

No. 126,626.

Patented May 14, 1872.

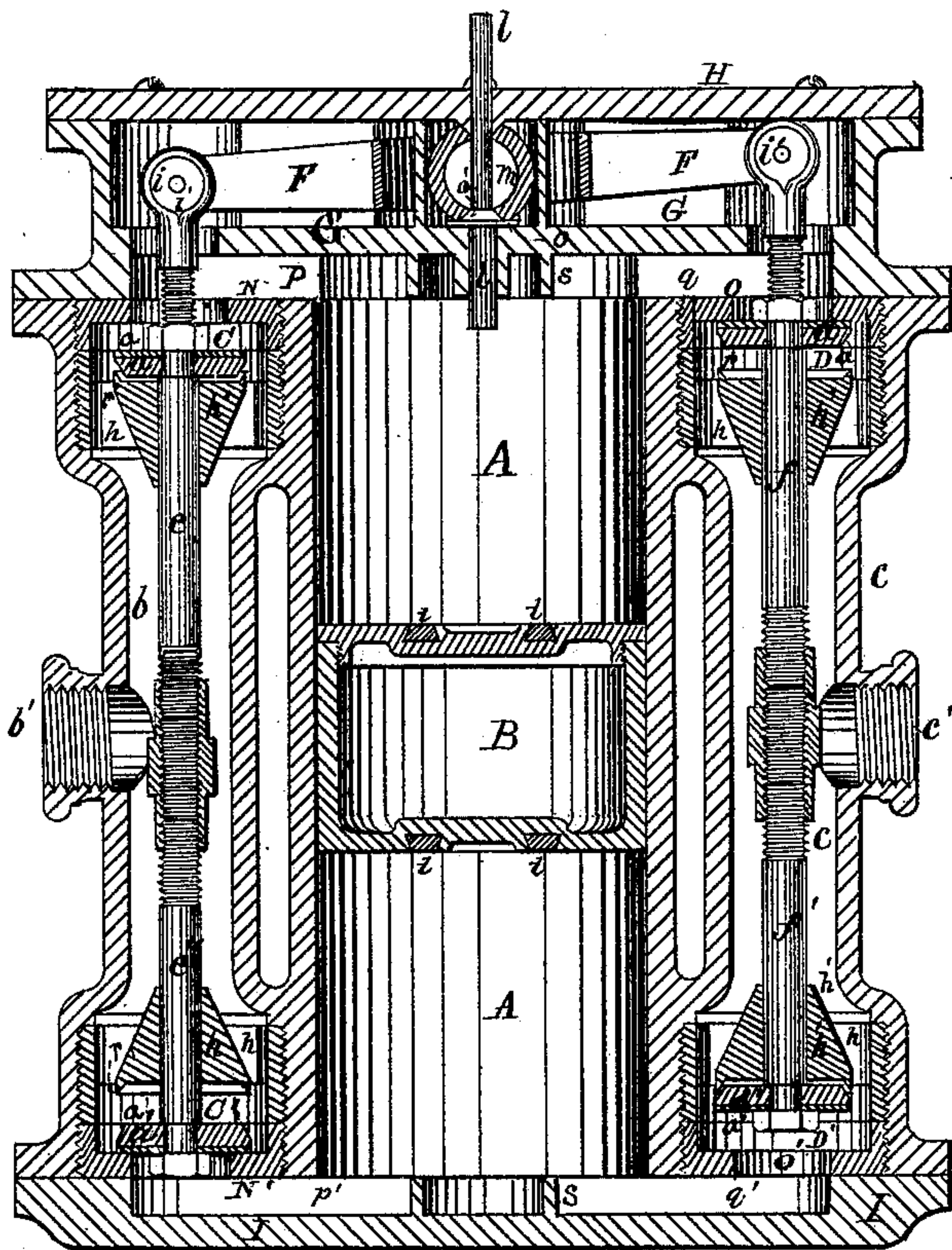


FIG. 2.

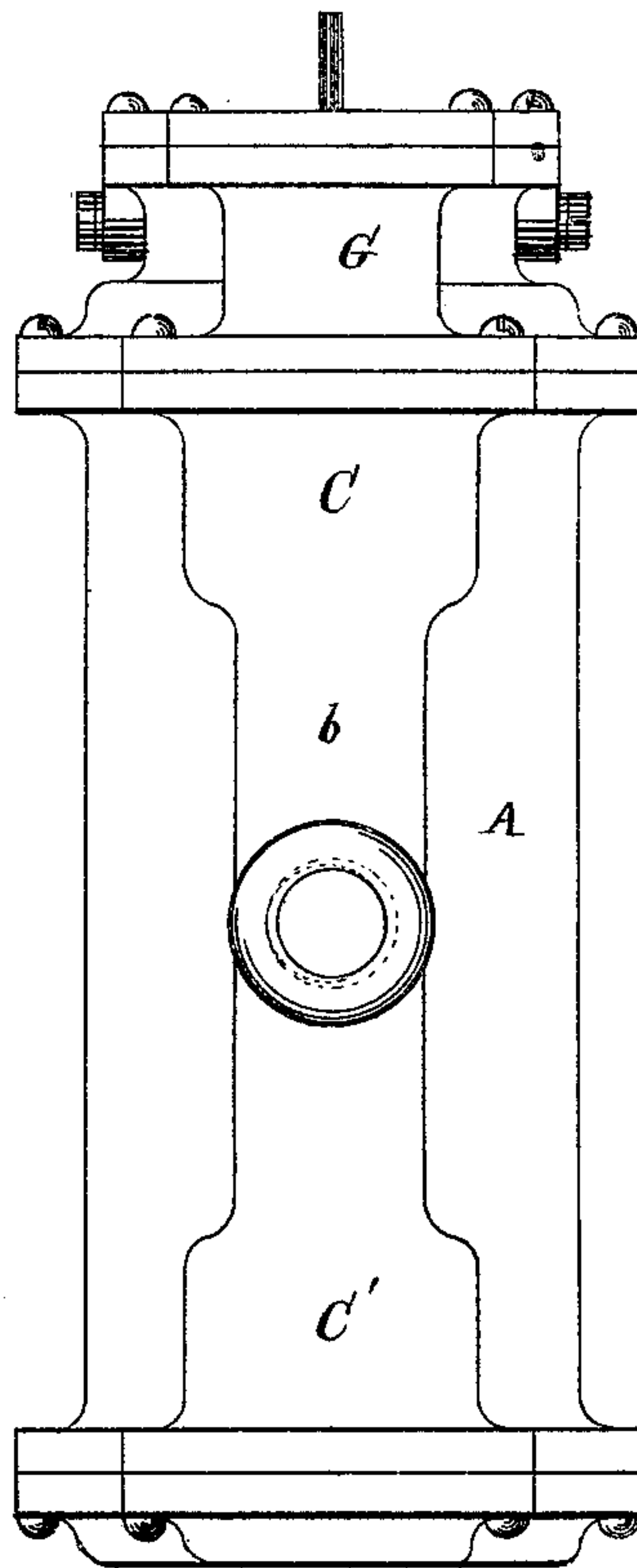


FIG. 1.

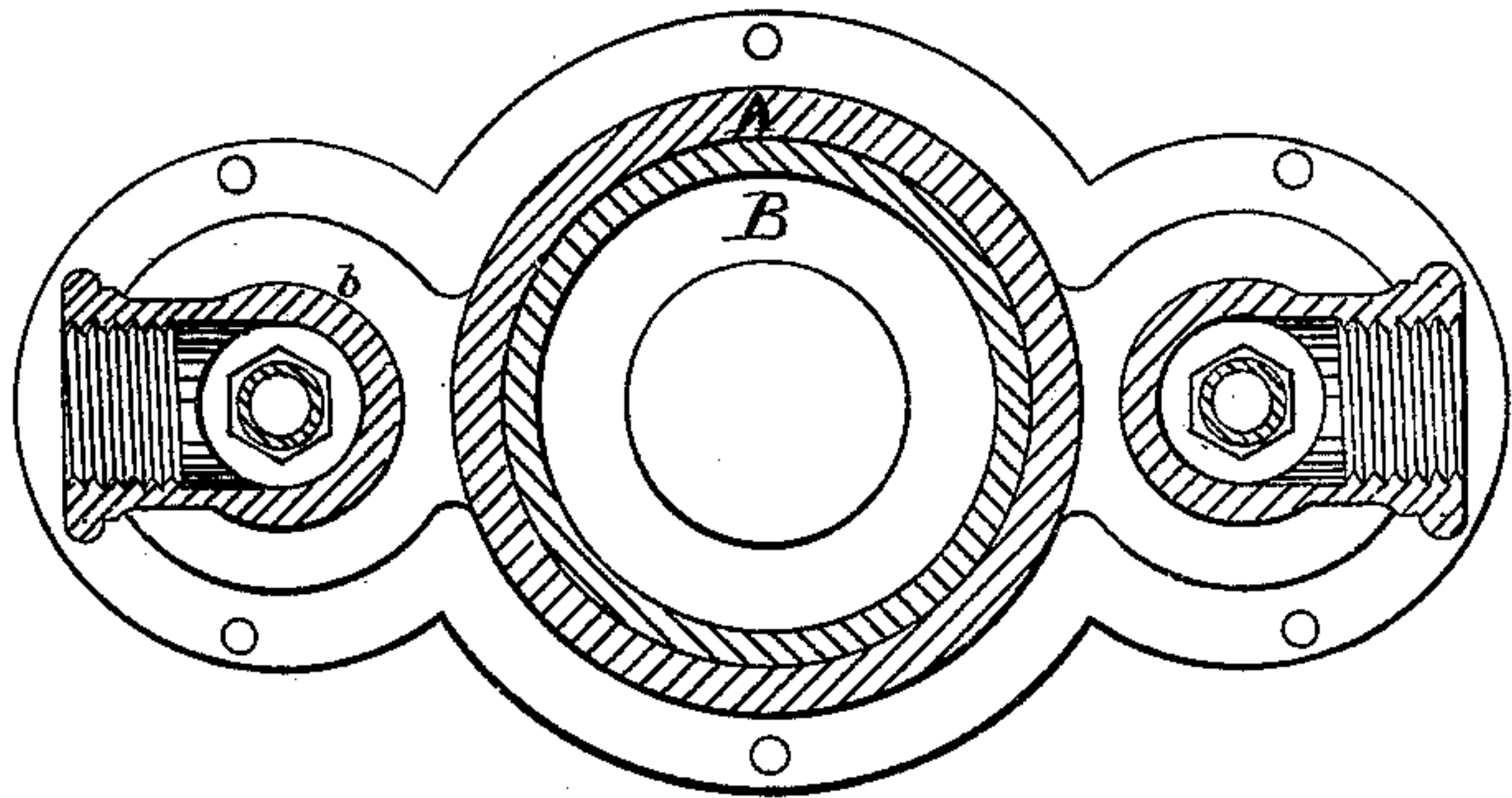


FIG. 3.

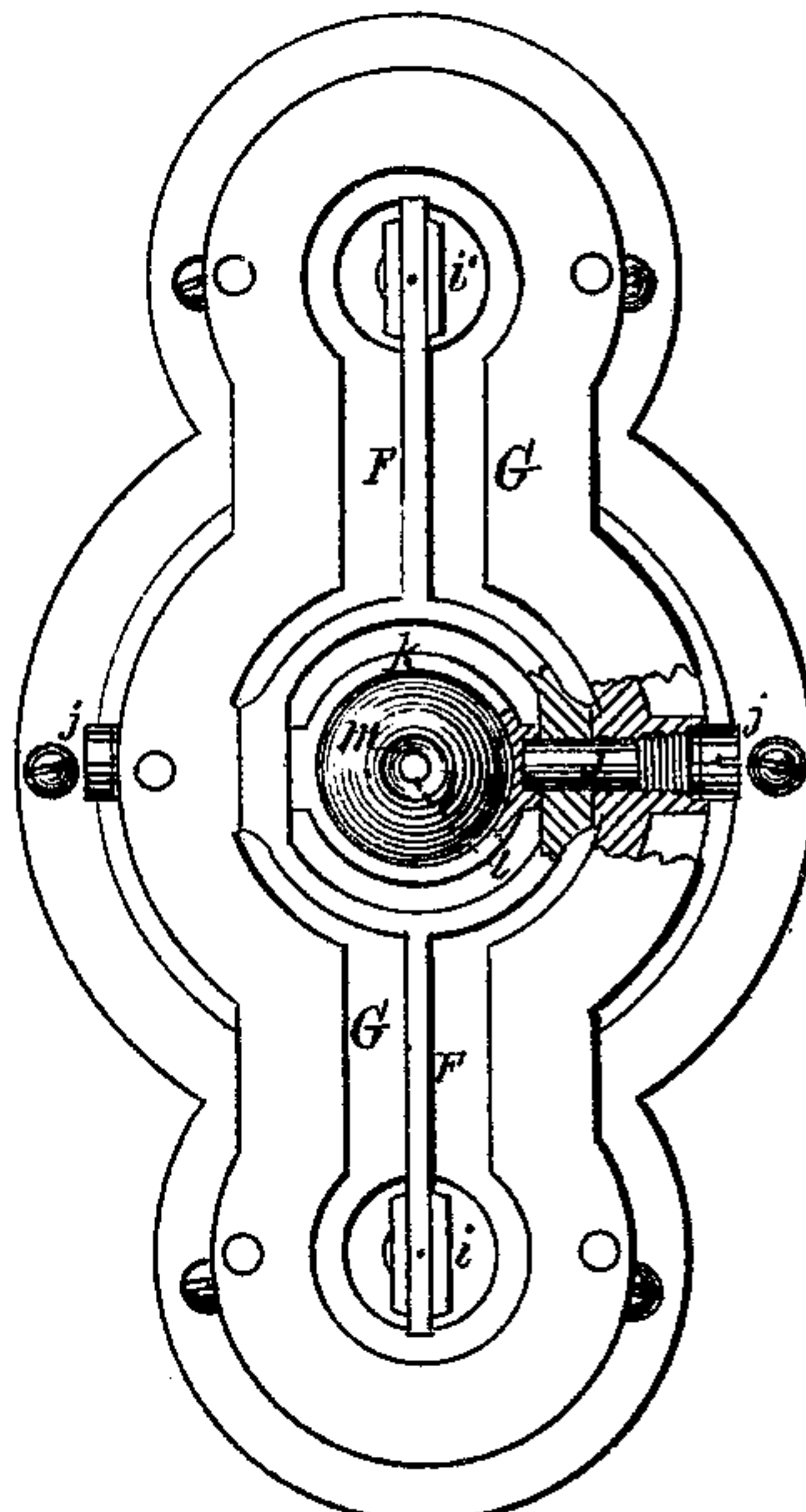


FIG. 5.

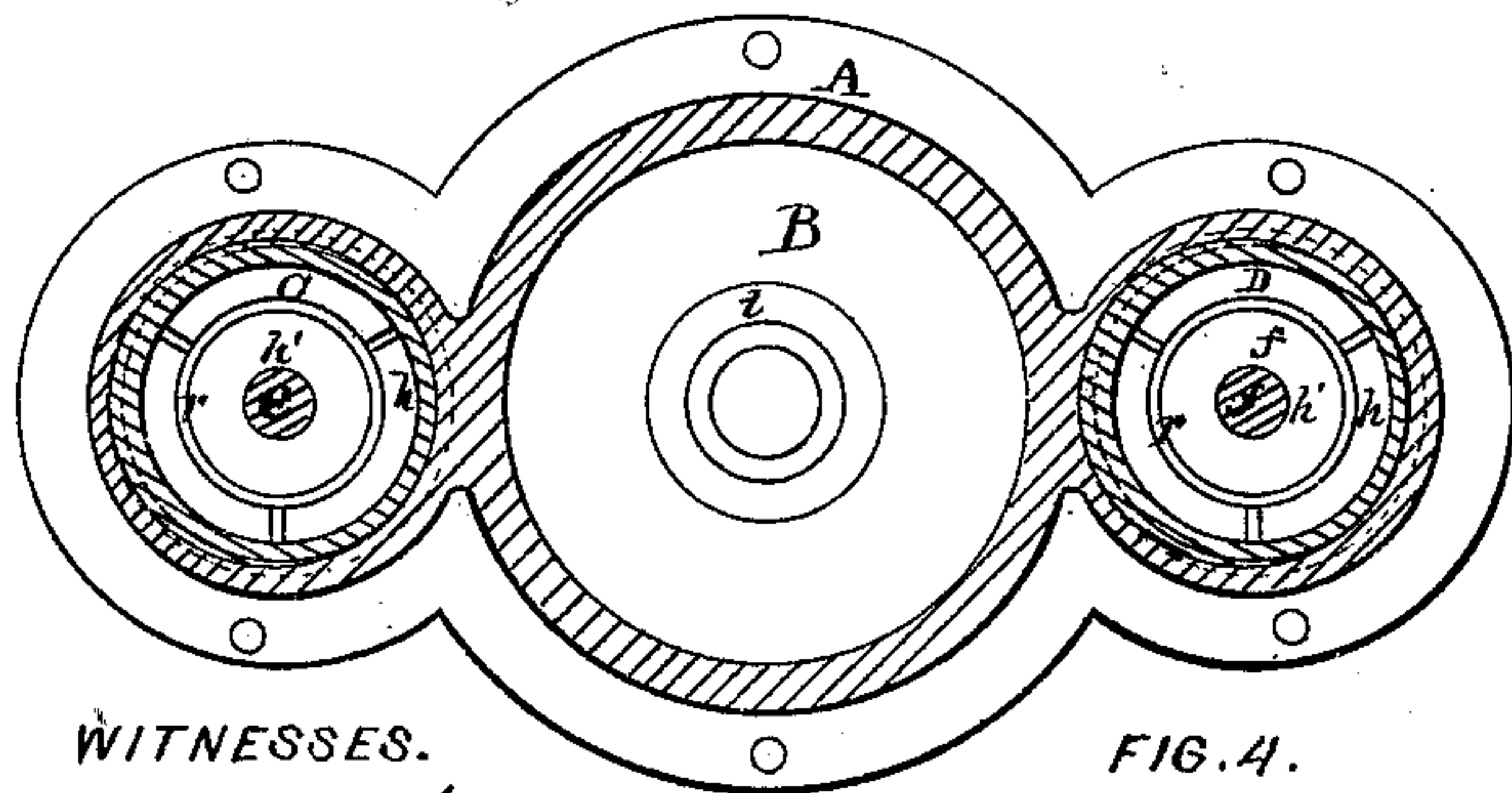


FIG. 4.

WITNESSES.

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JAMES DOOLING, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN FLUID-METERS.

Specification forming part of Letters Patent No. 126,626, dated May 14, 1872.

Specification describing certain new and useful Improvements in Fluid-Meters, invented by JAMES DOOLING, of Boston, in the county of Suffolk and State of Massachusetts.

The first part of my invention relates to the arrangement of the cylinder and the valve-chambers in relation to each other; and it consists in the arrangement of two induction-valve chambers upon one side of the cylinder—one at either end of said cylinder—and two eduction-valve chambers upon the other side of the cylinder—one at either end thereof; said induction-chambers both being entered by the inlet-pipe and both of the eduction-chambers opening into the discharge-pipe, as will be further described.

The second part of my invention relates to the arrangement of the valves and their connections; and it consists in the arrangement and combination of four disk or puppet valves and valve-seats, situated in suitable chambers, two at either end of the cylinder, and so connected together that a movement of one valve will cause a movement of all of the other valves, as will be more fully described. It further consists in the use in each of said valve-chambers, in combination with said valves, of a "spider"-bearing for the valve-rod, said spider-bearing being made up of a central hub supported by two or more arms, connecting it to a ring fitting the inner diameter of said chamber, leaving sufficient area of space between said ring and hub for the passage of the necessary quantity of water or other fluid. It also consists in making the hubs of said spider-bearings cone-shaped, the apexes or small ends of said cones being turned from the valves and toward each other. The object of said cone shape is to serve as a deflector to the water when entering the cylinder, and cause it to pass entirely outside of the valve and flow freely by it without acting upon it to lift it when said valve is open. This applies to the induction side of the cylinder. The cone shape is not needed on the eduction side of the cylinder, except to give a free passage from the valve-chamber to the discharge-pipe, which may be done by making the valve-chamber longer without making the hub of the "spider" cone-shaped. It further consists in hanging the beam or lever, by means of which the valves upon one side of the cylin-

der are connected to those on the other side, in a chamber in the cylinder-head, said beam or lever consisting of a ring of metal of suitable size, from opposite sides of which project two arms, to the outer extremities of which are connected the valve-stems; and at two other points in said ring, on opposite sides thereof and in a line at right angles to said arms, are formed bosses, through the center of which the journals or fulcrum-pins pass, on which the beam or lever vibrates, said fulcrum-pins having their bearings in the outer wall of said chamber and in an annular rib which projects upward from the bottom of the cylinder-head inside of the ring portion of the beam, and having their outer bearings so packed as to prevent leakage around the same.

The third part of my invention relates to the means employed for packing the register-pin; and it consists in the use of a rubber or other suitable elastic ball inclosed in a chamber of equal diameter therewith, said ball having a hole through its center for the passage of the register-pin, and being confined in said chamber so that it cannot move as a whole in the direction of the movement of the pin, but being free to change its form sufficiently to allow the necessary movement of the pin.

The fourth part of my invention relates to the means of adjusting the valves to their seats; and it consists in so connecting the stems of the two valves upon either side of the cylinder, by means of a sleeve-coupling having a right-and-left-hand screw-thread formed therein, that, by a revolution of said coupling, said valves may be moved further apart or drawn nearer together.

Figure 1 of the drawing is a side elevation of my improved meter. Fig. 2 is a vertical longitudinal section through the axis of the cylinder, the valve-chambers, and inlet and outlet pipes. Fig. 3 is a transverse section on line *x x*, on Figs. 1 and 2. Fig. 4 is a transverse section on line *z z*, on Figs. 1 and 2; and Fig. 5 is a plan with the upper cover removed so as to show the valve-lever and the packing for the register-pin, a portion being shown in section to show more clearly the manner of hanging the valve-lever.

A is the cylinder, provided with the piston B, of sufficient length to guide it steadily in its movement from end to end of the cylinder.

C C' are two valve-chambers, one at either end of the cylinder, and in line with each other for the reception of the induction-valves *a* and *a'*, said chambers being connected together by the pipe *b*, arranged parallel to the axis of the cylinder, and provided with the nozzle *b'*, by which the meter is connected to the supply-pipe. D D' are two other valve-chambers similarly arranged on the opposite side of the cylinder, or at any other convenient point around the circumference of the cylinder, and connected together by the pipe *c*, also parallel to the axis of the cylinder, and having a nozzle, *c'*, near the center of its length, by which the meter is connected to the pipe leading to the faucet, said chambers being for the reception of the eduction-valves *d* and *d'*. The valves *a*, *a'*, *d*, and *d'* are plain disks of metal, cast with or otherwise secured to the stems *e*, *e'*, *f*, and *f'*, said stems being coupled together in pairs by means of the sleeve-couplings *g*, screwed therein by means of right-and-left-hand screw-threads, to facilitate the putting together of the machine and the adjustment of the valves to their seats. When the valve-rods *e* and *e'* and *f* and *f'* are coupled together, as described, *e* and *e'* become virtually one rod, as also do *f* and *f'*, with a disk-valve at either end thereof, said rods having their bearings in the conical hubs *h'* of the spiders *h*, which are fitted to the interiors of the valve-chambers C, C', D, and D', and secured therein by screwing in or otherwise.

The hubs are made conical, to serve as deflectors for the water in its passage from the pipe *b* to the chambers C and C', and to allow sufficient space for the passage of the water from the chambers D and D' to the pipe *c*, it being very essential that the water, in its passage from the inlet-pipe through the induction-valves to the cylinder, should be deflected and turned around the valves instead of striking directly against them. N, N', O, and O' are metal rings fitted to the interior of the chambers C, C', D, and D', their outer surfaces being flush with the end of the cylinder and their inner faces forming the valve-seats, said rings being secured in place by screwing in or otherwise. The valve-stems *e* and *f* extend upward above the valves, and have secured thereto the forked couplings *i* and *i'*, by means of which said valve-stems are connected to the ends of the rocking lever F, which is pivoted by its center upon the fulcrum-pins *j* and *j'*, said pins having their bearings in the outer wall of the lever-chamber G and the annular rib *k*, which rises from the bottom plate G' of the chamber G. The pins *j* and *j'* are screwed in and packed under their heads, so as to make a water-tight joint. In the chamber inclosed by the annular rib *k* is a rubber ball, *m*, of a diameter equal to the diameter of the chamber, said ball being, in practice, made hollow, and pierced through the center to receive the register-pin *l*, said pin being provided with a flange, *o*, which rests on the bottom plate G' of the chamber G, and a conical seat, *o'*, to re-

ceive the rubber ball *m*, which is cut to fit said seat, as well as at its upper side, to fit a corresponding seat formed on the under side of the cover H around the hole through which the register-pin *l* passes to the register mechanism, not shown in the drawing. I is the lower cylinder-head or bottom, having the inlet and outlet passages *p'* and *q'* formed therein, the corresponding passages or ports *p* and *q*, at the other end of the cylinder, being formed in the under side of the casting in which is formed the lever-chamber G. The sides of the conical hubs *h'* next to the valves *a* and *d* are recessed or have a raised rib, *r*, around the outer edge thereof, which partially incloses the valves when open, and protects them from the action of the water in its passage to the cylinder. The piston B has an annular groove formed on either end thereof, which is filled with rubber, leather, or other elastic material *t*, against which the annular ribs *s*, formed on the inner sides of the cylinder-heads, strike to limit the movement of the piston in either direction.

The operation of my meter is as follows: The parts being in the position shown in Fig. 2 and the meter being full of water, the ports will all remain in the position shown; but if the faucet is opened so that the water in the pipe *c* is free to flow, the pressure of the water passing through the valve-seat ring N into the cylinder will cause the piston B to move toward the bottom of the cylinder, forcing the water below it out through the valve-seat ring O', around the valve *d'*, through the pipe *c* and nozzle *c'* to the faucet, which operation continues until the lower end of the piston comes in contact with the annular rib *s*, when the motion of the piston in that direction ceases, when the momentum of the water, creating a sudden increase of pressure upon the upper surface of the valve *d*, will start it from its seat, there being no pressure behind it, and, by means of the lever F, move the valve *a* toward its seat, when the current of water flowing past it seizes upon it, and, closing it and the valve *d'* and opening the valves *a'* and *d*, causes the current of water entering the nozzle *b'* to turn downward in the pipe *b*, passing around the open valve *a'*, through the valve-seat ring N', and through the port or passage *p'* to the cylinder, and causes the piston to move upward, expelling the water in the cylinder above it through the port *q*, through the valve-seat ring O around the valve *d*, into the pipe *c* and nozzle *c'* to the faucet. The piston continues to move upward until it comes in contact with the annular rib *s* when it has moved the register-pin upward and operated the register, when the valves are again changed, and also the direction of the movement of the water, as above described.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination and arrangement of the cylinder A, the valve-chambers C, C', D, and D', located two at or near either end of the

cylinder, the two induction disk or puppet valves *a* and *a'*, and the two eduction disk or puppet valves *d* and *d'*, when said valves are so connected together that they must all move at the same time, substantially as described.

2. In combination with a disk induction-valve and its seat in a water-meter or engine, I claim the conical deflector *h'*, arranged and operating substantially as described.

3. In combination with two disk-valves, located, one at each end of the cylinder, in line with each other, and connected together, by means of a rod or rods, in such a manner that they must both move together, I claim the sleeve-coupling *g*, provided with right-and-left-hand screw-threads for coupling the stems of said valves together, substantially as described.

4. In combination with the valves *a*, *a'*, *d*, and *d'*, and their seats *N*, *N'*, *O*, and *O'*, I

claim the rocking lever *F*, constructed with a ring at its center, so that it may surround the annular rib *k* and be partially supported thereby, substantially as described.

5. I claim the lever-chamber *G* for inclosing the rocking lever *F*, in combination with the ports or passages *p* and *q* formed in the under side of the same casting, substantially as described.

6. The combination of the register-pin *l*, the ball-packing *m*, and the inclosing annular rib *k*, arranged and operating substantially as described.

Executed at Boston, Massachusetts, this 16th day of February, 1872.

JAMES DOOLING.

Witnesses:

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