

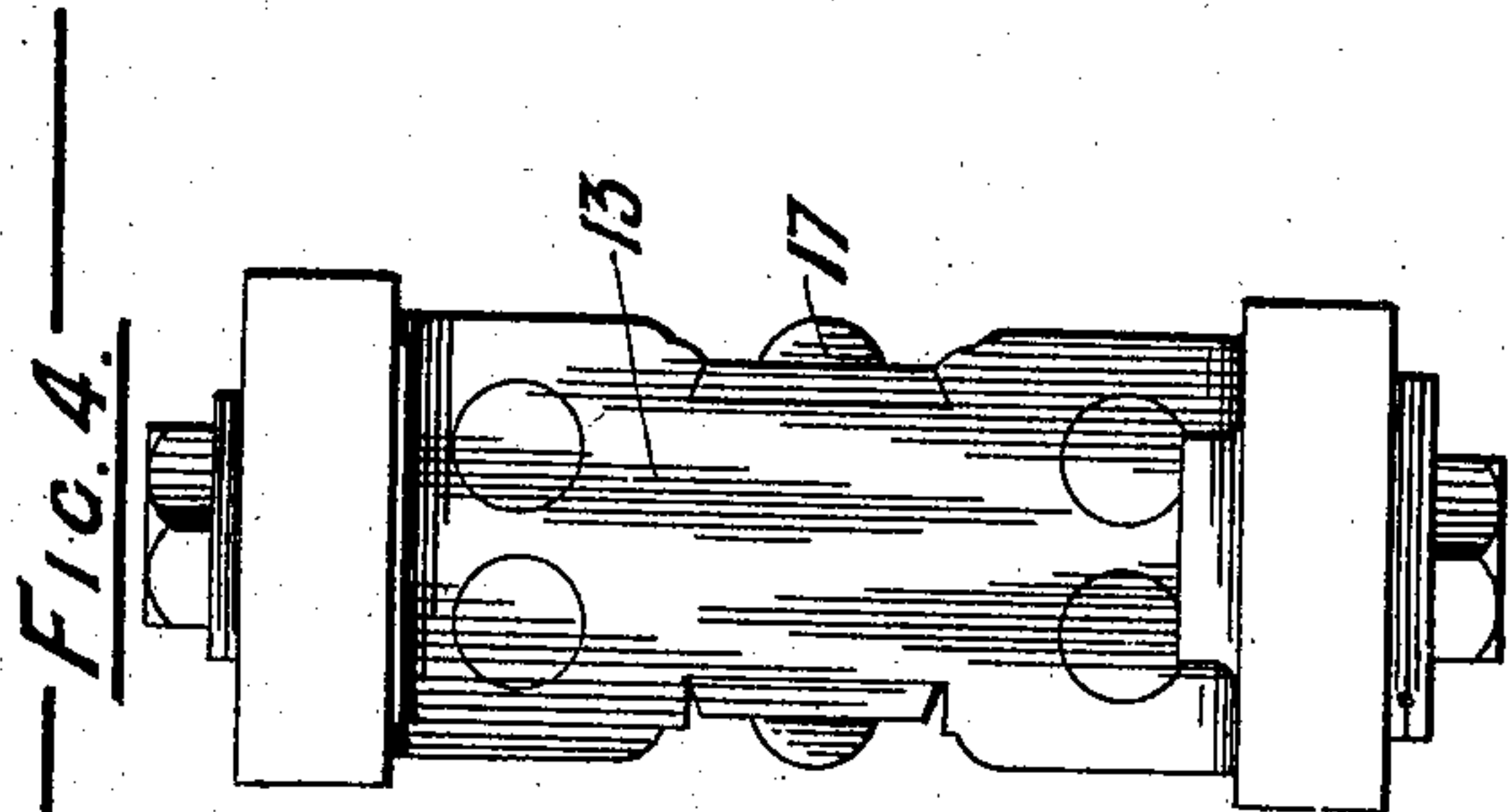
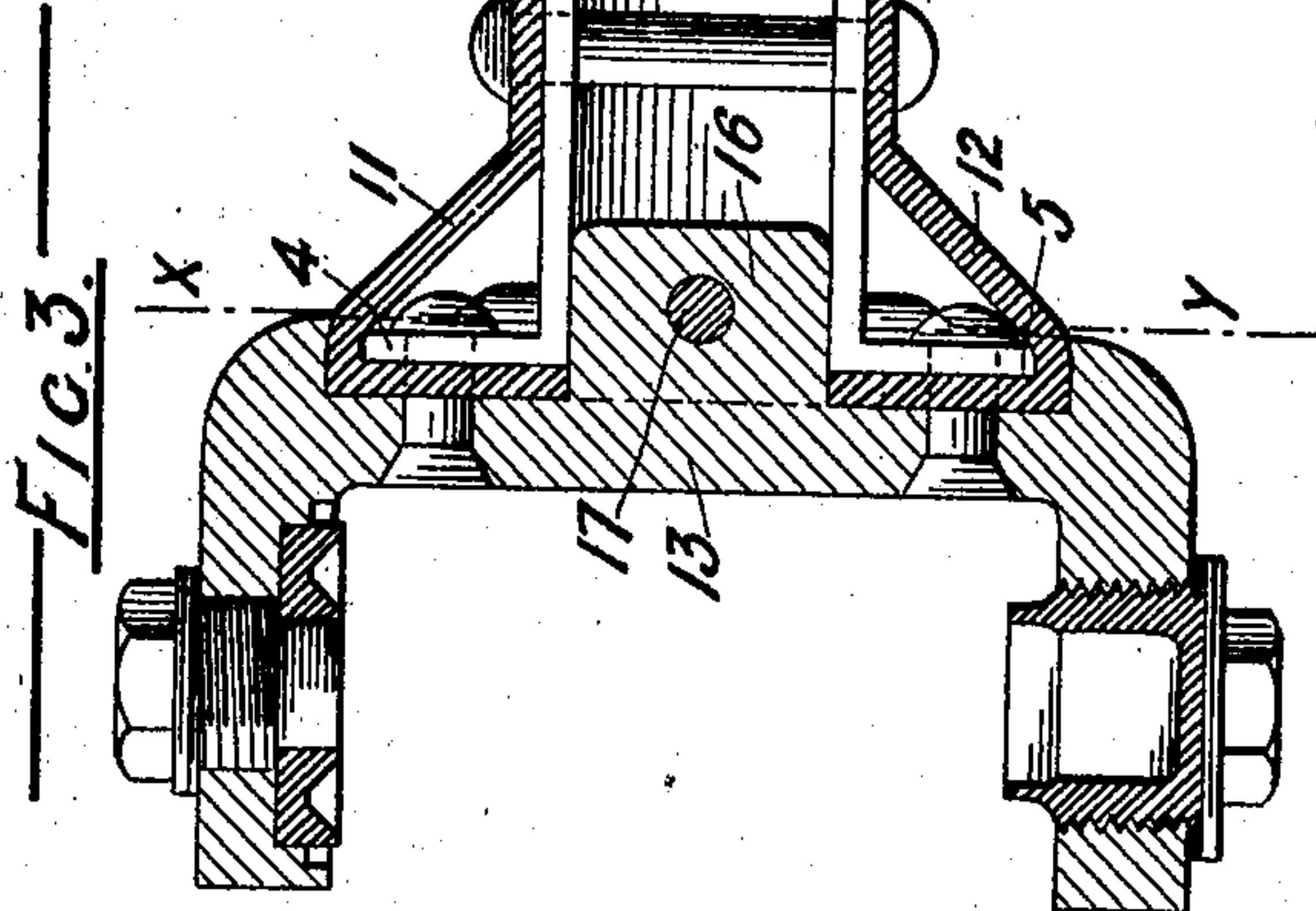
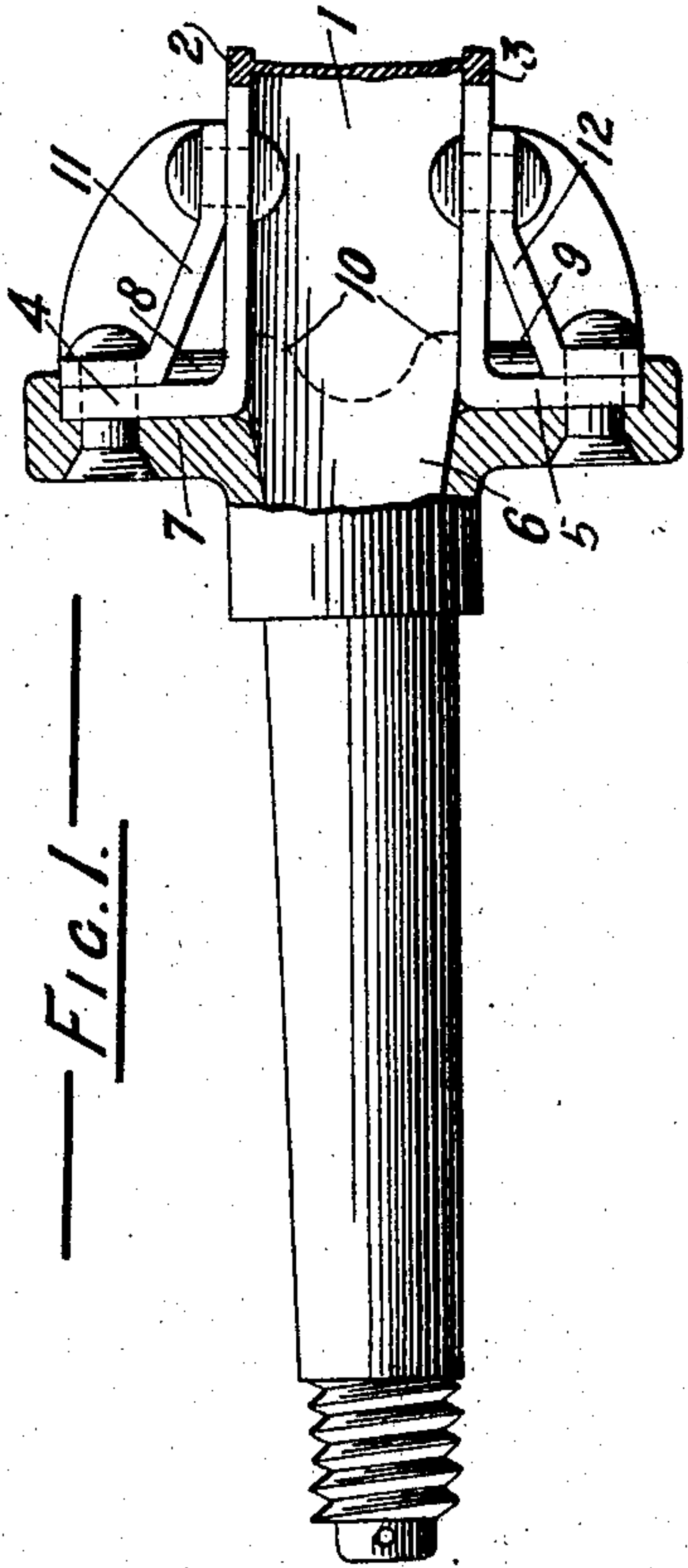
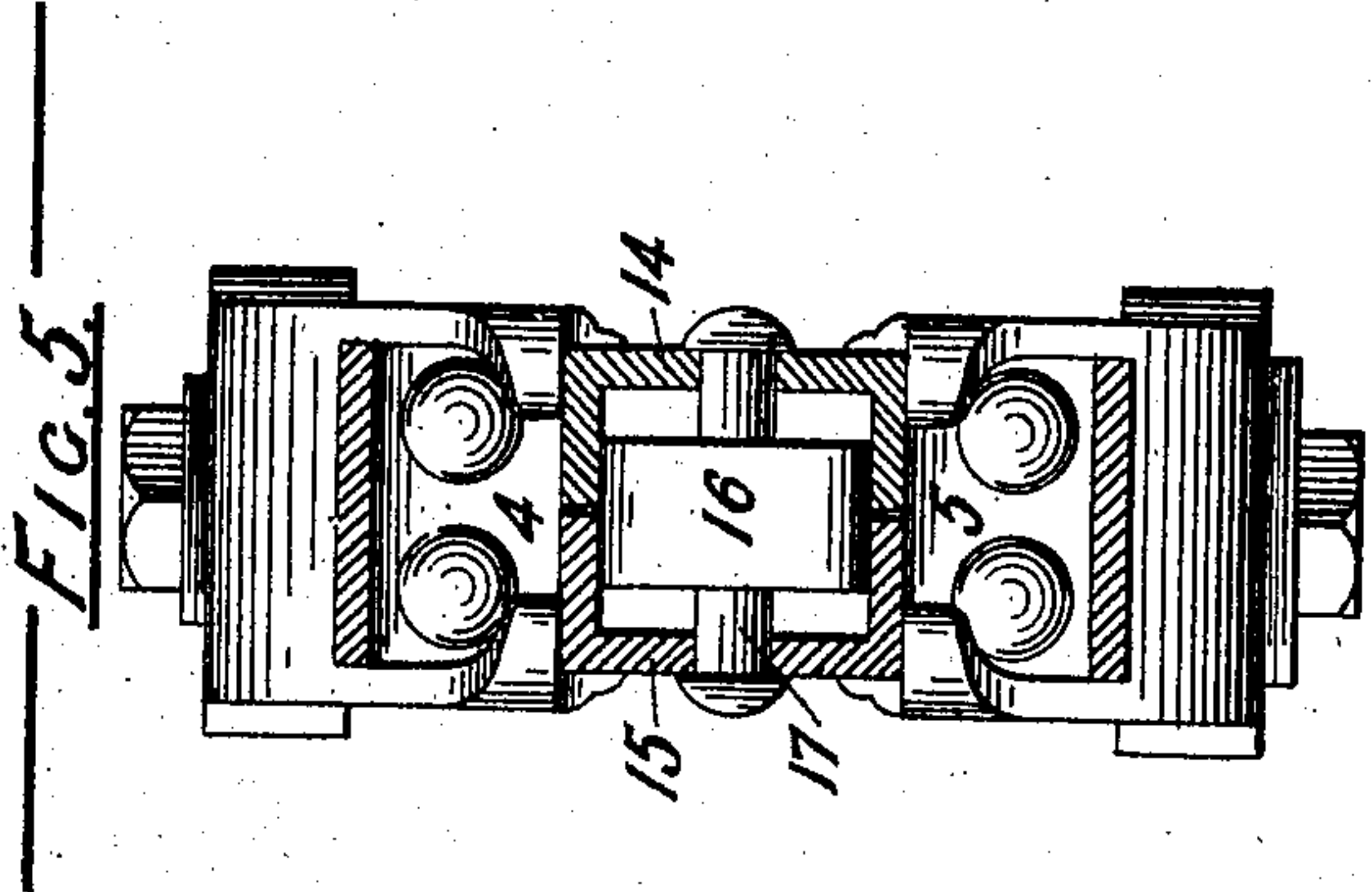
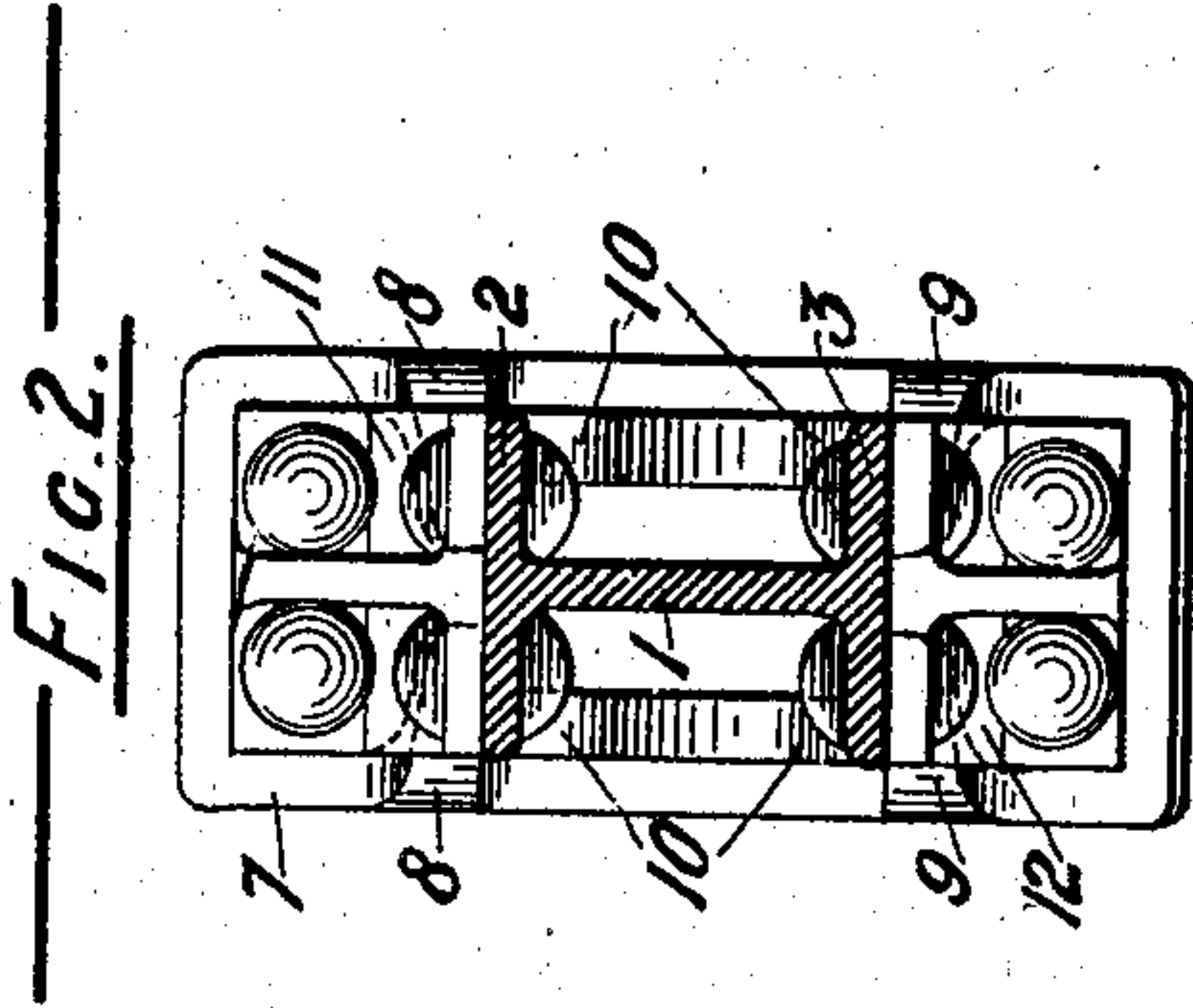
No. 815,678.

PATENTED MAR. 20, 1906.

H. M. BUTLER.
METALLIC AXLE.

APPLICATION FILED JUNE 29, 1905.

2 SHEETS—SHEET 1.



Witnesses
Chas. A. Smith
Leopold Kern.

Inventor
Hugh M. Butler.
per Harold Terrell
att'y.

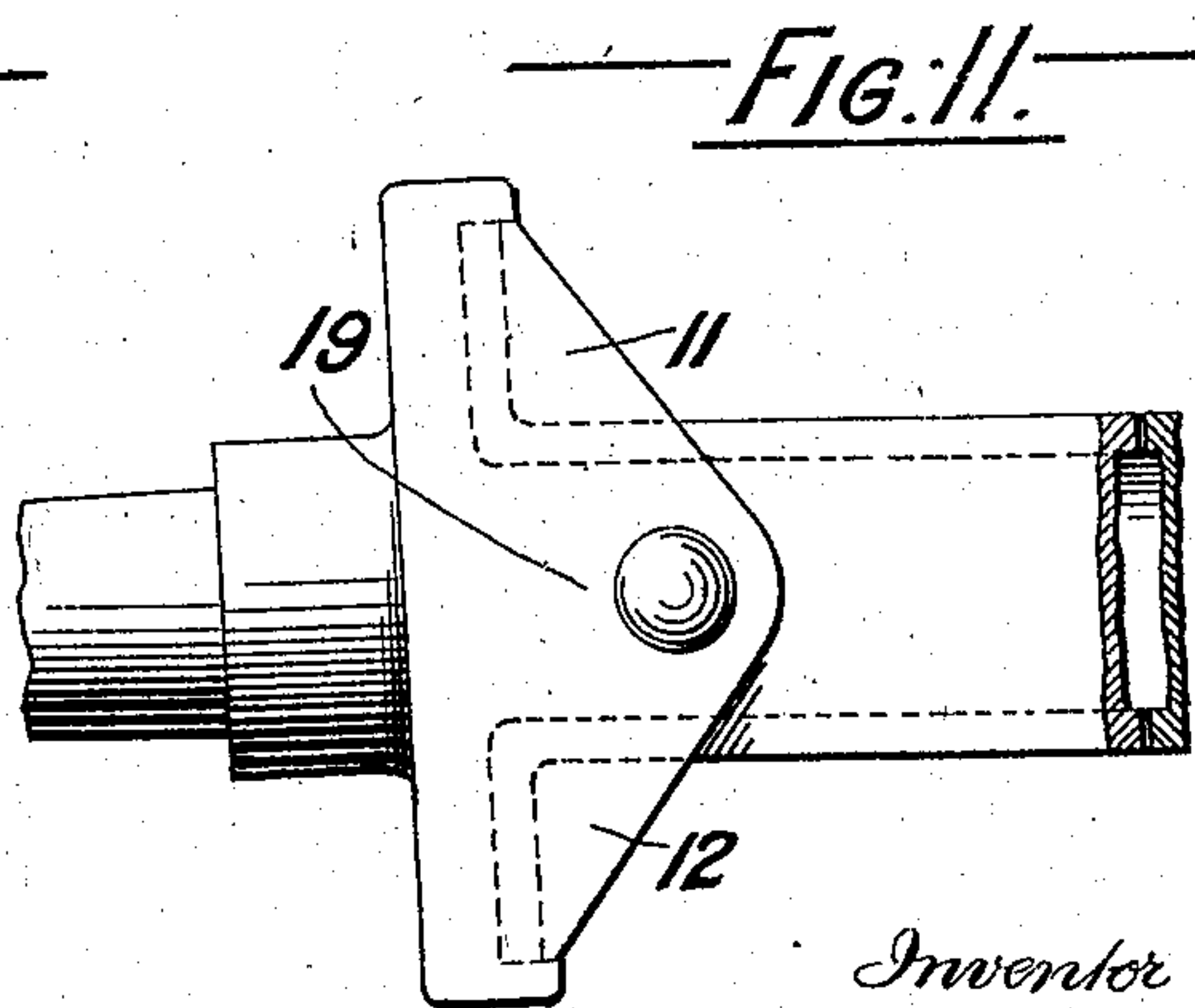
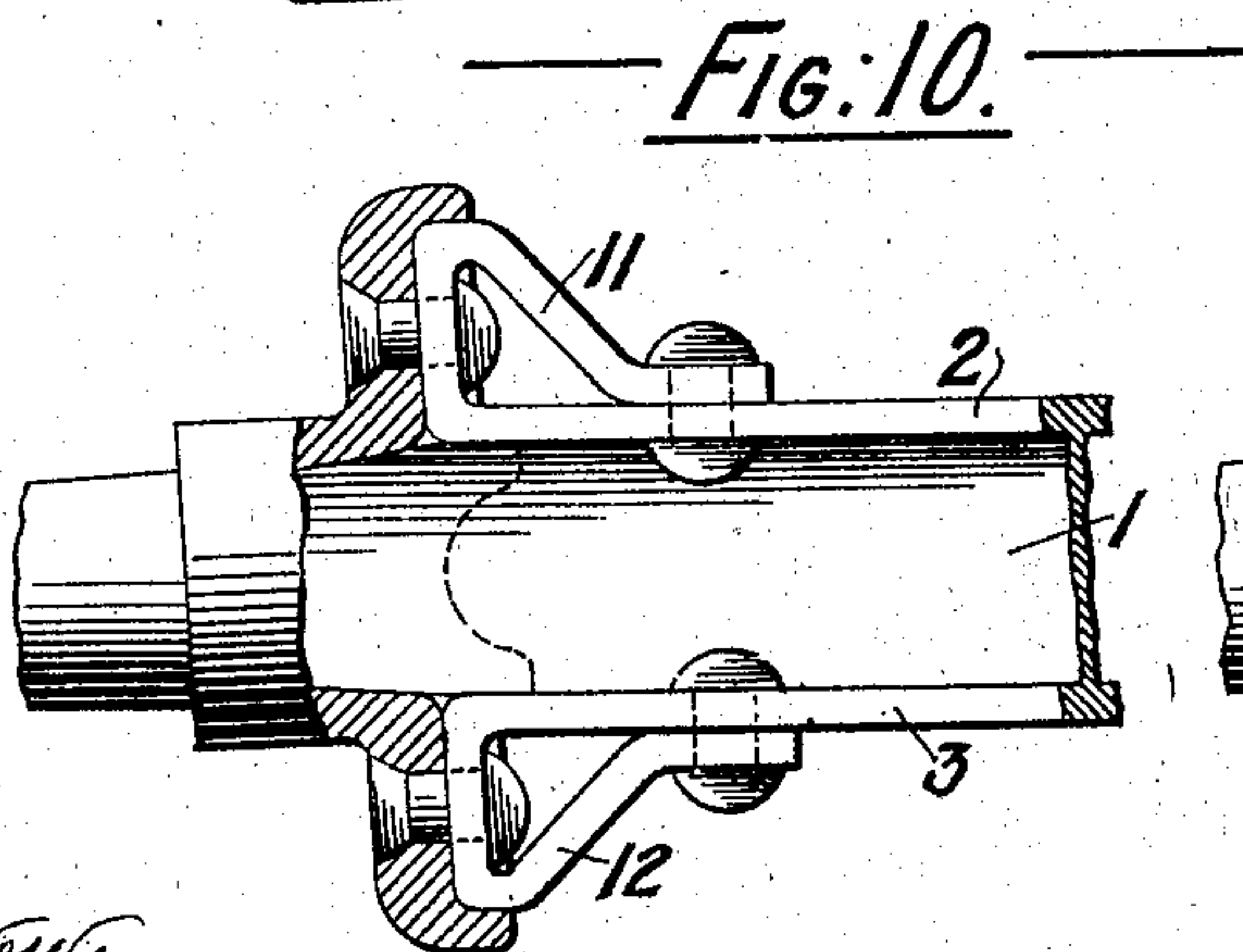
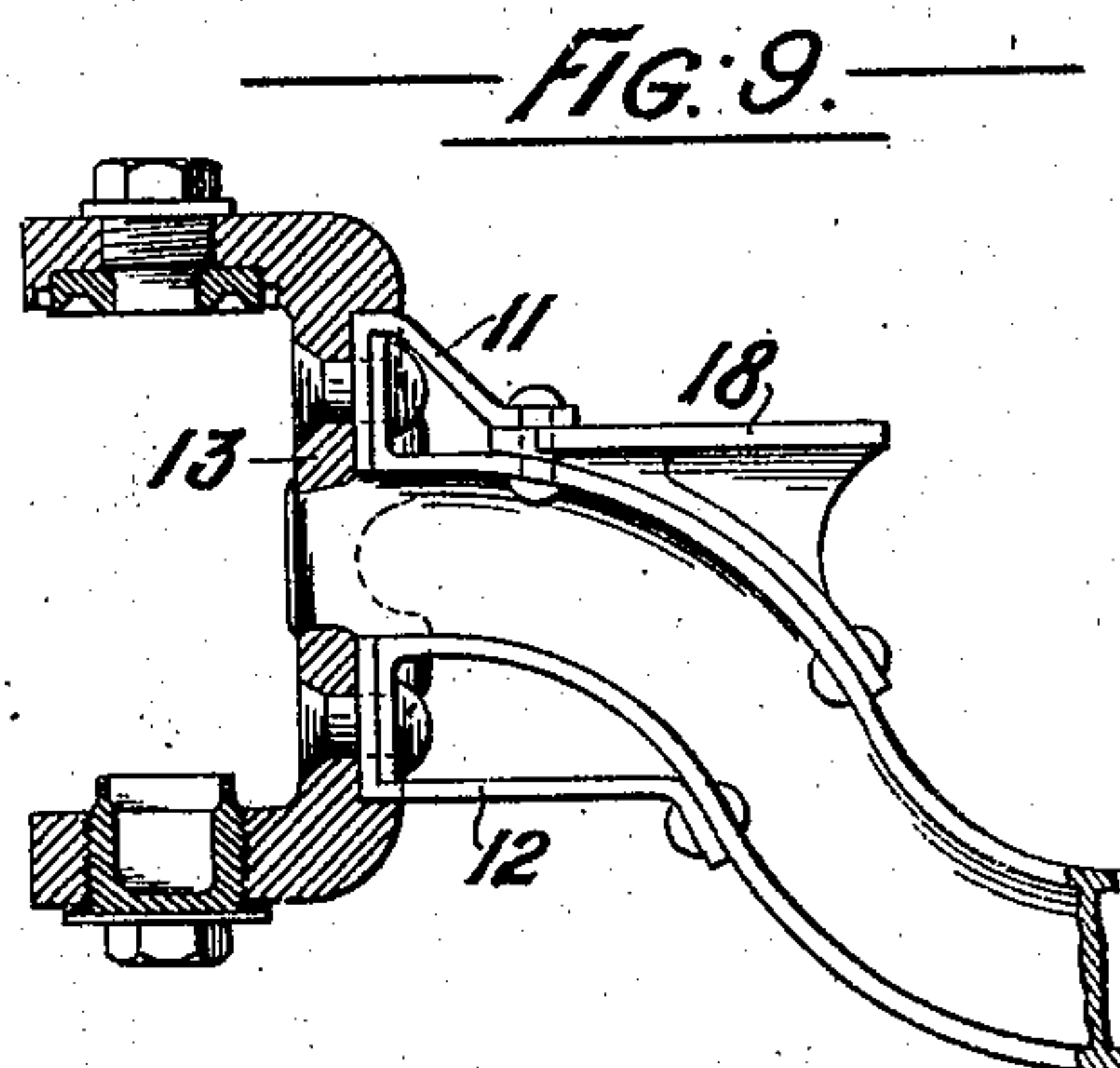
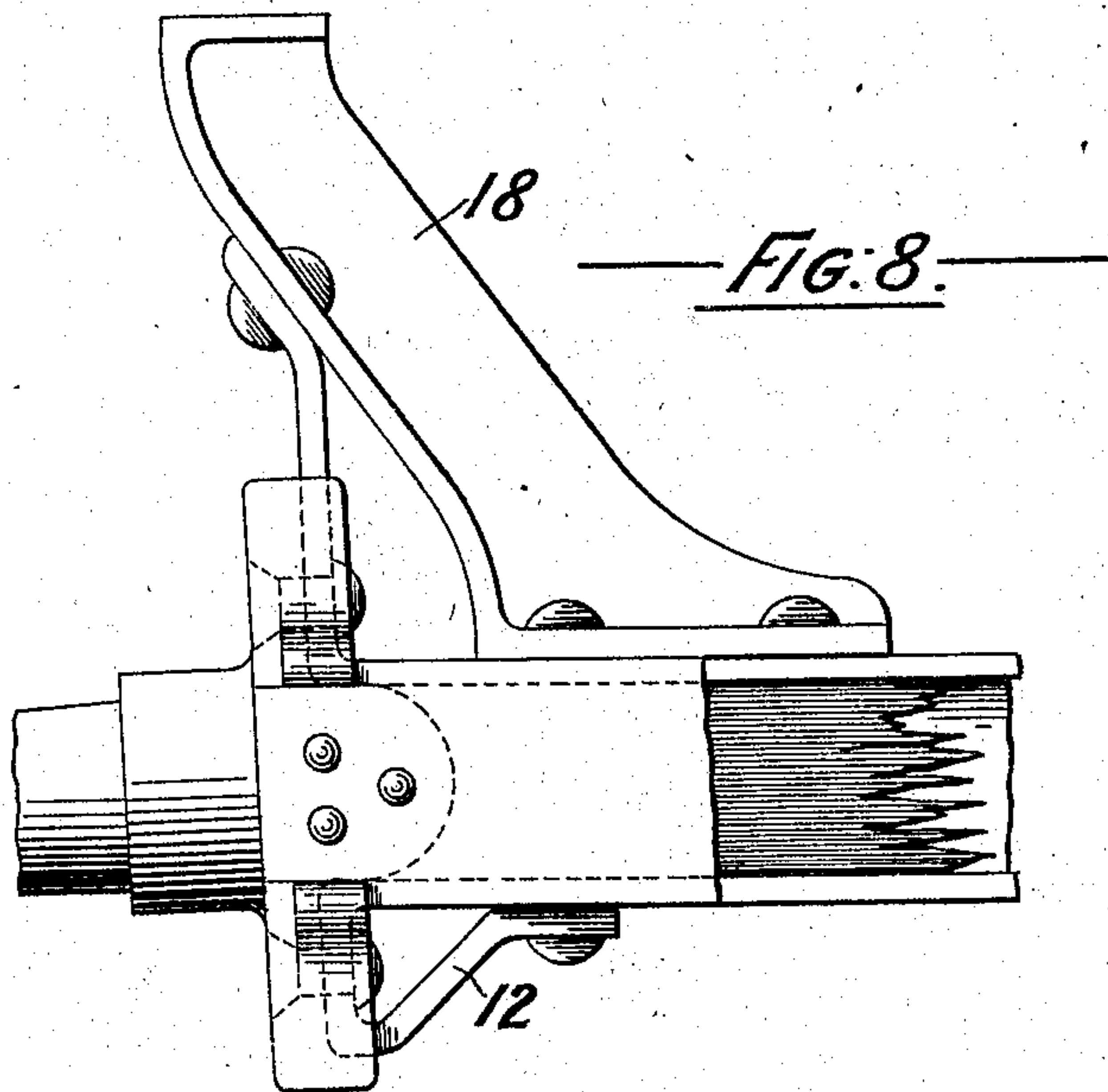
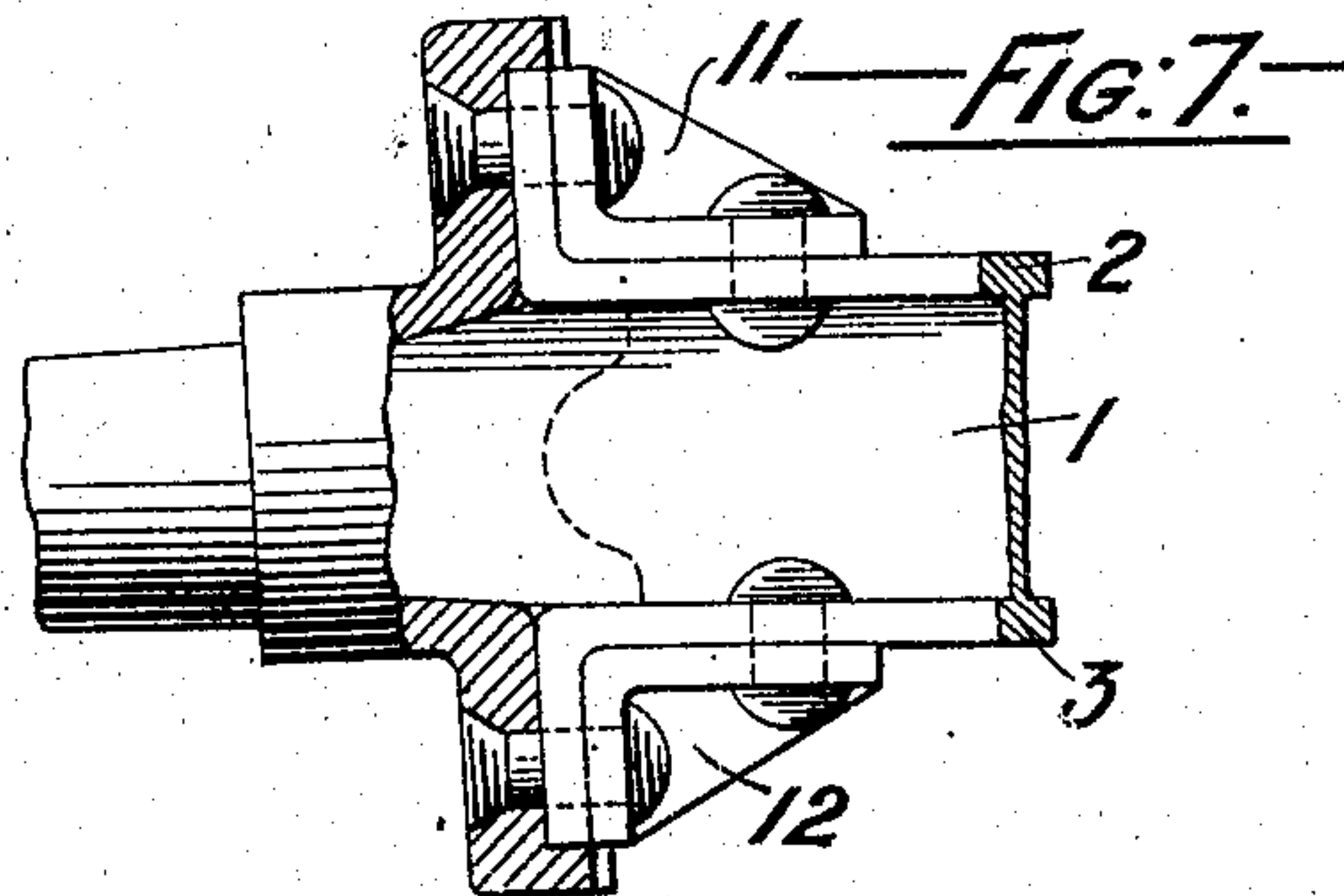
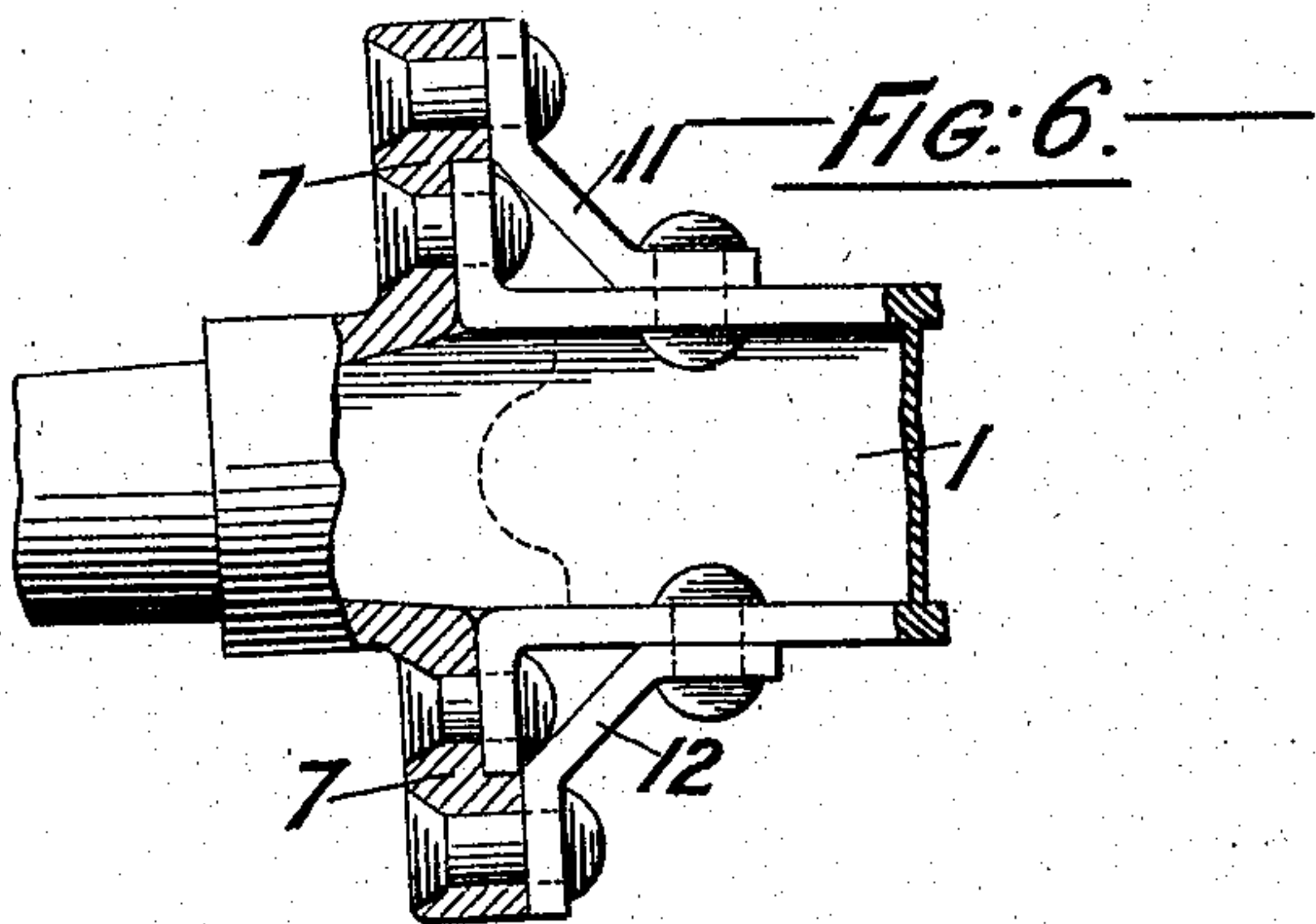
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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

HUGH MYDDLETON BUTLER, OF KIRKSTALL FORGE, NEAR LEEDS,
ENGLAND.

METALLIC AXLE.

No. 815,678.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed June 29, 1905. Serial No. 267,533.

To all whom it may concern:

Be it known that I, HUGH MYDDLETON BUTLER, a subject of the King of Great Britain, residing at Kirkstall Forge, near Leeds, in the county of York, England, have invented certain new and useful Improvements in Metallic Axles for the Wheels of Road-Vehicles, of which the following is a specification.

This invention refers to what I term "built-up" metallic axles for the wheels of road-vehicles, an example of which is described in the specification of a United States Patent granted to myself and numbered 784,383, of March 7, 1905. Such an example broadly consists of a rolled-metal girder-section bed extending between the wheel-carrying members, the latter being fixed to the ends of such a bed; and the object of my present invention is to reinforce the joints made between the ends of the bed and the wheel-carrying members. The wheel-carrying members, which are fixed at the ends of the bed, consist in an ordinary axle for road-vehicles, of barrels upon which the wheels revolve; but in steering-axles for motor-driven vehicles the usual wheel-carrying members are composed of forks, one fixed to each end of the axle-bed, and within these forks the barrels are pivoted, the forks forming the members of the axle-bed, which thus carry the wheels.

My invention, as aforesaid, equally refers to reinforcing the joints between the wheel-carrying members and the bed, whether those members consist of forks for steering-axles or barrels for fixed axles, and also my invention is equally applicable either where the bed of the axle is constructed of H-section rolled steel or of a pair of parallel channel-section girders arranged, for example, channel to channel, so as together to constitute a box-like section, and I form the wheel-carrying members so that they extend upward and downward above and below the upper and lower flanges of the said bed. In the practical construction of such axles I generally attach the wheel-carrying members by turning upward and downward the ends of the flanges and attaching them to flanges which are formed on the barrels and which extend upward and downward or by attaching the flanges of the bed to the backs of the forks or to upward or downward extensions of the backs of the forks. With the end in view,

therefore, as aforesaid, of reinforcing the joints between the ends of the bed and the wheel-carrying members which are fixed thereto I provide according to this invention stays, or as I broadly term them "diagonals," consisting of steel or other metal bars, rods, or straps extending downward and upward in diagonal or inclined directions from those parts of a wheel-carrying member which project above and below the bed-flanges to the top of the girder-bed. Each of these diagonal stays has one end or part fixed or connected to the wheel-carrying member and its other end fixed or connected to the girder-bed flange or flanges, and such diagonal stays, as I have found by the numerous experiments I have made, constitute a very considerable and advantageous addition to the strength of the structure composing such a built-up axle.

I will now refer to some examples of construction illustrated in the accompanying drawings, whereon—

Figure 1 is a sectional elevation, and Fig. 2 a sectional right-hand end view, of a wheel-carrying member consisting of a barrel attached to a girder-bed of H-section and illustrating one design of diagonal stay. Fig. 3 is a sectional elevation, Fig. 4 is a left-hand end elevation, and Fig. 5 is a right-hand transverse section taken on the line X Y of Fig. 3, showing another design of diagonal bracing applied to a wheel-carrying member, in this instance consisting of a steering-fork attached to a bed composed of channel-section beams. Figs. 6 and 7 are sectional side elevations showing two designs or alternative constructions of diagonal stay. Fig. 8 is a sectional elevation showing a construction of diagonal stay applied to a built-up axle where the bed is composed of channel-section beams. Fig. 9 shows an application of the diagonal stays to a bent or cranked H-section bed; and Figs. 10 and 11 show, respectively, a sectional elevation and an elevation illustrating two further alternative forms of diagonal stays.

Referring to Figs. 1 and 2, the bed consists of a girder of H-section having its web 1 vertical and its flanges 2 3 horizontal, the ends 4 5 of the flanges being divided from the web, the upper flange 4 bent upward and the lower flange 5 downward. Each barrel—one for attachment to each end of the bed—has an

axial recess to receive the projecting web end 6 of the bed, and the upper and lower portions of the flange 7, which is formed on the inner end of the barrel, present a surface to which the bent ends 4 5 of the bed-flanges are secured. The said bed-flanges 4 5 preferably and in the construction shown enter recesses in the barrel-flange 7, and inwardly-projecting ears 8 9 are formed on the barrel-flange, which are bent laterally over the bed-flanges, while horns 10 are formed on the inner face of the barrel-flange which projects beneath the upper and above the lower flanges of the bed. To such a construction of metallic axle (which in itself does not form the subject of the present invention) the diagonal stays are shown applied, and in this example these stays 11 12 are shown of T-section, the ends abutting on the upwardly and downwardly turned flanges 4 5 of the bed and secured by those rivets by which the flanges of the bed are fixed, while the other ends of the diagonal stays 11 12 extend to the upper and lower faces of the flanges of the bed, to which they are riveted or otherwise secured, and thus a diagonal bracing is provided, which I have found to very greatly add to the strength and stability of built-up axles of this type.

Instead of diagonal stays 11 12 fitting onto the outer face of the flanges 4 5 they may be constructed as shown at Figs. 3 to 5, where the said stays 11 12 are bent so that their ends enter between the flange of the barrel or in the case illustrated between the back of the fork 13 and the said flanges 4 5 of the bed, while the other ends of the stays are riveted to the flanges of the bed.

The axle shown at Figs. 3 to 5 is composed of a bed of channel-section beams 14 15, arranged channel to channel, the flanges at the ends of the beams being turned upward and downward and fixed to the wheel-carrying member—in this instance the fork 13—similarly to the arrangement at Figs. 1 and 2; but the webs of the girders 14 15 extend on each side of the fork or of the barrel-flange when such is fitted and fit in recesses therein, while a lateral projection 16 on the wheel-carrying member enters within the hollow of the axle-bed, which latter is secured thereto by a rivet or bolt 17.

At Fig. 6 is shown a modification of the design of the diagonal stays according to my invention, where the flange 7 of the barrel or of the wheel-carrying member which is attached to the bed is extended sufficiently to receive the ends of the diagonal stays 11 12 without the latter overlying the flanges of the barrel.

At Fig. 7 the diagonal stays 11 12 are shown as fitting up against the surface of the bed and against the surface of the wheel-carrying member instead of stretching from point to

point, and in such construction the said stays form, as it were, corner-pieces.

At Fig. 8 the lower diagonal 12 is shown as formed by bending the continuations of the lower flanges of the bed backward and upward and uniting their ends beneath and to the under surface of the said bed, the bed in the example shown consisting of parallel channel-section beams placed channel to channel, although it will be understood that this mode of forming the diagonal stays is equally applicable to H-section beds.

A similar construction of diagonal stay may be employed upon the upper side of the bed; but in the example illustrated a bracket 18 is fixed on the upper surface of the bed for the attachment of the springs of the vehicle where the seating for the same upon the axle is required at a higher level than the bed thereof, and in this case the diagonal stay is formed by an extension of the bent-up flanges at the ends of the bed being united to such brackets, so that the bracket 18 and said bent-up flanges together form a diagonal stay.

At Fig. 9 is illustrated a bent bed of H-section having a wheel-carrying member consisting of a fork 13 and showing variations in the form of the diagonal stays 11 12, in which the bracket 18 carries the spring and receives the end of the upper diagonal stay 11, but does not actually form a part thereof.

Fig. 10 shows an H-section axle-bed carrying a flanged barrel and in which the diagonal stays 11 12 are formed by bending extensions of the upper and lower flanges 2 3 of the bed and uniting the ends of such extensions to the upper and lower surfaces of the bed.

At Fig. 11, which shows a double channel-section bed, the diagonal stays 11 12 are formed by wings 19, extending from each side of the wheel-carrying members so as to embrace the sides of the girders, and a rivet or rivets may be employed to connect the inner ends of the wings 19 to the girder proper, and these diagonal supports are formed in a piece with the barrel itself.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an axle for the wheels of road-vehicles; the combination with a rolled-metal girder-bed having its flanges horizontal, and a wheel-carrying member fixed to each end of said bed, the inner end parts of said members adjacent to the bed ends extending upward and downward above and below the upper and lower flanges of said bed; of stays connecting the said extending parts of the wheel-carrying members to the rolled-metal girder-bed, substantially as set forth.

2. In an axle for the wheels of road-vehicles; the combination with a rolled-metal girder-bed having its flanges horizontal, two wheel-carrying members each having an in-

ner face for attachment to the end of the girder-bed of greater height than the height of the said girder-bed, and means for fixing the ends of the girder-bed at about right angles to the inner faces of the wheel-carrying members so that the inner faces of the latter extend above and below the flanges of the bed; of stays fixed to the upwardly and downwardly projecting inner faces of each wheel-carrying member extending inwardly and being fixed to the girder-bed at a distance from the ends thereof, substantially as set forth.

3. In an axle for the wheels of road-vehicles; the combination of a rolled-metal girder-bed having its flanges horizontal, the ends of the upper and lower flanges at each end of the bed being bent respectively upward and downward, two similar wheel-carrying members one for attachment to each end of the bed, each of said wheel-carrying members having an inner face of greater height than the height of the girder-bed to receive the bent end flanges of said bed, means for fixing the bent end flanges of the bed to the inner faces of the wheel-carrying members, and stays fixed to the upwardly and downwardly projecting parts of each wheel-carrying member, extending inwardly, and being fixed to

the girder-bed at a distance from the ends thereof, substantially as set forth. 30

4. In an axle for the wheels of road-vehicles; the combination of a rolled-metal girder-bed having its flanges horizontal, the ends of the upper and lower flanges at each end of the bed being divided from the web and bent respectively upward and downward, two similar wheel-carrying members one for attachment to each end of the bed, each of the said wheel-carrying members having an inner face of greater height than the height of the girder-bed in order to receive the bent end flanges of said bed, and recesses to receive the projecting ends of the web, means for fixing the bent end flanges of the bed to the inner faces of the wheel-carrying members, and stays extending inwardly from the upwardly and downwardly projecting inner faces of each wheel-carrying member to the girder-bed at a distance from the ends thereof, substantially as set forth. 35 40 45 50

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

HUGH MYDDLETON BUTLER.

Witnesses:

JOHN JOWETT,
VANCE E. GALLOWAY.