 1 is a side elevation of a bicycle embodying my invention. Fig. 2 is an enlarged vertical sectional view through the gearing-casing, taken on the line 2 2 of Fig. 3. Fig. 3 is a horizontal sectional view taken on the line 3 3 of Fig. 2, the rear hub being also shown in section. Fig. 4 is a side view of one side of the gear-casing with the cone and crank-shaft removed. Fig. 5 is a detached perspective view of one of the crank-shaft cone-rings. Fig. 6 is an enlarged detached view of the rear-wheel crank-shaft. Fig. 7 is a sectional view through one end of one of the pitmen, showing the construction of the bearing for attaching it to the crank-shaft. Fig. 8 is an enlarged longitudinal sectional view through the rear hub,

showing the crank-shaft and its cooperating parts in position therein.

Referring now to the drawings, A are the rear horizontal forks of the machine-frame, which converge at their forward ends and are connected with the rear ends of a gear-casing B in any desired manner. Projecting from the upper side of the gear-casing B is the saddle-post standard C and the front fork C'.

Situated within the gear-casing B is a crank-shaft gear D, an intermediate gear E, and a gear F, carried upon a shaft 6, which is provided with the crank-arms 7.

The crank-shaft G is preferably made of a single piece of metal bent into the proper shape, and upon which are situated and held in any desired and convenient manner the ball-cones H.

I represents the ball-cups cooperating with the cones H and forming a ball-race. These cones I screw into the adjustable bearing-rings J, said rings fitting in oblong openings K and provided at their inner edges with laterally-projecting lips b. The inner side of the casing B, adjacent the oblong openings K, is provided with the teeth or serrations a, with which corresponding teeth upon the adjacent face of the flanges b engage for the purpose of holding the crank-shaft bearings at the desired adjustment in relation to the gear-wheel E in a manner and for a purpose to be hereinafter described.

The crank-shaft G is provided with a flange g, against which the removable and changeable gear D rests and is secured by means of countersunk screws h, passing through the said wheel and into the flange. An enlargement i is formed upon the shaft, and upon which the central opening of the changeable gear D snugly fits, the said enlargement being of a size so that the opening in the changeable gear will be large enough to pass around the angle in the crank-shaft when it is desired to remove the gear D and to place thereon a larger gear. One side of the gear-casing B is held in position by means of the screws j, whereby it is readily removable to permit the changing of the gear D, which will be presently described. The bearing-cup rings J for the crank-shaft G project considerably beyond the outer face of the casing B, as illus-



trated, and are provided with an external screw-thread to receive the clamping-rings L. These clamping-rings are of a diameter sufficient to cover the oblong openings K of the casing B when the rings J are adjusted to their maximum extent within said openings, whereby the openings are never in view.

Each side of the casing B, in addition to having the oblong openings K, is provided with outwardly-projecting integral cups or cavities 3 and 9. These cups, cavities, or rings 3 and 9 are internally screw-threaded, and the rings 3 receive the ball-cups 4, and screwing in the extremities of these rings 3 and outside of the cups 4 are the locking-plates 5 for holding the ball-cups 4 in position therein against removal. The intermediate wheel E is suitably secured upon a shaft 2, preferably by the well-known sweating process, and placed upon the ends of the shaft 2 are the cones s. An adjustable bearing, therefore, for the ends of the shaft 2 is provided.

The wheel F upon the pitman crank-shaft 6 is secured in the same manner, preferably, as the wheel E, and this shaft is provided with enlargements upon which the cones H are snugly placed and held against rotation. The rings 9 receive the ball-cups 10, similar to the ones 4 of the rings 3, and also locking-plates 11, which are provided with openings for the passage of the shaft 6. The object of having enlargements for the cones H is to have openings in the cones sufficiently large to permit them to pass over the angle in the shaft, as will be readily understood.

From the drawings and the above description it will be noted that the gearings D, E, and F are in a direct horizontal line, by means of which direct power is attained, which is an advantage over an indirect power.

The hub of the rear wheel is provided with end pieces 16, having screw-threaded openings, which receive the screw-threaded portions 22 of the two parts 17 and 18 of the rear crank-shaft. These threaded portions are respectively right and left hand threads, for a purpose to be presently explained. The portion 17 of this rear crank-shaft is provided with the tapered opening 19, and the portion 18 with a tapered projection adapted to enter it. A sleeve t receives the ends of this two-part shaft and is situated between the threaded portions 22 thereof. In applying the back shaft to the hub the sleeve is inserted therein and the ends of the crank then started in the sleeve. The screw-threads 22 are then slightly started in position in the hub, and by holding the cranks of the shaft and turning the rear wheel forward the two parts of the shaft will be forced endwise in the sleeve and the projection 20 firmly seated in the tapered opening 19, so that the shaft is then made, for practical purposes, a rigid shaft. The two parts of the shaft are provided with a screw-threaded portion 23 just outside of the screw-threaded portion 22 and of a size preferably smaller in diameter. Situated upon the screw-threaded

portion 23 are the ball-cones 28 and 29, as clearly illustrated, and outside of the outer cone 28 is situated a locking-nut 31.

At the junction of the horizontal forks A and the rear forks 24 is a socket 25, in which the ball-cups 27 are placed. These ball-cups are removably held in position in the socket by having the rear side 26 of the socket removable and held in position by screws or other suitable means. In this way the rear wheel, with all of its bearings, may be readily removed from the socket 25 and as readily placed therein. In the operation the crank, with its bearings, which include the cups 27, are secured within the rear hub and properly adjusted and then the rear wheel placed in position in the socket 25.

The crank-arms 7 of the gear crank-shaft 6 and the crank-arms of the crank-shaft of the rear wheel are united by means of the pitmen 12, and these pitmen are preferably made in two parts and united by the turnbuckles 14, whereby they can be nicely and properly adjusted.

When it is desired to change the gear, the removable side of the casing is removed; but first the pedal of that side attached to the crank-shaft is removed and the ball-cups I removed, then the ball-cups 10 removed from the removable side of the casing, and the pitman 12 at the same side detached from the crank-arms 7, when the side of the casing can be readily removed. The cones H at the adjacent end of the crank-shaft and the wheel D are then removed and a wheel of a different size placed therein. The adjustable bearing-rings J are then properly adjusted to have the new gear-wheel properly mesh with the gear E and then clamped in position by the clamping-ring L and the cones again replaced in position. The replacing of the cup-supporting rings and the cups and cones is the reverse to that described for detaching them.

While I have described that the entire one side of the casing B is removed when it is desired to change the gear D, it will be readily understood that this removable side of the casing could be divided on the dotted line f, Fig. 4, between the bearings for the crank-shaft and the intermediate gear, and in which event it would be necessary only to remove the bearings for the crank-shaft and that portion of the casing in front of the bearing for the intermediate shaft, without departing from the spirit and scope of my invention.

While I have shown and described the bearings for the crank-shaft as removable and adjustable in an oblong opening, this may be varied by having the cup-ring rigid with the sides of the gear-casing, similar to the cup-rings of the bearings for the wheels E and F, without departing from that part of my invention which involves the providing of the sides of the gear-case with laterally-projecting bearing-recesses for the shaft.

The bearing-cups for the ends of the shafts of the wheels E and F at the right hand of the



casing are made rigid or fast, so that the bearings are adjustable from one side only, which I consider an advantage in that it will prevent a zigzag adjustment of these wheels, which might otherwise occur should the ball-cups be at both sides adjustable.

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

1. A chainless bicycle comprising a gear-casing having a horizontally-elongated opening, a crank-shaft passing through said opening, a removable gear carried thereby, bearing-rings situated within said elongated opening and adjustable therein, and a clamping-ring situated upon the projecting end of the bearing-ring and having a flange which is larger in diameter than the length of the said slot, whereby the crank-shaft may be adjusted back and forth and held in its adjusted position for changing the size of the gear thereon and the said opening at all times covered by the flange of the clamping member, substantially as described.

2. A bicycle having a driving-wheel provided with a hub, said hub having its ends internally screw-threaded, a two-part crank-shaft passing through the hub and having its ends provided with abutting shoulders, a sleeve separated from and independent of the hub and of a length to fit between the screw-threaded portions of the hub, the parts of the crank-shaft provided with externally-screw-threaded portions at the ends of the sleeve and engaging the screw-threaded portions of the hub, substantially as described.

3. A drive-wheel for bicycles having a hub provided at its ends with inwardly-extending projections 16 having internally-screw-thread-

ed central openings, a two-part crank-shaft having enlarged inner ends with abutting shoulders, the said enlarged ends having screw-threaded portions 22 for engaging the screw-threaded openings of the projections 16, the crank-shaft being reduced in size at a point outside of the screw-threads 23, the reduced portion screw-threaded and bearing-cones screwed upon said reduced portions, the inner cone locking against the outer end of the enlarged portion of the crank-shaft, and a sleeve surrounding the enlarged inner ends of the crank-shaft, substantially as described.

4. A chainless bicycle comprising a gear-casing, a train of gear within the casing including a crank-shaft carrying a gear, opposite sides of the casing provided with correspondingly horizontally elongated openings, independent bearing-rings for opposite ends of the crank-shaft, said bearing-rings having at their inner ends laterally-projecting flanges adapted to engage respectively the inner sides of the casing, said bearing-rings projecting beyond the outer side of the casing and externally screw-threaded, and internally-screw-threaded clamping-rings surrounding the said bearing-rings and adapted to engage the outer sides of the casing, whereby the bearing-rings for opposite ends of the shaft are independently horizontally adjustable, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM H. F. YOUNG.

Witnesses:

LUCIAN A. JOHNSON,  
WILLIAM M. JACKSON.