

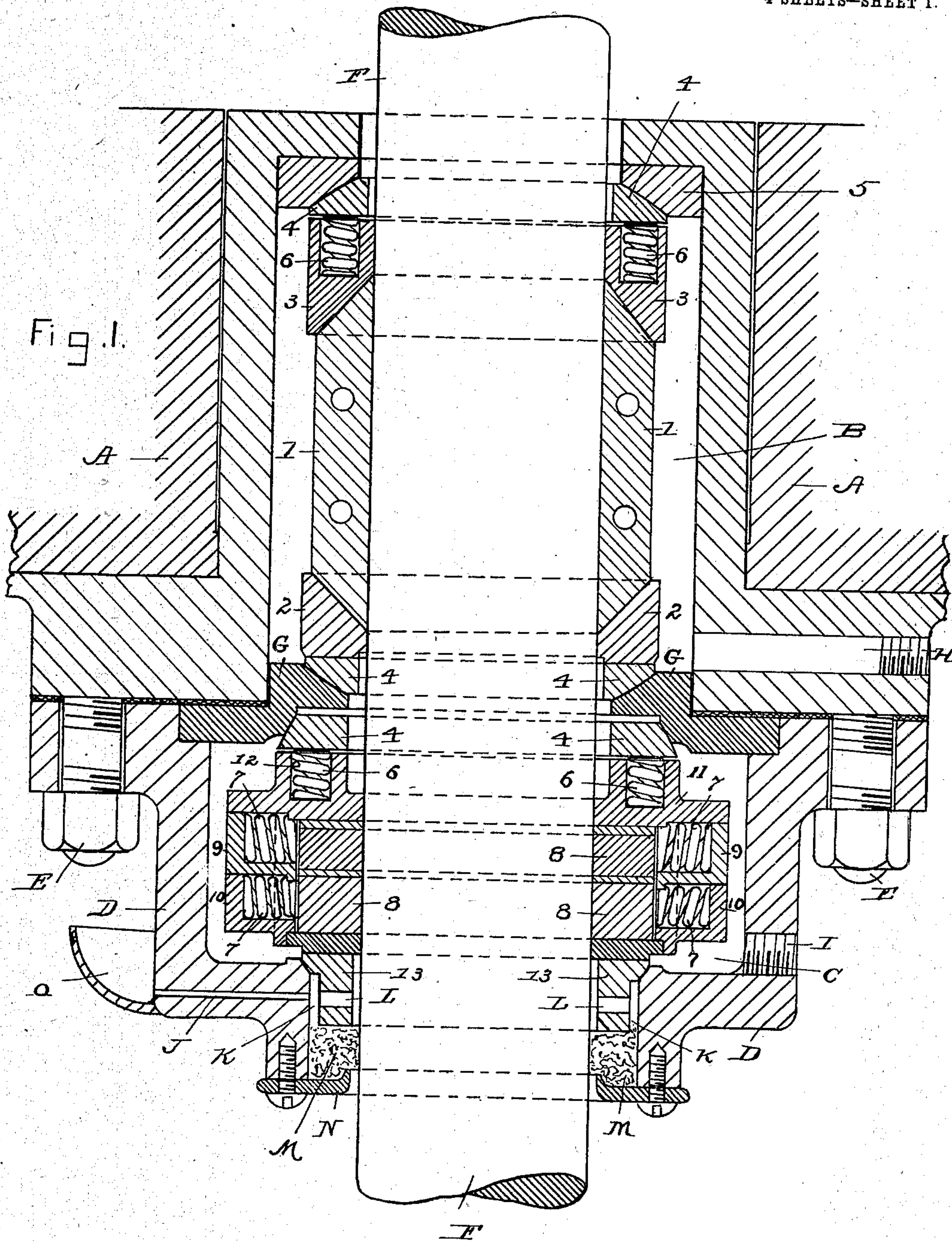
No. 723,220.

PATENTED MAR. 17, 1903.

E. W. TUCKER.
PISTON ROD PACKING.
APPLICATION FILED JUNE 12, 1900.

NO MODEL.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 2.

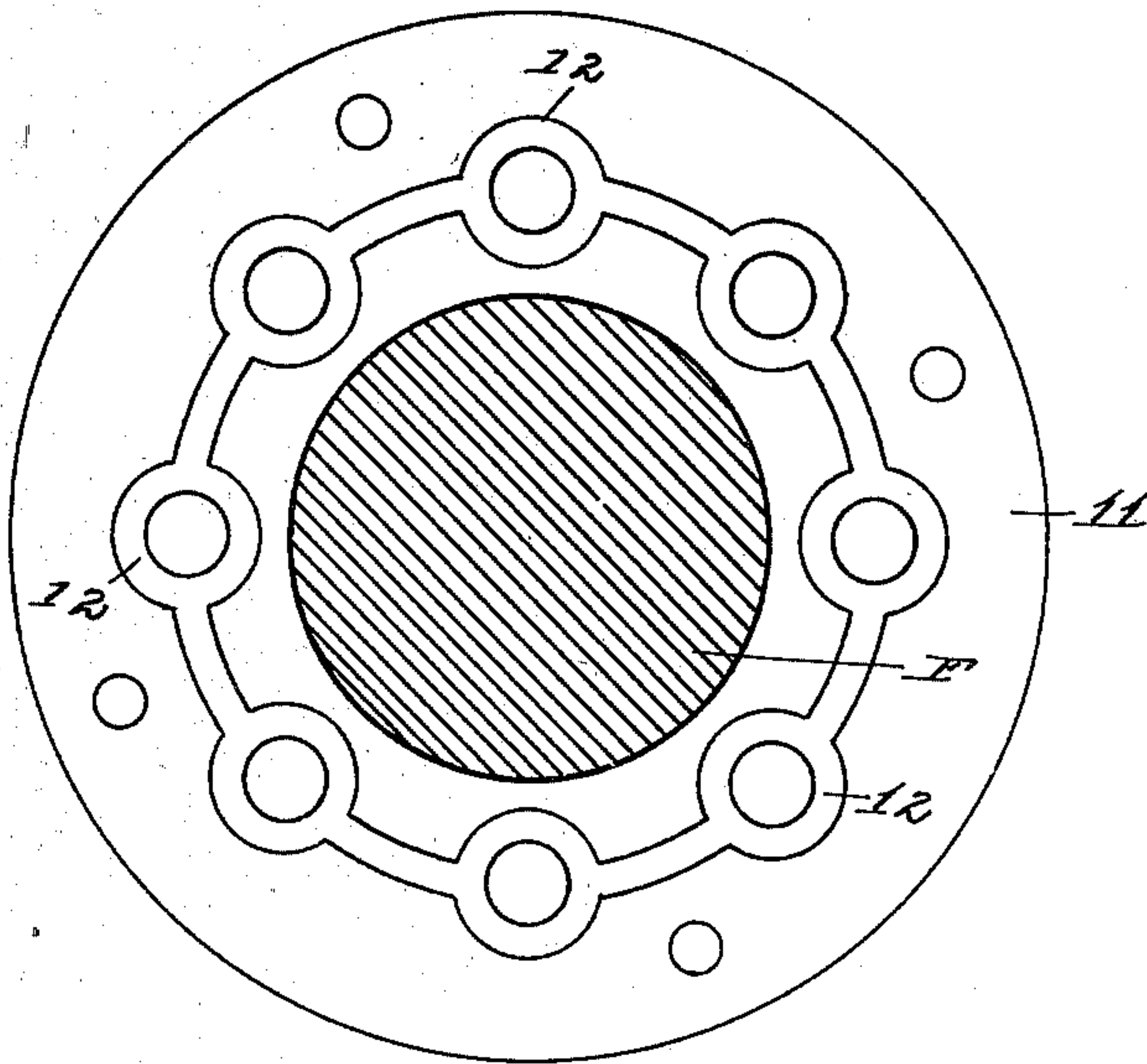
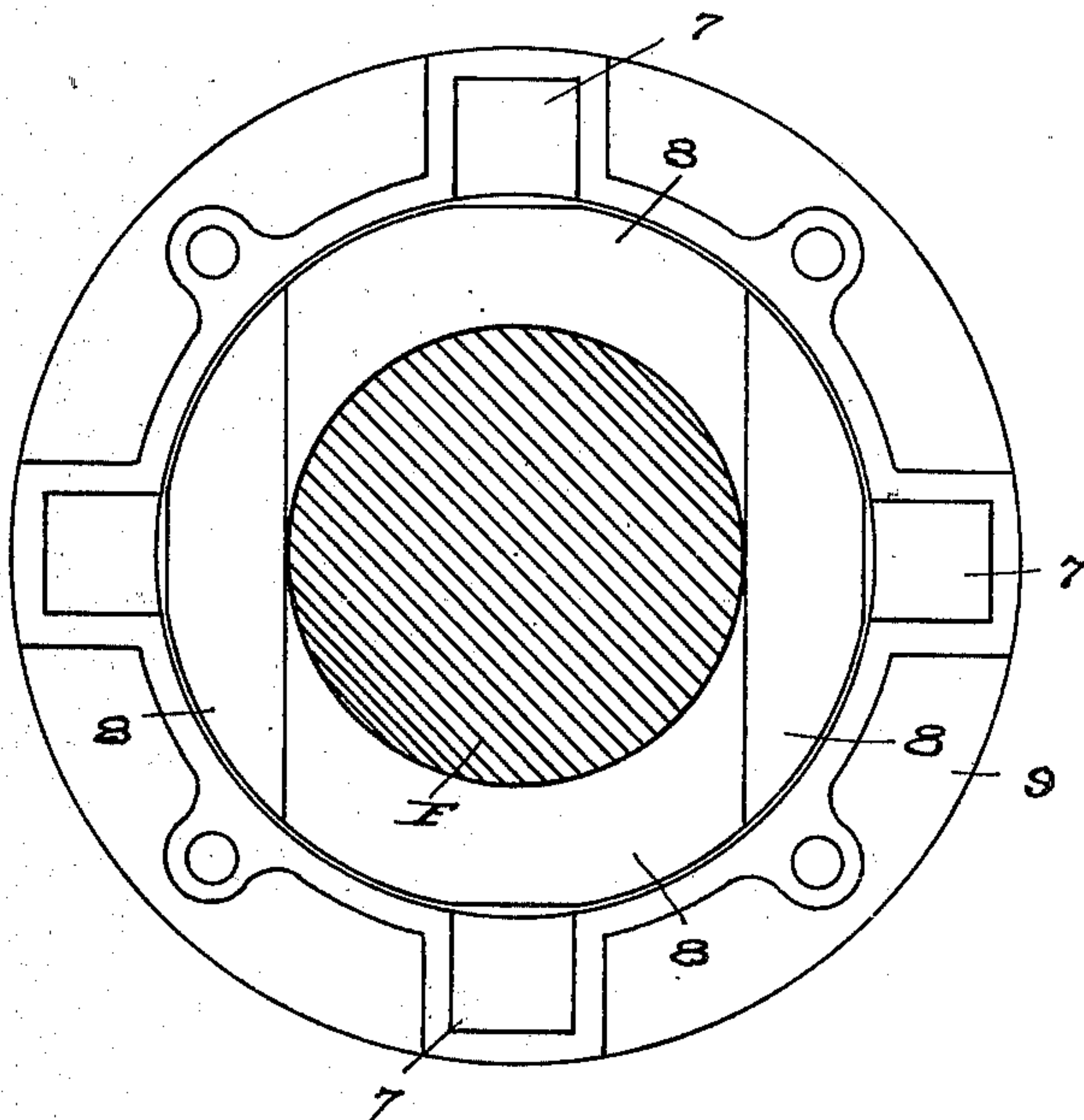


Fig. 3.



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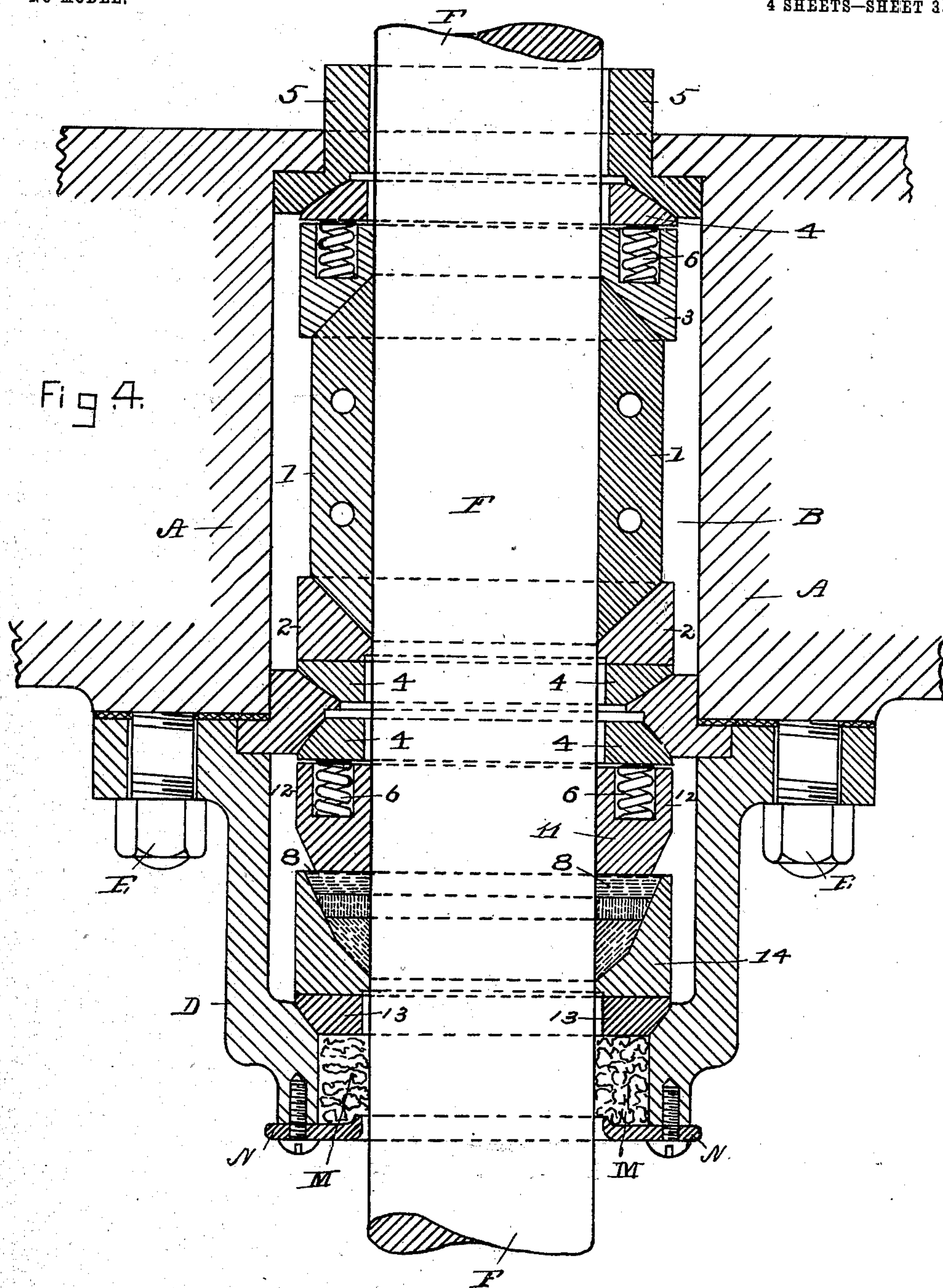
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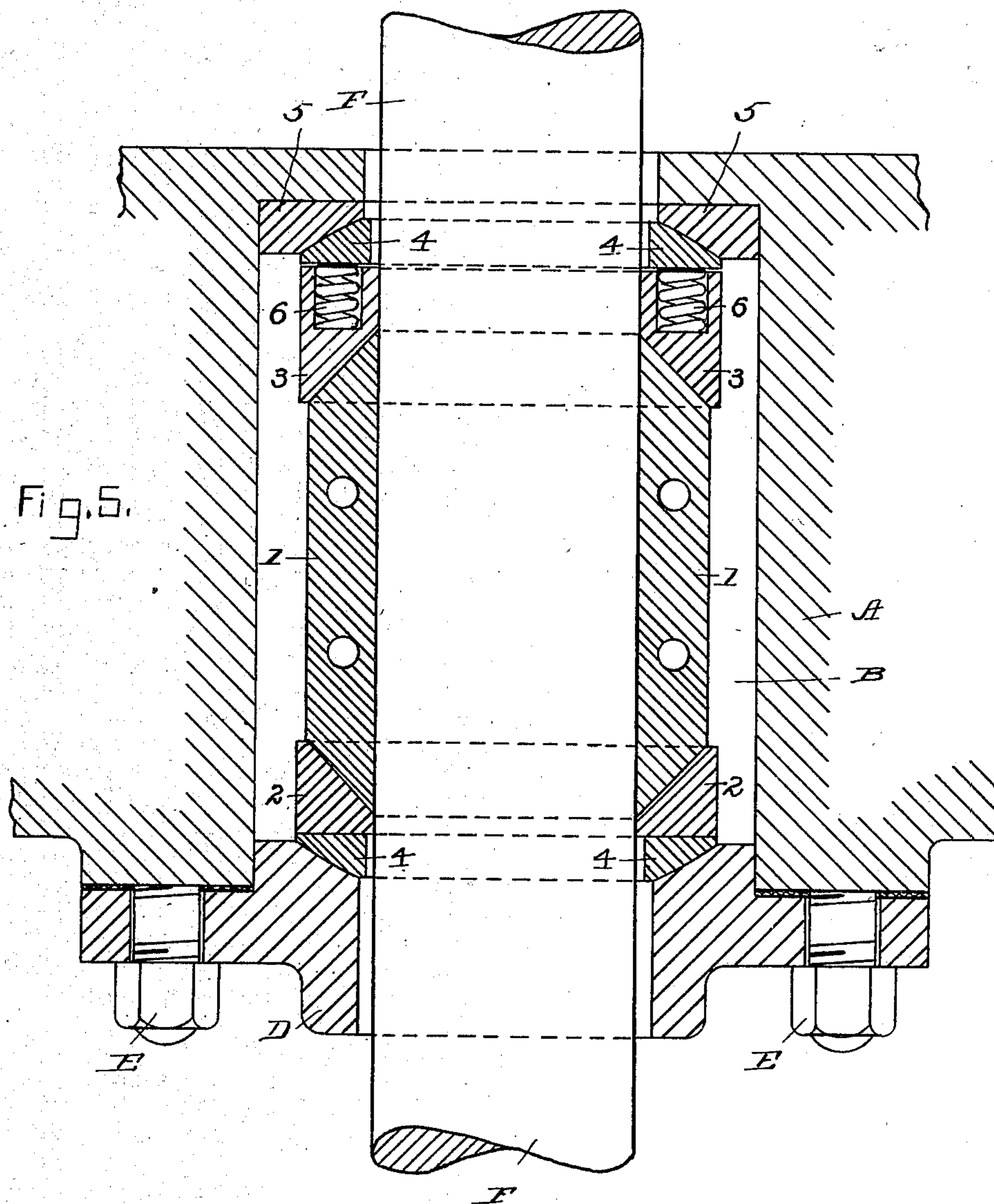
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

EDWIN W. TUCKER, OF SAN FRANCISCO, CALIFORNIA.

PISTON-ROD PACKING.

SPECIFICATION forming part of Letters Patent No. 723,220, dated March 17, 1903.

Application filed June 12, 1900. Serial No. 20,075. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. TUCKER, a citizen of the United States, residing at 818 Page street, San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Piston-Rod Packing; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to improvements in metallic packing and case for use upon piston-rods, valve-stems, and similar constructions, and more particularly for use where high pressures of steam or other gases or fluids are used.

In the drawings, Figure 1 represents a vertical section of the packing as applied to the piston-rod of a steam-engine, showing the rod and packing in a central position. Fig. 2 is a plan view from above showing the upper ring or follower and spring-pockets with connecting-webs. Fig. 3 is a plan view of the rings or yokes which hold the packing-blocks and springs. Fig. 4 is a longitudinal section of the stuffing-boxes, showing an alternative construction in the upper packing-boxes. Fig. 5 is a longitudinal section showing the pressure-breaker used as a single packing.

The objects which the present invention has in view are to accommodate the oscillation of the piston-rod, to relieve the excess pressure of the packing upon the rod, to avoid the wearing of the joints, and to prevent the passage of water from the cylinder to the gland containing the packing.

The invention consists, primarily, in providing end collars or rings to receive the packing members between, the outer surfaces or edges of which collars are formed to a segmental ball shape the center of the curvature of which is the center of the combined packing member and collars, and, further, in providing seats within the stuffing-boxes, also formed to a corresponding curvature, upon which and against which the said collars have their bearings.

It further consists in interposing between the said collars and the packing members re-

lieving the resilient members by preventing possible jamming of the packing in the stuffing-boxes.

It further consists in providing packing collars or rings to encompass the piston-rod and so formed with conical-shaped ends to seat within cup-shaped collars, so that end pressure as well as side pressure upon the packing-rings will result in a tightening of the said collars upon the piston-rod.

It further consists in the construction of a box or casing to hold the outer packing members so constructed as to release the said members from the pressure of the cylinder, while admitting of the ready removal of the packing-blocks.

The invention further consists in a particular construction and arrangement of the parts as shown in the drawings, in which the letter A represents the end of the cylinder, the letter B what is herein termed the "inner" stuffing-box, the letter C what is herein termed the "outer" stuffing-box, and the letter D the casing forming the outer stuffing-box. This latter is bolted to the end of the cylinder A by means of the usual bolts E. The piston-rod shown in the drawings is indicated by the letter F.

In Figs. 1 and 4 the invention is illustrated as having double stuffing-boxes, and these are formed by the partition G.

The preferred form of construction is that shown at Fig. 1 of the drawings, having the inner and outer stuffing-boxes, which I will describe in the order as above named. The pressure-breaker or upper packing-ring 1 is constructed of a suitable material, the texture of which will not cut the piston-rod and which will be practically unaffected by the heat of the cylinder or the steam or of other gases or fluids contained therein. It is constructed in the usual manner, except as to the ends, which, as shown in the drawings, are made conical in form. While this shape is shown as a straight-walled cone, it will be understood that a curved wall might perform the function for which it is intended. Further, by means of these cone-shaped ends I am permitted to accommodate the construction to varying steam-pressures within the cylinder by making the conical ends in some

instances more perpendicular than in others, with the effect that the end pressure results in less shrinking of the packing-ring. Fitted over both ends are the cups 2 and 3, which are formed to accurately fit the ends of the collar 1. The perforations or openings in these cups are constructed to neatly but not tightly fit the circumference of the piston-rod. The outer surface of the ring 2 is recessed or cut away from the inner edge in order to produce the effect of two surfaces wiping past each other, and thereby avoid wearing the inner edge of the rings rounded. Against the outer faces of both collars 2 and 3 are placed the ball segmental rings 4 4, which, as stated, are formed with ball-like surfaces the center of the curvature of which is the center of the combined packing. The ball-surfaces of these rings 4 4 are seated upon suitable seats produced in the edges of the ring 5 and the partition G. The ring 5 is loosely fitted in the inner end of the stuffing-box B and may be changed by substituting rings of varying thickness, and thereby producing various strains upon the springs 6 6, which are seated in recesses or pockets provided in the cup 3 and bearing against the adjoining surfaces of the rings 4.

In mounting this packing so far described the ring 5 is first inserted in the stuffing-box and is followed by the upper ring 4, the cup 3, with its springs, the packing 1, the cup 2, the ring 4, and the partition G, which is firmly secured by the casing D, into which it fits. When thus in position, it will be noted the pressure-breaker or packing-ring 1 grasps tightly the piston-rod, and by reason of its construction and the cups 2 and 3 within which it is contained the more end pressure that is exerted upon the packing-ring the tighter the packing-ring is forced against the piston-rod, thereby automatically tightening the joint through which the steam would pass as the pressure is increased. The ball-shaped faces of the rings 4 4 permit the piston-rod to assume its natural position by moving upon their seats at both ends of the stuffing-box. The rings 4 4 thus maintain the joint between the seats of the rings tightly closed in all the positions of the piston-rod, thereby preventing the exit of steam from the interior of the stuffing-box past the partition G. This operation is largely facilitated by the springs 6 6, which maintain a direct bearing or thrust through the packing members upon all parts of the rings 4 4.

Where a single packing is used, as shown in Fig. 5, the partition G is superseded by the flat form of the casing D.

The cone-shaped ends of the pressure-breaker or packing-ring 1 and the cup shape of the cups 2 and 3 are varied according to the pressure under which the piston is working. In high-pressure cylinders the cones are made much more abrupt, while in low-

pressure cylinders the cones are more acute, giving thereby less contractile force for the pressures upon the cups for the higher pressures and more contractile force for the lower pressures.

Where the construction demands the employment of two stuffing-boxes and two packing members, they are preferably constructed as shown in Fig. 1, where the packing-blocks are formed in segments, as shown in Fig. 3, which are forced inward by springs 7 7, which press upon the blocks 8 8 and force the same against the surface of the piston-rod. In the usual construction there are two series of these packing-blocks, the inner and the outer, and for convenience of construction they are carried in independent casings 9 and 10. They are formed of any suitable material and, as stated, are held in position against the piston-rod by means of the springs 7 7. In this particular construction, however, these packing-blocks and the springs are thoroughly incased by means of a top and bottom covering 11, securely bolted together, forming a steam-tight joint. (Shown in Figs. 1, 2, and 3.) This top covering or follower is provided with receptacles or pockets 12 to contain spiral springs to bear against a ball-shaped ring 4 and similar in construction to the ring ball-like device above described in the inner stuffing-box. The springs contained in the receptacles or pockets 12 are substantially the same in construction and function as those described with reference to the inner stuffing-box. At the outer side of the packing members is formed a collar or what might be termed "neck-bushing" 13, extending above the inside of the cylinder to prevent the access of water to the stuffing-box, on which is produced a ball-shaped ring the function of which is the same as the outer ring 4 in the inner stuffing-box.

The remainder of the construction of this invention is such as will be most suited to the demands of the work to be performed.

By means of this double construction of stuffing-boxes and independent packing members having ball-shaped outer surfaces bearing against the stationary parts of the stuffing-box the piston-rod is permitted to have lateral movement or oscillating movement without jamming the packing members and without causing any leakage past the packing members, as above set forth with reference to the inner stuffing-box.

In Fig. 4 is shown the alternative construction in which the packing-rings 8 8 of the outer stuffing-box are contained in the cone-shaped box 14, which rests upon the ball-shaped ring 4 to close the outer exit of the stuffing-box. The collar 11 in this instance rests directly upon the packing-collars, so that any pressure which would cause the steam to escape would compress the packing-collars in the cone-shaped cup 14, thereby closing them

the more tightly upon the piston-rod. The construction of the two collars 4 13 and the action of them is exactly similar to that described in the other forms of employment of this invention.

To prevent the accumulation of water in the inner stuffing-box, I have provided the drain-tube H, which is suitably connected to the condenser of the engine. The opening I in the outer stuffing-box is intended for a like purpose and may be similarly connected, thus saving any leakage or waste of water in marine engines, where such saving is particularly desired.

It is for the purpose of providing an oiling device for the piston-rod that I have extended the outwardly-projecting flange from the outer ring 13 and pierced the same with the holes L L, which lead from the space (marked K) to a similar space inside the flange and surrounding the piston-rod. The oil is led from the oil-cup O, through the channel J, into the space K. The portion between the end of the casing D and the space K is filled with packed waste M or wool, which is held in place by the cap N tightly around the piston-rod. In a vertical engine, such as illustrated in the drawings, this waste M becomes saturated with oil from the space K and forms the bottom of the space K to carry the oil therein and in the space on the inside of the flange surrounding the piston-rod. This construction forms an oil-pocket in which the piston-rod operates.

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

1. In a packing for piston-rods, the combination with an inclosing stuffing-box having concave seats at both openings; a longitudinally-sectional pressure-breaker, having cone-shaped ends; ball-shaped members having center openings of greater diameter than the piston-rod, interposed between the said cups and the concave seats in the stuffing-box; a cushioning device interposed between one of the said cups and the ball-shaped member located thereat: substantially as described.

2. In a packing for piston-rods and like constructions, the combination with the piston-rod; of two connecting stuffing-boxes having a partition, having a central opening, the inner edges of which are formed to form the seats of ball-joints on opposite sides of the partition; separate packing members for said piston-rod adapted to enfold the said rod within each of the said stuffing-boxes and comprising loosely-connected end pieces the outer surfaces of which are ball-shaped; and resilient cushions interposed between the said end pieces to produce an even pressure of both end pieces against the seats provided in the stuffing-boxes, substantially as described, whereby a piston-rod may be dou-

ble-packed to allow of independent lateral movement of the same in each box.

3. In a packing for piston-rods, the combination with an inclosing stuffing-box, of a pressure-breaker having cone-shaped ends; cups receiving said cone-shaped ends; ball-shaped members against which the cups bear, and having center openings of appreciably greater diameter than the piston-rod; seats upon the stuffing-box on which the ball-shaped members are respectively adapted to rock, or turn; and a cushioning device interposed between and barely separating one of the said cups and the ball-shaped member located thereat: substantially as described.

4. In a packing for piston-rods and like constructions, the combination with the wall of a casing forming a stuffing-box, said wall having a channel therethrough leading into the interior of the said casing; of a suitably-supported oil-cup delivering into said channel, an annular ring surrounding the piston-rod loosely to form an annular chamber about the same and provided with perforations leading from the said chamber and adapted to convey the oil delivered from the said cup into the said chamber about the piston-rod, substantially as described.

5. In a packing for piston-rods, the combination with an inclosing stuffing-box having openings of appreciably greater diameter than the piston-rod; a pressure-breaker having cone-shaped ends; cups overriding said cone-shaped ends, whereby the pressure-breaker is contracted about the piston-rod by the constant pressure within the stuffing-box; ball-shaped members having center openings of greater diameter than the piston-rod, adapted to seat in and oscillate on concave seats formed in the stuffing-box; and cushioning devices interposed between one of the cups and the ball-shaped member located thereat; whereby the pressure-breaker operates independent of the oscillation of the packing as a whole: substantially as described.

6. In a packing for piston-rods, the combination with an inclosing stuffing-box, of a pressure-breaker cone-shaped at both ends; cups receiving said cone-shaped ends; ball-shaped members against which said cups bear, adapted to rock or turn on seats formed on the stuffing-box; spiral springs embedded in one of the said cups on its radial lines, and adapted to bear against the ball-shaped member located thereat: substantially as described.

In testimony whereof I have hereunto set my hand this 29th day of May, 1900.

EDWIN W. TUCKER.

Witnesses:

BALDWIN VALE,
JNO. S. ROBBINS.