

No. 789,840.

PATENTED MAY 16, 1905.

J. D. COLT.  
VEHICLE.

APPLICATION FILED JAN. 27, 1904.

4 SHEETS—SHEET 1.

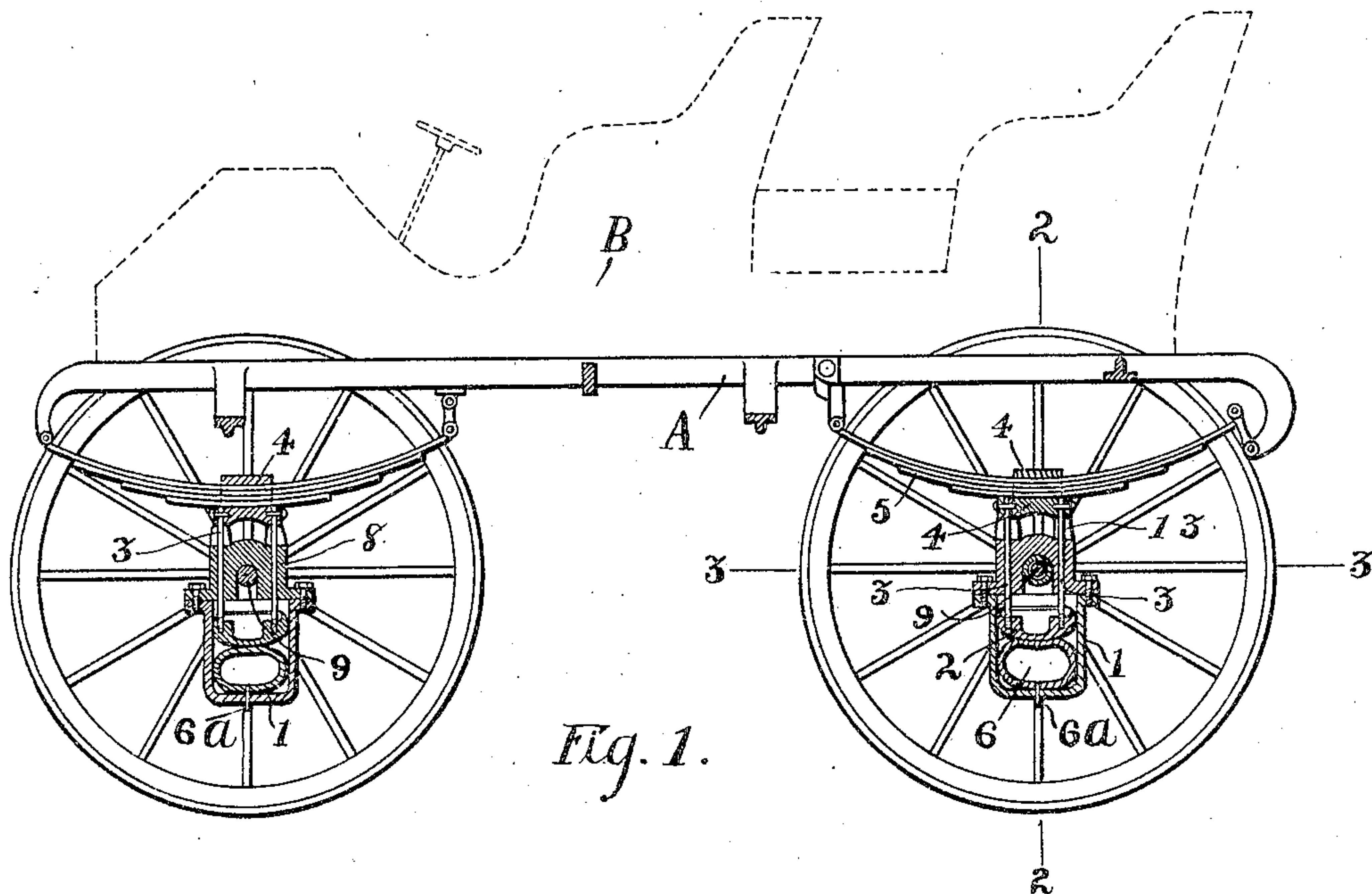


Fig. 1.

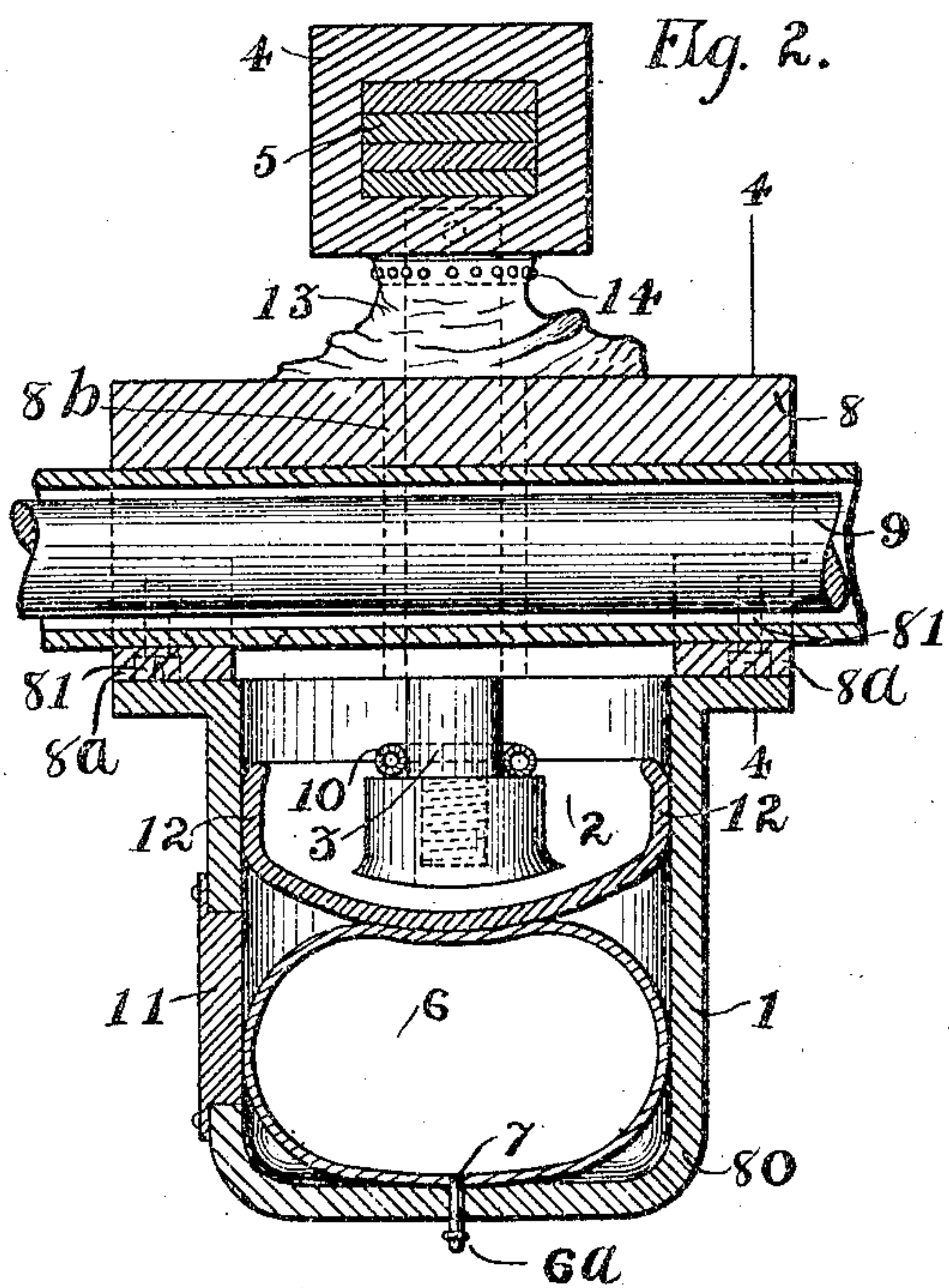


Fig. 2.

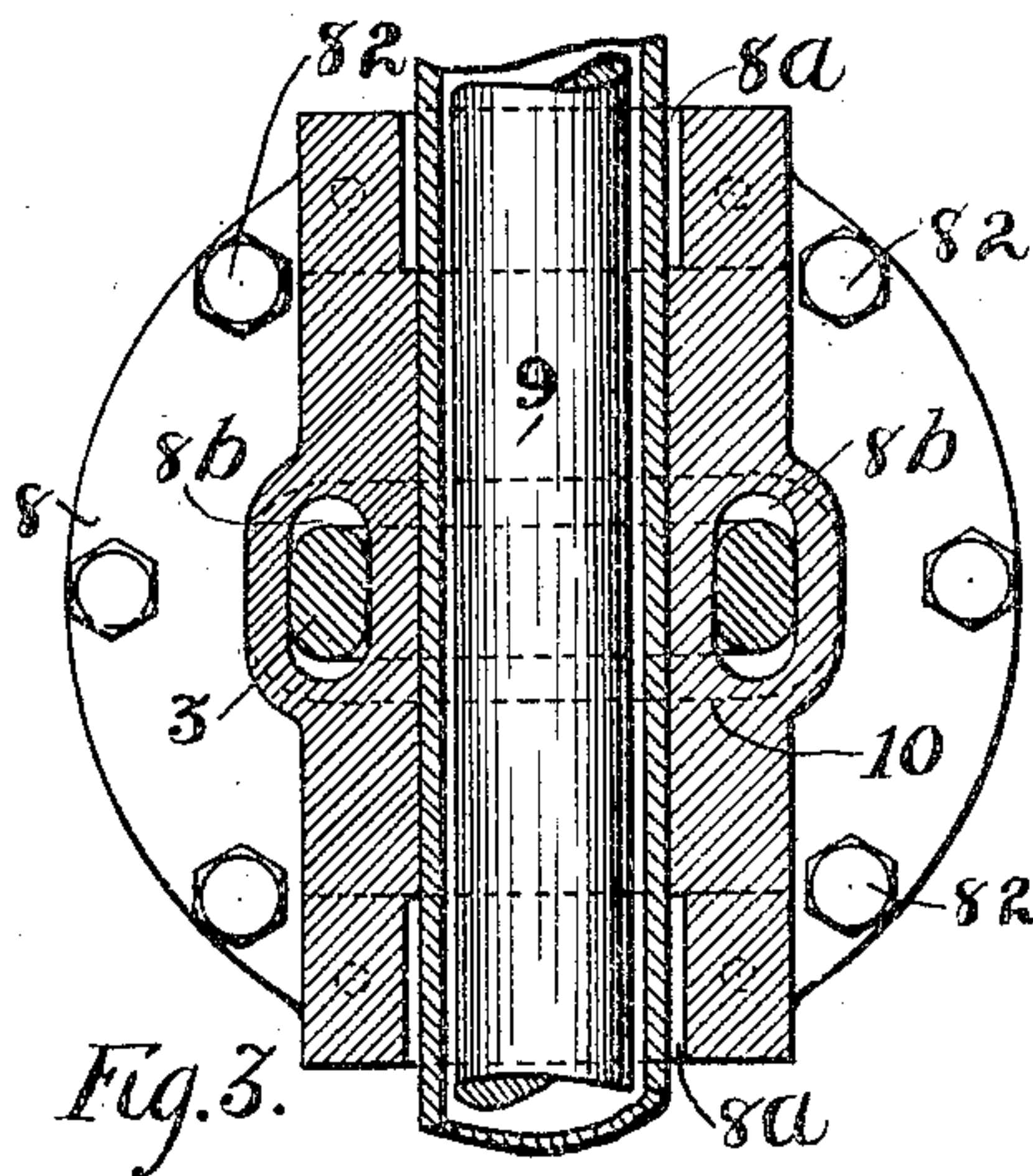


Fig. 3.

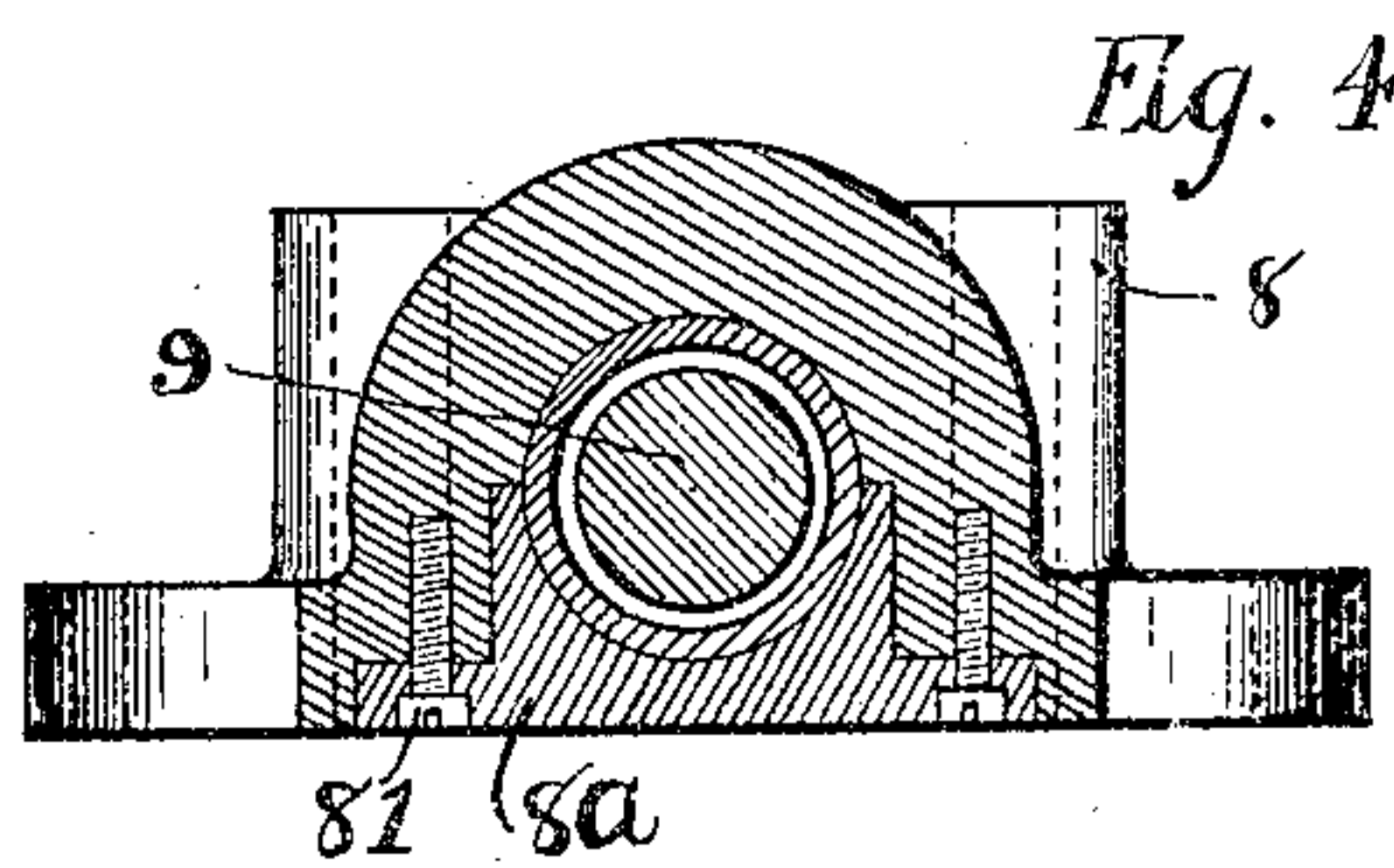


Fig. 4.

Witnesses:  
E. A. Allen.  
J. M. Laing.

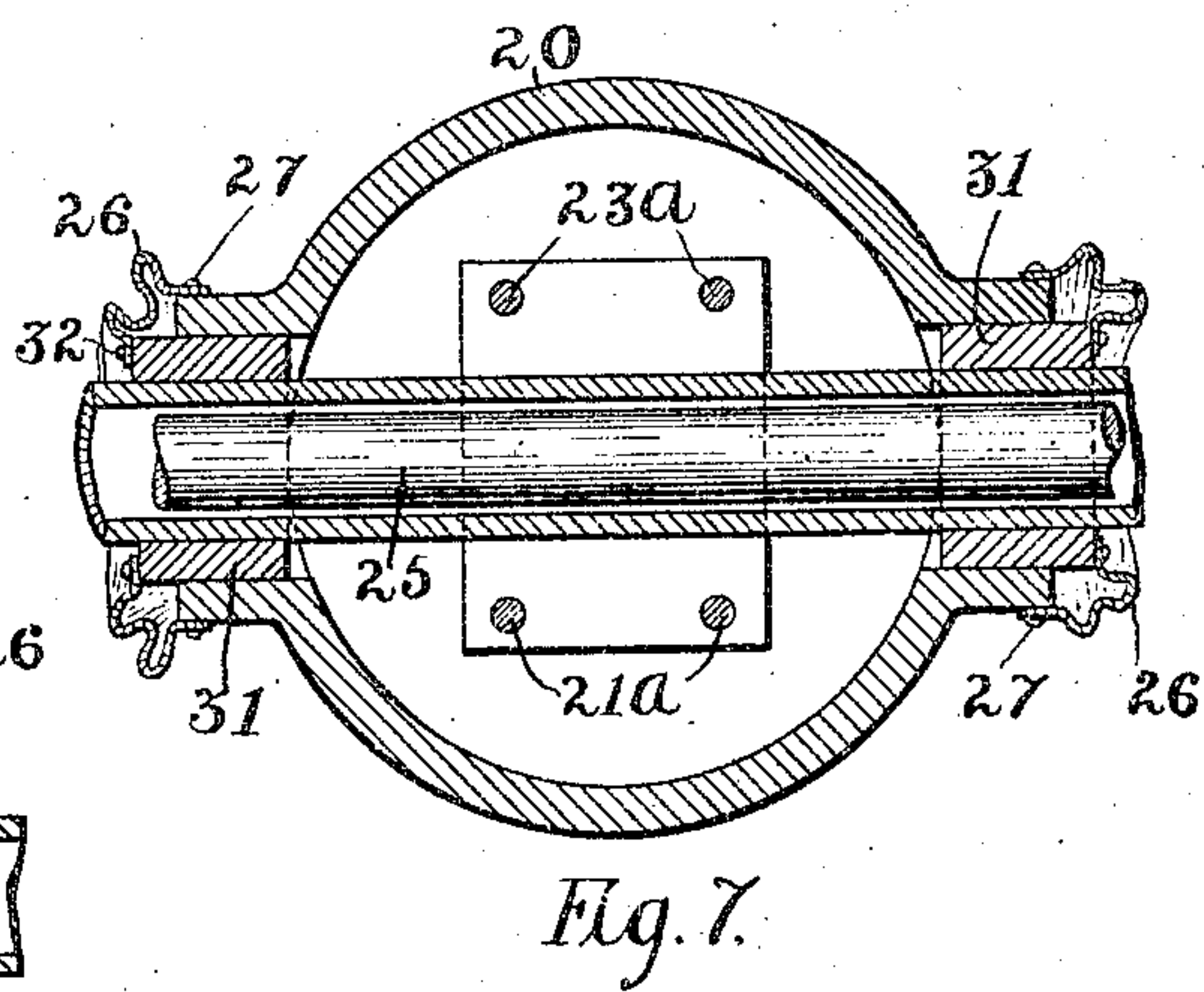
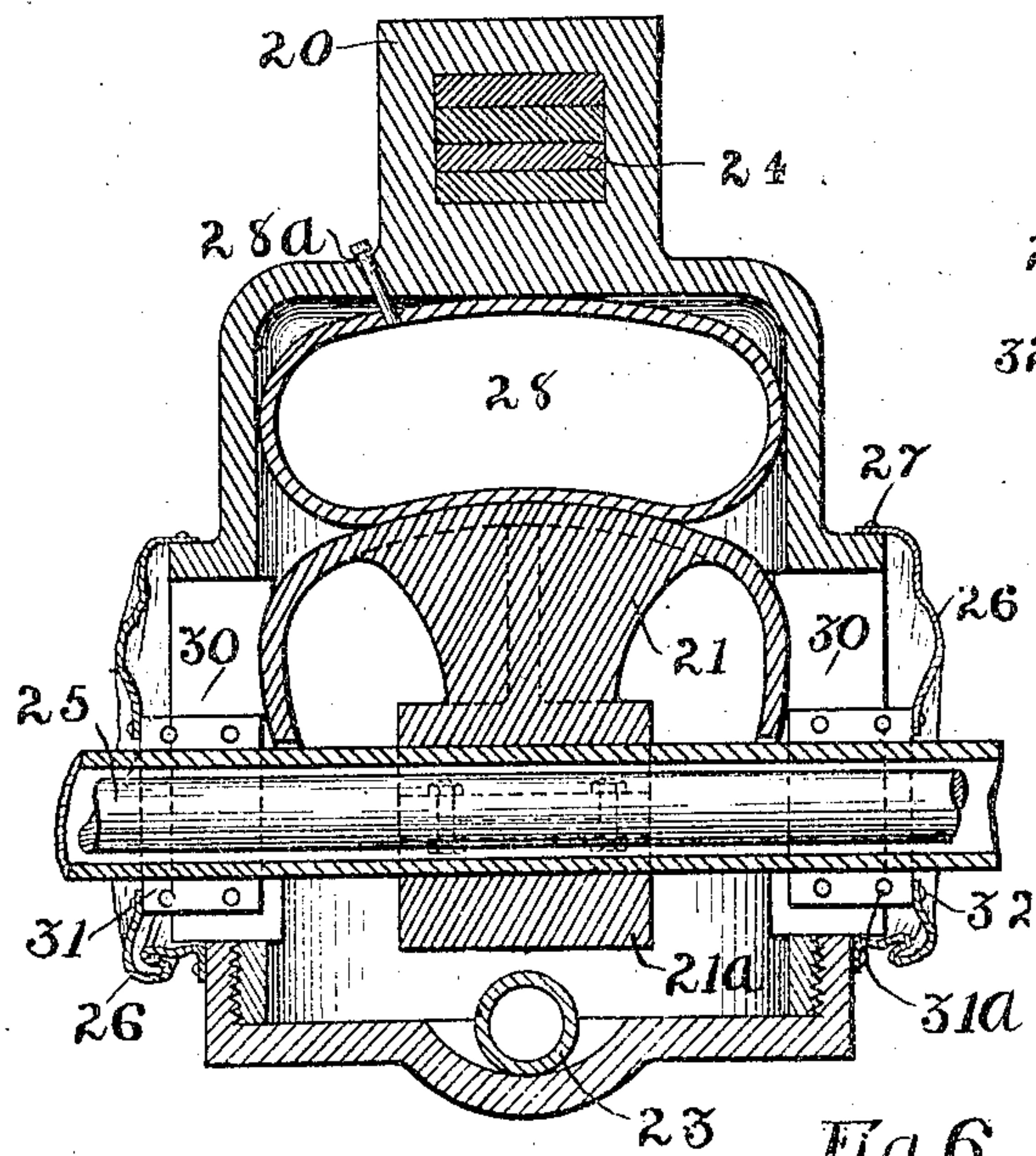
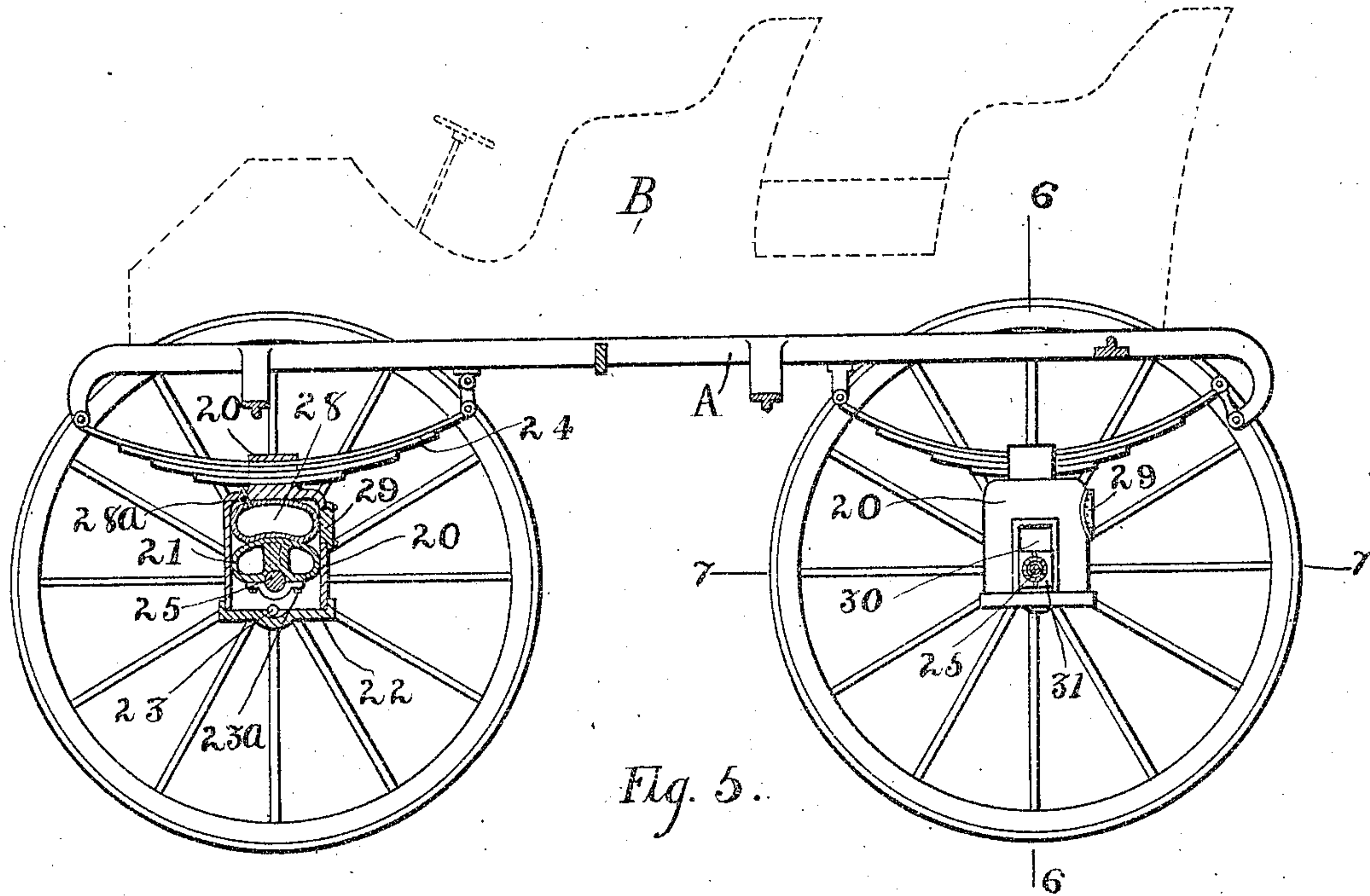
Inventor.  
James D. Colt  
by his attorney  
Edward S. Beach



J. D. COLT.  
VEHICLE.

APPLICATION FILED JAN. 27, 1904.

4 SHEETS—SHEET 2.



Witnesses:  
E. A. Allen.  
J. M. Laing.

Inventor.  
James D. Colt  
by his attorney  
Edward S. Beach

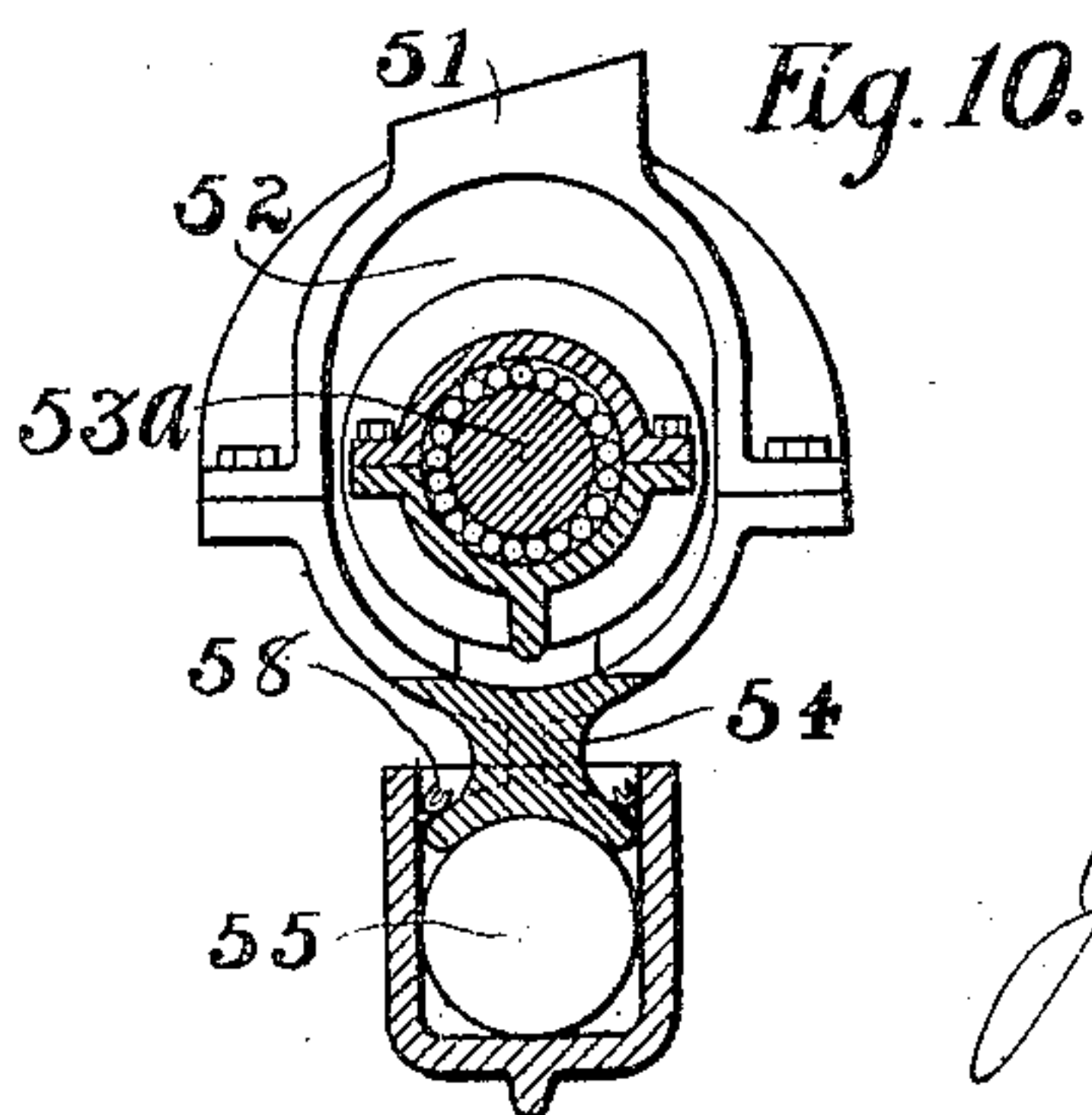
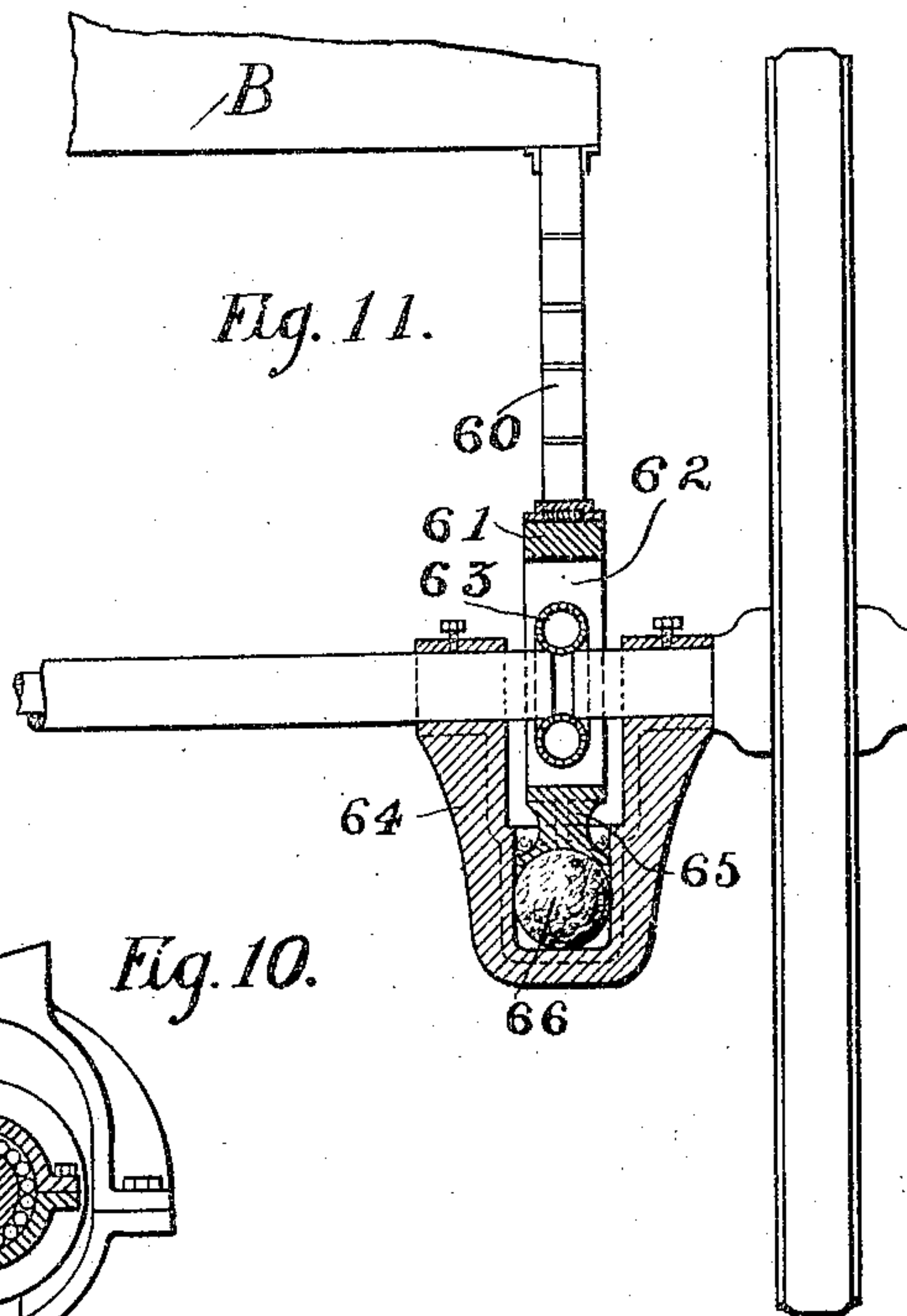
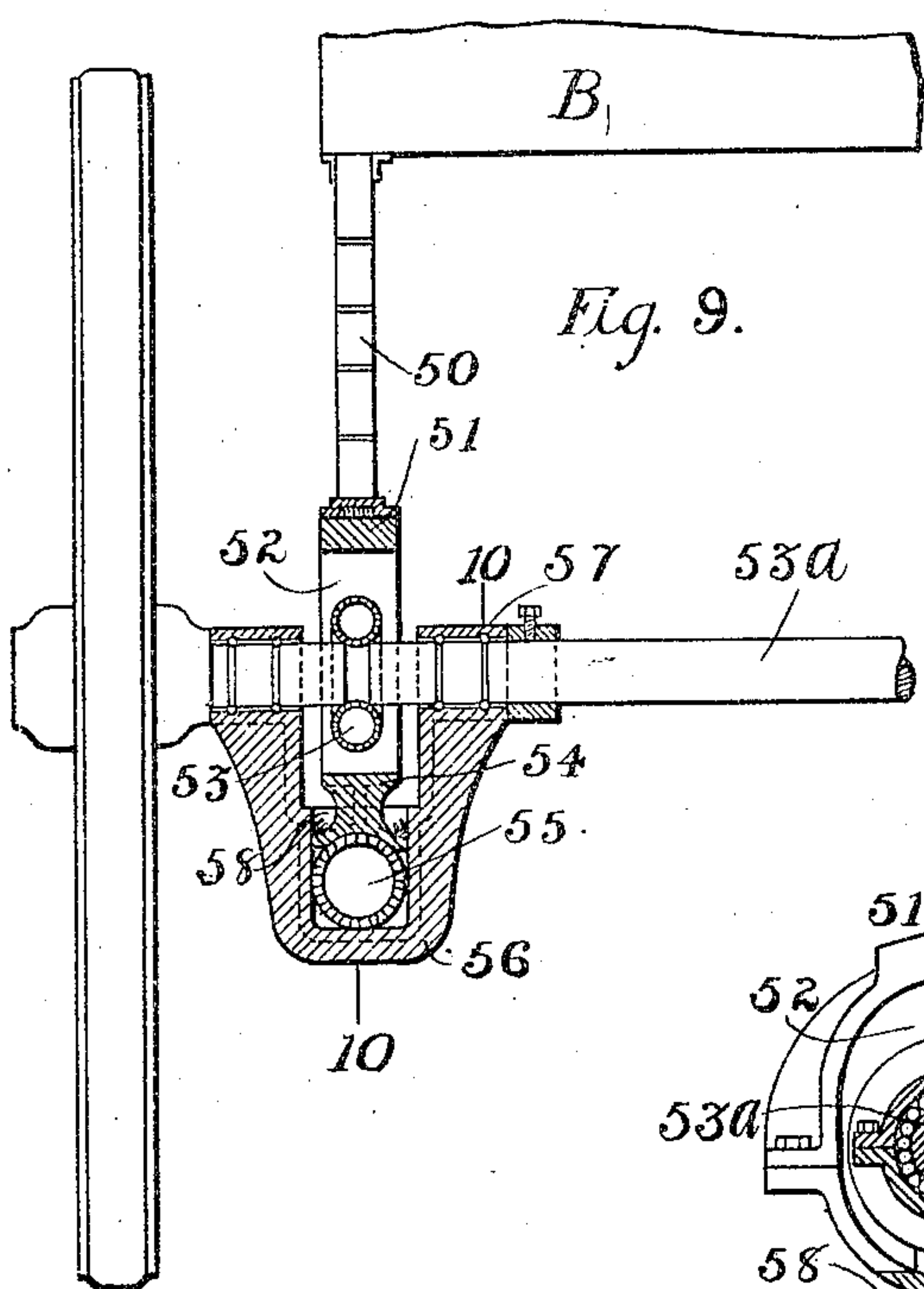
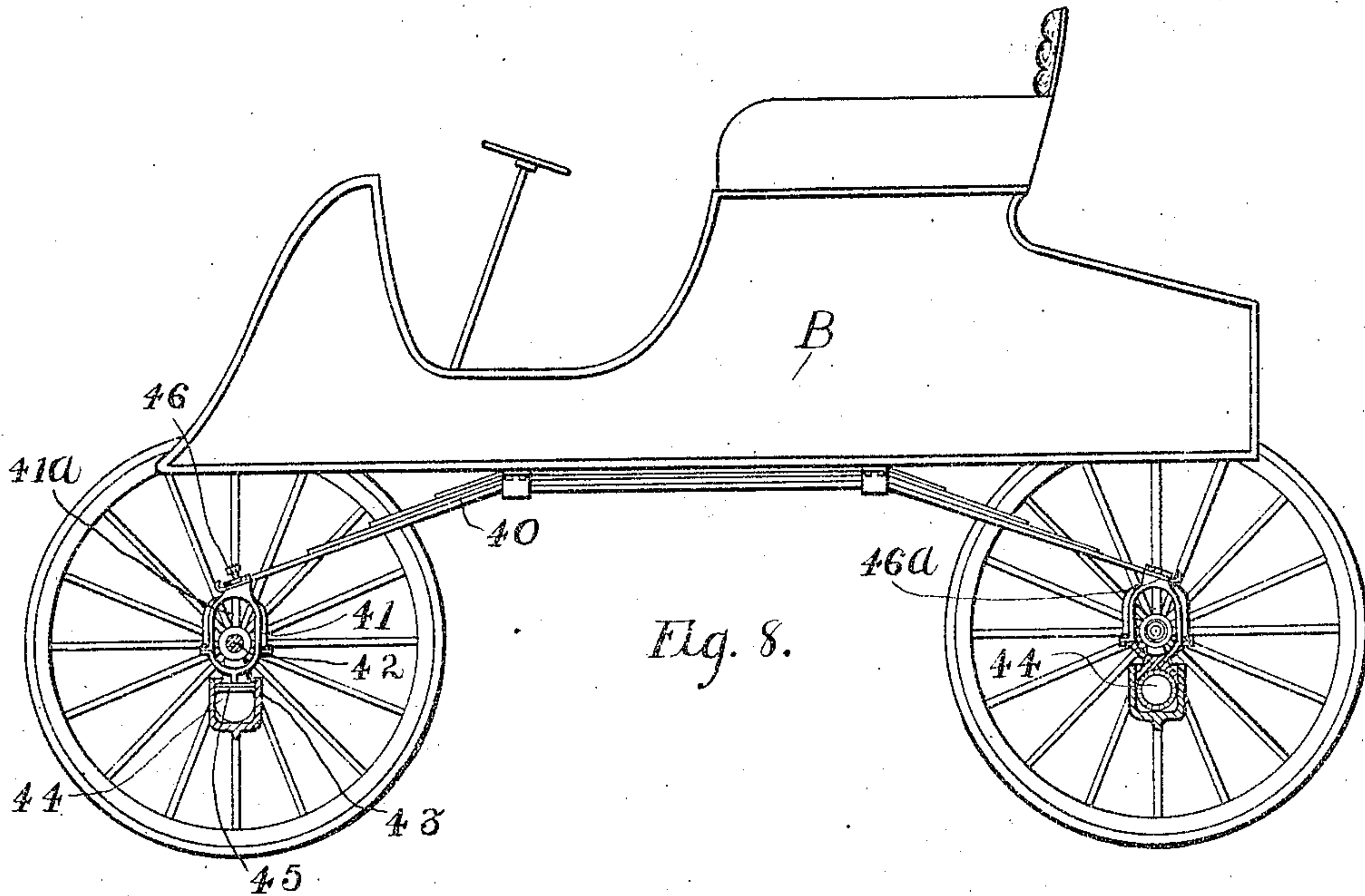
No. 789,840.

PATENTED MAY 16, 1905.

J. D. COLT.  
VEHICLE.

APPLICATION FILED JAN. 27, 1904.

4 SHEETS—SHEET 3.



Witnesses:  
E. A. Allen.  
J. M. Laing.

Inventor.  
James D. Colt  
by his attorney  
Edward S. Beach



J. D. COLT.  
VEHICLE.

APPLICATION FILED JAN. 27, 1904.

4 SHEETS—SHEET 4.

Fig. 12.

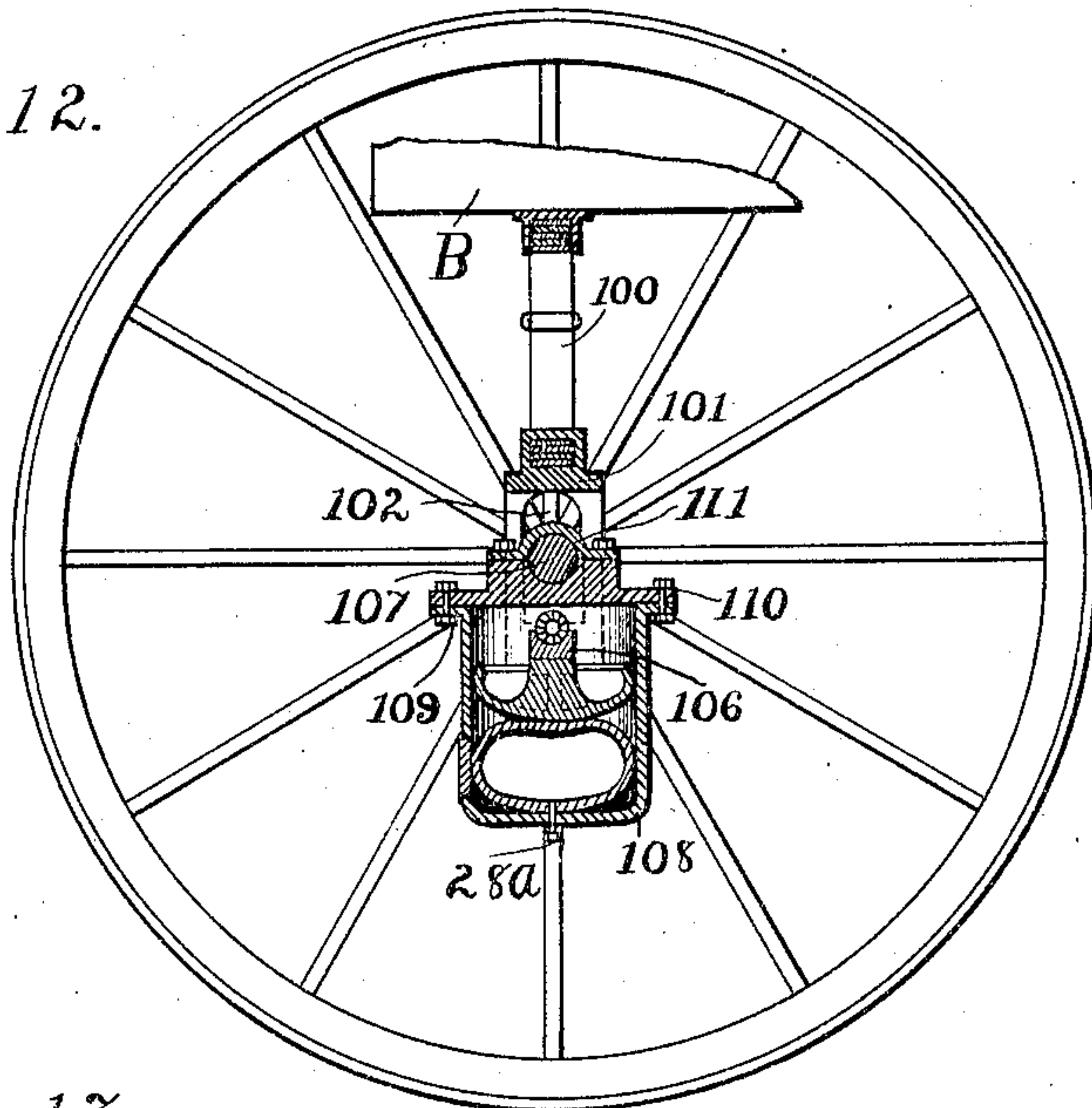


Fig. 13.

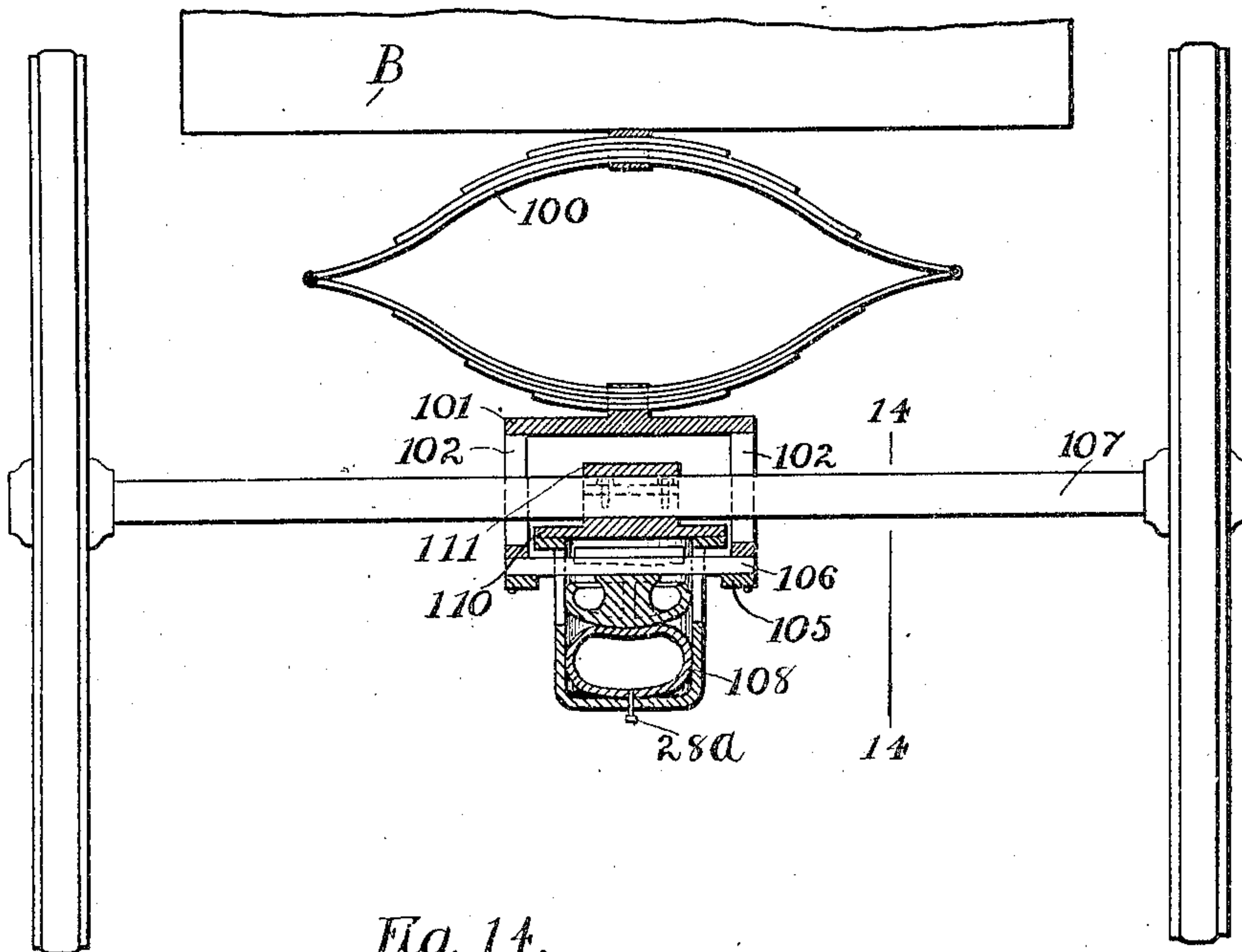
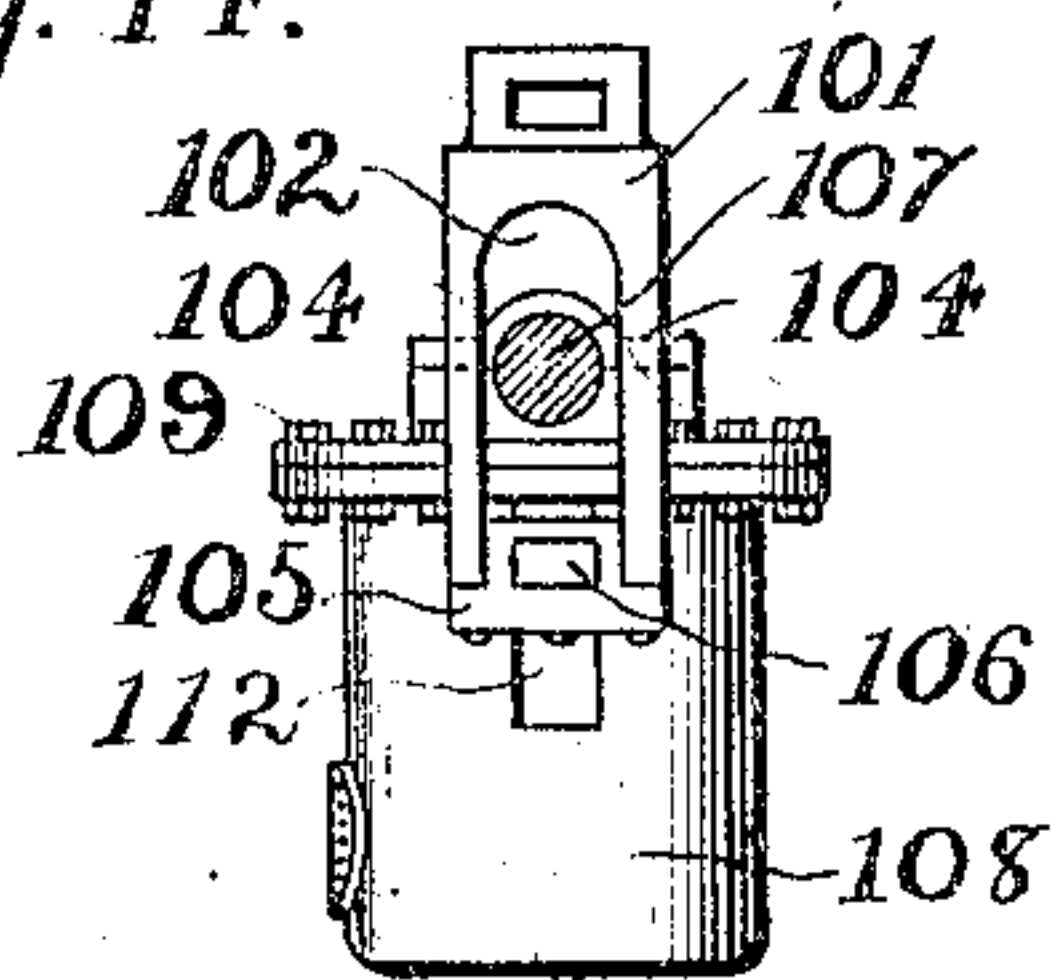


Fig. 14.



Witnesses.  
E. A. Allen.  
J. M. Loring.

Inventor.  
James D. Colt  
By his attorney  
Edward S. Beach



# UNITED STATES PATENT OFFICE.

JAMES D. COLT, OF NEWTON, MASSACHUSETTS.

## VEHICLE.

SPECIFICATION forming part of Letters Patent No. 789,840, dated May 16, 1905.

Application filed January 27, 1904. Serial No. 190,861.

*To all whom it may concern:*

Be it known that I, JAMES D. COLT, a citizen of the United States, residing at Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Vehicles, of which the following is a specification, reference being had therein to the accompanying drawings.

Figure 1 is a side elevation of a vehicle embodying my invention. Fig. 2 is a vertical section on line 2 2 of Fig. 1, showing the vehicle-spring, mushroom-headed plunger, pneumatic cushion, and plunger-box, with other parts of my invention. Fig. 3 is a transverse horizontal sectional view at line 3 3 of Fig. 1 looking down and particularly showing the transverse slots in which the plunger-rods play crosswise of the vehicle when one side of the vehicle is lifted higher than the other side. Fig. 4 is a sectional detail at line 4 4 of Fig. 2 and shows the cushion-box head through which the axle passes. Figs. 5 to 14, inclusive, show modifications. Fig. 5 shows the cushion on top of the plunger, which is supported on the axle. Fig. 6 is a sectional detail on line 6 6 of Fig. 5, and Fig. 7 is a sectional detail on line 7 7 of Fig. 5. Figs. 8, 9, 10, and 11 show details in section of a construction in which the cushion-box is suspended from the axle and the plungers at the front and rear axles are connected by side springs of the vehicle. Figs. 12, 13, and 14 show details of a construction whereby the vehicle-body and an axle are connected by a transverse spring thereinbetween, the spring being indirectly connected with the plunger and the cushion-box being suspended from the axle.

The object of my invention is to provide an improved elastic connection of any kind of a vehicle-body with any kind of an axle.

In the drawings illustrating the preferred form of my invention, which may be embodied in various forms without departure from the spirit of my invention, 1 is the cushion-box, which is substantially closed—that is, formed without openings through which the elastic walls of the cushion when under alternating compression and expansion would be forced, and consequently worn and abraded. The

cushion-box is of metal or other rigid material and, in effect, is similar to an ordinary piston-cylinder. The walls of the cushion-box should be imperforate when in use at all points opposed to the pneumatic cushion and are so shown, to the end that the inner walls of the cushion-box may afford a non-abrasive continuous rigid support for the outer walls of the pneumatic cushion as it moves under compression and expansion. This is important to the resiliency, durability, and economy of the cushion. 2 is the mushroom-headed plunger, which reciprocates in said box against the cushion; 3, the plunger-rods; 4, a bracket fast on the vehicle-spring 5, which may be of any proper form. Bracket 4 carries plunger-rods 3, which depend from the under surfaces of the bracket on the vehicle-spring.

6 is a pneumatic cushion within the cushion-box. The end of the cushion-box on the inner side is preferably concave or rounded, as at 80, so that when the cushion is compressed its walls will be forced against concave surfaces and not into angular corners, which would tend to the disintegration of the walls of the pneumatic cushion 6. A valve 7 is provided for the cushion and is accessible from the outside, so that the cushion may be inflated, if desired, by an air-pump after the manner of inflating pneumatic tires.

The mushroom head permits rolling contact with it of the opposed cushion-wall and eliminates sliding contact, which would produce heat from friction. If the inner end of the plunger were flat instead of convex, its compressive movement toward the cushion would cause the cushion-wall to assume during the compression-stroke angularity at the corner formed by the flat face of the plunger-head and the side wall of the cushion-box. It is therefore advantageous for the elimination of friction, as aforesaid, to make the plunger-head convex.

Plunger-rods 3 pass loosely through cushion-box head 8, which is provided with transverse slots 8<sup>b</sup>, so that when the vehicle is canted the rods 3 may move slightly laterally. In this movement the mushroom head permits a rolling contact with it of the opposed wall of the cushion 6 and prevents the



inner wall of the cushion-box from binding on the edge of the plunger to any undue extent. Cushion-box head 8 is formed in any suitable manner for the passage therethrough of any suitable kind of an axle 9. Between plunger 2 and cushion-box head 8 springs 10 of any suitable construction, such as rubber blocks, are preferably interposed.

Cushion-box 1 is preferably provided with a movable and accessible section 11, through which the cushion 6 may be passed when desired.

The contacting periphery of the plunger-head with the cushion-box wall is preferably reduced to the lowest practical dimensions, as at 12, so as to prevent the periphery of the plunger-head from binding on the cushion-box when the vehicle is canted.

A dust-guard 13, which may be of leather, is provided, one end of it being made fast to bracket 4 at 14, the dust-guard in this case being, say, of leather and in the shape of a truncated cone, so that when bracket 4, which depends from the vehicle-spring, moves downwardly, carrying plunger-rods 3 of the plunger against the cushion 6, the leather or pliable portion of the dust-guard 13 works somewhat after the fashion of an accordion plait.

The cushion-box head is provided with an under plate 8<sup>a</sup>, held in place by screws 81, the axle 9 being held in the recess which forms a bearing for the axle between the opposed surfaces of the plate 8<sup>a</sup> and head 8, and head 8 is held in place on the cushion-box by suitable screws 82 through the flange of the cushion-box into the under side of the head 8.

A spring 10, which may be a hollow rubber ring, is interposed between the opposed surfaces of the plunger-head and the cushion-box head, so that on the upward movement of the plunger shock is prevented.

In addition to the elasticity ordinarily obtained by vehicle-springs there is secured by my invention additional elasticity of connection between vehicle body and axle by means of the depending plunger, which coöperates with a pneumatic cushion or the like, preferably with an air-blown cushion, upon which the load is sustained.

In many uses the outer head of the plunger may be of other than convex form; but for heavily-loaded vehicles—such as railway-cars, automobiles, and the like—I prefer the convex head, because of the advantages set forth and also because it prevents the cushion-wall that contacts with it from being formed with irregular creases when compressed.

As shown in Fig. 1, my invention is combined with a typical top frame A, supporting the vehicle-body B. Vehicle-springs 5 of the top frame A are of typical construction. The valve-stem 6<sup>a</sup> permits attachment of an air-pump for inflating the cushion. In Figs. 5, 6, and 7, showing modifications, the top frame A and vehicle-body B are of the same typical

construction, as are also vehicle-springs 24. In this modification the cushion-box 20 is suspended from the under side of the vehicle-spring, while the equivalent of the mushroom plunger of the preferred form is indicated by 21 and extends upwardly from the axle 25, being suitably mounted thereon and contained, together with the cushion 28, in the plunger-box, which is provided with a head 22 and with an interior elastic cushion 23, which is adapted to contact with the opposed clamping plate or cap 21<sup>a</sup>, that holds the equivalent of the plunger 21 in place on the axle. The axle-box is provided with a side cover 29, through which the pneumatic cushion 28 may be passed when necessary for removal or replacement. This construction is the reverse of the preferred construction. The valve-stem 28<sup>a</sup> permits attachment of an air-pump for inflating the cushion. In Fig. 6 the pneumatic cushion 28 is provided with a valve-stem 28<sup>a</sup>, which extends through a wall of the cushion-box 20. This figure illustrates a transverse sectional detail and shows one mode of applying my invention. Fig. 6 is a section at line 6 6 of Fig. 5 and illustrates a rear-axle construction, which is substantially the same as the front-axle construction shown in Fig. 5. In Fig. 6 the plunger is formed with a central lengthwise-chambered shank, which, with the cap 21<sup>a</sup>, incloses the axle. Fasteners 23<sup>a</sup> hold cap 21<sup>a</sup> on the part 21. The dust-guard 26, of flexible material—leather or rubber—is fast at 27 to the cushion-box and at 32 to the split collar 31, which surrounds the axle and the halves of which are secured together by pins 31<sup>a</sup>. Dust-guard 26 covers the vertical slots 30 in the side walls of the cushion-box, these vertical slots 30 being provided to permit the cushion-box to reciprocate over the axle. In Fig. 7, which is a section on line 7 7 of Fig. 5 looking down, the construction indicated in Fig. 6 is further shown.

In Fig. 8, showing another modification, the vehicle-spring 40 extends lengthwise of the body B and is fast to the under side thereof. The downwardly-extending forward end of the spring 40 is made fast at 46 to the upper end of the plunger-shank 41, which is formed with a vertical slot 41<sup>a</sup>, through which the axle 42 passes. The cushion-box 43 is provided with a pneumatic cushion 44, and the plunger 45 in this case has a slightly-concave head. The rear downward extension of spring 40 is mounted so that it can slide at 46<sup>a</sup>.

In Fig. 9 the vehicle-spring 50 from body B is attached to the plunger-shank 51, provided with a vertical slot 52, through which the axle 53<sup>a</sup> passes. A cushion, preferably in the form of a collar, is placed on the axle within the slot 52, so as to prevent shock. The plunger-head 54 is in this form concave and with the cushion 55 is contained in the cushion-box 56, which is suspended with a roller-bearing connection 57 from the axle.



A packing 58 forms the convenient dust-guard.

Fig. 10 illustrates a sectional detail at line 10 10 of Fig. 9.

5 In Fig. 11 the vehicle-spring 60 is fast to the plunger-shank 61, provided with a slot 62. A cushion-collar 63 is placed on the axle within slot 62, and the cushion-box is clamped on the outer member of the shaft. The plunger-  
10 head is made concave in this instance and co-operates with a ball-shaped cushion 66, which may be of sponge-rubber.

In Figs. 12, 13, and 14 I show another modification in which the vehicle-spring 100 extends parallel with the axle and is interposed between the axle and the body B. In this form a casing 101, slotted at 102, depends from the under side of the vehicle-spring, the axle passing through the slots  
20 102. Frame 101 is in the shape of a four-legged table, and to the leg portions 104 of the frame a block 105 is made fast. A bar 106 passes through block 105, parallel with the shaft. On axle 107 the cushion-box 108  
25 is hung, its flange being clamped at 109 to the flange of a half-bearing 110, which in turn is clamped to the other half of the bearing 111, the axle passing through this bearing. Cushion-box 108 is provided with a  
30 lengthwise-vertical slot 112.

In Fig. 9 the cushion is a hollow sphere of elastic material. In Fig. 11 the cushion is of sponge-rubber. In both cases they are pneumatic.

35 One of the advantages of my invention is that it may render unnecessary the use of expensive pneumatic tires on vehicles provided with my invention, which permits free play of the vehicle-springs and coöperates there-  
40 with to take up and overcome at the axle the vibrations heretofore sought to be eliminated by use of rubber cushions as substitutes for ordinary vehicle-springs or by pneumatic tires.

45 The rounded edge of the plunger of itself in some uses will suffice to permit canting of the vehicle-body without binding; but in other uses the plunger should have lateral play for reasons stated. In such constructions as re-  
50 spectively shown in Figs. 9, 11, and 13, for example, the slots 52, 62, and 102 permit the canting of the vehicle-body in relation to the axle, or vice versa, and performs in this respect the function of slots 8<sup>b</sup> in Fig. 3.

55 In all forms of my invention herein illustrated the axle passes practically through the plunger—that is, the plunger has parts (such as the plunger-rods 3 in Fig. 1) between which the axle passes. Thus the plunger  
60 straddles the axle and the load is distributed on each cushion in a cushion-box evenly on

both sides of the axle, whereby undue strains are minimized and binding of the plunger and cushion-box by jolting, canting, and the like largely neutralized.

65

What I claim is—

1. The combination of a vehicle-body and axle with a plunger and cushion-box; a vehicle-spring; a spring which takes up the shocks of rebounds; the plunger and cushion-box be-  
70 ing relatively movable one in relation to the other; and means which permit lateral movement of the vehicle-body without immediate strain on the plunger and cushion-box.

2. The combination of a cushion-box; a  
75 pneumatic cushion; a plunger; a cushion-box head having a transverse slot; and a plunger-rod passing through said slot and having lateral play therein.

3. The combination of a vehicle-spring with  
80 a plunger mounted thereon and having a convex head; and a cushion-box, the end wall of which, opposite the plunger-head, is concave; a pneumatic cushion in said box; means for attachment of a device for inflating it; a closed  
85 opening in the cushion-box for removal of the cushion without separation of the plunger and cushion-box; and means which permit lateral movement of the vehicle-body without immediate strain on the plunger and cushion-  
90 box; the plunger and box being relatively movable, one in relation to the other.

4. The combination of a vehicle-body and axle with a vehicle-spring; a plunger having a plurality of shanks; a cushion-box; a head  
95 therefor having transverse slots through which the plunger-shanks pass, and in which the shanks have lateral play, in the direction of the length of the axle; and a cushion in said box.

100

5. The combination of a vehicle-body and axle with a plunger; a cushion-box and a pneumatic cushion therein; the plunger having a sliding fit in the cushion-box, and having its edge that is in contact with the opposed wall  
105 of the cushion-box, rounded to permit canting of the vehicle-body without binding on the cushion-box.

6. The combination with a vehicle-body and an axle of a vehicle-spring; a cushion-box; a  
110 cushion therein; and a plunger movable against the cushion; the cushion-box and plunger being movable one in relation to the other; and the plunger having parts between which the axle passes.

115

In testimony whereof I affix my signature in presence of two witnesses.

JAMES D. COLT.

Witnesses:

EDWARD S. BEACH,  
E. A. ALLEN.