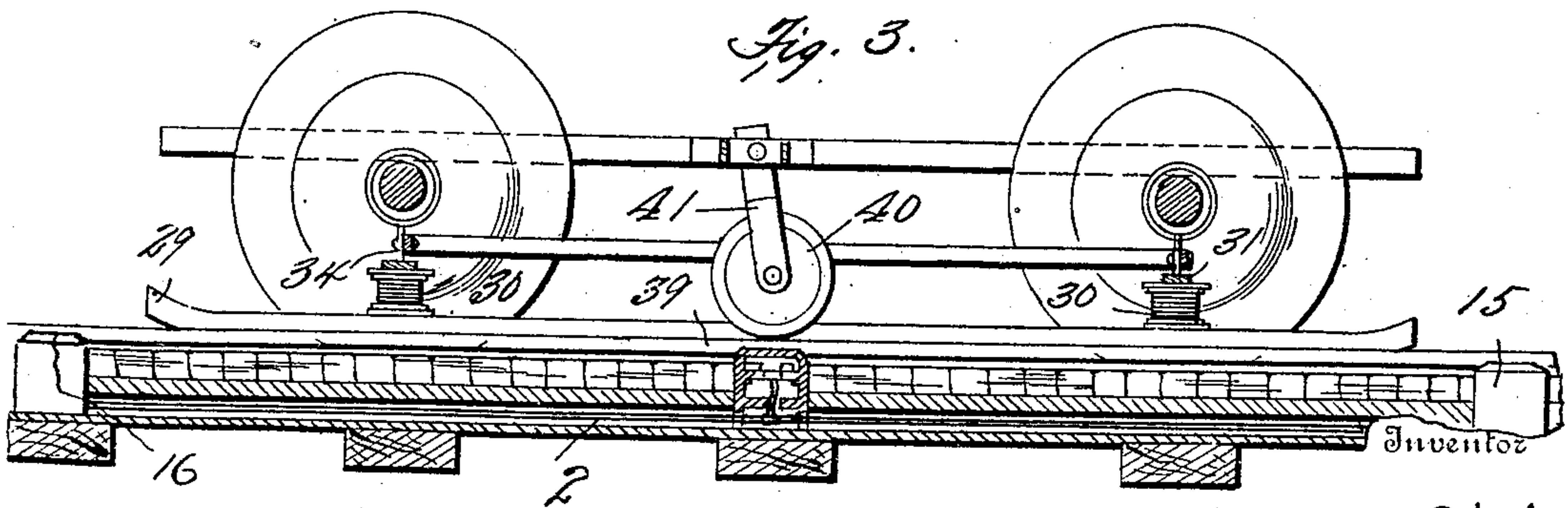
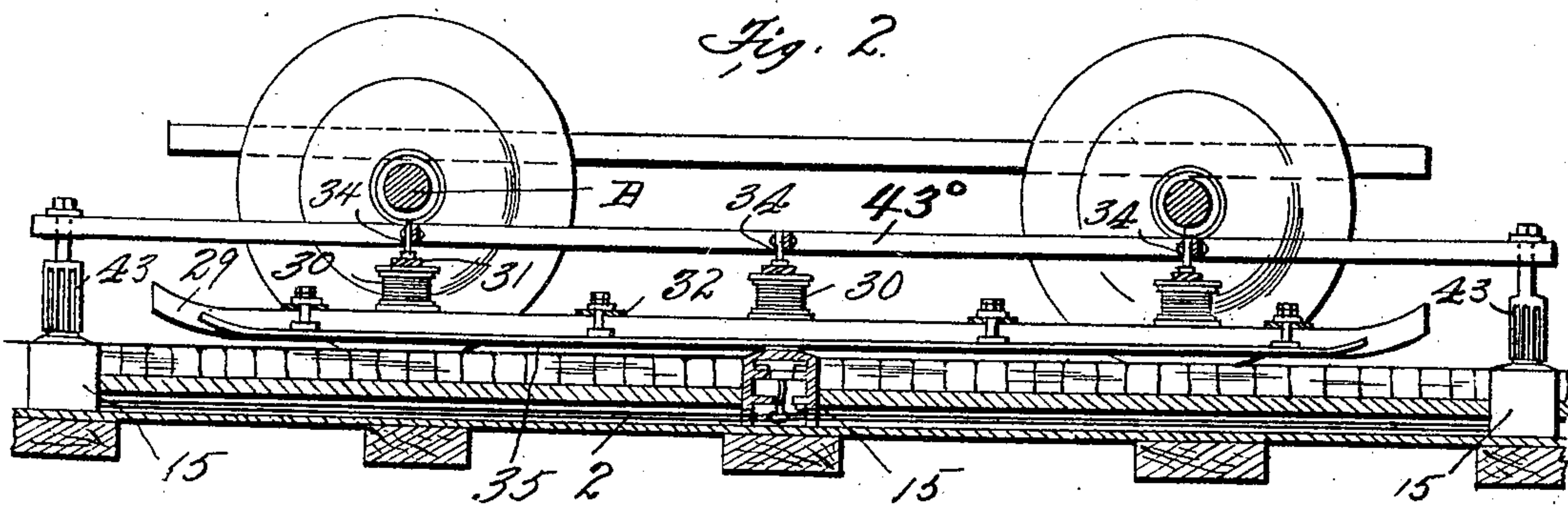
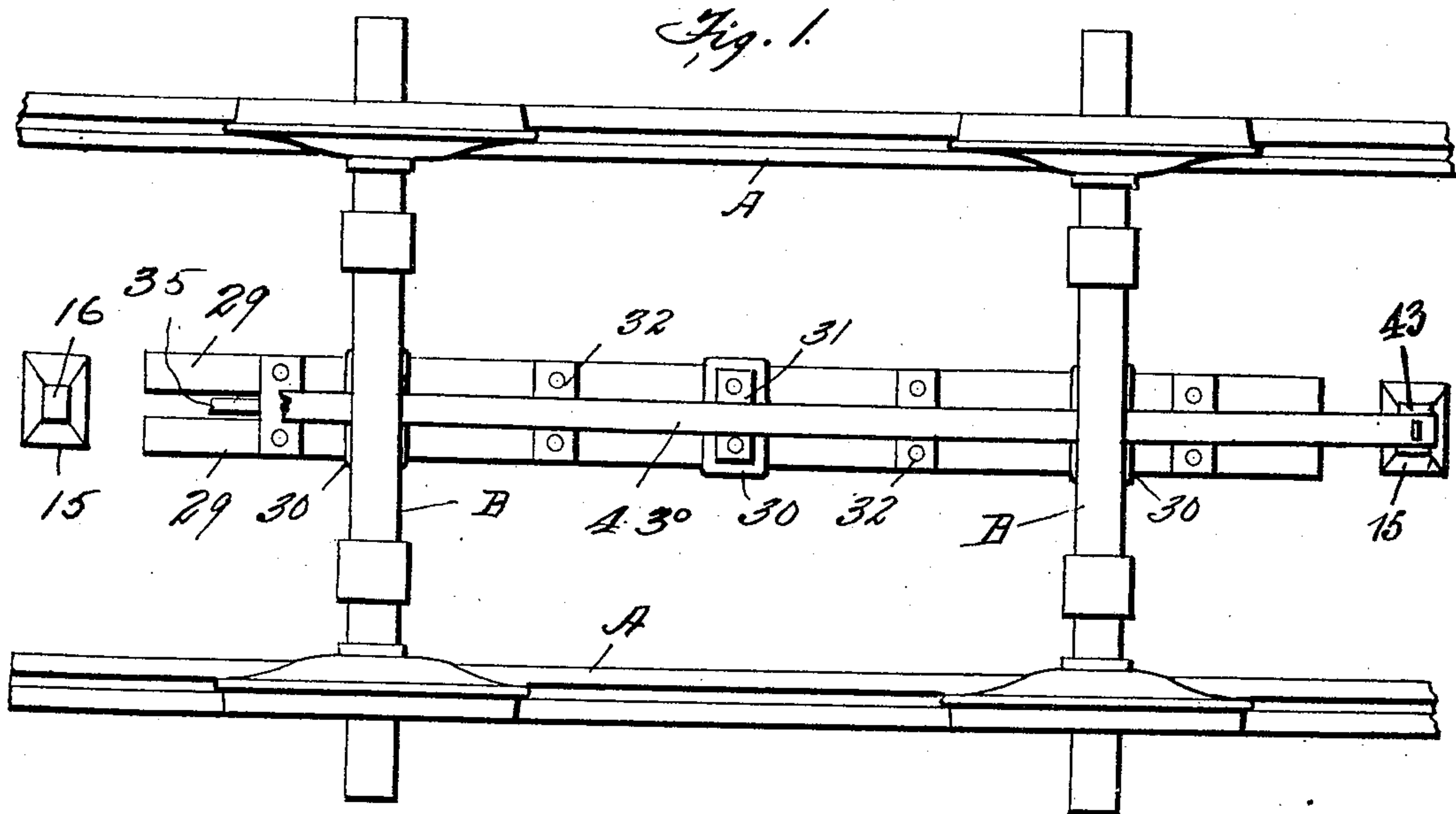


W. M. STEPHENS.
ELECTRIC RAILWAY SYSTEM.
APPLICATION FILED JAN. 4, 1907.

940,211.

Patented Nov. 16, 1909.

4 SHEETS—SHEET 1.



Witnesses
Chas. K. Davis

John S. Powers

By

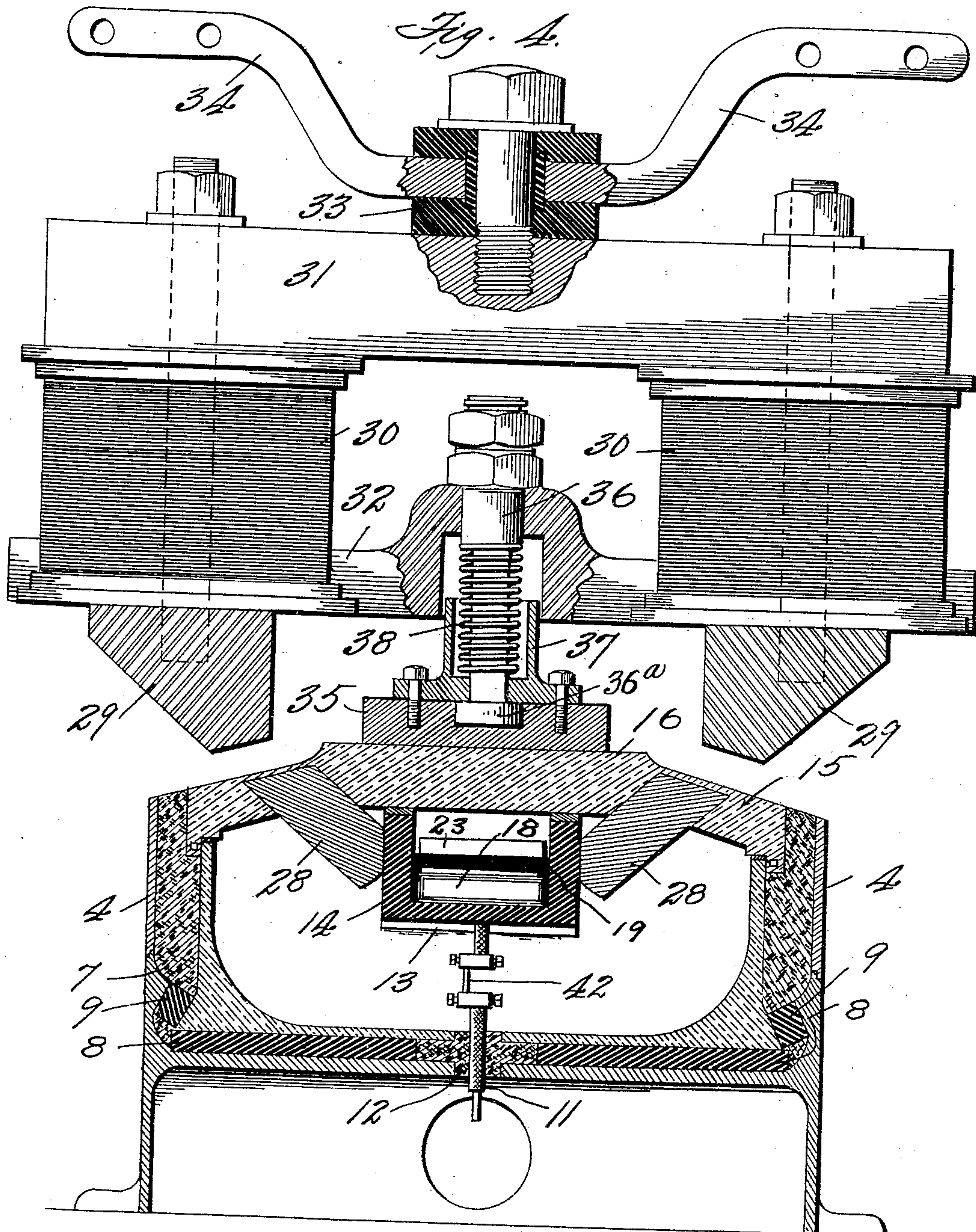
William M. Stephens
Shepherd Parkes
Attorney

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4 SHEETS—SHEET 2.



Inventor

William M Stephens

Witnesses

Chas. R. Davis

John P. Brown

By

Shepherd Parker

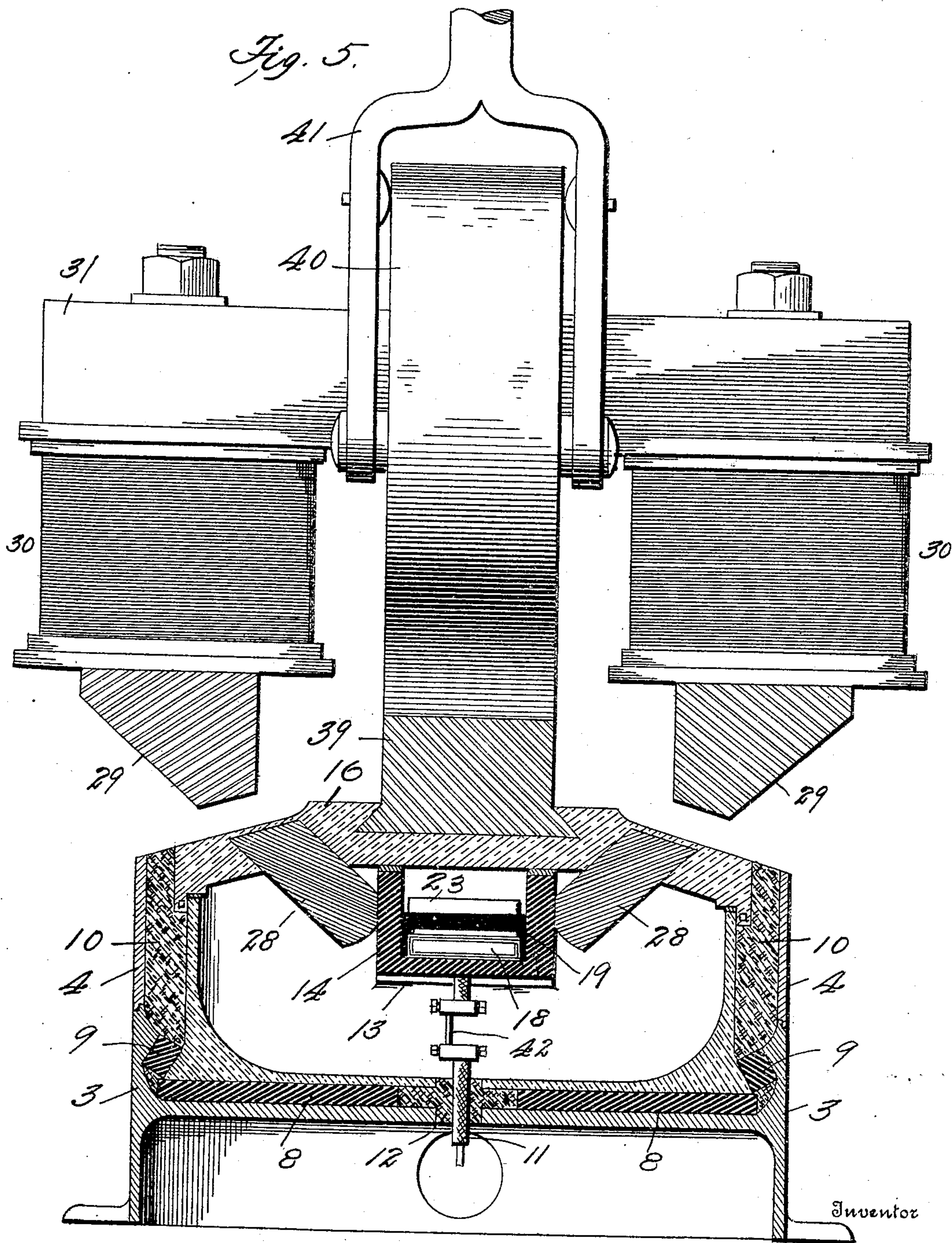
Attorney

940,211.

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APPLICATION FILED JAN. 4, 1907.

Patented Nov. 16, 1909.

4 SHEETS—SHEET 3.



Witnesses
Chas. K. Davis

John P. Paine

William M. Stephens

By

Shepherd & Parker
Attorney

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Patented Nov. 16, 1909.

4 SHEETS—SHEET 4.

Fig. 6.

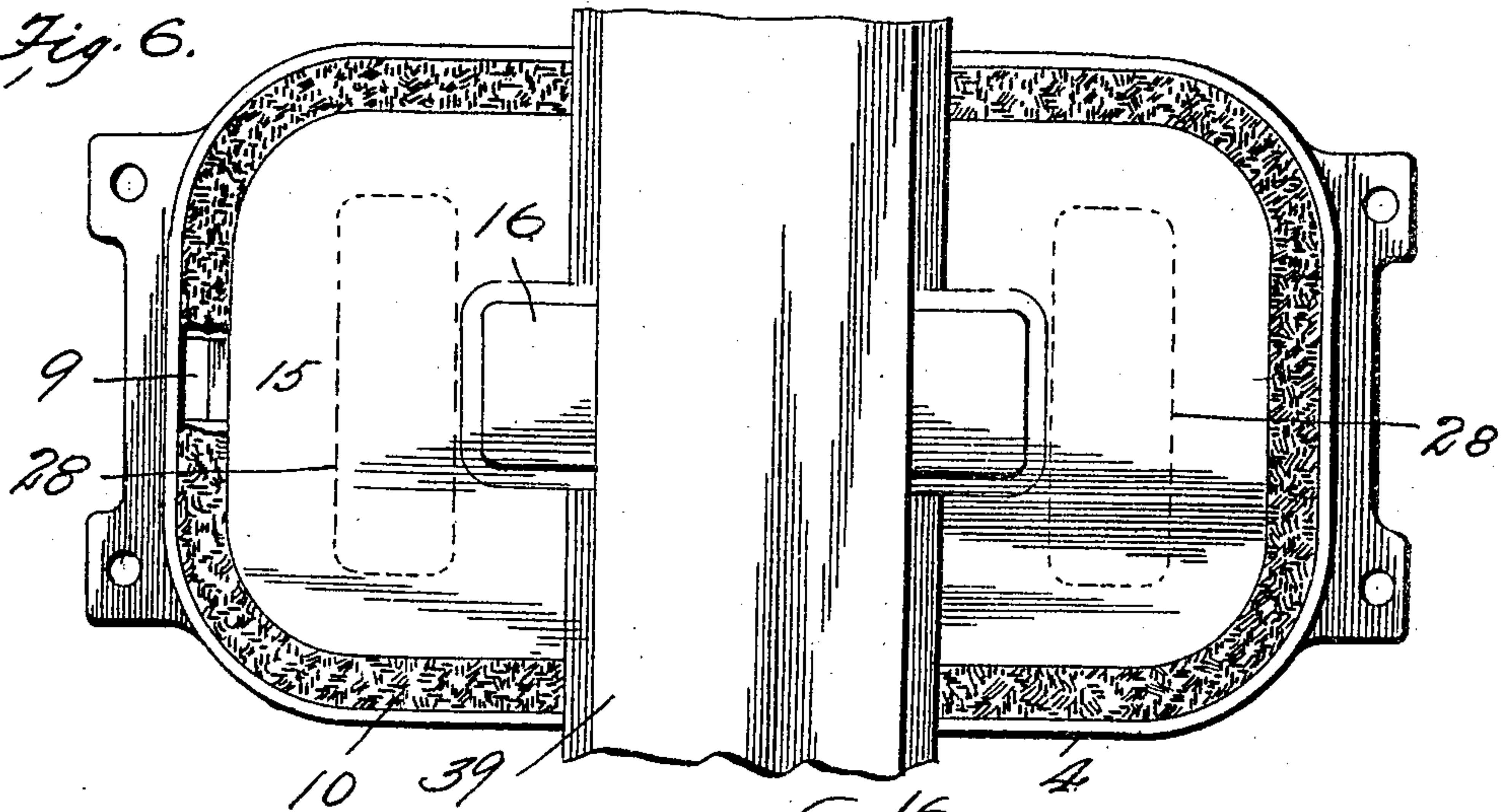


Fig. 7.

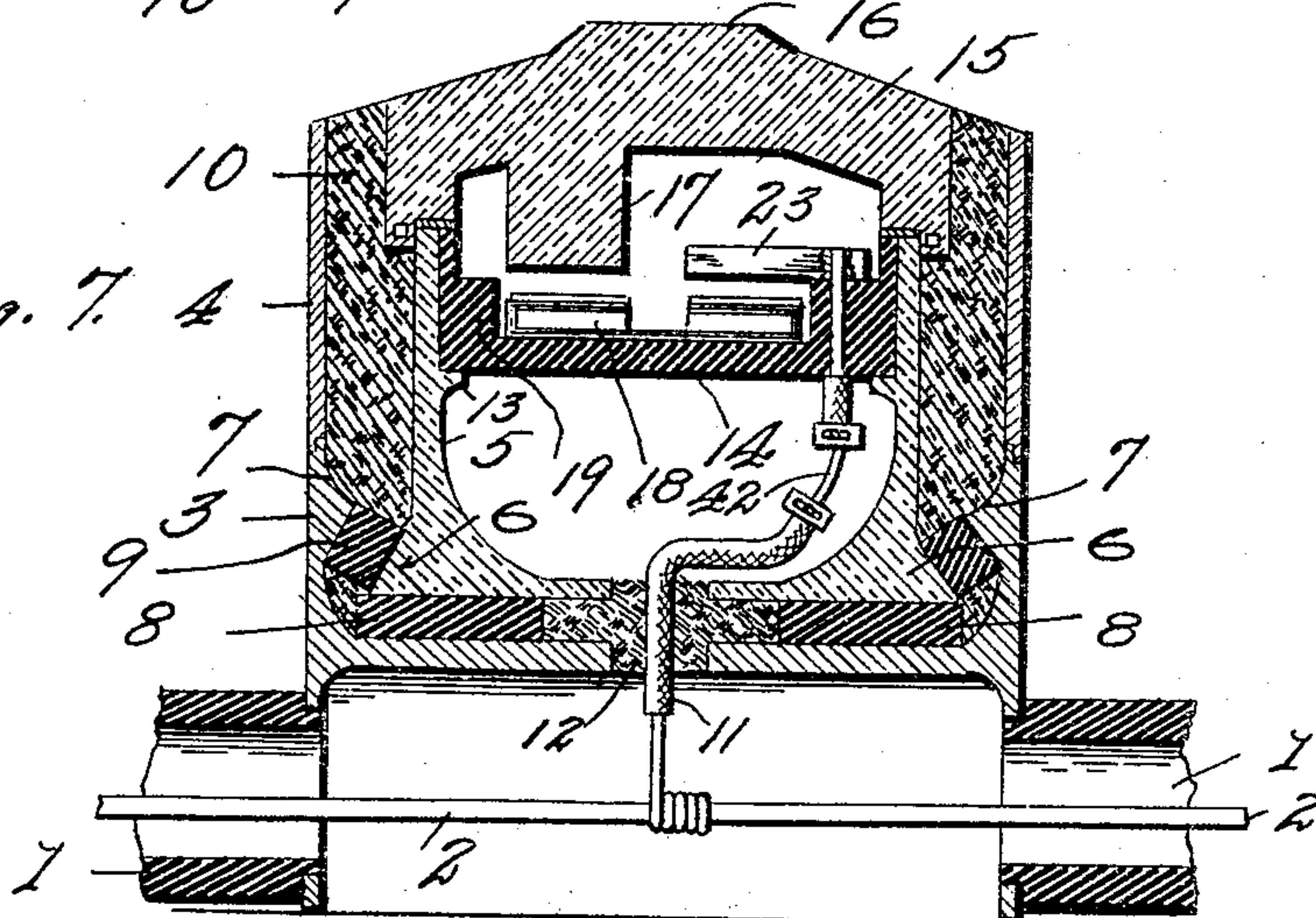
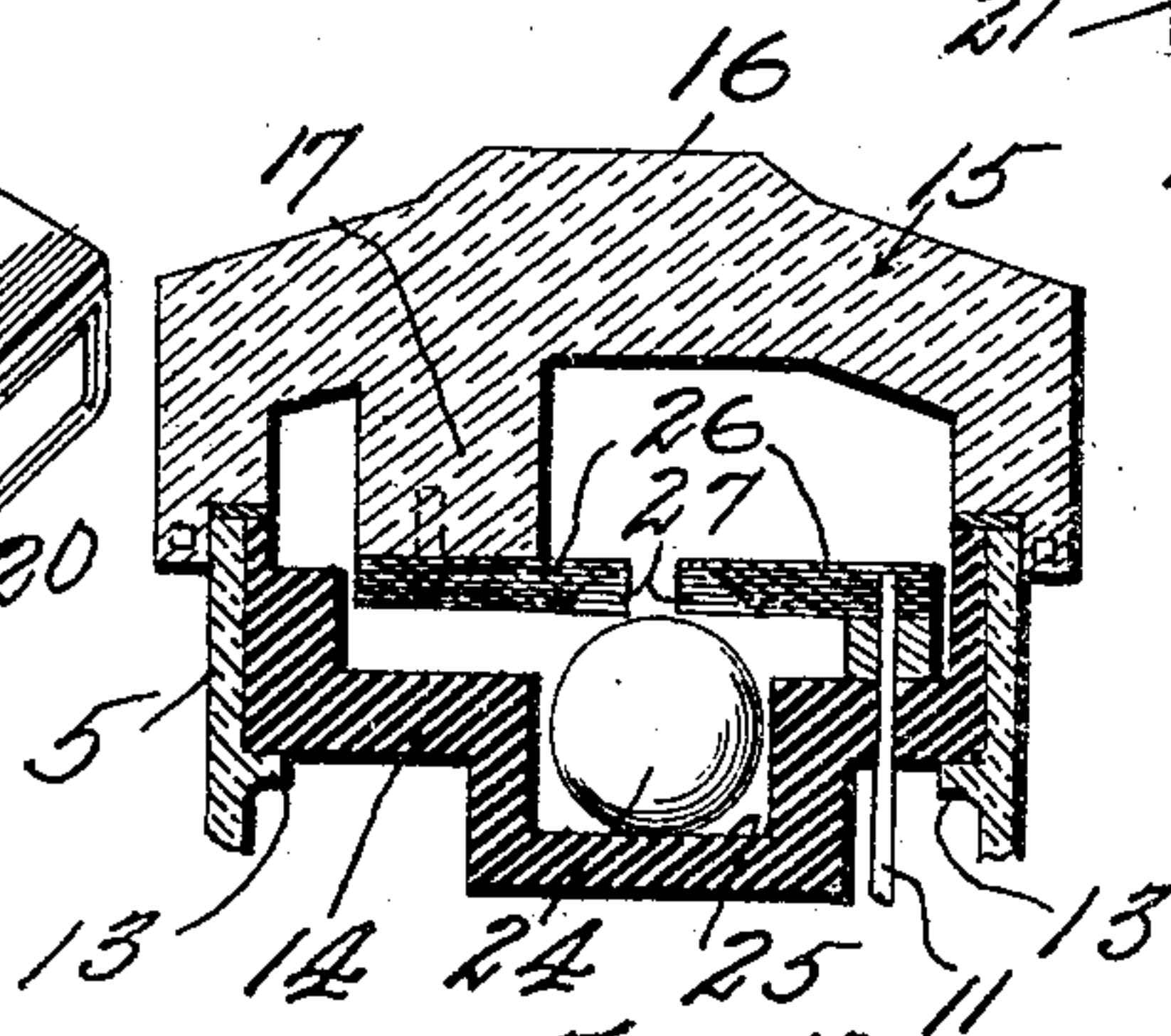
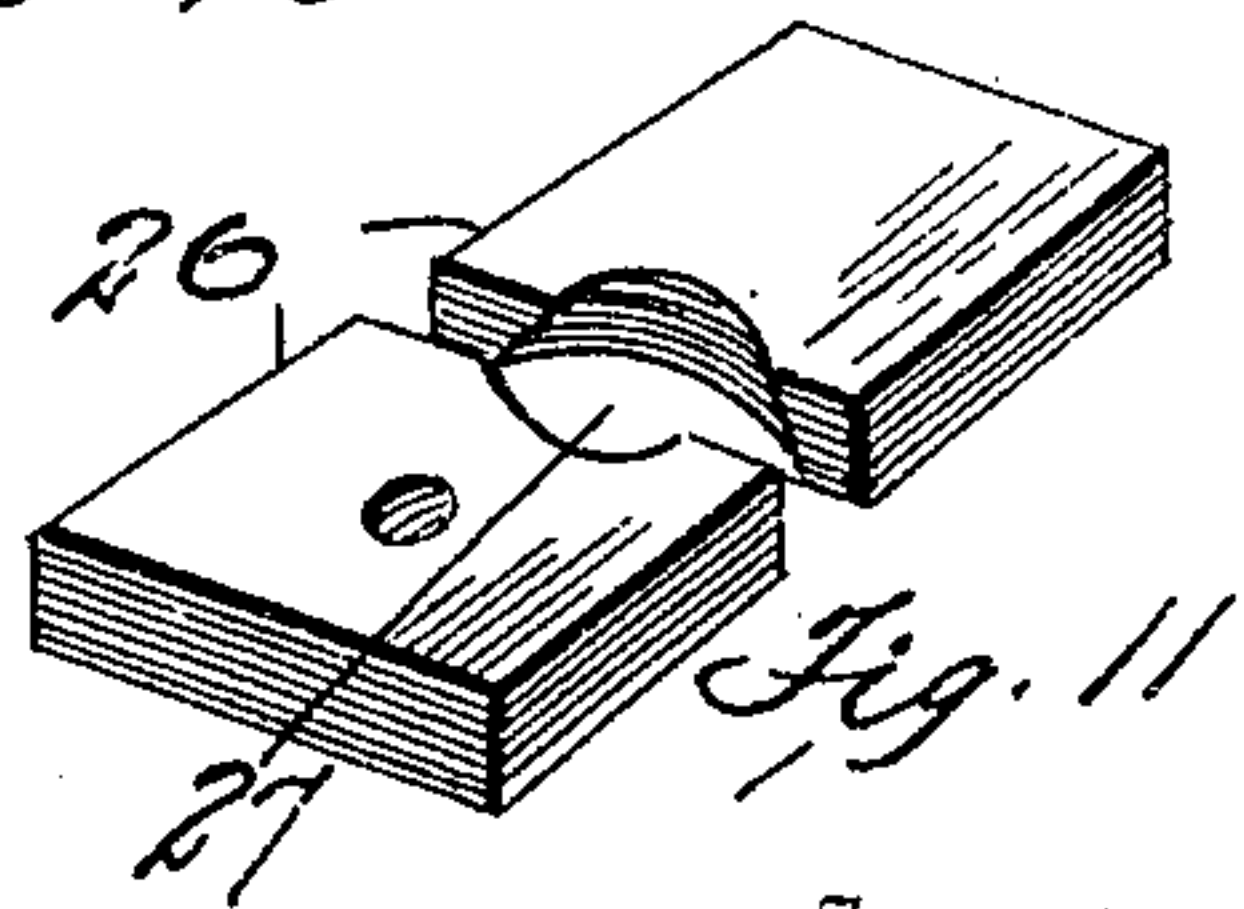
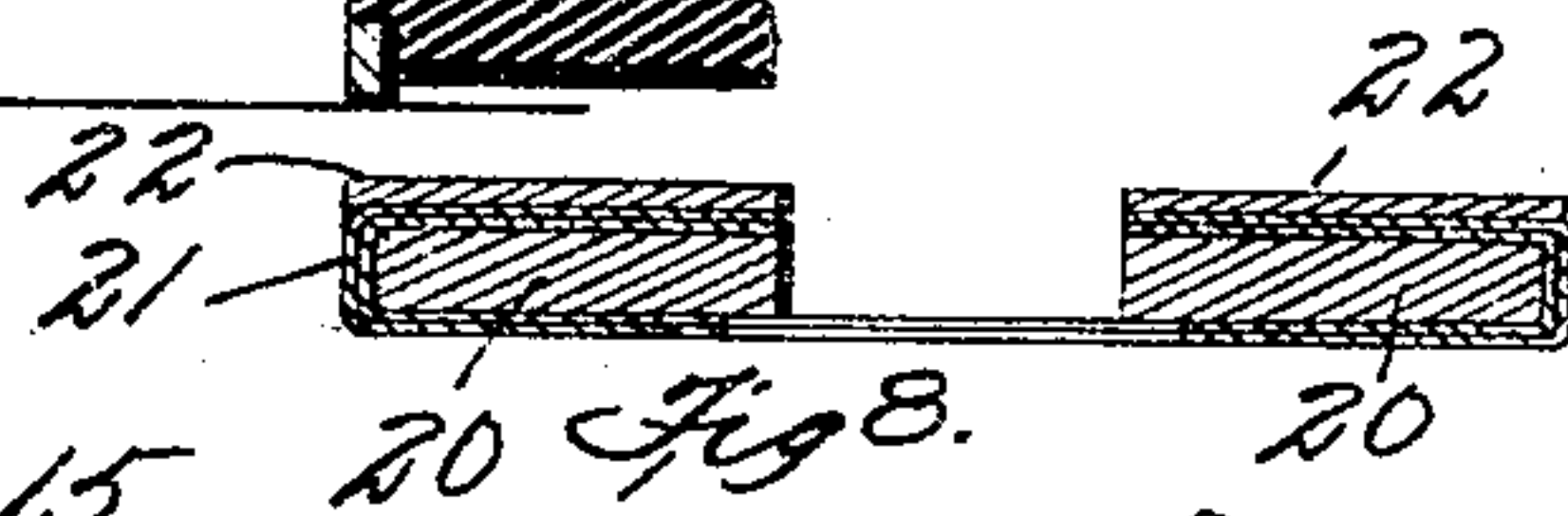
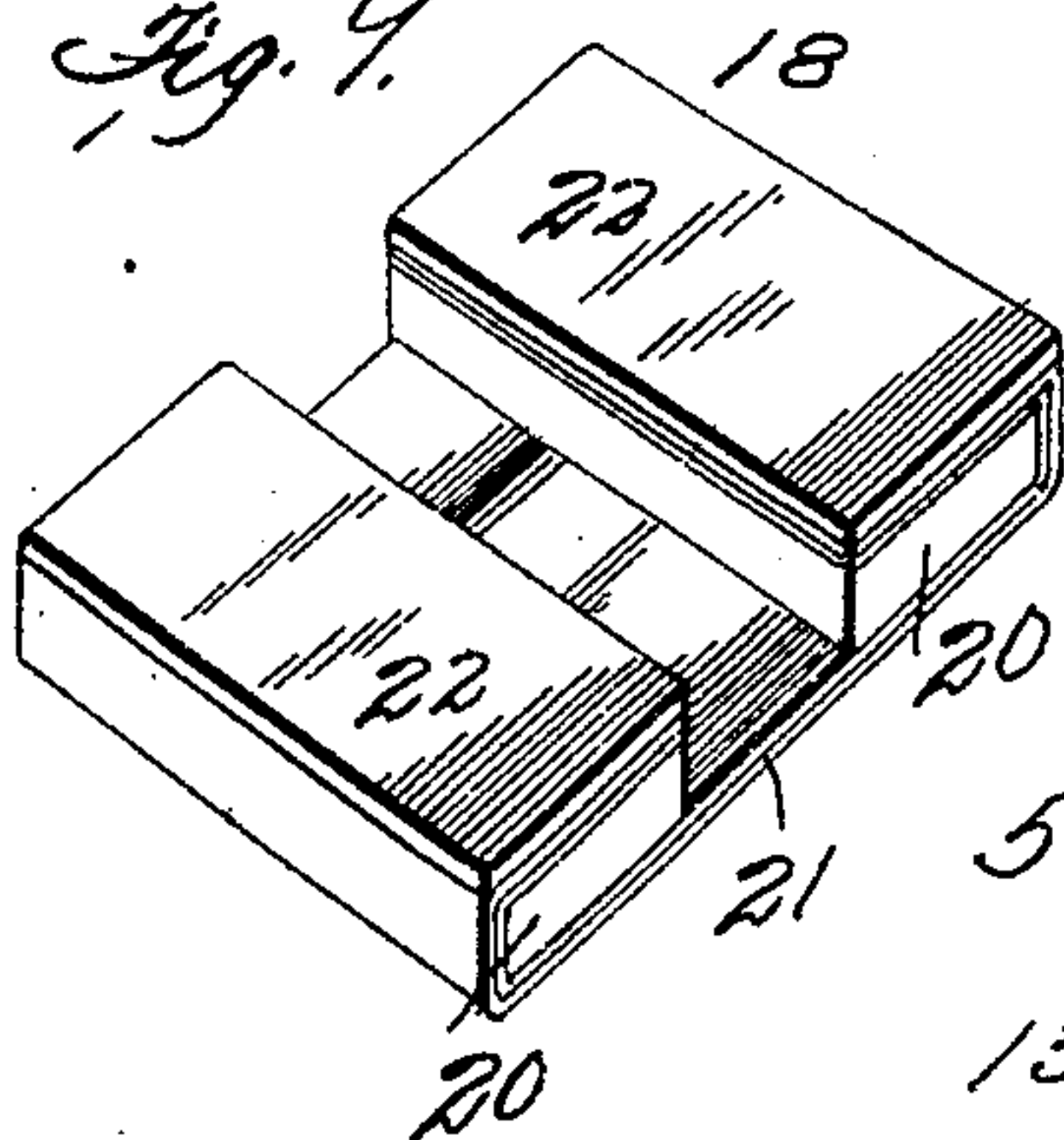


Fig. 9.



Witnesses
Chas. H. Davies.

John Powers

By

Inventor
William M. Stephens

Shepherd Parkes
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM M. STEPHENS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO RAILWAYS
SURFACE CONTACT SUPPLIES COMPANY, OF WILMINGTON, DELAWARE, A COR-
PORATION OF DELAWARE.

ELECTRIC-RAILWAY SYSTEM.

940,211.

Specification of Letters Patent.

Patented Nov. 16, 1909.

Application filed January 4, 1907. Serial No. 350,827.

To all whom it may concern:

Be it known that I, WILLIAM M. STEPHENS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Railway Systems, of which the following is a specification.

This invention relates to new and useful improvements in electric railway systems and has particular reference to a railway system including a main feed wire and contact boxes having connection therewith and arranged adjacent the track at equi-distant intervals. In connection with a system of this type a great objection has existed in the art as ordinarily practiced on account of the inability to obtain a maximum contact fully maintained and non-arcing, and the present invention aims as a primary object to overcome this objection by the provision of a contact of novel construction, including fixed and movable contact members, either one of which may be made flexible for purposes to be set forth.

The invention aims as a further object to provide in a system of this character, a contact box in which the parts are readily accessible for the purpose of repairs or renewal.

The above and other objects will appear in the course of the following description of the details of construction, in which description reference is had to the accompanying drawings forming a part of this specification, like characters of reference designating similar parts throughout the several views, wherein,

Figure 1 is a top plan elevation illustrating a portion of road bed, having the above mentioned spaced contact blocks and a car truck with its magnetic devices for engagement with said blocks. Fig. 2 is a central longitudinal section of such road bed and truck, Fig. 3 is a similar view of the invention as applied to a block contact system, having a continuous rail between the blocks and having an analogy with a third rail system. Fig. 4 is an enlarged transverse section of the magnetic device carried by the car and the contact box and its associated parts, arranged and constructed in accordance with the system shown in Fig. 2. Fig. 5 is a similar view of the magnetic device

carried by the car and the contact box and its associated parts arranged and constructed in accordance with the system in Fig. 3. Fig. 6 is a top plan view of the contact box shown in Fig. 5. Fig. 7 is a sectional view of the contact box shown in Fig. 4 and taken at right angles thereto. Figs. 8 and 9 are respective transverse sectional and perspective views of a flexible closer to be hereinafter referred to. Fig. 10 is a fragmentary sectional view similar to Fig. 7, but illustrating a modified embodiment of the invention, and Fig. 11 is a detailed perspective view of flexible contacts or brushes co-acting with the closer shown in Fig. 10.

Referring specifically to the accompanying drawings, the description will first treat the ground system comprising an embedded conduit 1 which receives the main or feed wire 2. The contact blocks above referred to are embedded in the road bed between the tracks A and are arranged at equi-distant intervals. Said contact blocks comprise, essentially an outer casing 3 of non-magnetic metal and having a removable or separable top portion 4, and an inner casing 5 of non-magnetic metal and disposed concentrically within the casing 3. At its lower end the casing 5 is formed with suitably arranged lugs 6 having their inclined sides arranged parallel with and spaced from the opposing correspondingly inclined sides of lugs 7 provided upon the inner surface of the casing 3. In their assembled relation the casing 5 is supported within the casing 3 upon the base thereof by insulating blocks 8, similar insulating blocks 9 being disposed between the parallel sides of the lugs 6 and 7. The spaces thus formed between the casings 3 and 5, are filled with a sealing medium 10, preferably viscous and of the form of a suitable asphaltic or other insulating cement, which may be softened to the desired extent by heating and then poured into said interstices, so as to completely fill the same. The bottoms of the casings 3 and 5 are apertured to receive an insulated branch wire 11 therethrough, and the space surrounding the wire 11 is filled by sealing medium 12 similar to the medium 10. The casing 5 is formed with a horizontal ledge 13, upon which is supported a shelf 14 of insulating material. The casing 5 is closed by a cap plate 15 having a raised tread 16 and a de-

pending contact lug 17 which co-acts in its function with a closer 18, loosely seated in a recess 19 cut into the face of the shelf 14.

The closer 18 is of novel construction, and comprises blocks 20 of magnetic metal which are united by one or more copper strips 21 that afford a flexible connection between the blocks 20. The blocks 20 are faced by plates 22 imposed upon the strips 21 and preferably of copper so as to have high conductive properties. The wire 11 leads through the shelf 14 and at its end has connection with a stationary contact 23 disposed adjacent the contact lugs 17 and spaced therefrom. It will be noted in Fig. 7, that the lug 17 and contact 23 are arranged in the same vertical plane with the respective blocks 20 of the closer 18. In the embodiment of the invention shown in Fig. 10, instead of the closer 18, a suitably constructed ball 24 of magnetic metal is employed. The ball 24 seats and is movable in a recess 25 provided in the shelf 14, the sides of which afford guides for said ball in its movement. The lug 17 and the wire 11 are respectively connected with juxtaposed spaced brushes 26 composed of copper laminae and having their adjacent edges concaved as at 27 to conform to the curvature of the ball 24.

Referring to Figs. 4 and 5, it will be noted that the cap plate 15 is provided with inwardly extending pole pieces 28 of magnetic metal, which project to a point adjacent the shelf 14. These pole pieces 28 are energized from the fields 29 of electro-magnets 30 supported between the bars 31 and 32. The bar 31 is suspended from the truck B by means of a suitable insulating swivel connection 33 with a yoke 34 which, in practical use, is attached to said truck. In Fig. 4 a continuous contact shoe 35 is disclosed, which rests upon the tread 16 and is yieldably suspended from the bar 32. To this end said bar carries an adjustable depending pin or stud 36, which projects loosely and concentrically through a socket 37 provided on the shoe 35, and is provided with an enlarged head 36^a at its lower end arranged within a conformable recess in said shoe. An expansive coil spring 38 is arranged about said stud within said socket and bearing with its ends against said bar 32 and the inner closed end of the socket 37.

In Fig. 5 the bar 32 and the shoe 35 are eliminated. A continuous track section 39 parallel with the tracks A, is dove-tailed into the treads 16 and affords a third rail contact, as it were. The car carries a wheel conductor, or shoe 40 contacting with the conductor 39 and journaled in a yoke 41 carried by each of the trucks B.

Another novel feature of the invention resides in the provision of a safety device for preventing the contact blocks from remaining alive, due to unforeseen causes, after the

passage of the car thereover. As the car passes over the blocks the magnets 30, will, through the pole pieces 28, attract the free moving closers 18 or 24 and when the car is moved away from a block, said pole pieces will of course become instantly deenergized and the closers will drop by gravity to their normal position in the recessed face of the shelf 14, so as to disrupt the electrical connection. Hence it will be seen that after a car passes over a block, the block becomes "dead" so far as the transmission of electrical currents are concerned, and thus it is impossible for pedestrians or horses to become shocked, or for currents to be transmitted to any vehicle or other structure which may move over the tracks. Should the freely movable closers 18 or 24, for any reason fail to return by gravity, to their "dead" position, means are provided for cutting out the current from the line wire 2. To this end a safety fuse 42 of any approved form is interposed in the wire 11. From each end of the truck brushes 43 depend, said brush being in direct connection with the axle of the car by the bar 43^a to which they are attached, and are dead grounded on said axle to short circuit the same and blow out the circuit breaking fuse 42 and thus sever the wire 11 so that the main circuit is interrupted. On the other hand, if the block is dead, as it should be during the passage of the brush 43, the contact of said brush with said block, will be without any result.

It will be readily appreciated that in practical use, when a contact is established between the freely movable closer and the stationary contact members, such contact will be maintained by virtue of the current and will be constant. Ordinarily in systems of this character the vibrations and jars of the car as it passes over the block, will cause the movable member to become disengaged so that the circuit is destroyed. In the present invention, however, in which one of the contact members is flexible, this accidental displacement is impossible, for the reason that said contact being capable of yielding under shocks and jars, will compensate therefor, as it were, and will remain at all times in contact with its opposing member. In Fig. 7 the closer is shown as yieldable and in Fig. 10 the stationary contacts are shown as yieldable. It will also be apparent that owing to the constancy of the contact, arcing will be prevented so that the exposed surfaces will remain clear and will be efficacious in the performance of their function. However, if desired, high tension oil, such for instance as one of the higher members of the paraffin series is employed as an additional means for preventing this arcing.

While the elements herein shown and described are well adapted to serve the func-

tions set forth, it is obvious that various minor changes may be made in the proportions, shape and arrangement of the several parts without departing from the spirit and scope of the invention as defined in the appended claims.

Having described my invention, I claim:

1. In a contact system of electric traction, a contact box, a pair of contact elements located therein, and an armature or closer adapted to be magnetically attracted toward and into electrical contact with said contact elements, said armature or closer comprising a pair of magnetic metal plates secured together by a one-piece connection of superposed layers of flexible metal, substantially as described.

2. In a contact system of electric traction, a contact box, a pair of contact elements located therein, and an armature or closer adapted to be magnetically attracted toward and into electrical contact with said contact elements, said armature comprising a pair of magnetic metal plates secured together by a one-piece connection of superposed layers of flexible metal having their ends secured about said plates, and facing plates of high conductive properties imposed upon said metallic layers about said first named plates, substantially as described.

3. In a contact system of electric traction, the combination with a stationary member, a feed wire, and elements for electrically connecting said member with said feed wire upon the action of a magnet, of a contact

shoe, rails mounted parallel with and at the sides of said shoe, magnets disposed at selected points along said rails, superposed transverse bars connecting said rails and supporting said magnets and elastic connections between said contact shoe and the lower of said bars, the upper of said bars having swivel connections with the axles of a car, substantially as described.

4. In a contact system of electric traction, the combination with a stationary contact member, a feed wire, and elements for electrically connecting said member with said feed wire upon the action of a magnet, of a contact shoe, rails mounted parallel with and at the sides of said shoe, magnets disposed at selected points along said rails, superposed transverse bars connecting said rails and supporting said magnets, elastic connections between said contact shoe and the lower of said bars, the upper of said bars having swivel connections with the axle of a car, and a bar mounted longitudinal of the car and connected to and dead-grounded upon the said axles and provided with brushes depending therefrom beyond the ends of said shoe to contact with said member after the passage of the shoe thereover, substantially as described.

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

WILLIAM M. STEPHENS.

Witnesses:

SIGMUND J. BLOCK,
JOHN S. POWERS.