

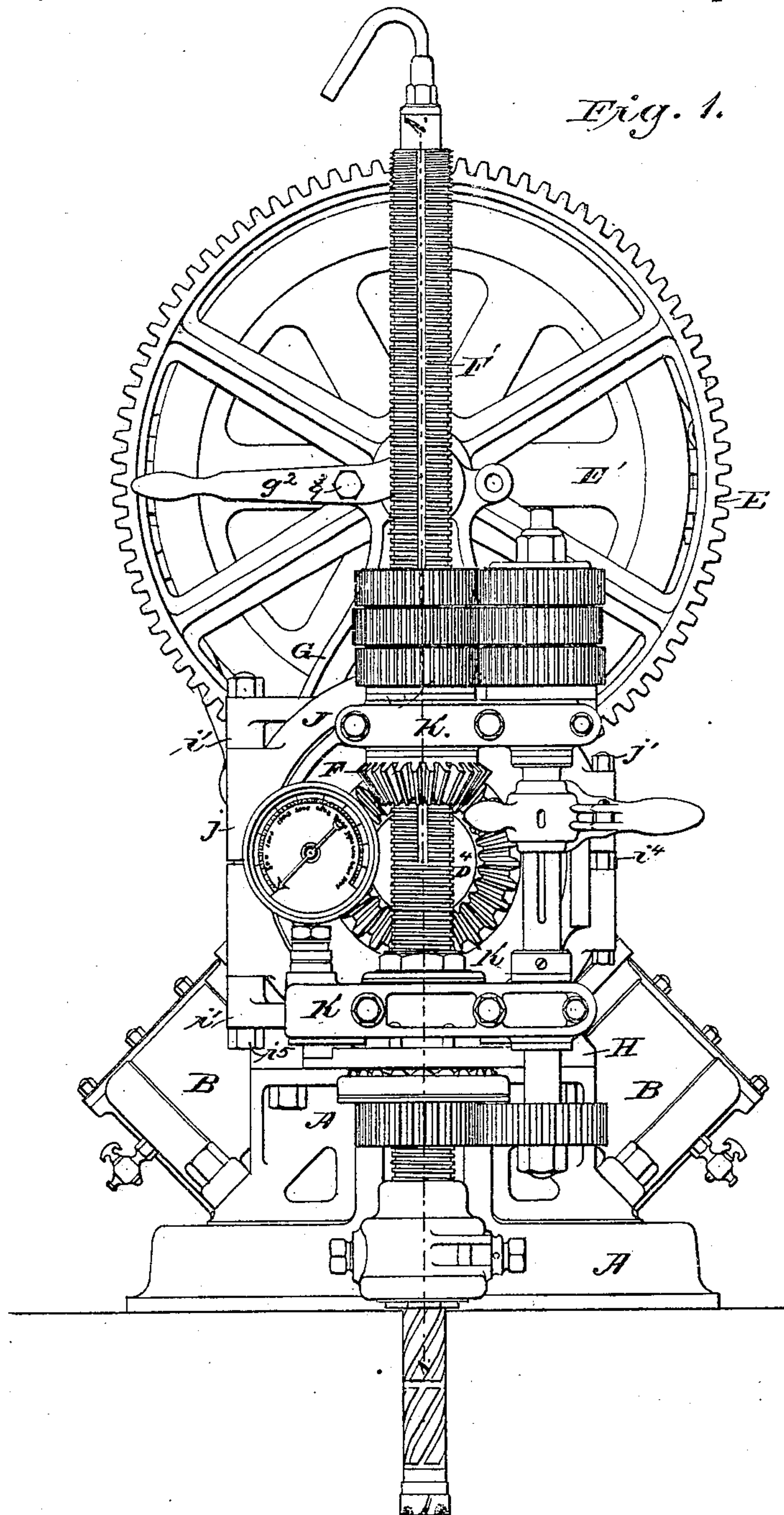
(No Model.)

6 Sheets—Sheet 1.

M. C. BULLOCK.
ROCK DRILLING MACHINE.

No. 246,938.

Patented Sept. 13, 1881.



Witnesses:
Chas. S. Styer.
Attorney

Inventor,
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by E. B. Bullock
Attorneys

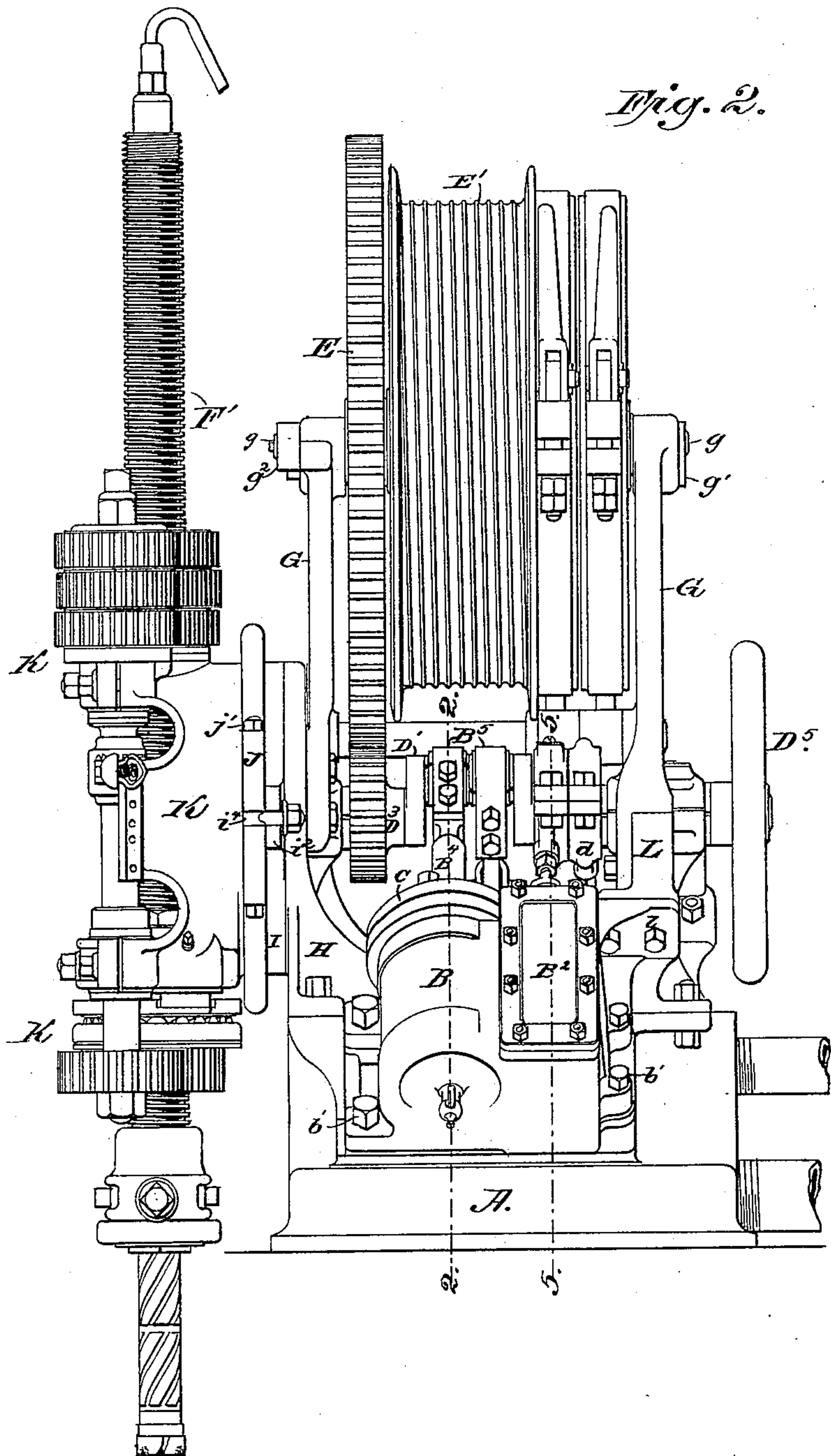
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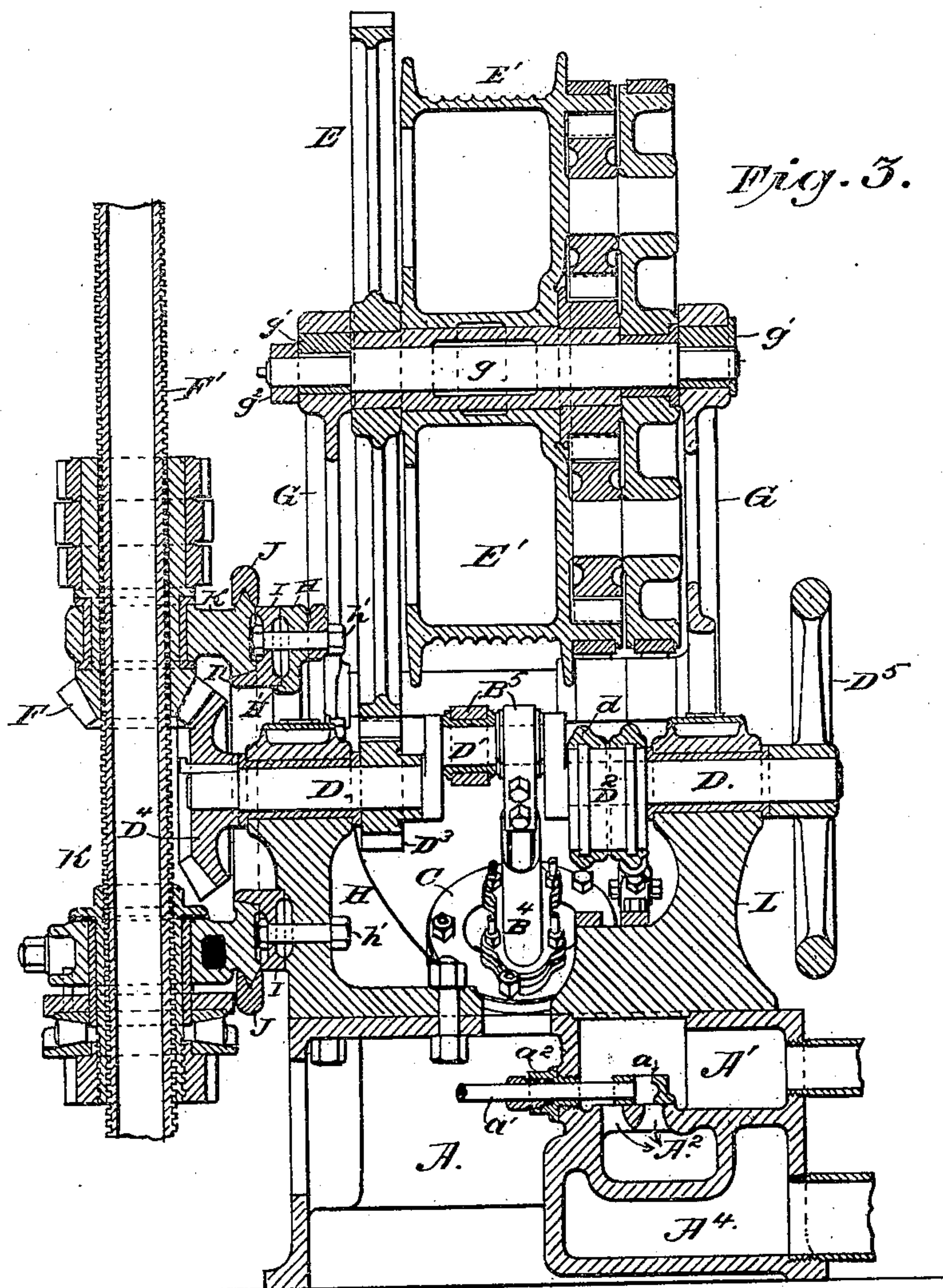
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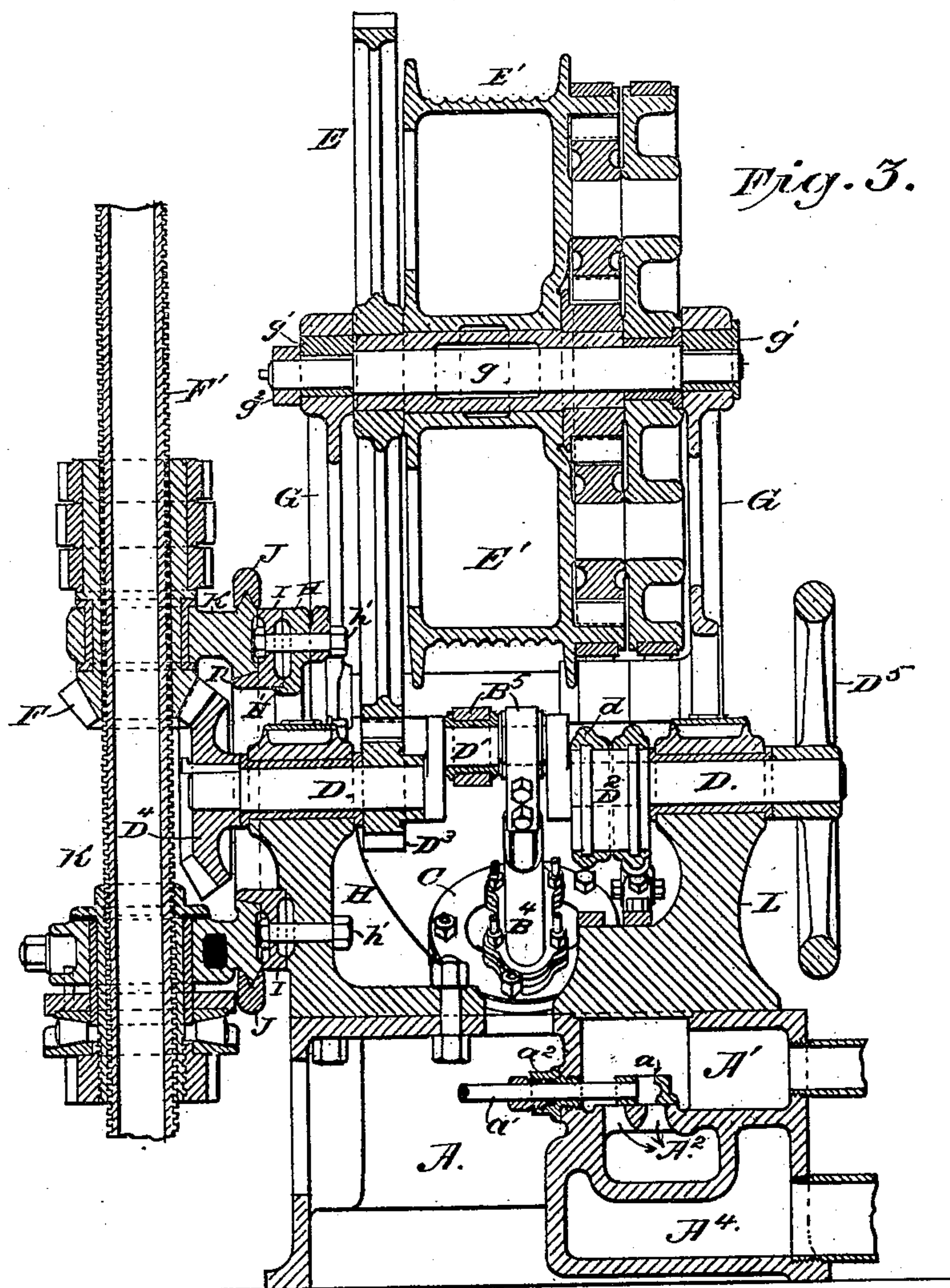
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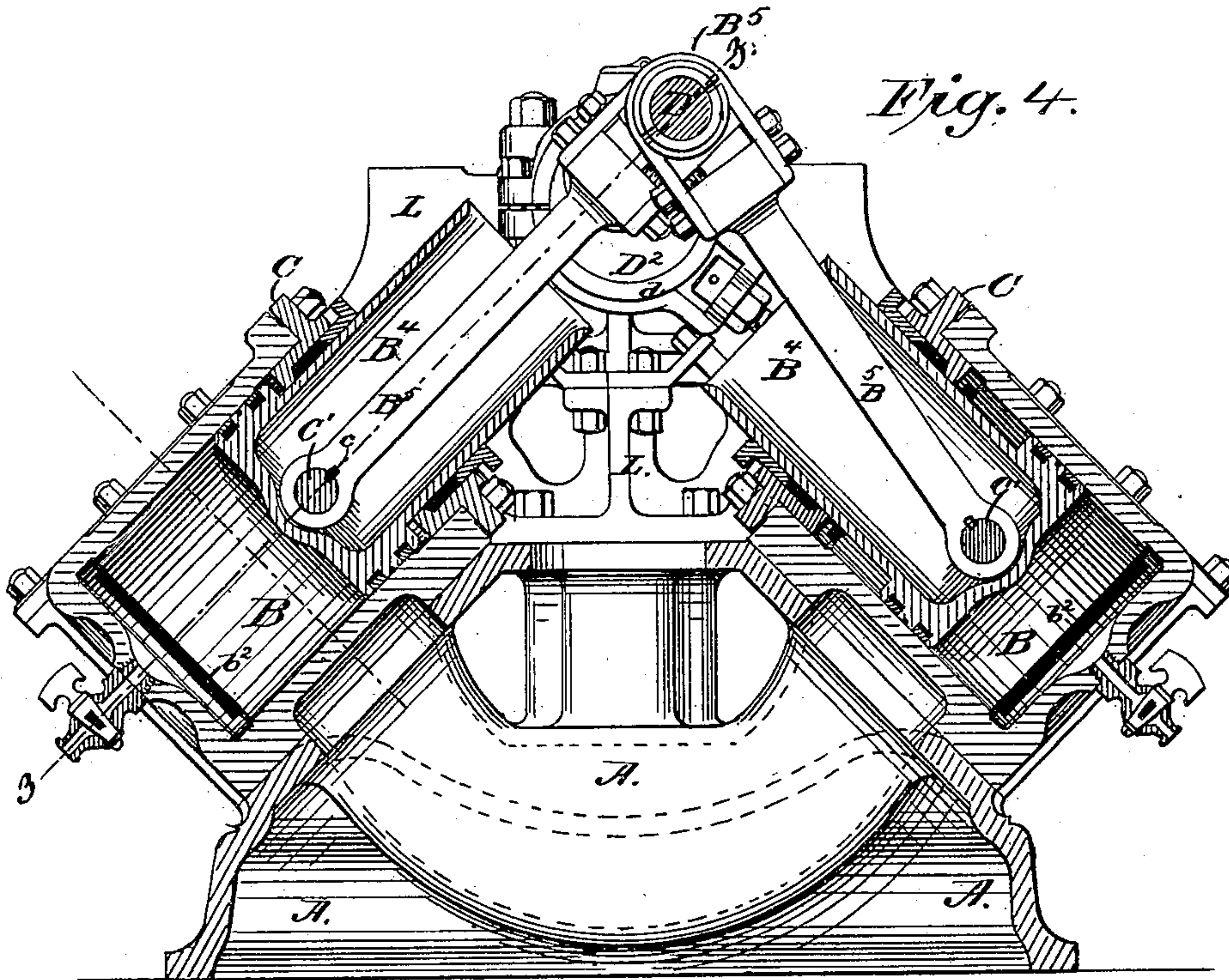


Fig. 4.

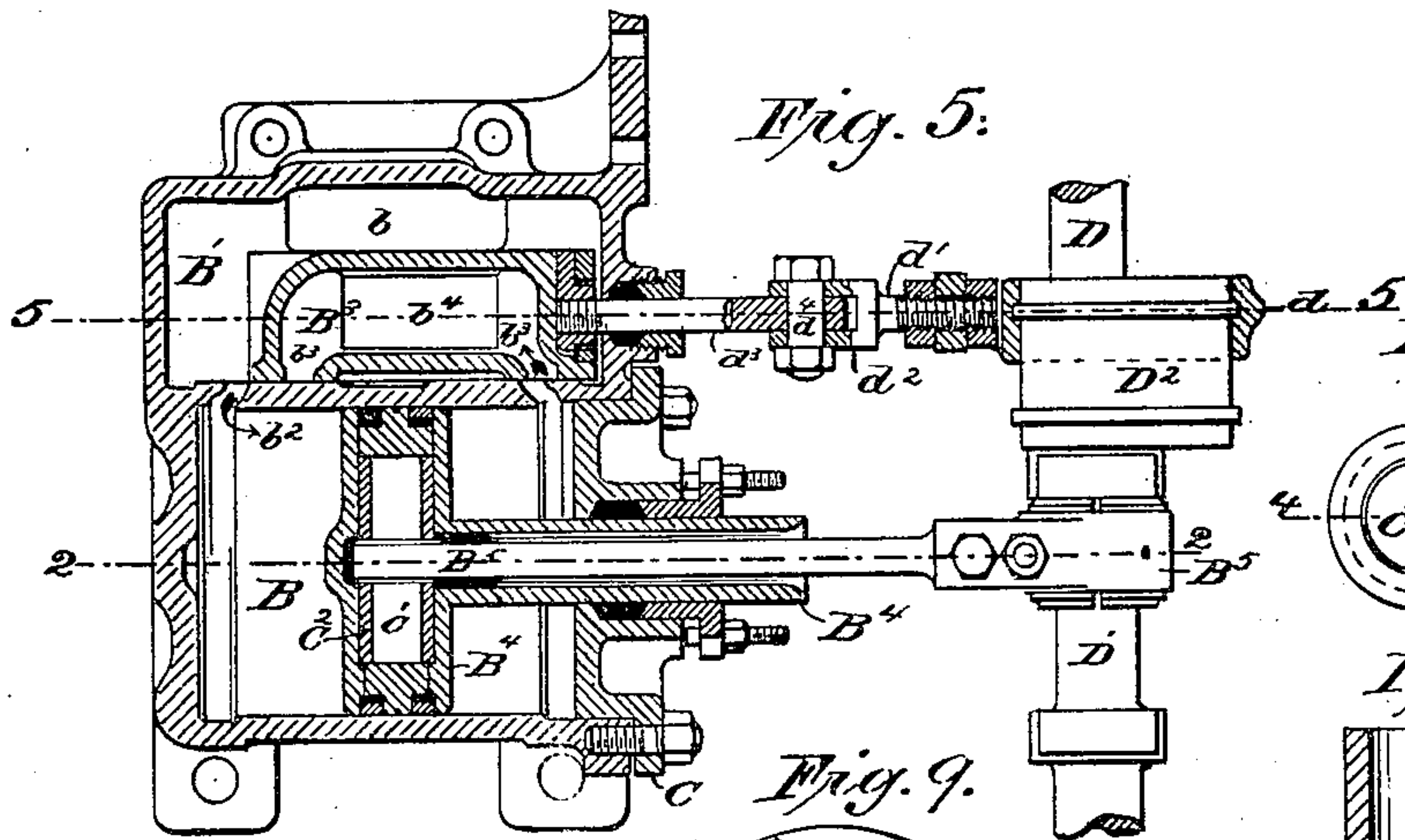


Fig. 5.

Fig. 6.

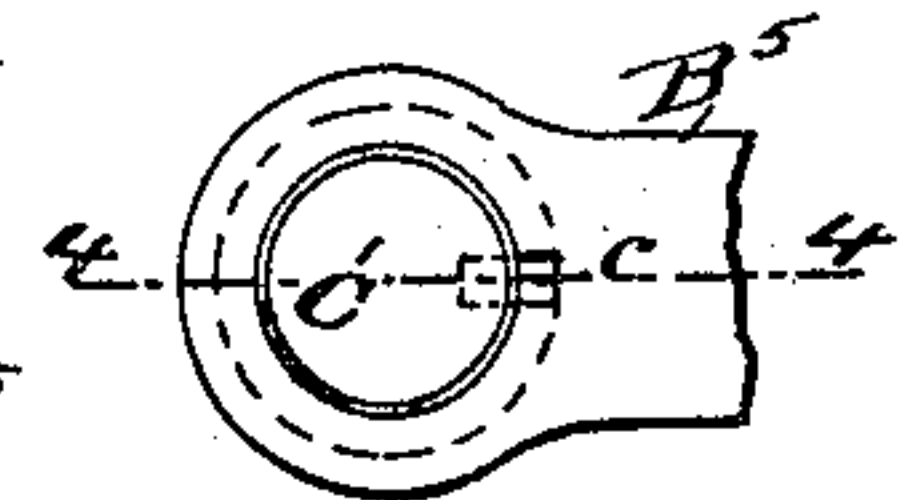


Fig. 7.

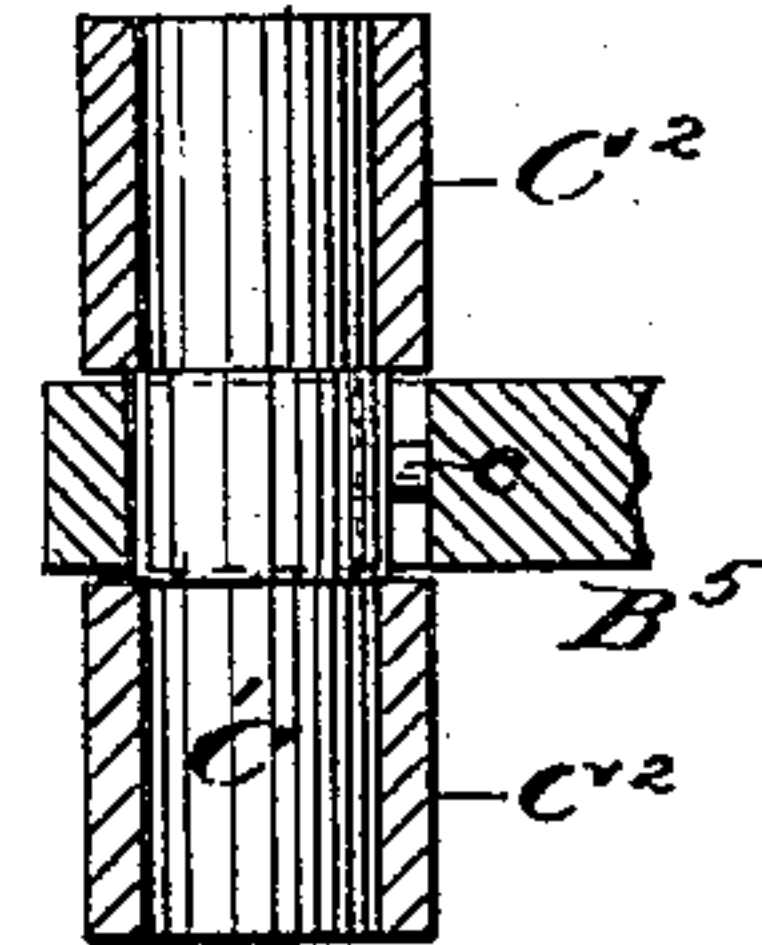


Fig. 8.

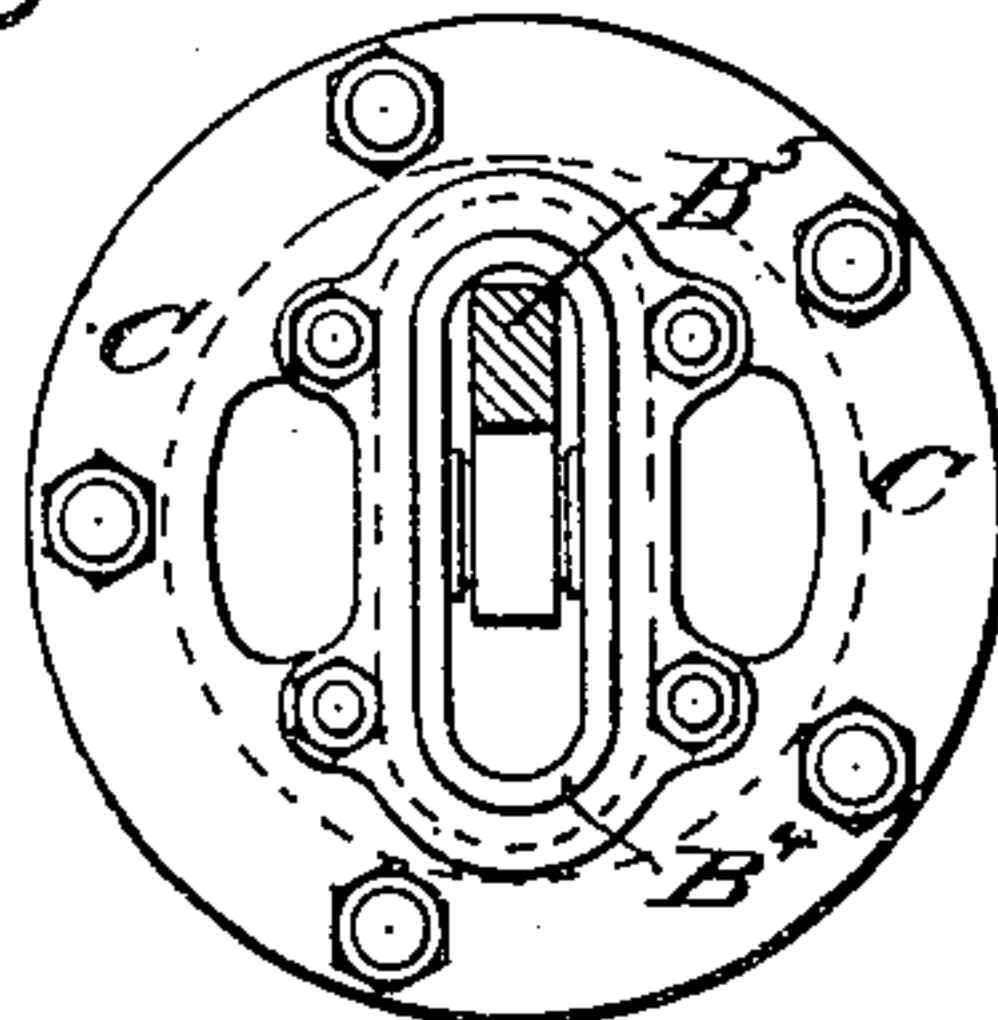
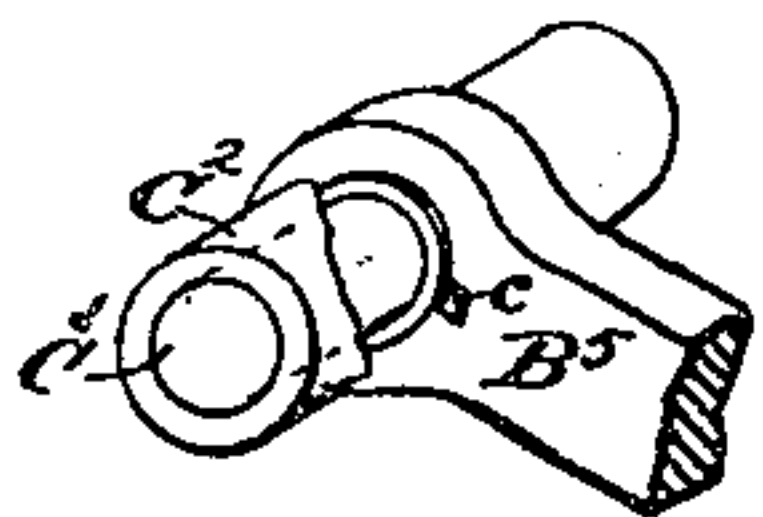


Fig. 9.

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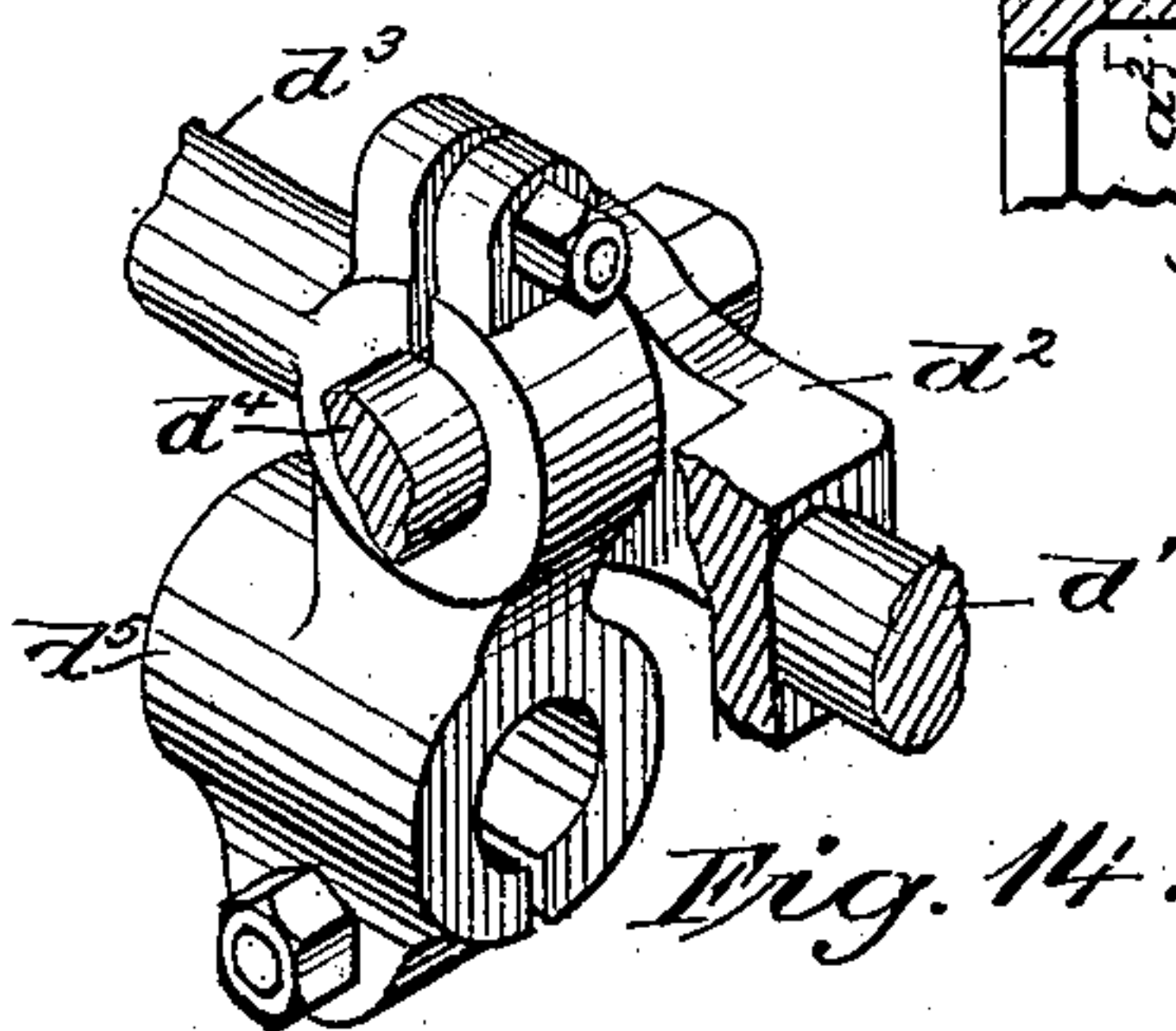
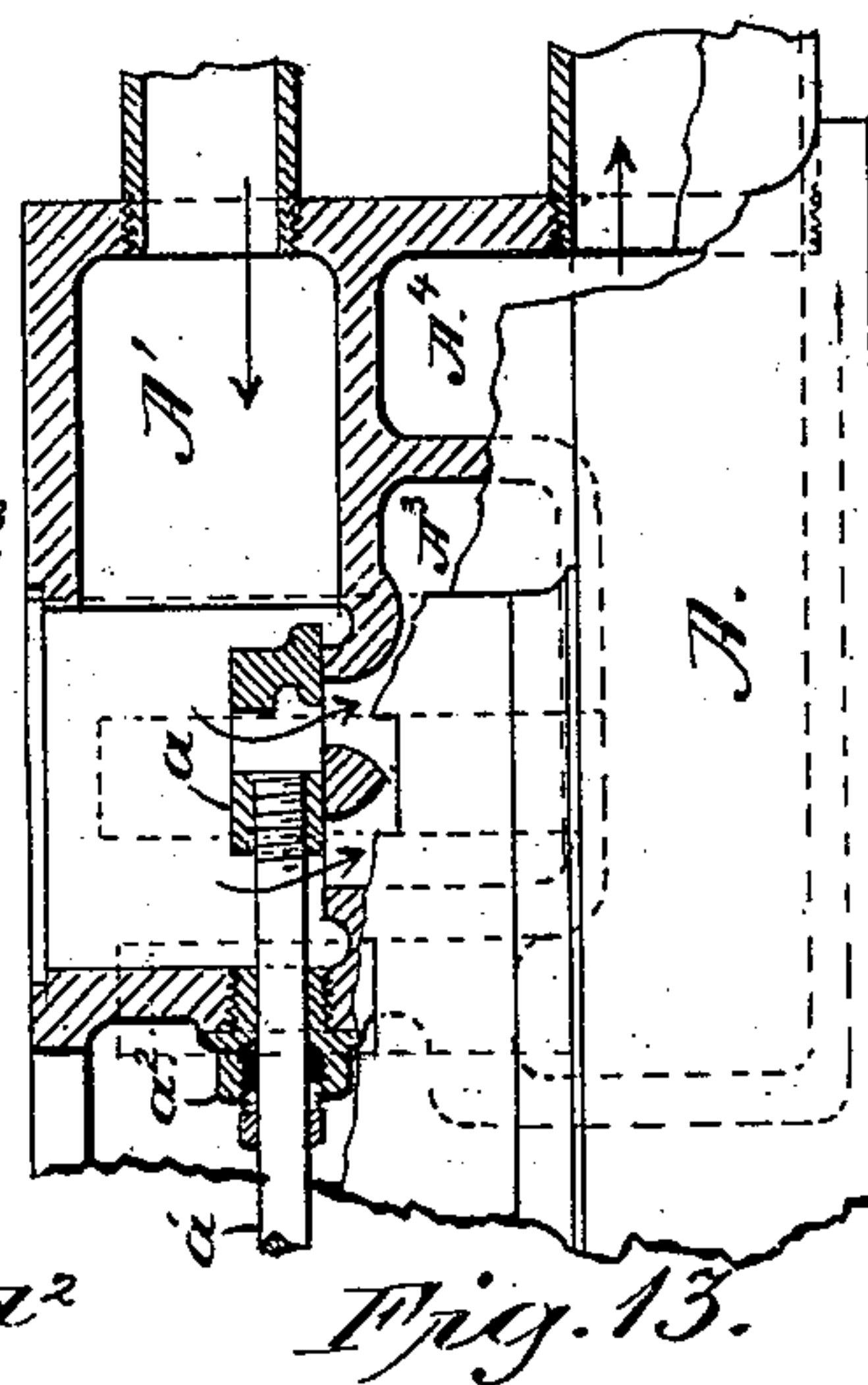
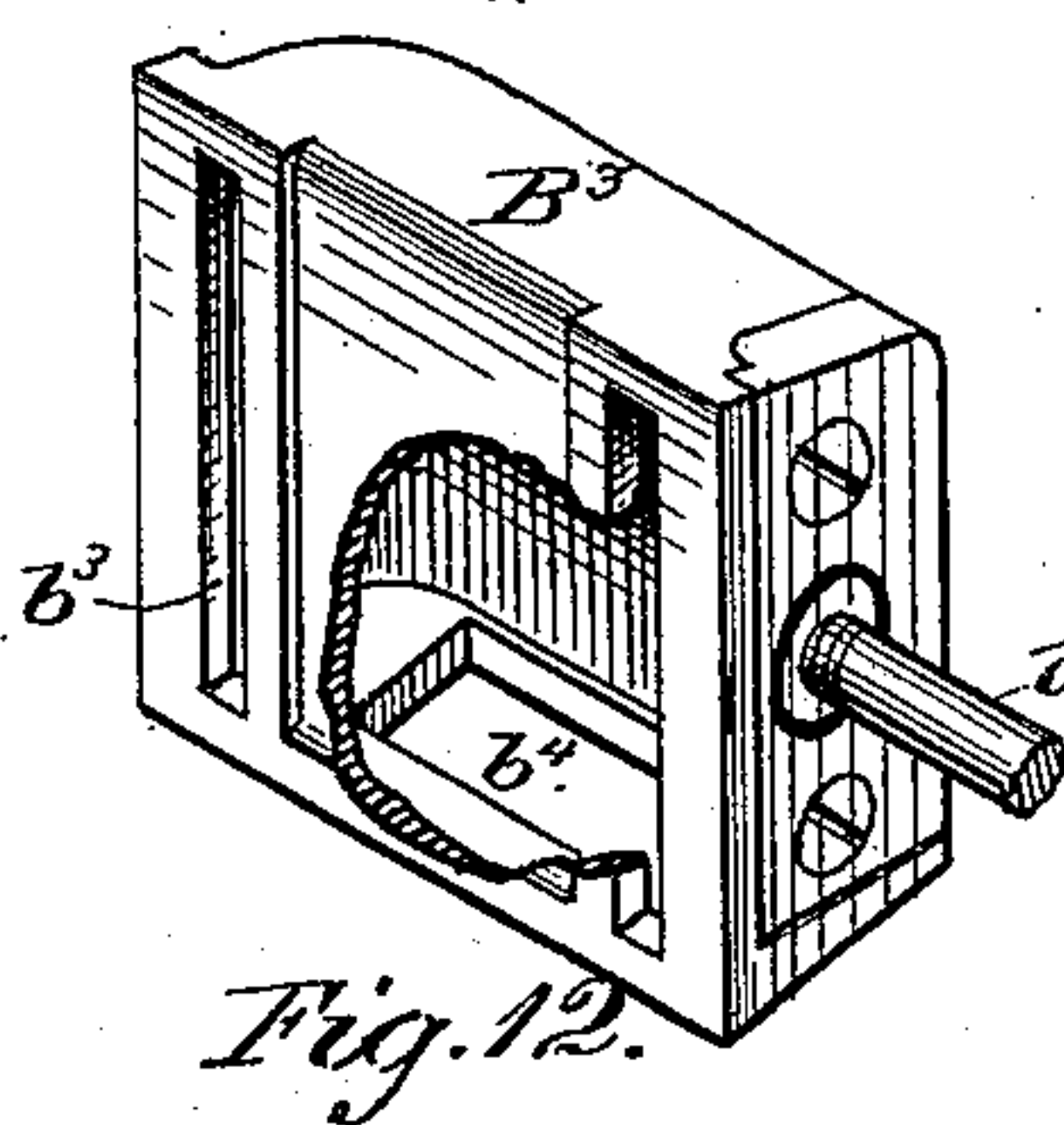
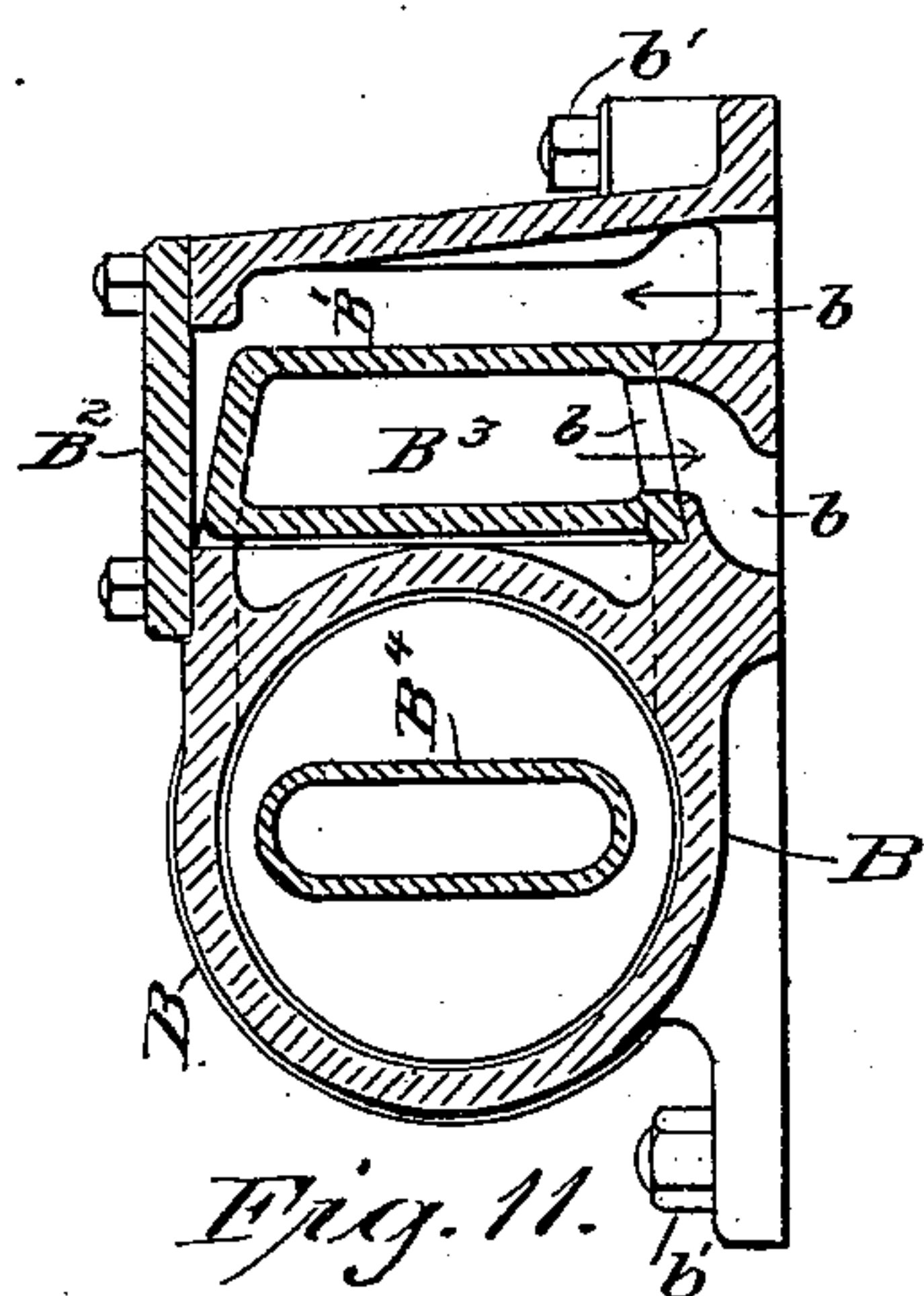
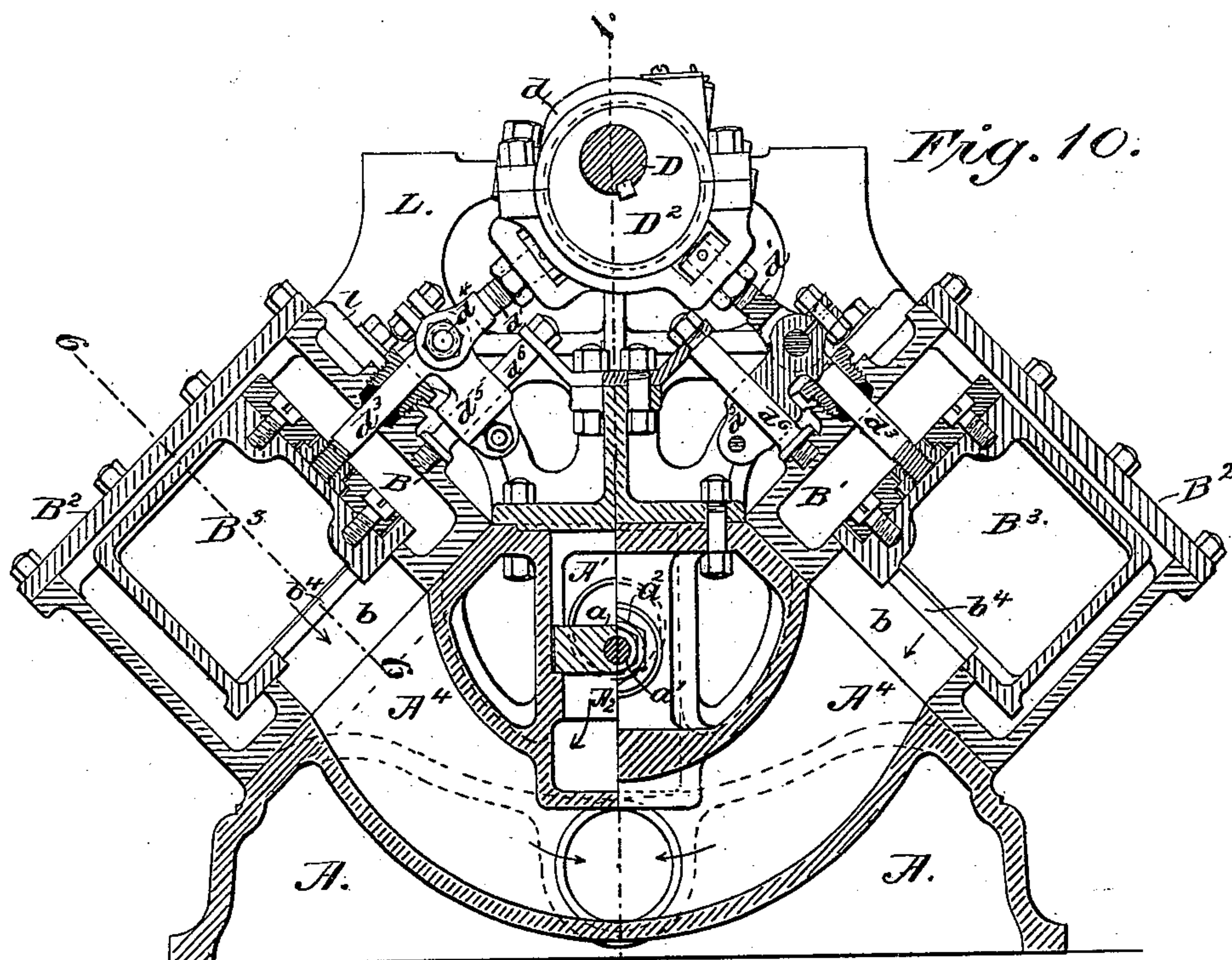
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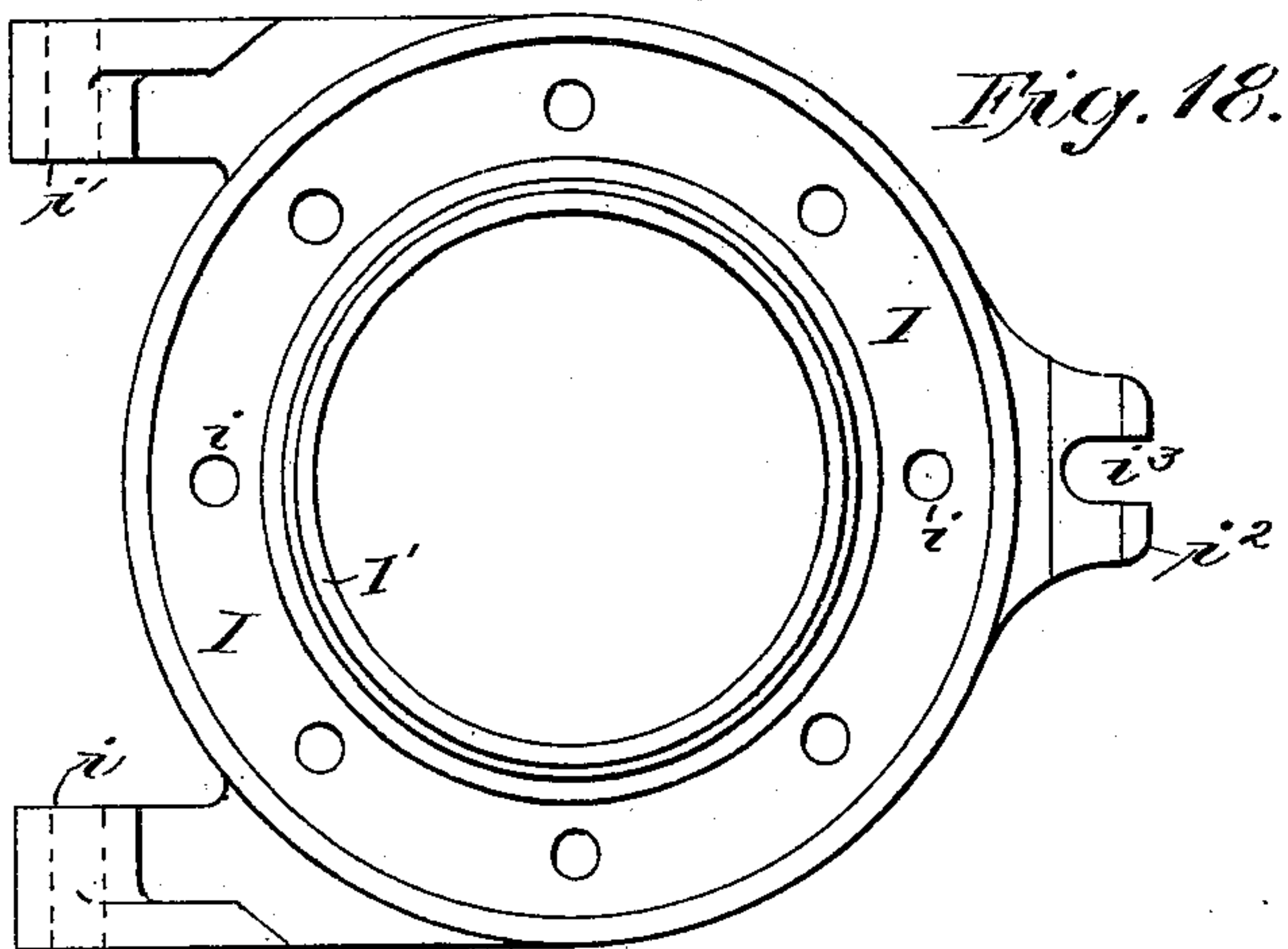
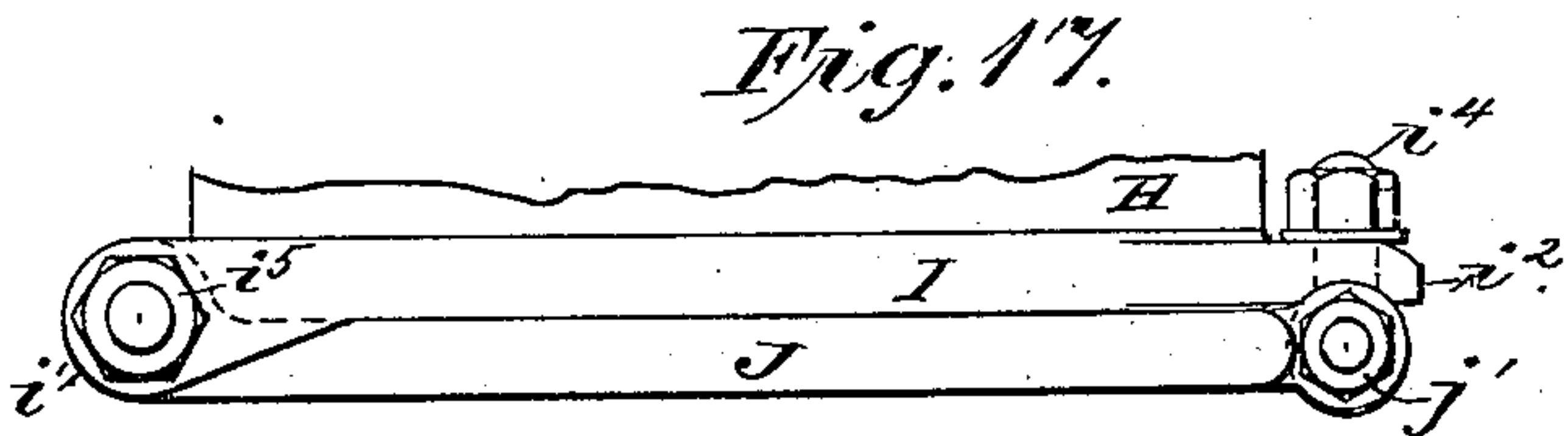
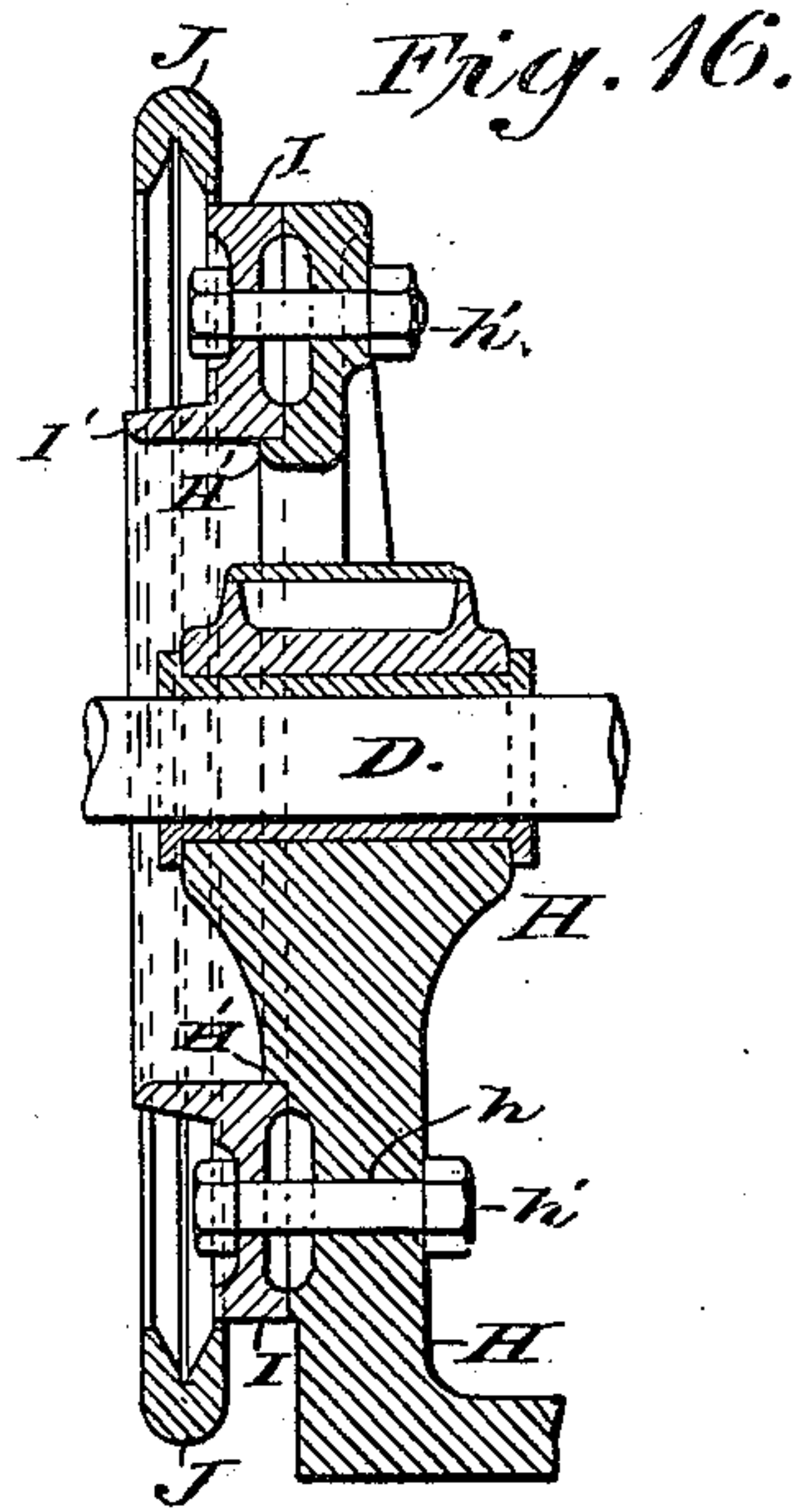
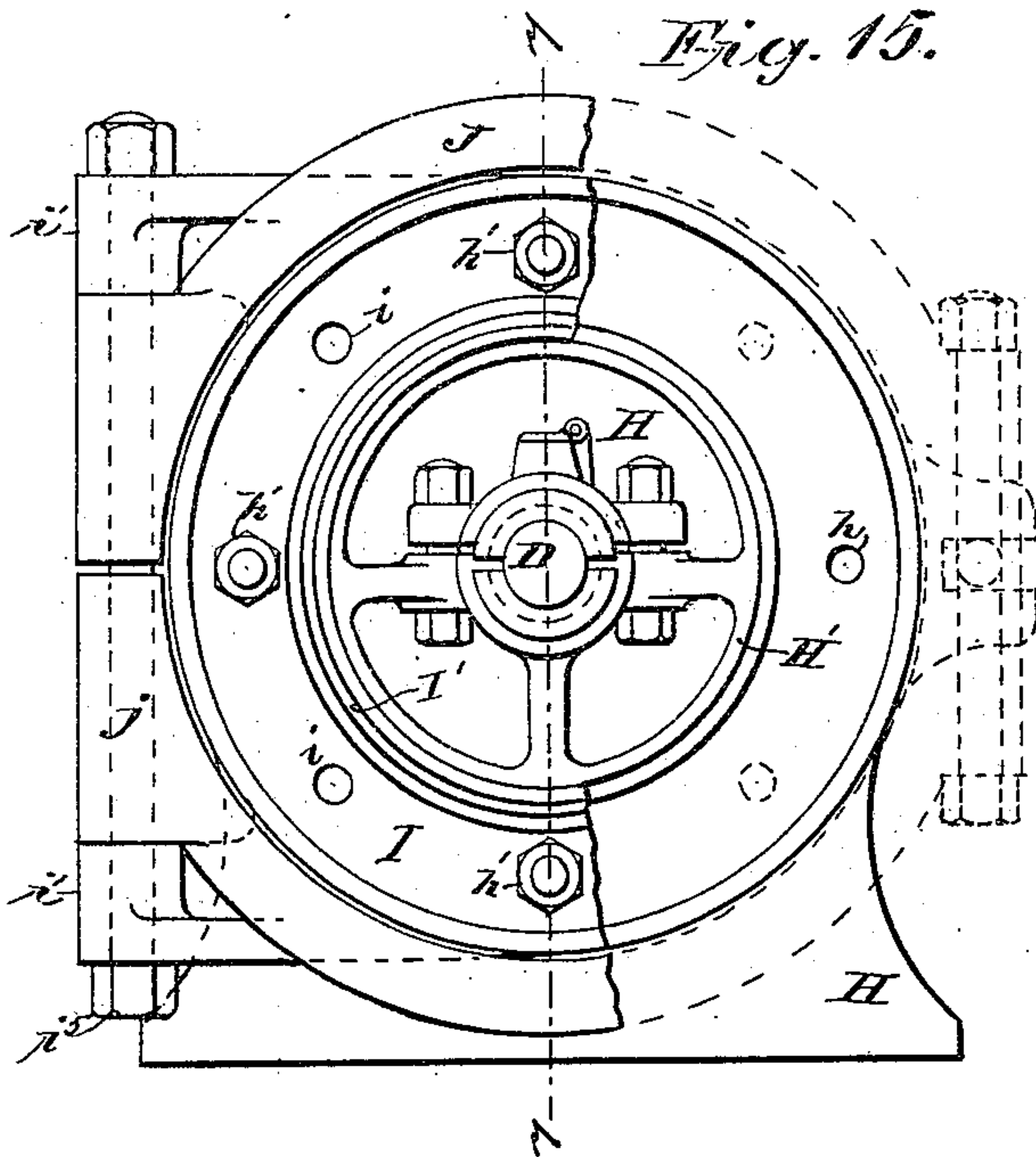
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UNITED STATES PATENT OFFICE.

MILAN C. BULLOCK, OF CHICAGO, ILLINOIS.

ROCK-DRILLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 246,938, dated September 13, 1881.

Application filed January 27, 1881. (No model.)

To all whom it may concern:

Be it known that I, MILAN C. BULLOCK, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Rock-Drilling Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in rotating diamond-pointed rock-drills, and to drilling-machines for the same purpose which have a rotary motion imparted to their drills, but which are not provided with diamond points; and the objects of my invention are, first, to provide novel means of attaching the supports of the swivel-head to the machine; second, to combine with such machines an engine or engines constructed and arranged with special reference to the economy of space, and adapted to serve the double purpose of driving the drill and removing the same from the drilled hole; third, to combine with such an engine and drilling mechanism a hoisting device for raising the drill and its rods when removing them from the hole formed by the drill; and, fourth, to provide the necessary combinations of mechanism for producing the results hereinafter described.

Oscillating engines have heretofore been used for propelling rock-drills; but they have been found to be objectionable on account of the large amount of friction produced and on account of the vibration caused when run at a high rate of speed.

Swiveled heads, or the parts containing and forming bearings for the feed-screws of rock-drilling machines, the feed apparatus, and their thrust-bearings, have heretofore been attached to the front standards of drilling-machines or to the body thereof, as fully set forth in my United States Letters Patent No. 153,929, August 11, 1874. The objections to this form of attachment are that when the head is turned in its yoke so that the hole may be drilled at an oblique angle the hinge is directly in the way when the swivel-head is swung out, and therefore the

drill-rods cannot be removed from the hole without moving the machine.

By the adoption of the improvements herein described these objections are removed, the objects of my invention being attained by the devices illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of my improved rock-drilling machine. Fig. 2 is a side elevation thereof. Fig. 3 is a longitudinal sectional elevation thereof on line 1 1 of Fig. 1. Fig. 4 is a vertical section on line 2 2, Fig. 2, showing the position of the engines with relation to the driving-shaft. Fig. 5 is a section taken on line 3 3, Fig. 4, showing the steam-chest, cylinder, &c. Figs. 6, 7, and 8 are views in detail of that end of the connecting-rod which is united to the trunk. Fig. 9 is a plan of the upper cylinder-head. Fig. 10 is a vertical section taken on line 5 5, Fig. 5. Fig. 11 is a transverse section taken on line 6 6, Fig. 10. Fig. 12 is a perspective of one of the valves, it being partly broken away to show the parts more clearly. Fig. 13 is a view on an enlarged scale and partly in section, showing the steam-supply pipe, throttle-valve, &c. Fig. 14 is a perspective view of the cross-head of the valve-stem. Fig. 15 shows, in elevation, the front standard and its ring, the plate, and the yoke, the plate and yoke being broken away. Fig. 16 is a vertical section taken on line 7 7, Fig. 15. Fig. 17 is a plan view, showing the manner of connecting the yoke to the plate. Fig. 18 is a front elevation of the plate.

The same letters of reference are used in all the figures in the designation of identical parts.

In constructing machines of this type there is provided a bed-plate, A, in which there is formed a steam-chamber, A', which receives steam from any conveniently-located generator through a pipe, one end of which is in communication with said chamber.

Within the chamber A' there is placed a throttle-valve, a, through which and through the seat upon which it moves there is an aperture for the passage of steam to a passage, A², which conducts it to the steam-chest B', in which there is placed a valve, B³, which, when properly moved, admits the steam to the cylinder, and after it has been used therein allows it to pass out through ports b³ and b⁴ in said

valve into the exhaust-passage A^4 formed in the bed-plate.

The throttle-valve above alluded to is provided with a rod, a' , for operating it, said rod passing through a stuffing-box, a^2 , which may be constructed in any approved manner.

The cylinders B B are secured to the bed-plate A at an angle of forty-five degrees to its base-line and at right angles to each other, as shown in Figs. 1 and 4. By the side of each of these cylinders there is placed a steam-chest, B' , the angularity of which corresponds with that of the cylinders. These chests are provided with ears B^2 , and, as before remarked, receive steam from the passages A^2 , and the valves B^3 , placed in said chests, control the passage of the steam to the ends of the cylinders through ports b^2 b^2 therein, and provide for the escape of the exhaust-steam from the cylinders through said ports b^2 b^2 and the ports b^3 b^3 and b^4 in the valves to the exhaust-chamber A^4 in the frame by way of passages b , as shown in Figs. 5, 10, and 11.

The engine-cylinders here represented are each provided with a piston and trunk, B^4 , which are connected to the crank-shaft by connecting-rods B^5 . These trunks work in stuffing-boxes in the heads C of the cylinders. The connecting-rods are attached to the trunks by means of pins C' journaled in bearings C^2 , which are seated in the trunks or pistons, as shown. The pins C' are prevented from turning in the eyes of the connecting-rods by a feather, c , which is fitted in grooves in the pins and eyes.

For the purpose of converting the reciprocating movement of the trunks and pistons into a rotary motion for driving the drill and hoist-drum, there is placed in bearings formed in the upper portions of the standards secured to the bed-plate A a crank-shaft, D, to the crank D' of which the connecting-rods B^5 are attached. As the thrust of one of the engines is exerted on the crank in a direction at right angles to the thrust of other engine, it will be readily understood that the crank can have no dead-point.

Upon the shaft D is fixed an eccentric, D^2 , as shown in Fig. 10, its arrangement being such that as it is rotated by the shaft the proper motion is imparted to the valves for causing them to admit steam to the cylinders and exhaust it therefrom at the proper times in the manner heretofore described. This eccentric is provided with straps d , to which are secured rods d' , connected at their lower forked ends with the cross-heads d^5 , which slide upon guides d^6 , and to which are secured the valve-rods d^3 . The valve-rods are in this instance formed of one piece of metal with the cross-heads.

Keyed to the shaft D is a geared pinion, D^3 , which meshes into and drives a spur-wheel, E, mounted to revolve on a shaft, g , which is supported in standards G fixed to the main frame of the machine. By the side of the spur-

wheel E, and moving with it on the same shaft, is placed a drum, E' , provided upon its periphery with a groove or grooves for the reception of a rope, which is to lead therefrom to a sheave or pulley placed above it and directly over the hole in the rock, so that when it becomes desirable to lift the drill and its rods from such hole the rope may be attached to the upper end of said rods and the drum put in motion and lift the rods and drill, the swivel-head which carries the drill-rods having first been swung or slid out of the way.

To provide for throwing the hoisting mechanism into and out of operative connection with the driving mechanism, eccentrics g' are keyed to the drum-shaft g , said eccentrics being adapted to turn in bearings in the standards G. In order to turn the drum-shaft g and its eccentrics to a position which will raise the spur-wheel E out of mesh with the pinion D^3 , I fix upon one end of said shaft a handle or lever, g^2 , which, when it has raised or lowered the shaft g , and with it the drum and spur-wheel, is to be locked to the standard G by a pin, g^3 , passing through the lever into the standard, suitable holes being provided for this purpose. By this arrangement the hoisting mechanism can at any time be thrown out of gear without stopping the machine.

At the front end of the crank-shaft is keyed a bevel-gear wheel, D^4 , which meshes into and drives a similarly-beveled gear-wheel, F. This wheel F is provided with a sleeve, which rotates in a bearing formed in a bracket projecting outwardly from the swivel-head K of the machine. The feed-screw F' is mounted in and driven by the wheel F, and to this end both the screw and the sleeve of the wheel are provided with grooves for the reception of a feather, by which they are keyed together. The screw is adapted to move vertically in the sleeve, but will be rotated with it. The feed-wheels are mounted to turn with the sleeve of wheel F, these parts being constructed and operated in substantially the same manner as is shown in my United States Patent No. 165,539, July 13, 1875.

The swiveled head K, which carries the feed-screw F' and its connections, is connected to the frame in such manner and position that the bevel-gears D^4 and F will always be in mesh with each other when the drill is in position for drilling holes, whether such holes are to be drilled in a vertical line or at an angle to a vertical line. To this end the standard H is provided with a ring or flange, H' , of which the crank-shaft D is the axial center, upon which flange a plate, I, is seated and can be rotated.

The standard H is provided with four holes, h , through which pass bolts h' , said bolts passing through corresponding holes i in the plate I, thus securing it to the standard. This plate I is provided with additional holes in order to admit of its being secured to the standard in the various positions required when drilling holes at an angle to a vertical line. It is also

provided with ears or projections i' , in which are formed holes for the reception of a bolt or pintle, i^5 , which also passes through lugs j formed on a yoke, J, thus hinging said yoke to the plate I. Upon that part of the plate I which is opposite to the ears or projections there is formed a slotted lug or projection, i^2 , the slot i^3 being for the reception of a swinging bolt, i^4 , which holds the yoke in its closed position when the drill is being operated. In front of the plate I is secured a yoke, J, composed of two parts, each one of which is provided at one side with a projection, j , through which passes the bolt or pintle i^5 , by which means the yoke is hinged to the plate I, as already stated. The members of the yoke are at the other side secured by a bolt, j' , on which the swinging bolt i^4 is pivoted.

In the interior surfaces of the parts composing the yoke there is formed a V-shaped groove for the reception of a projection formed on the swivel-head K, consisting of an annular ring, the interior surface of which rests upon the beveled flange I' of the plate I. The portion of the swivel-head K which is held in the V-shaped groove of the yoke is formed to fit said groove snugly. The arrangement of these parts is shown in Figs. 3, 16, 17, and 18.

When it is desired to remove the drill and its rods from the hole that has been drilled the nut on swinging bolt i^4 is loosened and the bolt swung free from the lugs i^2 , and the yoke turned on its hinge, thus moving the yoke and the swivel-head carried thereon out of the path of the drill.

Should it be desired to drill a hole at an angle to a vertical line, the required adjustment is made by removing the bolts h' , which secure the plate I to the standard, then rotating said plate on the flange H' until the hinge $i j i^5$ is substantially parallel with the direction in which the hole is to be drilled, and again securing the plate to the standard H with the bolts h' .

It will be understood that the holes i in the plate I will be sufficient in number and so arranged that said plate may be secured in various positions, in order that the hinge at the side thereof may be practically parallel with the hole to be drilled. When this adjustment has been made, and the feed-screw and drill are found to be not in the exact position desired, a further adjustment can be made by slacking the nut upon the bolt j' in the yoke J, when the swivel-head K and the parts carried by it may be turned so as to give the required direction to the drill. The nut on bolt j' should then be tightened in order to prevent the swivel-head from turning accidentally.

I have described the method of moving the parts out of the way of the drill and its rods when they are to be removed from the drilled hole as being by attaching the parts to a swing-

ing yoke; but it is obvious that a plate or frame adapted to slide upon ways or guides may be substituted therefor and the parts be slid or moved to one side a sufficient distance to allow the drill and its rods to be removed without departing from the spirit of my invention.

When the hinged yoke is used for removing the parts out of the way it is important that the hinge shall be parallel, or nearly so, to the hole being drilled, as already described.

The feed-screw is connected to the drill-rods in the usual or any approved manner.

I have described the drum-shaft g as having eccentrics g' keyed to it. It is obvious, however, that said eccentrics may be formed upon the shaft by casting, and also that a single eccentric may be used at the center of the drum-shaft without departing from the spirit of my invention, the object of this construction being to adapt the driving gear-wheel of the hoisting apparatus to be readily thrown into or out of mesh with the pinion on the crank-shaft.

I make no claim herein to the valves and valve-gear shown, but reserve the right to cover these features in a subsequent application.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a rock-drilling machine, the combination, substantially as before set forth, of the front standard provided with a ring-flange, the plate seated and adapted to be rotated on said flange, and the movable yoke, the parts being so arranged that the yoke carrying the swivel-head and its attachments can be moved out of the way of the drill when the latter is to be withdrawn from the drilled hole.

2. In a rock-drilling machine, the combination, substantially as before set forth, of a pair of trunk-engines arranged at right angles to each other and operating a crank common to both engines, the crank-shaft, the hoist-rig arranged above said shaft, and the feed-screw for operating the drill.

3. In a rock-drilling machine, the combination, substantially as before set forth, of the crank-shaft, the hoist-drum mounted to revolve on the drum-shaft, motion-transmitting mechanism, and the eccentrics on the drum-shaft.

4. In a rock-drilling machine, the combination, substantially as before set forth, of the front standard, provided with a ring-flange, the swivel-head, the hinged yoke, and the plate to which the yoke is hinged, said plate being adapted to be turned so as to change the position of the hinge.

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

MILAN C. BULLOCK.

Witnesses:

W. S. WHIPPLE,
CLARK WHITE.