PATENT SPECIFICATION

745,011

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Index at acceptance:—Class 136(3), A31E.

COMPLETE SPECIFICATION

Improvements in or relating to Cycle and like Steering-Gear

I, BURNARD SCOTT WADE, a British Subject of Sunshine House, Bolshaw Road, Cheadle, Cheshire, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement;—

This invention relates to steering gear for cycles and like vehicles, of the type in which the (or each) steerable wheel is carried in or upon a fork having its limbs fixedly connected by upper and lower transverse members which are swivellably mounted upon the frame or structure of the vehicle.

In the case of motor cycles, it is the normal practice to build a frame with a steering head through which extends a tubular stem permanently fixed to the lower fork cross-member or bridge, and passed through the upper cross-member or crown, ball-bearings being interposed between the fork crown and bridge and the adjacent ends of the steering head and being adjusted by rotation of a ball-race or bearing seat in screw-threaded engagement with the fork crown.

With such an arrangement, it is usual to simplify the assembly operation by making the crown detachable from the fork legs and securing it thereto only after the stem has been passed through the steering head, this final location of the crown being effected either by clamping split portions thereof around the fork legs, or by passing screws downwardly through it into tapped sockets in such legs.

This mode of construction is, however, insufficiently robust when the fork is repeatedly subjected to violent shocks and side-thrusts, as for example when the machine is driven over rough surfaces at speed, and it frequently happens that the crown fixing means or even the permanent brazed attachment of the bridge member will fail, thus allowing the fork legs to twist out of parallelism, besides which the adjustment of the steering head bearings is at once upset by any deformation or relative movement of the crown and bridge member.

It is known to provide the steering head with a coaxial tie-bolt whose function is to positively prevent movement apart of the fork crown and bridge member under excessive load, but experience shows that this expedient alone will not suffice to keep the bearings in correct adjustment, since the insecurity of the customary methods of fork crown attachments results in the bolt-head or nut being forced off.

The object of the present invention is to provide an improved construction of fork and steering head, which will permit of the fork legs and cross-members being brazed up as a single permanently rigid unit and which will ensure that the steering head bearings, once correctly adjusted, remain so indefinitely without further attention, no matter to what rough usage the assembly may be subjected.

The adjustable bearing seat aforesaid may be in screw-threaded engagement with the adjacent cross-member or merely slidable therethrough.

According to this invention, cycle or like steering gear of the type referred to, and having the fork cross-members mounted upon coaxial anti-friction bearings at opposite ends of a steering head, is characterised in that the said cross-members are permanently and rigidly united to the fork legs at a sufficient distance apart to permit introduction of the steering head between them, one of such cross-members having mounted therein an adjustable bearing seat whose distance from the corresponding portion of the other cross-member is positively controlled by a tie-bolt coaxial with the said bearings.

Preferably the thread of such tie-bolt is different in pitch from the thread of the adjustable bearing seat, which may carry a locknut engaging the adjacent cross-member.

In the accompanying drawings:—

Fig. 1 is a fragmentary side elevation of a fork and steering head constructed in accordance with the present invention,

Fig. 2 is a fragmentary front elevation

[Price 3s. 0d.]

partly in section on the line 2—2 of Fig. 1, and

Fig. 3 is a fragmentary plan view of the assembly

Figs. 4 to 6 are detail views corresponding to part of Fig. 2, but showing modified constructions.

In the example illustrated in Figs. 1 to 3, the invention is applied to a motor cycle whose frame 10 has built into it the usual hollow steering head forging 11 which has counterbores 12 at top and bottom adapted snugly to receive the adjacent races of upper and lower ball-bearings 13^1 13^2.

Associated with this steering head 11 is a front fork 14 comprising tubular legs 15 which are connected in spaced parallel relation by crown and bridge members 16, 17 respectively, the distance between the inner surfaces of these cross-members being at least equal to the overall length of the steering head 11 and its associated ball-bearings 13^1 13^2.

The fork legs 15 may be made straight throughout to accommodate coil springs and telescopic extensions between which the front wheel is mounted, or alternatively the lower parts of the legs may be curved rearwardly as shown (or forwardly) to carry swinging wheel-arms which are connected through compression springs to the upper parts of the legs.

The fork crown 16 is of triangular shape in plan view and formed at two corners thereof with blind integral sockets 18 in which the upper ends of the fork legs 15 are permanently secured by brazing.

The upper face of the crown 16 may be provided with the usual handlebar mountings 19 at laterally-spaced positions, and there may be the usual bracket 20 thereon for supporting an instrument panel 21, or a single instrument, such as a speedometer.

The fork bridge 17 may be of similar construction, but provided with sockets which are open at both ends to allow of the fork legs 15 being slipped through them prior to being brazed in position. Alternatively, the bridge 17 may comprise two tubular lugs 22 brazed upon the fork legs 15 and connected by an integral U-shaped tubular portion, or provided with rearward extensions between which is fixed a separate cross-tube, disposed below the rear corner of the fork crown 16.

In the case illustrated, where the fork legs 15 are curved rearwardly from a point about the bridge 17, the cross-tube 23 aforesaid may be fixed directly between the tubular lugs 22, its ends being brazed into sockets 24 at the inner sides of such lugs.

The lower race of the steering head bottom bearing 13^2 fits around a shouldered spigot 25 on the fork bridge 17, and where the latter is fabricated as aforesaid this spigot may be represented by the upper part of a separate seating 26 which is brazed into a milled recess 27 in the wall of the cross-tube 23 and which has a dependant coaxial hollow stem 28 extending diametrically through such tube.

A similar seating member 29 is associated with the fork crown 16 to receive the upper race of the top bearing 13^1, but in this case the coaxial hollow stem 30 extends upwardly and is screw-threaded externally to engage a tapped hole 31 at the rear corner of the fork crown.

Accurate alignment of the bearing seats 26, 29 is ensured by drilling the hole 31 in the fork crown 16, or alternatively brazing the lower seat 26 to the fork bridge 17, whilst the fork 14 is supported in a jig which incorporates a dummy steering head and bearings.

When assembling the cycle frame 10 and forks 14 together, the adjustable seat 29 for the top steering head being 13^2 is screwed up as far as it will go, and the fork 14 (with its bridge 17 carrying the lower race and balls of the bottom bearing 13^2) is offered to the steering head 11 into which the adjacent races have already been fitted.

After (or prior to) this operation, the balls of the top bearing 13^1 are placed in position and its upper race is fitted to the adjustable seat 29, which latter is finally screwed down to the appropriate extent and its adjustment locked by means of a nut 32 applied to that part of the threaded stem 30 which projects above the fork crown 16.

The threaded stem 30 has a semi-closed top end in which is a square or other non-circular hole 33 for engagement by a key during the locking operation.

A washer 34 is interposed between this end of the stem 30 and the head 35 of a tie-bolt 36, whose shank extends coaxially downwards through the adjustable seat 29 and steering head 11 to engage a tapped hole 37 in the fork bridge 17 or in the seat member 26 fixed to the latter, this bolt 36 being tightened up until the washer 34 is just nipped and being then locked by means of a nut 38 beneath the fork bridge 17.

As will be understood, this tie-bolt 36 effectively resists any relative springing of the fork cross-members 16,17 such as might affect the adjustment of the steering head bearings 13^1, 13^2, besides securely retaining the nut 32 which serves to lock such adjustment.

Preferably the tie-bolt 36 is screwed 20 threads per inch and the stem of the adjustable bearing seat 29 is screwed 24 or 26 threads per inch, so that any tendency for the adjustable bearing lock-nut 32 to slacken off is resisted by the tie-bolt.

Obviously the arrangement of the adjustable bearing seat 29 may be modified in numerous ways within the scope of the invention.

For example, as shown in Fig. 4, its threaded portion 30 may be made of larger

diameter than the bearing 13^1, so that the parts of the latter, as well as the seat 29 itself, may be inserted downwardly through the fork crown 16.

In the further modification shown in Fig. 5, the seat 29 is again designed for downward insertion, but the lock-nut 32 therefore is arranged at the under side of the fork crown 16.

It is, of course, immaterial which of the bearing seats 25, 29 is made adjustable, or in which direction the tie-bolt 36 is inserted; for example, any of the constructions above described may be used inverted, and furthermore the tie-bolt 36 may be a tubular member instead of solid.

Fig. 6 illustrates yet another modification, in which the downwardly-insertable upper seat 39 is arranged to slide, with a minimum of radial clearance, in a plain hole 40 in the fork crown 16 and is tapped out at 41 so as to be engageable with the inverted tie-bolt 36 in the manner of a nut. Adjustment of the seat 39 may be effected by means of a key engageable with peg-holes 42 therein or suitable flats thereon and is retained by means of the lock-nut 43, the lower end of the tie-bolt having a plain head as at 35, or being screwed into the lower seat 25 and retained by a nut such as 38.

Such an arrangement enables a given fork to be applied to steering heads of various effective lengths (measured between the seatings for the inner races of the two ball-bearings 13^1, 13^2.)

What I claim is:—

1. Cycle or like steering gear of the type referred to, and having the fork cross-members mounted upon coaxial anti-friction bearings at opposite ends of a steering head, characterised in that the said cross-members are permanently and rigidly united to the fork legs at a sufficient distance apart to permit introduction of the steering head between them, one of such cross-members having mounted therein an adjustable bearing seat whose distance from the corresponding portion of the other cross-member is positively controlled by a tie-bolt coaxial with the said bearings.

2. Steering gear according to Claim 1, further characterised in that the adjustable bearing seat is in screw-threaded engagement with the adjacent cross-member.

3. Steering gear according to Claim 2, further characterised in that the threaded portion of the adjustable bearing seat carries a lock-nut engaging the adjacent cross-member.

4. Steering gear according to Claim 3, further characterised in that the head of the tie-bolt acts upon the outer end of the adjustable bearing seat whose central portion is designed for previous rotation by means of a key.

5. Steering gear according to Claim 1, further characterised in that the adjustable bearing seat is slidably guided in a plain hole in the adjacent cross-member and makes screw-threaded engagement with the tie-bolt.

6. Steering gear according to any one of the preceding Claims, further characterised in that the tie-bolt screws into a similar bearing seat fixedly united to the second cross-member and is locked by means of a nut behind the later.

7. Steering gear according to Claim 3 or Claim 4, further characterised in that a washer is interposed between the head of the tie-bolt and the nut locking the adjustable bearing seat, the bolt being tightened until such washer is just nipped.

8. Steering gear according to any one of the preceding Claims, except Claim 5, further characterised in that the thread of the tie-bolt is different in pitch from the thread of the adjustable bearing seat.

9. Cycle or like steering gear according to Claim 1, substantially as described with reference to and as shown in Figs. 1 to 3, or any of Figs. 4 to 6 of the accompanying drawings.

For the Applicant:—
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PROVISIONAL SPECIFICATION

Improvements in or relating to Cycle and like Steering-Gear

I, BURNARD SCOTT WADE, a British Subject of Sunshine House, Bolshaw Road, Cheadle, Cheshire, do hereby declare this invention to be described in the following statement:—

This invention relates to steering gear for cycles and like vehicles, of the type in which the (or each) steerable wheel is carried in or upon a fork having its limbs fixedly connected by upper and lower transverse member which are swivellably mounted upon the frame or structure of the vehicle.

In the case of motor cycles, it is the normal practice to build the frame with a steering head through which extends a tubular stem permanently fixed to the lower fork cross-member or bridge, and passed through the upper cross-member or crown, ball-bearings being interposed between the fork crown and bridge and the adjacent ends of the steering head and being adjusted by rotation of a ball-race or bearing seat in screw-threaded engagement with the fork crown.

With such an arrangement, it is usual to simplify the assembly operation by making the crown detachable from the fork legs and

securing it thereto only after the stem has been passed through the steering head, this final location of the crown being effected either by clamping split portions thereof around the fork legs, or by passing screws downwardly through it into tapped sockets in such legs.

This mode of construction is, however, insufficiently robust when the fork is repeatedly subjected to violent shocks and side-thrusts, as for example when the machine is driven over rough surfaces at speed, and it frequently happens that the crown fixing means or even the permanent brazed attachment of the bridge member will fail, thus allowing the fork legs to twist out of parallelism, besides which the adjustment of the steering head bearings is at once upset by any deformation or relative movement of the crown and bridge member

It is known to provide the steering head with a coaxial tie-bolt whose function is to positively prevent movement apart of the fork crown and bridge member under excessive load, but experience shows that this expedient alone will not suffice to keep the bearings in correct adjustment, since the insecurity of the customary methods of fork crown attachments results in the bolt-head or nut being forced off.

The object of the present invention is to provide an improved construction of fork and steering head, which will permit of the fork legs and cross-members being brazed up as a single permanently rigid unit and which will ensure that the steering head bearings, once correctly adjusted, remain so indefinitely without further attention, no matter to what rough usage the assembly may be subjected.

According to this invention, cycle or like steering gear of the type referred to, and having the fork cross-members mounted upon coaxial anti-friction bearings at opposite ends of a steering head, is characterised in that the said cross-members are permanently and rigidly united to the fork legs at a sufficient distance apart to permit introduction of the steering head between them, one of such cross-members having screwed into it an adjustable bearing seat whose threaded portion carries a lock-nut engaging the last-mentioned cross-member and whose distance from the corresponding portion of the other cross-member is positively controlled by a tie-bolt coaxial with the said bearings.

Preferably the thread of such tie-bolt is different in pitch from the thread of the bearing seat aforesaid.

In one embodiment, the invention is applied to a motor cycle whose frame has built into it the usual hollow steering head forging which is counterbored at top and bottom snugly to receive the adjacent races of upper and lower ball-bearings.

Associated with this steering head is a front fork comprising tubular legs which are connected in spaced parallel relation by crown and bridge members, the distance between the inner surfaces of these cross-members being at least equal to the overall length of the steering head and its associated ball-bearings.

The fork legs may be made straight throughout to accommodate coil springs and telescopic extensions between which the front wheel is mounted, or alternatively the lower parts of the legs may be curved rearwardly (or forwardly) to carry swinging wheel-arms which are connected through compression springs to the upper parts of the legs.

The fork crown is of triangular shape in plan view and formed at two corners thereof with blind integral sockets in which the upper ends of the fork legs are permanently secured by brazing.

The upper face of the crown is provided with the usual handlebar mountings at laterally-spaced positions, and there may be the usual bracket thereon for supporting an instrument panel, or a single instrument, such as a speedometer.

The fork bridge may be of similar construction, except that in this case the sockets aforesaid are open at both ends to allow of the fork legs being slipped through them prior to being brazed in position. Alternatively, the bridge may be fabricated from two tubular lugs brazed upon the fork legs and connected by an integral U-shaped tubular portion, or provided with rearward extensions between which is fixed a separate cross-tube, disposed below the rear corner of the fork crown.

In a case when the fork legs are curved rearwardly from a point about the bridge, the cross-tube may be fixed directly between the tubular lugs aforesaid.

The lower race of the steering-head bottom bearing fits around a shouldered spigot on the fork bridge, and where the latter is fabricated as aforesaid this spigot may be represented by the upper part of a separate seating which is brazed into a milled recess in the wall of the cross-tube and which has a dependant coaxial hollow stem extending diametrically through such tube.

A similar seating member is associated with the fork crown to receive the upper race of the top bearing, but in this case the coaxial hollow stem extends upwardly and is screw-threaded externally to engage a topped hole at the rear corner of the fork crown.

Accurate alignment of the bearing seats is ensured by drilling the hole in the fork crown, or alternatively brazing the lower seat to the fork bridge, whilst the fork is supported in a jig which incorporates a dummy steering head and bearings

When assembling the cycle frame and forks together, the adjustable seat for the top steering-head bearing is screwed up as far as it will go, and the fork (with its bridge carrying

the lower race and balls of the bottom bearing) is offered to the steering head into which the adjacent races have already been fitted.

After (or prior to) this operation, the balls of the top bearing are placed in position and its upper race is fitted to the adjustable seat, which latter is finally screwed down to the appropriate extent and its adjustment locked by means of a nut applied to that part of the threaded stem which projects above the fork crown.

The threaded stem aforesaid has a semi-closed top end in which is a square or other non-circular hole for engagement by a key during the locking operation.

A washer is interposed between this end of the stem and the head of a tie-bolt, whose shank extends coaxially downwards through the adjustable seat and steering head to engage a tapped hole in the fork bridge or in the seat member fixed to the latter, this bolt being tightened up until the washer aforesaid is just nipped and being then locked by means of a nut beneath the fork crown.

As will be understood, this tie-bolt effectively resists any relative springing of the fork cross-members such as might affect the adjustment of the steering head bearings, besides securely retaining the nut which serves to lock such adjustment.

Preferably the tie-bolt is screwed 20 threads per inch and the stem of the adjustable bearing seat 24 or 26 threads per inch, so that any tendency for the adjustable bearing lock-nut to slacken off is resisted by the tie-bolt.

Obviously the arrangement of the adjustable bearing seat may be modified in numerous ways within the scope of the invention.

For example, its threaded portion may be made of larger diameter than the bearing, so that the parts of the latter, as well as the seat itself, may be inserted downwardly through the fork crown. The lock-nut may be arranged either above or below the fork crown, the tie-bolt washer in the latter case abutting the threaded end of the adjustable seat.

For the Applicant:—
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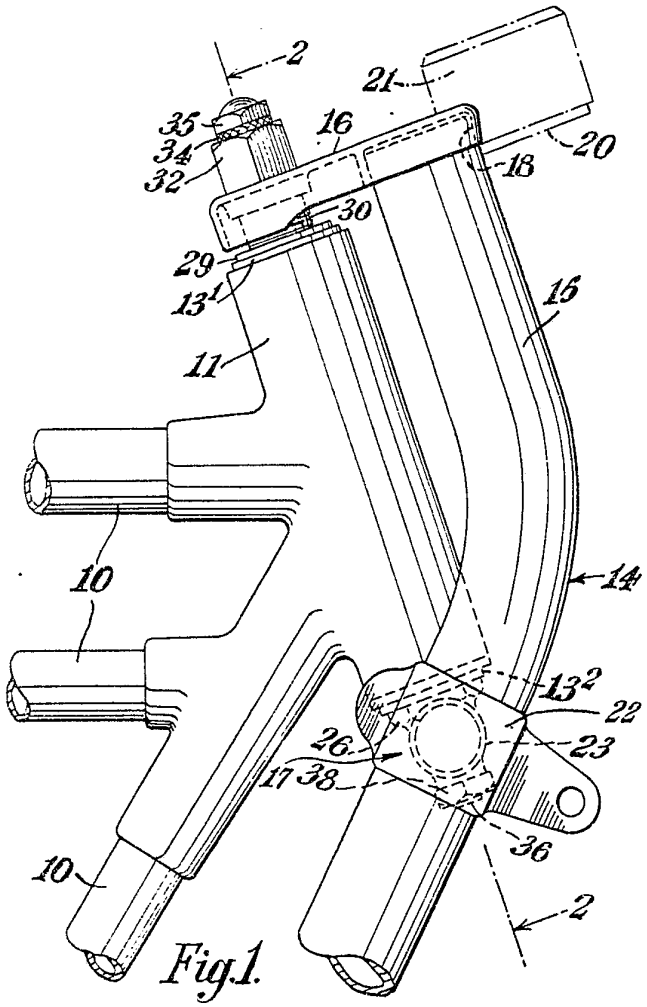
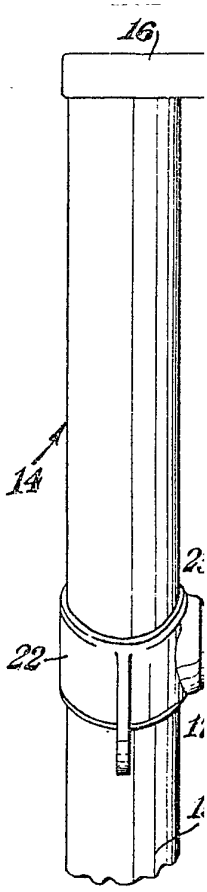
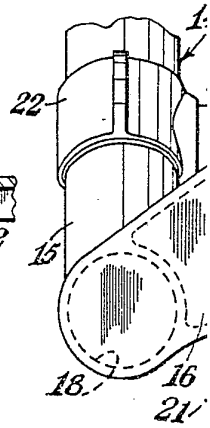


Fig.1.





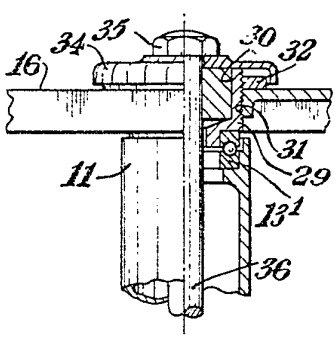


Fig.4.

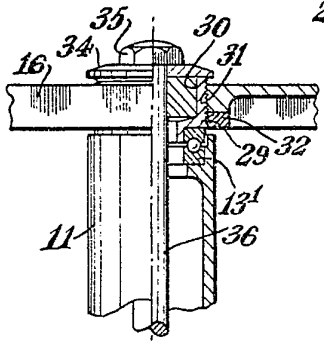


Fig.5.

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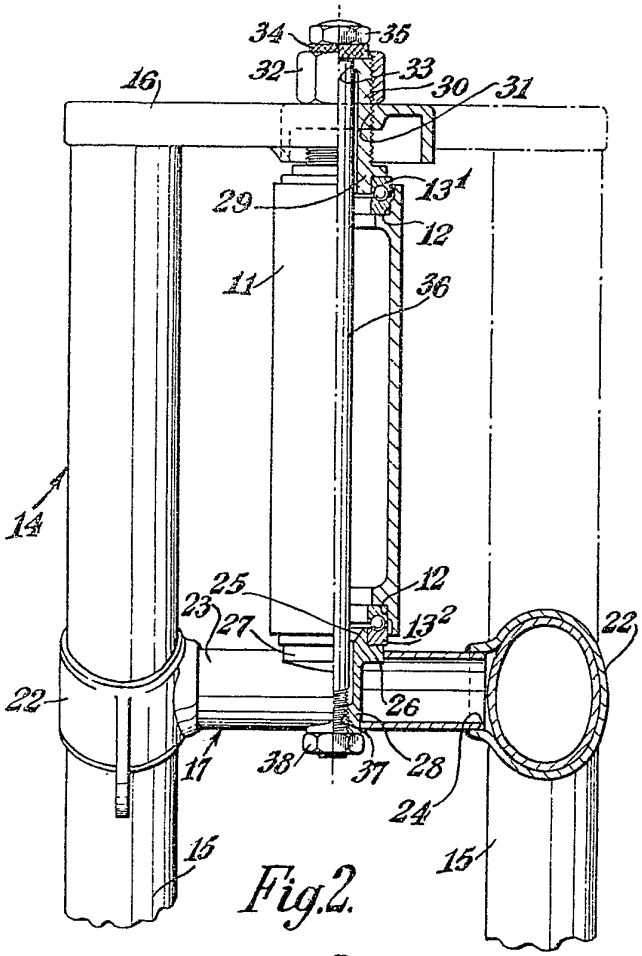

Fig.2.

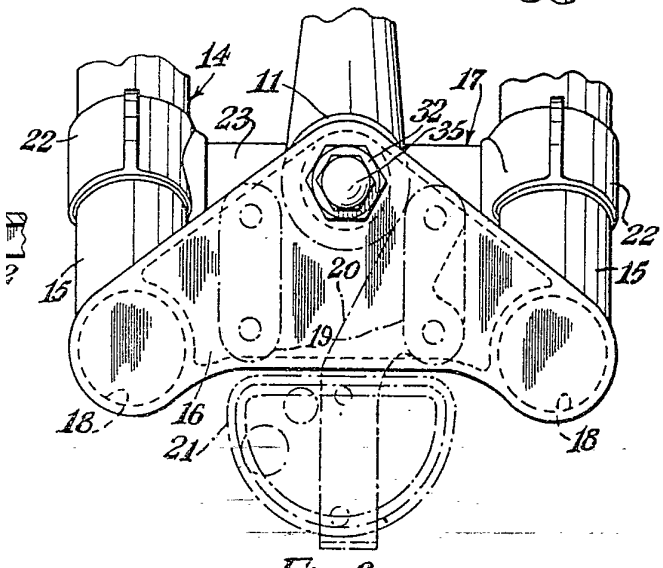

Fig.3.

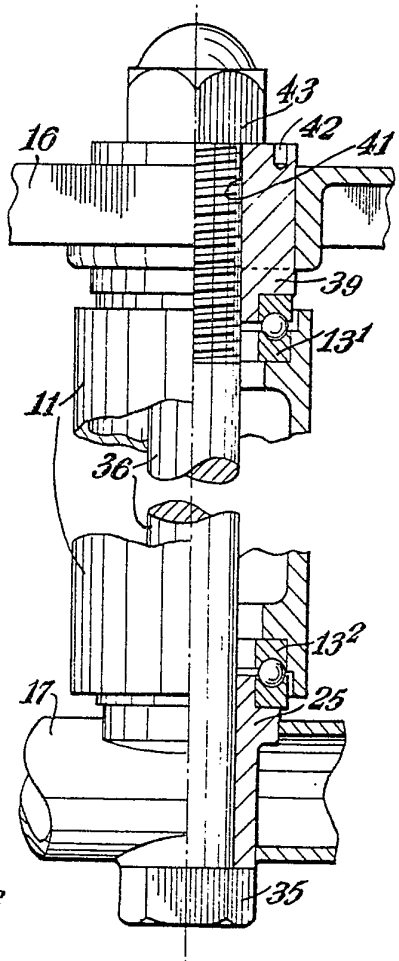

Fig.6.

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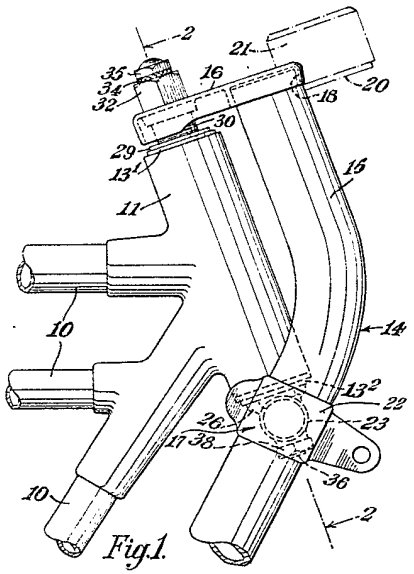

Fig.1.

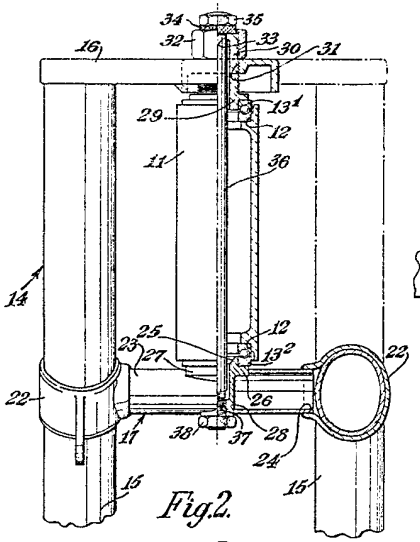

Fig.2.

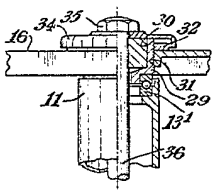

Fig.4.

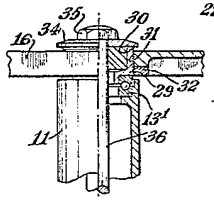

Fig.5.

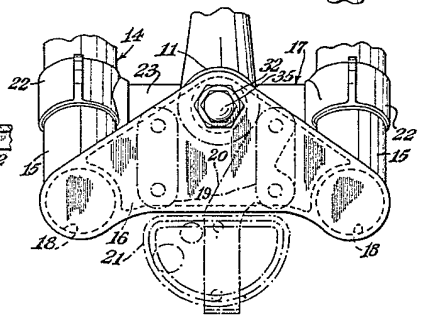

Fig.3.

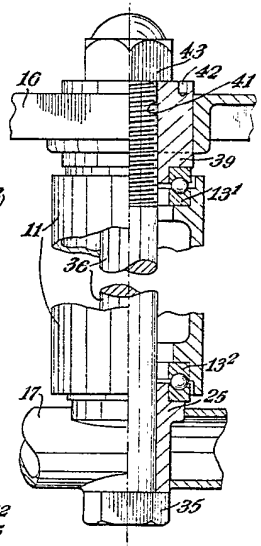

Fig.6.