L. BAUMGARTL & H. F. GASTON.

DEMOUNTABLE WHEEL.

APPLICATION FILED FEB. 6, 1917.

1,298,279.

Patented Mar. 25, 1919.

3 SHEETS—SHEET 1.

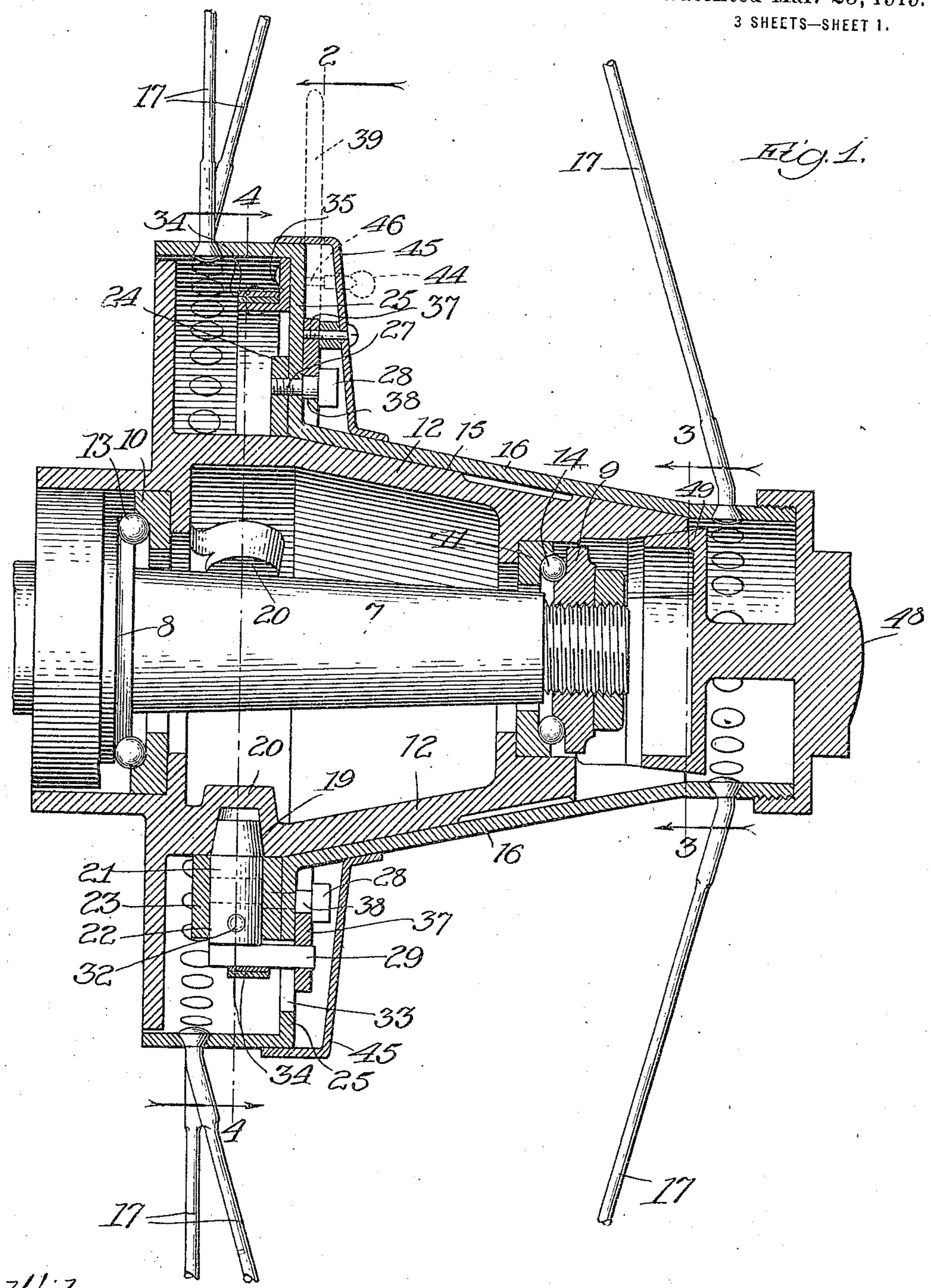


Fig. 1.

Witnesses:
Carl Berglund.
Irwin C. Sourman.

Inventors:
Leroy Baumgartl, and
Henry F. Gaston,
By Dyrenforth, Lee, Chritton & Dyrenforth,
Attys.

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3 SHEETS—SHEET 2.

Fig. 2.

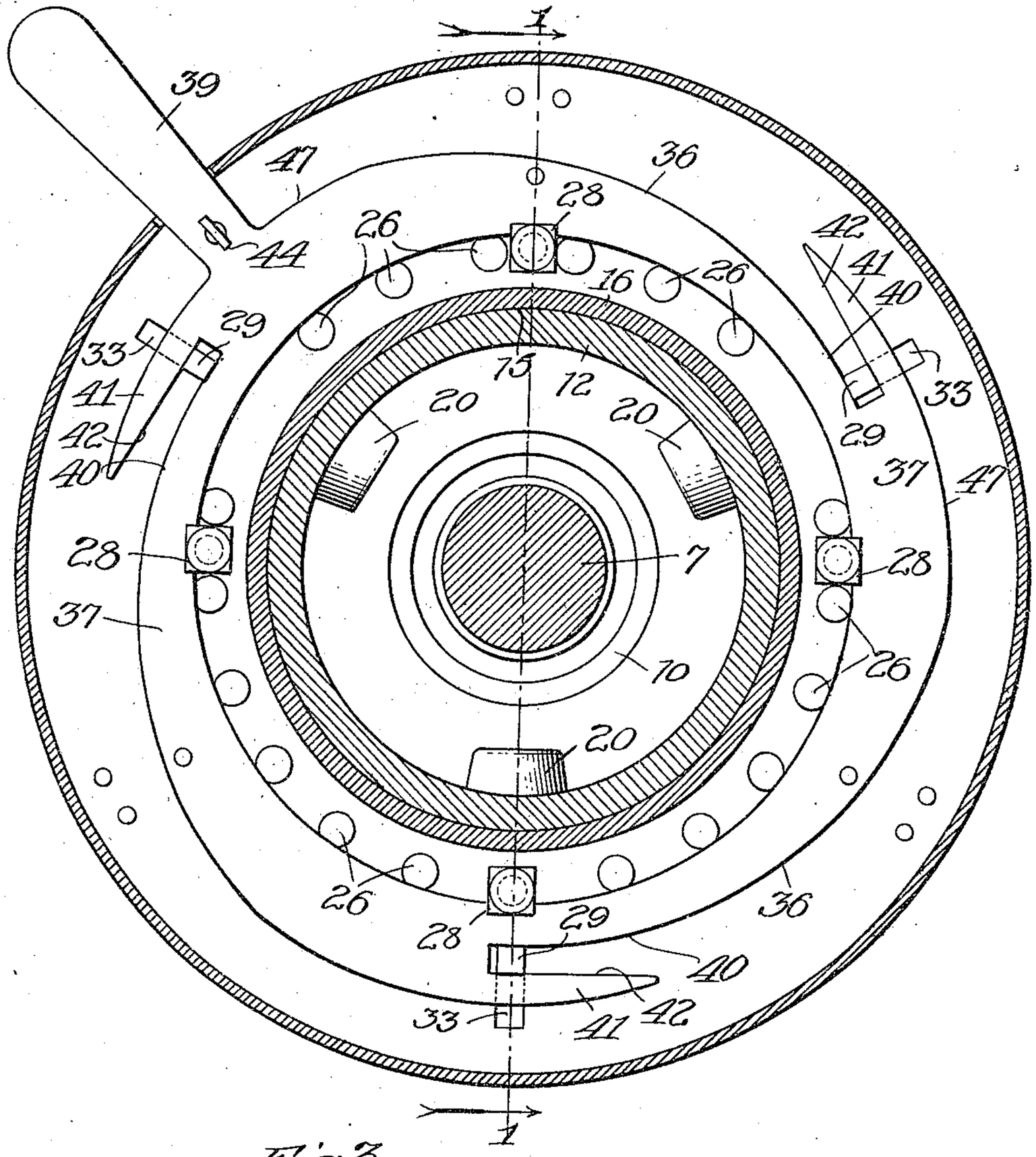
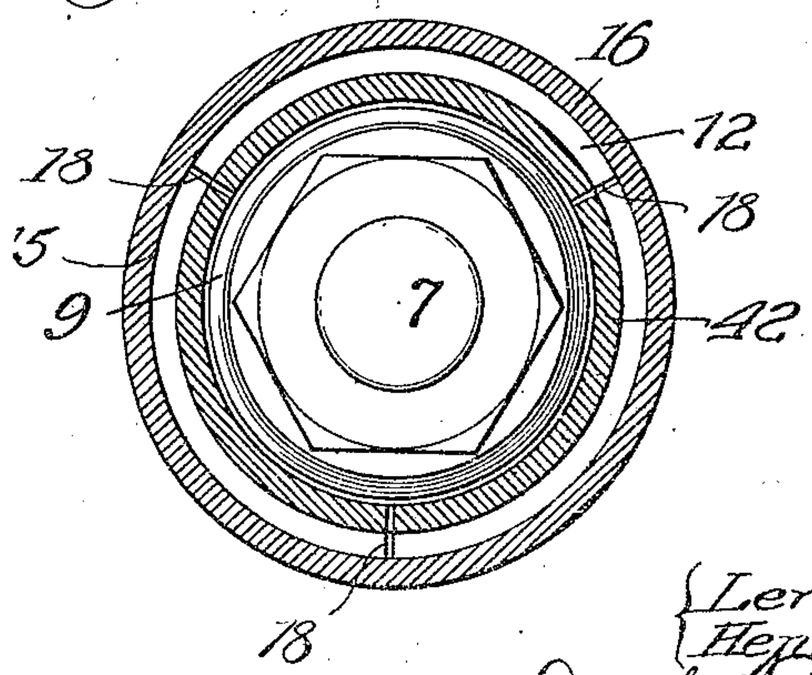



Fig. 3.




Witnesses:

Inventors,

Leroy Baumgartl &
Henry F. Gaston,

By Dyrenforth, Lee, Chritton & Wilkes,

Attys.

L. BAUMGARTL & H. F. GASTON.

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3 SHEETS—SHEET 3.

Fig. 4

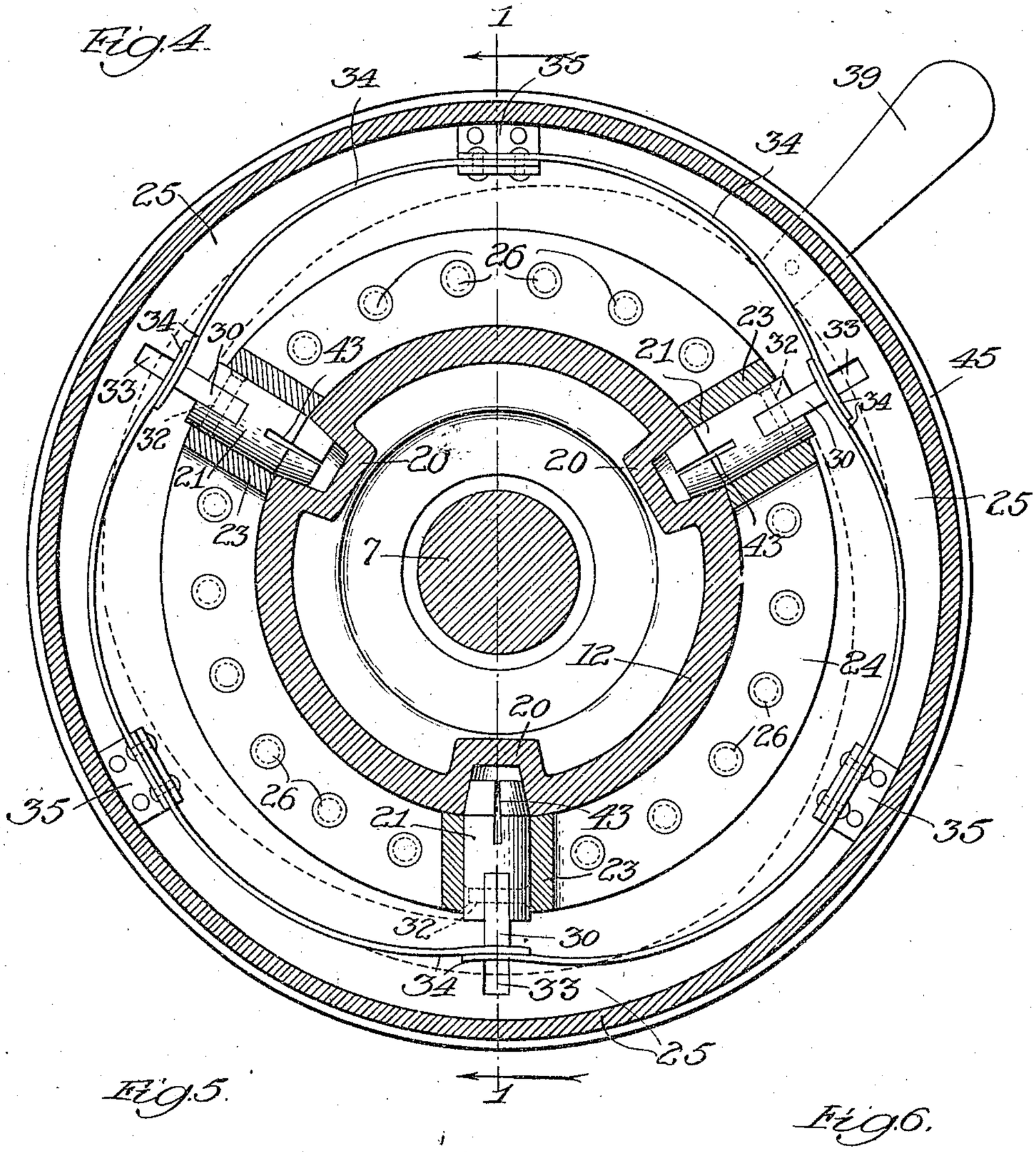


Fig. 5.




Fig. 6.




Witnesses:
W. E. Gaylord,
Irwin C. Bowman.

Inventors:
Leroy Baumgartl and
Henry F. Gaston,
By Dyrenforth, Lee, Chritton & Wills,
Attys.

# UNITED STATES PATENT OFFICE.

LEROY BAUMGARTL AND HENRY F. GASTON, OF CHICAGO, ILLINOIS; SAID GASTON ASSIGNOR TO SAID BAUMGARTL.

## DEMOUNTABLE WHEEL.

1,298,279. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed February 6, 1917. Serial No. 146,682.

*To all whom it may concern:*

Be it known that we, LEROY BAUMGARTL and HENRY F. GASTON, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Demountable Wheels, of which the following is a specification.

Our invention relates, more particularly, to wheels involving an inner hub-member adapted to be driven in the case of a drive-wheel, in which case it would be connected with a drive-mechanism, or mounted on bearings to rotate freely in the case of a wheel journaled on an axle; an outer hub-member adapted to telescope with the inner hub-member and to which the spokes of the wheel are connected, and means for releasably holding the outer hub-member in such relation to the inner hub-member that these two members will operate as a unit.

Our primary objects are to provide improvements in wheels of the character above referred to, to the end that the operation of assembling the outer hub-member and the parts carried thereby, with the inner hub-member, and the disassembling of these parts, may be effected easily and quickly, the outer hub-member being positively held to the inner hub-member when in assembled relation, regardless of slight variations in the proportions of the parts, whether resulting in the manufacture of the wheel or by wear of parts, and under the stresses to which the wheel is subjected in actual and continued use; and to the end that the outer hub-member shall be held against back-lashing.

Referring to the accompanying drawings:

Figure 1 is a view in longitudinal sectional elevation of a wheel structure constructed in accordance with our invention, the section being taken at the line 1 on Figs. 2 and 4 and viewed in the direction of the arrows.

Fig. 2 is a sectional view taken at the line 2 on Fig. 1 and viewed in the direction of the arrow, certain of the parts being shown in elevation.

Fig. 3 is a section taken at the line 3 on Fig. 1 and viewed in the direction of the arrow.

Fig. 4 is a section taken at the line 4 on Fig. 1 and viewed in the direction of the arrow.

Fig. 5 is a view in elevation of one of the plurality of plunger devices employed; and

Fig. 6, a similar view of the plunger device shown in Fig. 5, this view being taken from the left hand side of Fig. 5.

We have chosen to illustrate our invention as applied to a wheel structure journaled on an axle as in the case of the front wheel of an automobile though it will be readily understood from the following that the invention is not limited to a wheel of this character, but is equally applicable to a drive-wheel.

One of the front steering axles of an automobile is represented at 7, this axle carrying ball-races 8 and 9, between which are imposed the races 10 and 11 carried by the inner hub-member 12, balls 13 and 14 being interposed between the opposed races 8 and 10 and 9 and 11 and forming a ball bearing upon which the hub-member 12 is supported on the axle 7 to rotate thereon, the hub-member 12 being hollow and preferably having its outer end tapered, as indicated at 15. The outer hub-member of the wheel is represented at 16, this hub being connected with the rim, or felly, (not shown) through the medium of the spokes 17. The outer hub-member 16, spokes 17, and felly would thus be connected together, and the whole is adapted to be bodily removed from and assembled with, the inner hub-member 12, as desired, the outer hub-member 16 likewise being hollow and of such internal form that it will snugly fit over the inner hub-member 12.

The inner hub-member 12, is open at its outer end, (the right-hand end in Fig. 1) and the metal forming this end of the hub is slitted longitudinally thereof, as at the three places indicated at 18 in Fig. 3, for a purpose hereinafter described, the angle at which the outer tapered surface of this part of the member 12 extends relative to the median line of the hub being slightly less than the angle of the main tapered portion of the hub. The hub-member 12 contains in its periphery, a plurality of radially-disposed openings, or sockets, 19, shown as three in number, though the number thereof may be varied as desired, these openings, or sockets, by preference, being of frusto-conical form with their walls flaring radially outward, and according to the particular construction illustrated being formed partly in inset bosses 20 arranged about the inner

circumferential surface of the member 12, these openings, or sockets, 19 being provided for coöperation with devices carried by the outer hub-member 16 and adapted to be projected into these sockets for releasably locking the outer hub-member to the inner hub-member. The locking devices according to the illustrated preferred embodiment of my invention comprise plungers 21 reciprocable in radially-extending openings 22 in bosses 23 extending laterally from a ring 24 surrounding the inner hub-member 12 and preferably closely fitting the latter and provided as a part of the outer hub-member 16, this ring being assembled with other parts to form this outer hub-member, as follows: In the particular arrangement shown the ring 24 fits flatwise against the inner surface of a radially-disposed annular flange 25 provided on the body portion of the outer hub-member 16, and is rigidly secured thereto, to be concentric with this body portion, by means of rivets 26 and screw bolts 27, the heads of which latter are represented at 28. The plungers 21 are provided with laterally extending fingers 29 formed, in the construction illustrated, by bars fitting at enlarged portions 30 thereof into slots 31 in the outer ends of the plungers and held therein by pins 32, the members 29 extending into radially-disposed slots 33 in the flange 25 of the outer hub-member 16.

In the particular construction illustrated the plungers 21 are normally projected inwardly in a direction to cause them to enter the sockets 19 by the action of springs 34, shown as of the leaf type. These springs are each held at one end by means of clips 35 secured to the inner face of the flange 25, the outer free ends of these springs, two of which coöperate with each plunger 21, being overlapped as indicated in Fig. 4 and bearing flatwise against the outer ends of the plungers 21. The portions 29 of the plungers coöperate with a series of cam-devices for withdrawing these plungers from the sockets 19, these cam-devices, in the construction illustrated, being indicated at 36 and of a number corresponding to the number of plungers 21. The cams 36 are provided about the peripheral surface of a ring 37 which is rotatably mounted, concentrically with the axis of the axle 7, upon the non-threaded parts 38 of the screw bolts 27, the latter forming journal support for this ring and permitting the latter to be rotated in either direction, as through the medium of a handle 39 thereon. The portions 29 of the plungers 21 extend transversely of the respective cam-devices 36 and into the path of movement of the latter, whereby in the movement of the ring 37 in one direction the plungers 21 are moved radially outward and in the movement of this ring in the opposite direction these plungers are permitted to move radially inward under the action of the springs 34. The lower portions of the cams 36 and which portions are represented at 40, extend adjacent to spurs 41 provided on the ring 37 and having deflecting surfaces 42 for a purpose hereinafter described.

The plungers 21, the inner ends of which are of tapered form to conform generally to the contour of the sockets 19, are longitudinally split, preferably centrally, as represented at 43 to render their inner ends contractible in order that they will snugly fit the sockets 19 into which they extend under their inherent spring tension.

The outer hub-member 16 may be assembled with the inner hub-member 12 in the following manner. The ring 37 is rotated to a position in which the spurs 41 are out of the path of radial movement of the plungers 21, in which position of the ring, the inner ends of these plungers extend into the interior of the outer hub-member 16. The outer hub-member is then telescoped with the inner hub-member to a position in which the plungers 21 enter the sockets 19, these plungers in the operation just stated, by engaging the outer periphery of the hub-member 12, being forced to retracted position against the resistance of the springs 34, which latter immediately project them into the sockets 19 as soon as the outer hub-member is adjusted on the inner hub-member to a position in which these plungers register with these sockets. The parts of the structure are preferably so proportioned that when the hub-member 16 is assembled with the inner hub-member 12, the outer, contractible, end of the inner hub-member 12 will be forced by the engagement therewith of the outer hub-member, to relatively contracted condition, causing these parts by reason of the inherent spring tension of the portions forming the outer end of the member 12 to be firmly gripped together. Upon assembling the inner and outer hub-members as stated, the operator rotates the ring 37 in anti-clockwise direction in Fig. 2 which carries the spurs 41 into a position in which they overlie the respective portions 29 of the plungers 21, in which movement the surfaces 42 of the spurs ride against the outer surfaces of the portions 29 and thereby force the plungers 21 into tight engagement with the sockets 19, the inner ends of these plungers contracting in the movement of the ring 37 as stated. In this position of the parts the spurs 41 by opposing the plungers as stated prevent them from being vibrated sufficiently to produce undue wear and also prevent them from being forced out of the sockets 19 by the centrifugal force developed by the rapid rotation of the wheel.

According to the preferred embodiment of our invention we provide a dust-cap 48

which screws into the outer end of the hub-member 16, this cap having a portion 49 which operates, when the cap is screwed into place, to exert pressure against the slotted outer end of the hub-member 12 tending to expand it against the outer hub-member and thus aids in the rigid securing together of the hub-members.

It will be readily understood from the foregoing that by providing the inner hub-member with a contractible portion which is caused to contract upon the forcing of the outer hub-member upon the inner hub-member, and by providing the plungers with contractible sections which are caused to contract upon forcing the plungers into the cooperating sockets 19 in the inner hub-member, the parts of the structure may not only be caused to closely fit and be interlocked with each other against relative movement when the parts are originally assembled, but also should the parts become worn in use. Under the conditions last stated if no provision were made for taking up wear, sufficient relative movement of the parts would occur to produce back-lashing, and if back lashing once starts the wheel would become comparatively quickly permanently impaired for continued practical use. By my construction, however, as stated above, it is possible to take up the wear and thus avoid back-lashing.

Any suitable means for holding the ring 37 in the position to which it is rotated in the operation of forcing the plungers 21 into the sockets 19, may be provided. Those shown comprise a set-screw 44 which extends through an opening in a cap-member 45 surrounding the outer hub-member 16 as shown, and secured to the ring 37, this set-screw having threaded engagement at 46 with the handle 39, the inner end of this set-screw being preferably provided with a prick-point (not shown) which engages the outer surface of the flange 25 when the set-screw 44 is screwed up tight and therefore prevents this ring from turning.

When it is desired to remove the hub-member 16 from the inner hub-member, assuming the parts of the structure to be in the positions illustrated in the drawings, the operator grasps the handle 39 and rotates the ring 37 in clockwise direction in Fig. 2, this movement of the ring causing the cams 36 to move against the under surfaces of the portions 29 of the plungers and withdraw the latter from the sockets 19 in opposition to the action of the springs 34, the outer ends of the cams 36 being preferably provided with portions 47 which are substantially concentric with the axis about which the ring 37 rotates, with which the plungers engage in the final movement of the ring and which operate to cause the ring to remain in the position to which it was rotated to withdraw the plungers, as stated, until rotated in the opposite direction by hand. From the foregoing it will be noted that all of the plungers 21 are withdrawn from the sockets 19 by the simple operation of rotating the ring 37 and that, with these plungers withdrawn to this position, the operator may readily draw the outer hub-member 16 from the inner hub-member 12.

From the foregoing description, it will be readily understood that a wheel constructed in accordance with our invention may be readily assembled with, and disassembled from, the supporting parts, and that when in assembled condition, the outer hub-member is rigidly, positively and firmly held to the inner hub-member without danger of back-lashing, which if once begun soon racks the entire wheel structure besides producing objectionable noise.

While we have illustrated and described a particular construction in which our invention may be embodied, we do not wish to be understood as intending to limit it thereto, as the same may be variously modified and altered without departing from the spirit of our invention, it being our intention to claim our invention as fully and completely as the prior state of the art will permit.

What we claim as new and desire to secure by Letters Patent is:—

1. In a structure of the character set forth, the combination of an inner hub-member and an outer hub-member, one of which contains a socket and the other a plunger adapted to be moved into and out of said socket, and means for insuring a tight fit between said plunger and socket regardless of slight variations in proportions of the interfitting parts of the structure.

2. In a structure of the character set forth, the combination of an inner hub-member containing a socket, an outer hub-member, a plunger carried by and movable on said outer hub-member into and out of said socket, and means for insuring a tight fit between said plunger and socket regardless of slight variations in proportions of the interfitting parts of the structure.

3. In a structure of the character set forth, the combination of an inner hub-member and an outer hub-member one of which contains a socket and the other a plunger adapted to be moved into and out of said socket, the wall of said socket and said plunger being relatively yieldingly movable in a plane transversely of the median line of said plunger to insure a tight fit of said plunger with said socket, for the purpose set forth.

4. In a structure of the character set forth, the combination of an inner hub-member and an outer hub-member one of which contains a socket, and a plunger on the other of said hub-members adapted to be moved into and out of said socket, said plunger being trans-

versely contractible to insure a tight fit of said plunger with said socket.

5. In a structure of the character set forth, the combination of an inner hub-member and an outer hub-member one of which contains a socket, and a plunger on the other of said hub-members adapted to be moved into and out of said socket, said plunger having a longitudinally slitted portion whereby it is rendered contractible when introduced into said socket, to insure a tight fit of said plunger with said socket, for the purposes set forth.

6. In a structure of the character set forth, the combination of an inner hub-member and an outer hub-member, one of which contains a socket, a plunger on the other of said hub-members and adapted to be moved into and out of said socket, said plunger being formed with a longitudinally split section rendering the latter contractible at which portion it extends into said socket, and means for forcing said plunger into said socket against the inherent spring tension of the split section of said plunger.

7. In a structure of the character set forth, the combination of an inner hub-member having its outer end of tapered form, said hub-member containing a socket, an outer hub-member telescoping the tapered portion of said inner hub-member, the latter being longitudinally slitted at its tapered portion and contractible upon assembling together said hub-members, and a plunger carried by said outer hub-member and adapted to be moved into and out of said socket, the inner end of said plunger being longitudinally slitted for the purpose set forth.

8. In a structure of the character set forth, the combination of an inner hub-member having its outer end of tapered form, said hub-member containing a socket, the wall of which flares outwardly, an outer hub-member telescoping the tapered portion of said inner hub-member, the latter being longitudinally slitted at its tapered portion and contractible upon assembling together said hub-members, and a plunger carried by said outer hub-member and adapted to be moved into and out of said socket, the inner end of said plunger being longitudinally slitted for the purpose set forth.

9. In a structure of the character set forth, the combination of an inner hub-member, an outer hub-member, one of said members containing a socket and the other a plunger adapted to be moved into and out of said socket, and constructed and arranged to require it to be forced into position in said socket, a spring tending to force said plunger inwardly, means for moving said plunger outwardly against the resistance of said spring, and means adapted to engage the plunger for finally forcing it to position in said socket, said last-named means being so constructed and arranged as not to prevent the radial movement outwardly of the plunger against the action of the spring when the plunger is in a position wherein it extends inwardly beyond the inner periphery of the outer hub-member.

10. In a structure of the character set forth, the combination of an inner hub-member containing a socket, an outer hub-member telescoping with said inner hub-member, a plunger on said outer hub-member and adapted to enter said socket, a spring tending to force said plunger into said socket, said plunger being so constructed and arranged as to require it to be forced into position in said socket, a rotatably mounted member carrying a cam adapted to engage said plunger and withdraw the latter from said socket against the action of said spring when said rotatable member is rotated in one direction, and a surface on said rotatable member located adjacent the lower end of said cam and arranged to force said plunger into said socket and obstruct outward movement of said plunger.

11. In a structure of the character set forth, the combination of an inner hub-member containing a socket, an outer hub-member telescoping with said inner hub-member, a plunger on said outer hub-member and adapted to enter said socket, and having a lateral extension, a rotatable member provided with a cam-surface engaging said extension for actuating said plunger, and a series of studs on said outer hub-member and on which said rotatable member is rotatably mounted.

12. In a structure of the character set forth, the combination of an inner hub-member containing a socket, an outer hub-member telescoping with said inner hub-member, a plunger on said outer hub-member and adapted to enter said socket, a flange on said outer hub-member, and a leaf spring secured to said flange to extend circumferentially of the hub-member and bearing against said plunger and tending to force it into said socket.

13. In a structure of the character set forth, the combination of an inner hub-member containing a socket, an outer hub-member telescoping with said inner hub-member, a plunger on said outer hub-member and adapted to enter said socket, a flange on said outer hub-member, a leaf spring secured to said flange to extend circumferentially of the hub-member and bearing against said plunger and tending to force it into said socket, and a rotatably supported member on said outer hub-member and provided with a cam adapted upon rotating said member to withdraw said plunger from said socket against the action of said spring.

14. In a structure of the character set forth, the combination of an inner hub-member containing a socket, an outer hub-member telescoping with said inner hub-member, a plunger on said outer hub-member and adapted to enter said socket, a flange on said outer hub-member containing a slot, an extension on said plunger extending, and radially movable, in said slot, and a cam-equipped member rotatably mounted on said outer hub-member and engaging said extension for actuating said plunger.

LEROY BAUMGARTL.
HENRY F. GASTON.