

A. K. RIDER.  
Pistons and Packings.

No. 143,255.

Patented September 30, 1873.

Fig:1.

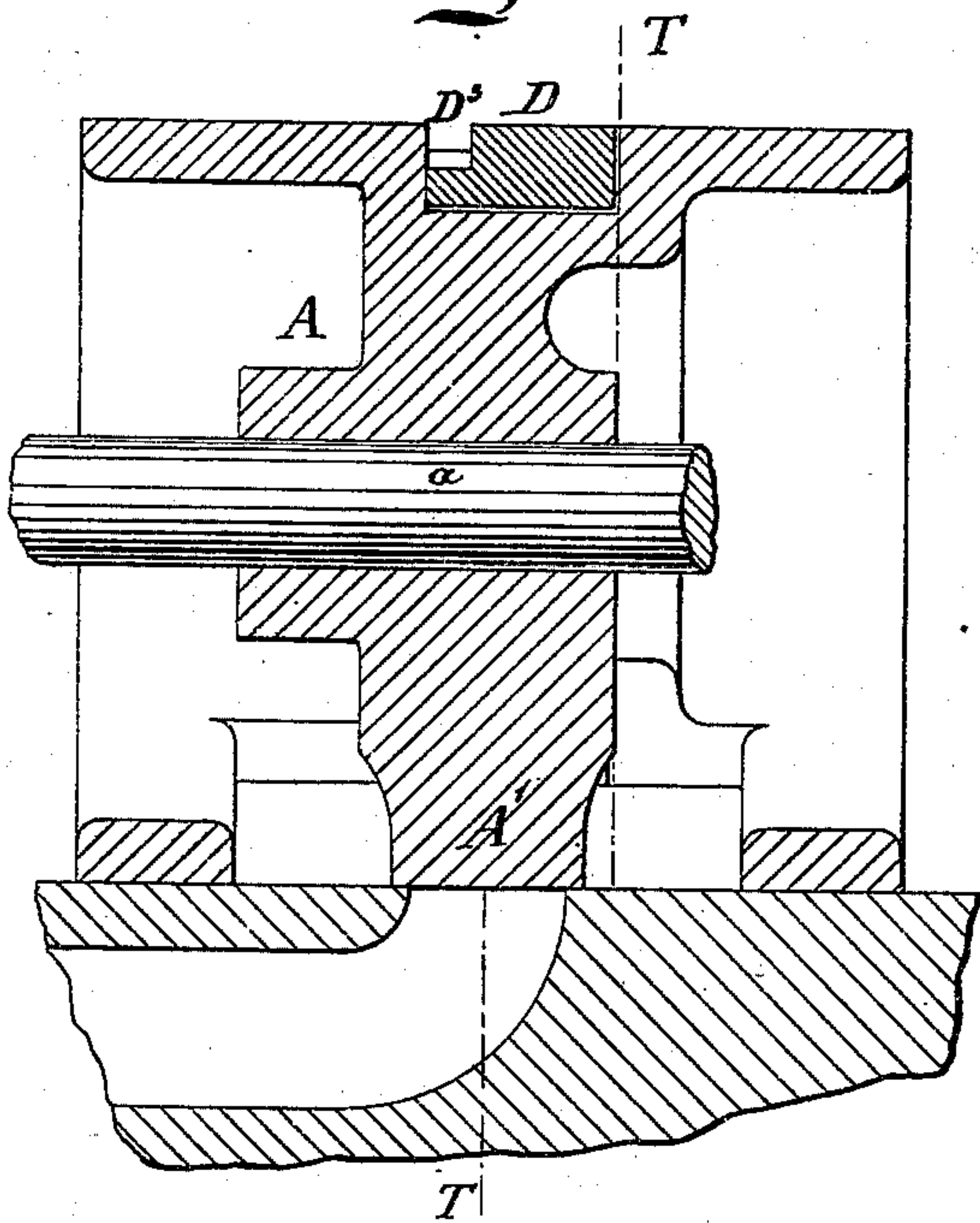


Fig:2.

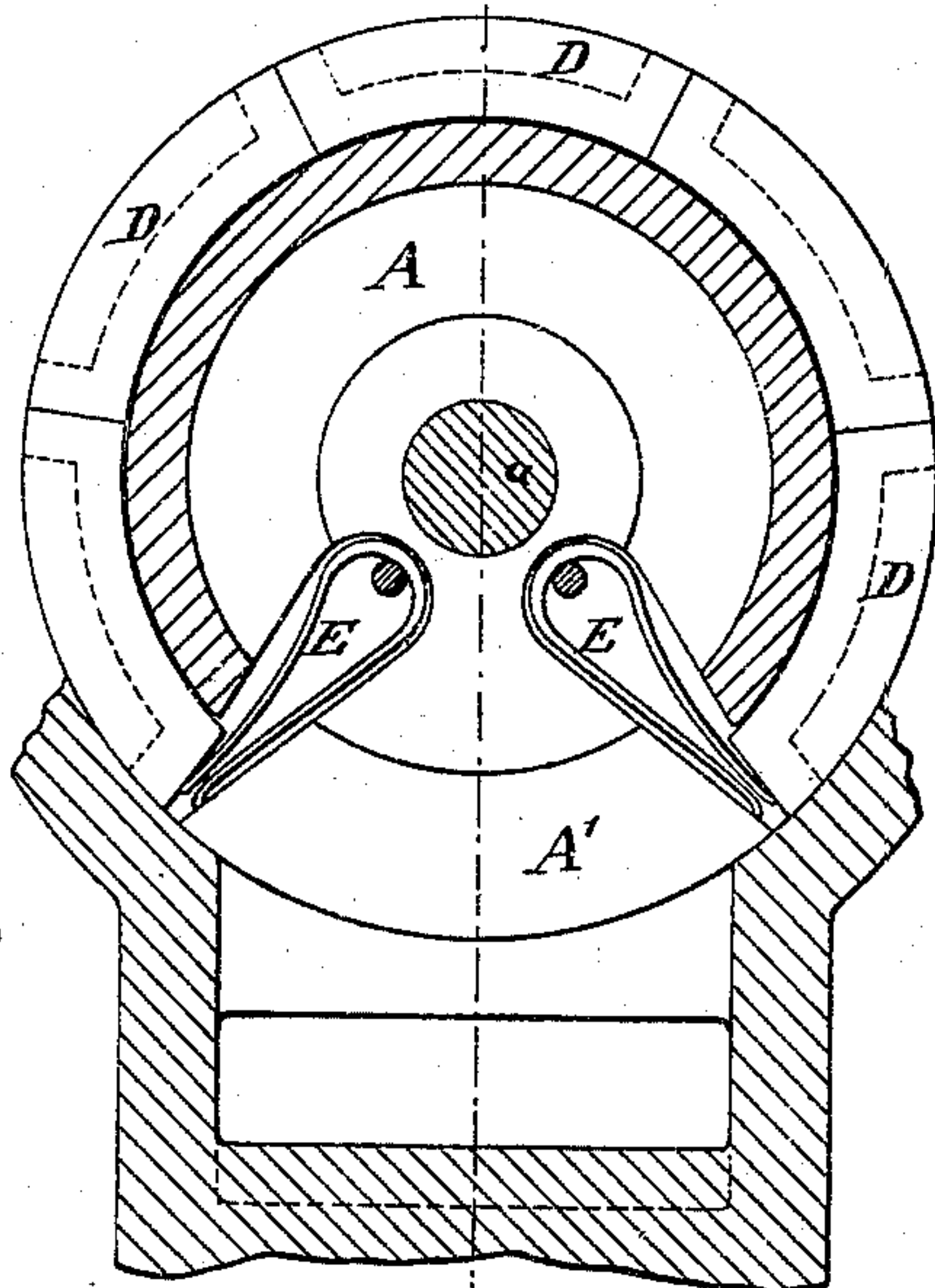


Fig:10.

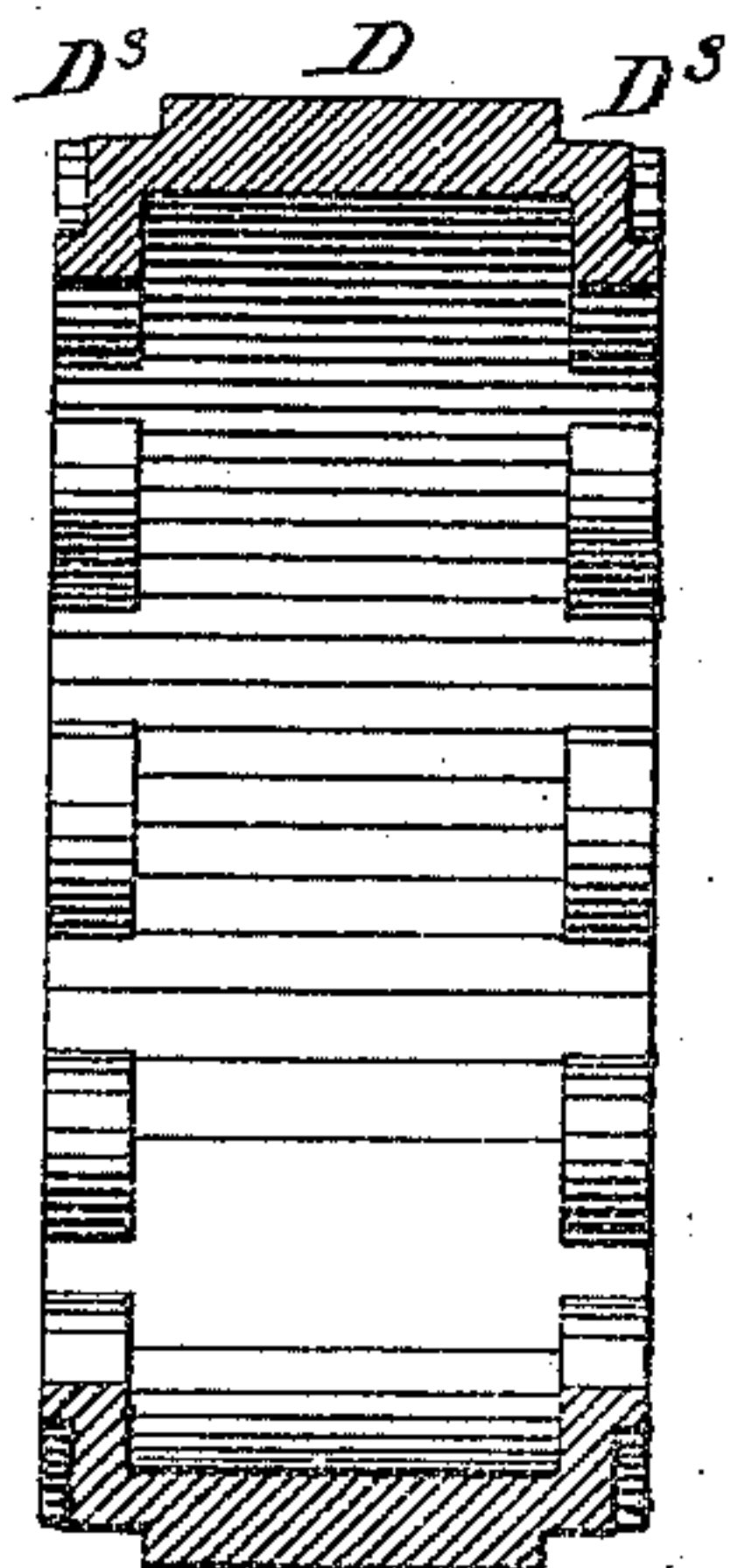
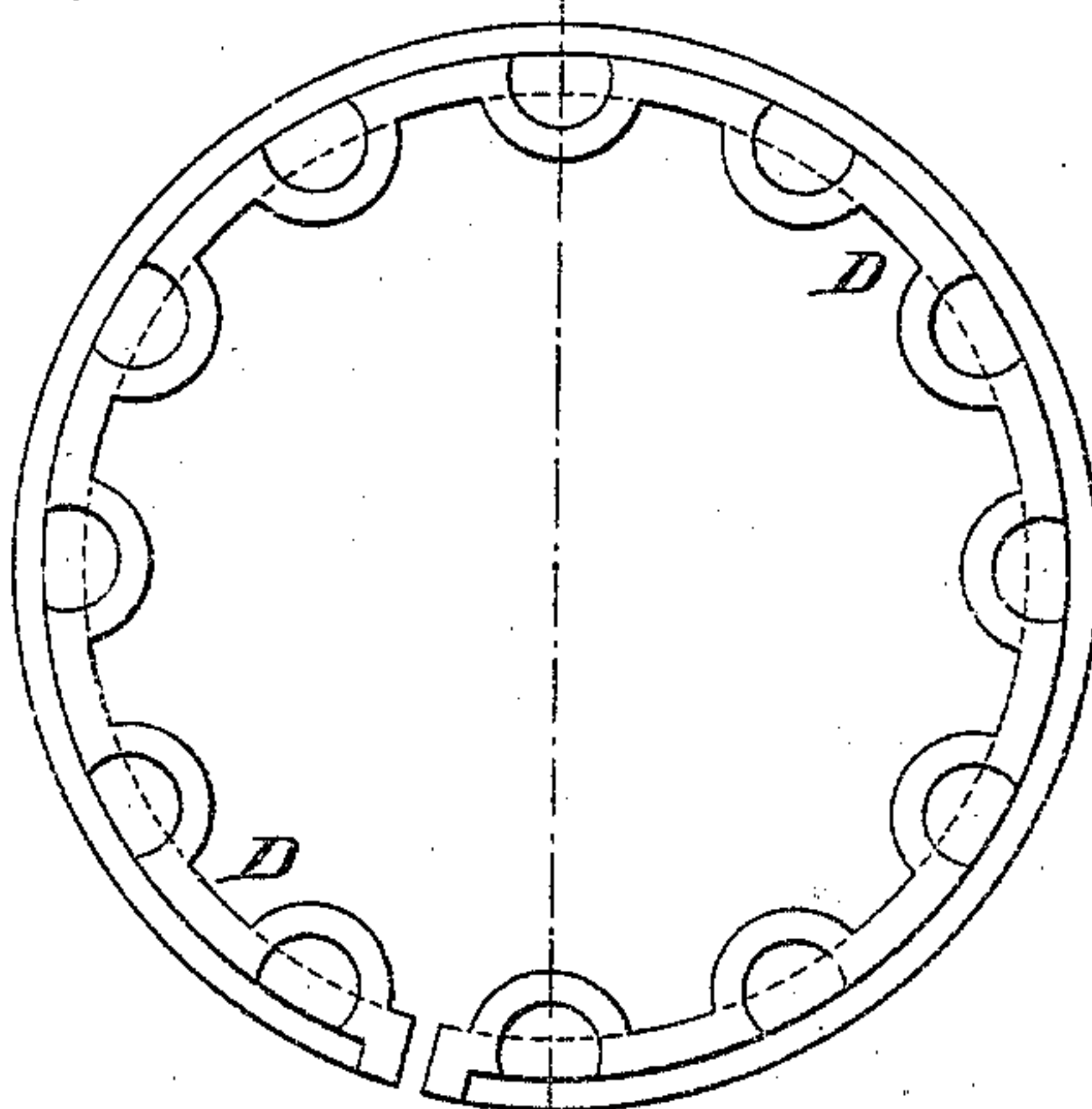


Fig:11.



Witnesses:

Arnold Hornum.  
M. C. Day

Inventor:

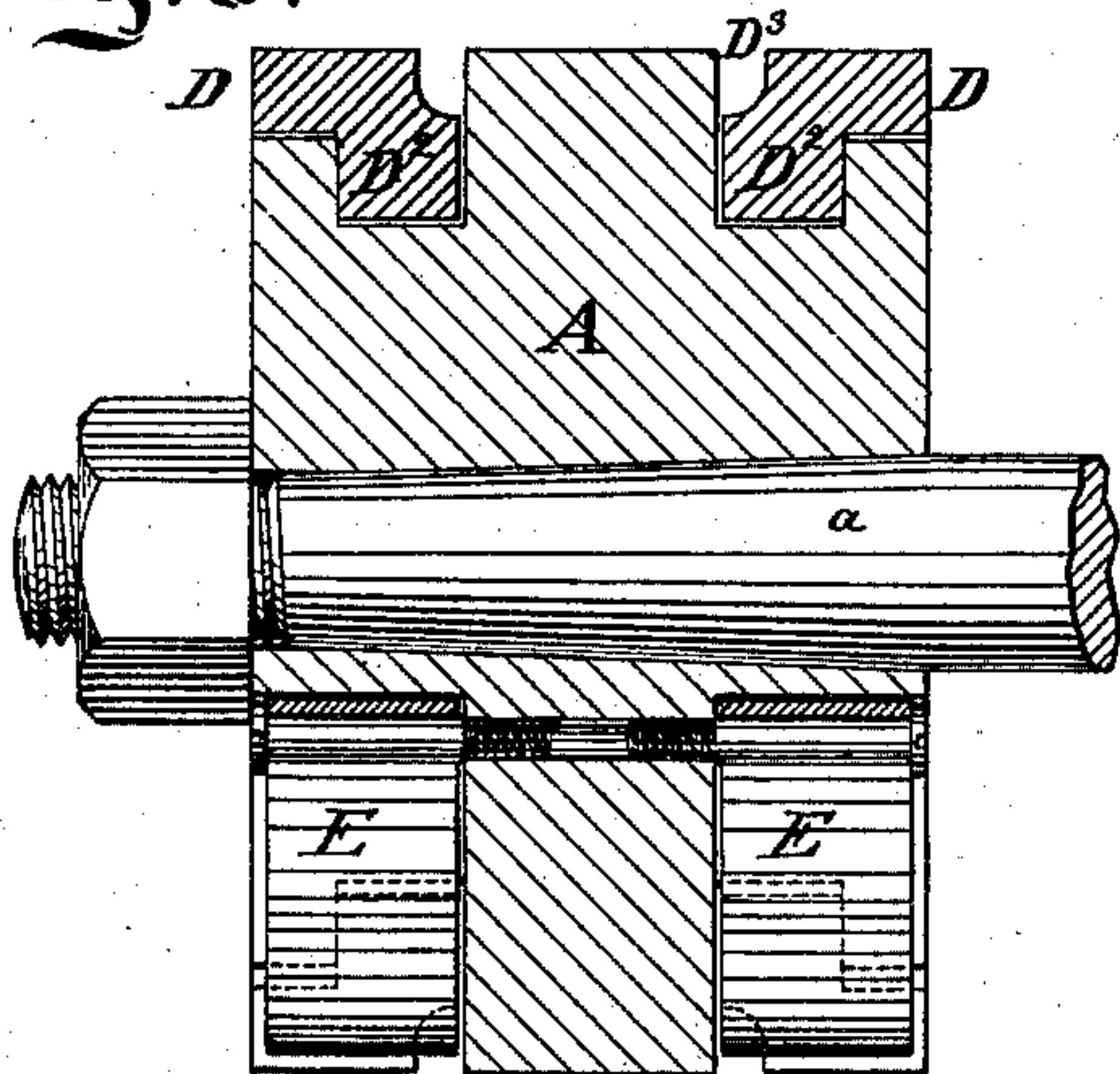
A. K. Rider  
by his atty J. D. Helton

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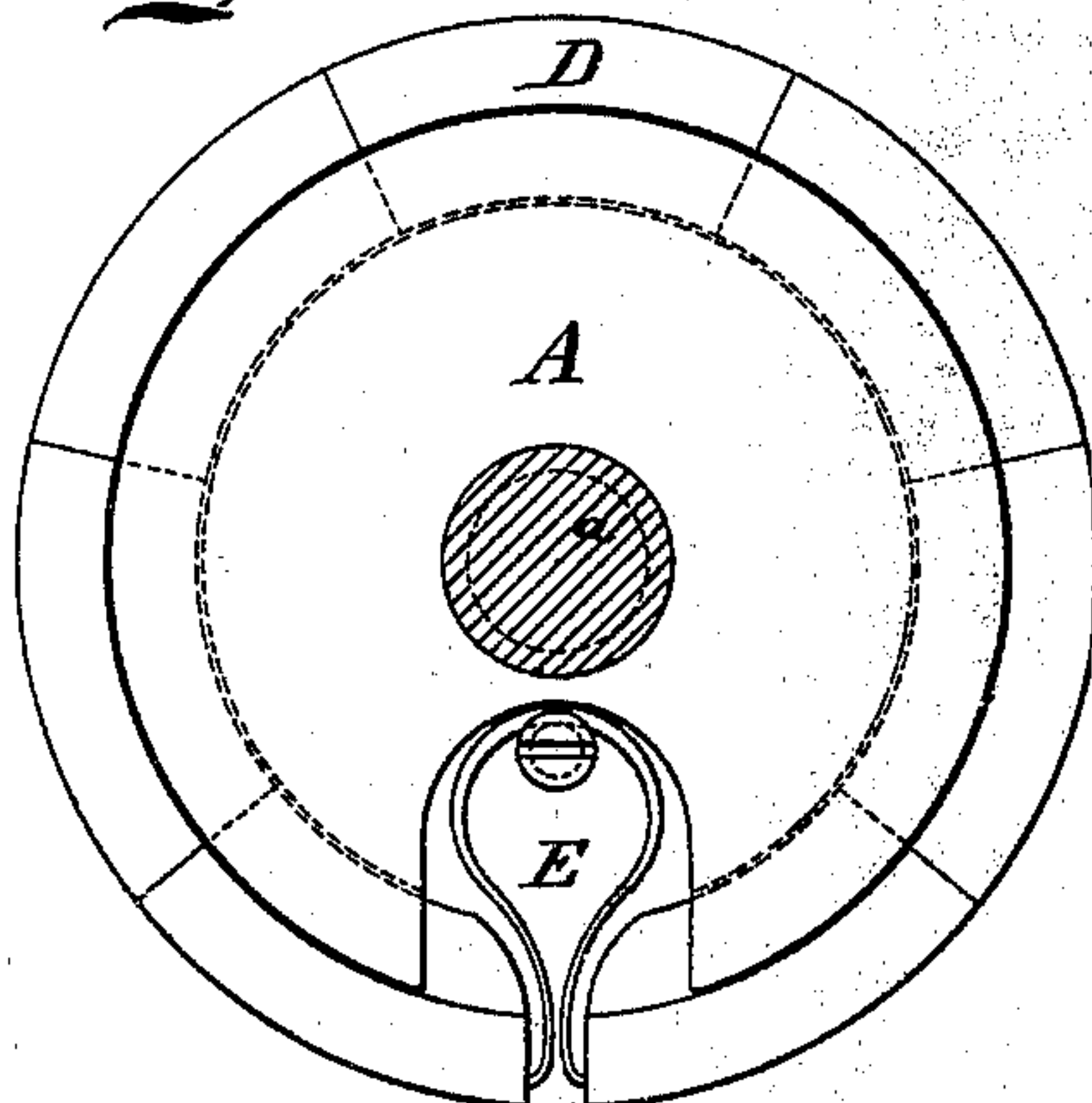
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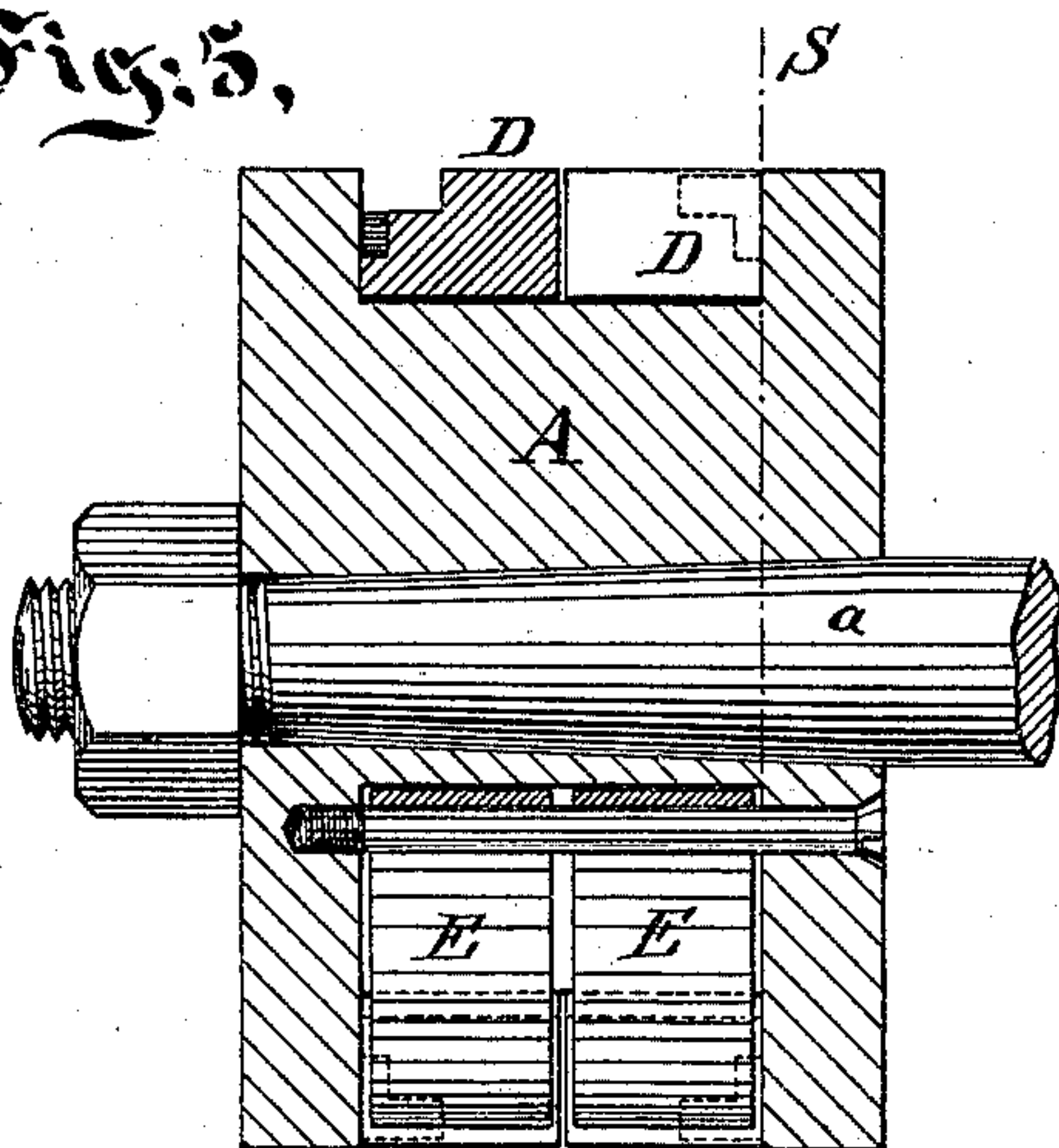
*Fig. 3.*



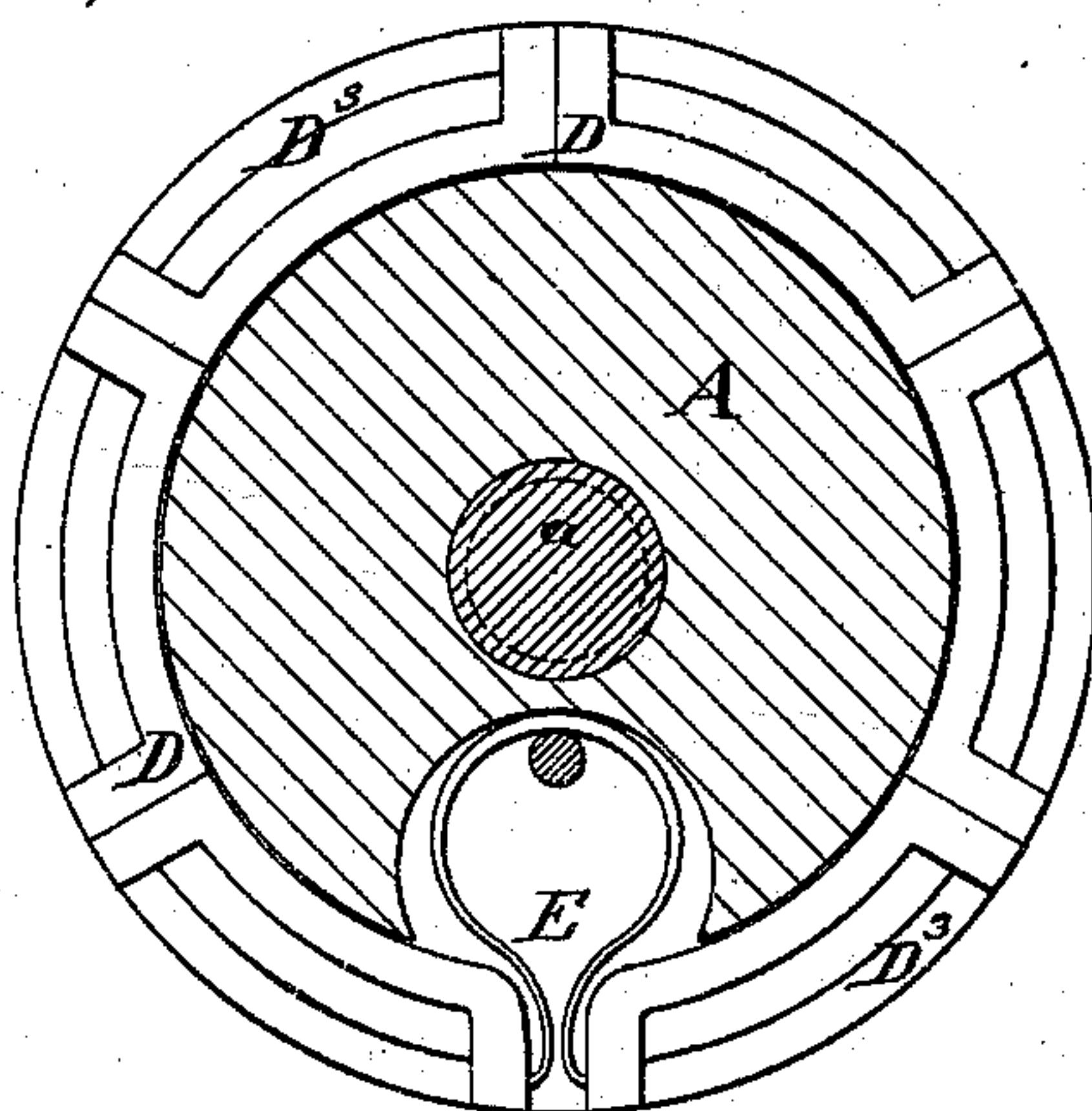
*Fig. 4.*



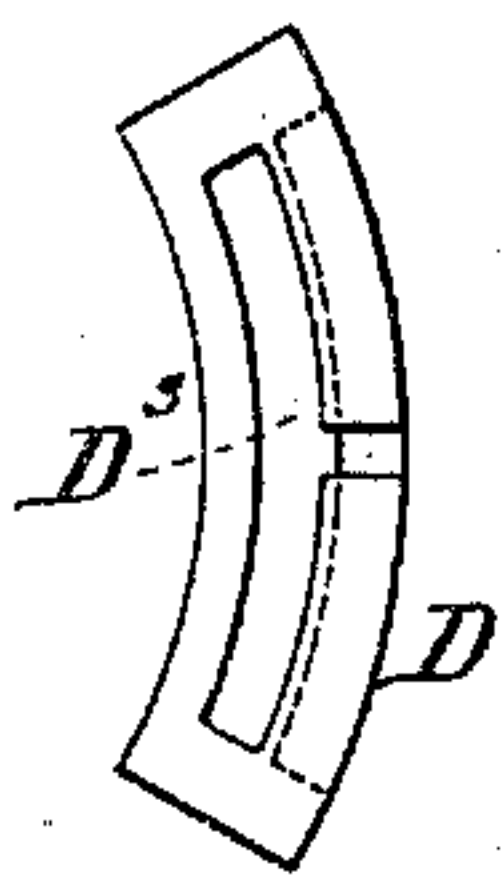
*Fig. 5.*



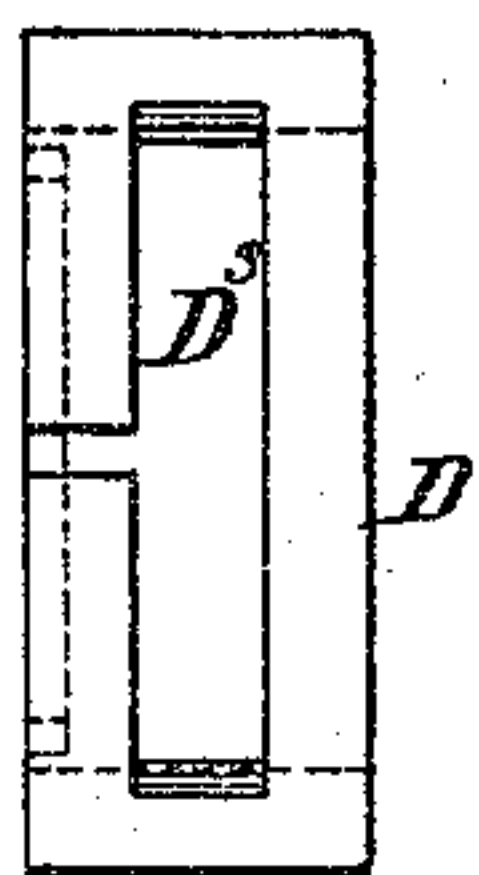
*Fig. 6.*



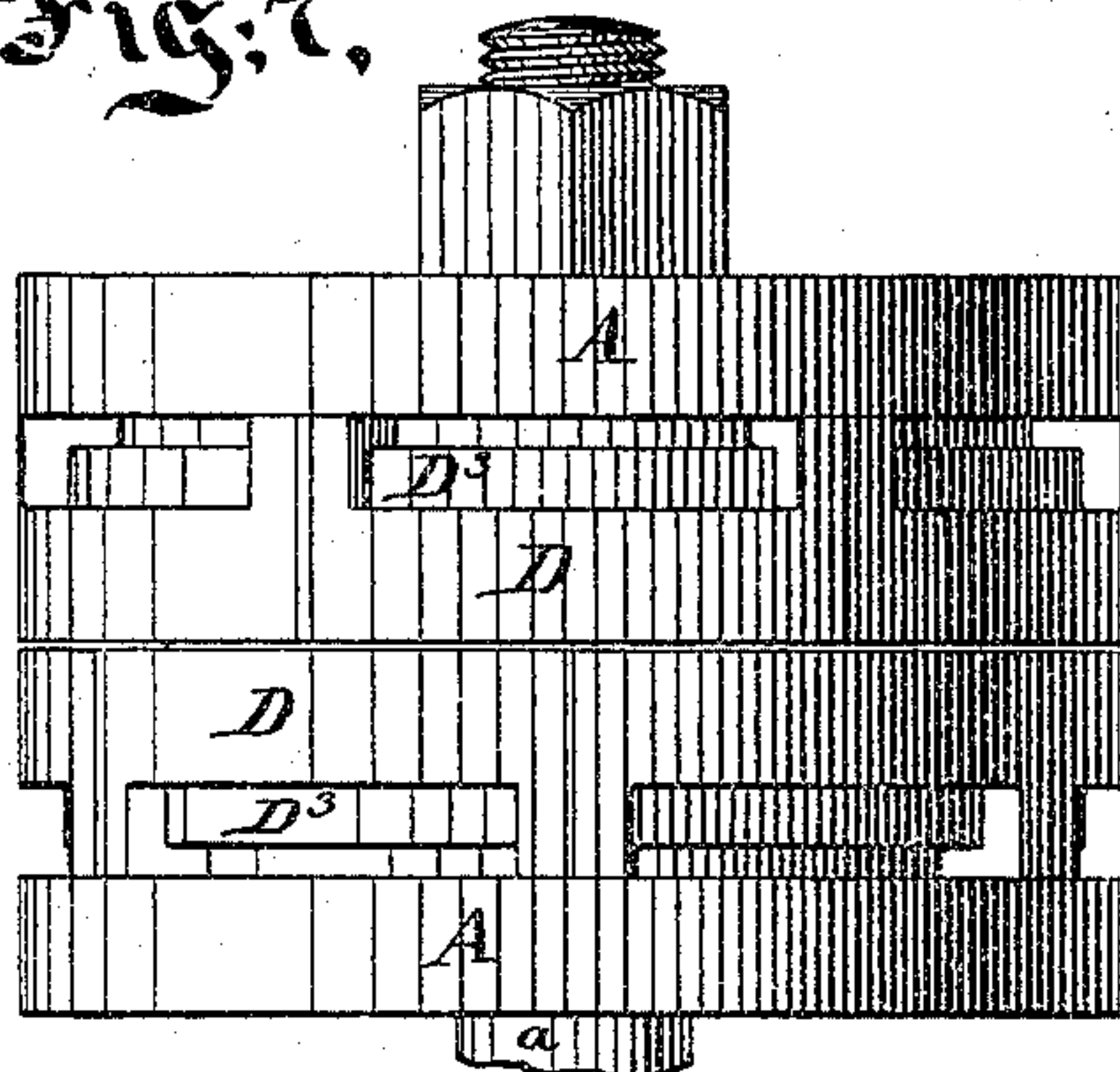
*Fig. 8.*



*Fig. 9.*



*Fig. 7.*



Witnesses:

*Arnold Hermann.*  
*W. C. Dey*

Inventor:

*A. K. Rider*  
by his attorney *J. L. Stetson*



# UNITED STATES PATENT OFFICE.

ALEXANDER K. RIDER, OF NEW YORK, N. Y.

## IMPROVEMENT IN PISTONS AND PACKINGS.

Specification forming part of Letters Patent No. 143,255, dated September 30, 1873; application filed March 29, 1873.

*To all whom it may concern:*

Be it known that I, ALEXANDER K. RIDER, of New York city, in the State of New York, have invented certain new and useful Improvements in Pistons and Packing, of which the following is a specification:

The invention is more particularly intended for use in steam-engines, and will be so described; but it will be understood that it may be used for any ordinary purposes where pistons are required.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification, and represent several modifications.

Figure 1 is a central section, showing the invention as applied to a piston-valve. Fig. 2 is a section through the same on the line T T. Fig. 3 is a central vertical section through the piston of a horizontal steam-engine. Fig. 4 is an end view of the same. Fig. 5 is a vertical section of a piston for a similar situation, but with the packing-rings differently mounted. Fig. 6 is a section at right angles to Fig. 5 on the line S S. Fig. 7 is a top view of the same. The other figures represent parts detached, and show still further modifications.

Similar letters of reference indicate corresponding parts in all the figures wherever they occur.

Referring to Figs. 1 and 2, A is the main body of a piston-valve; A', the face, which moves over the ports; and a, the valve-rod. The body A extends out nearly to the interior of the inclosing-cylinder, except where it is peculiarly recessed, as shown, to receive a partial packing-ring, D. I prefer making the packing-ring D in several sections, and have so represented it in this instance. The ends of the several sections or short curved pieces are fitted steam-tight together, and thus form a continuous ring of packing extending from one side of the solid part A' nearly around the piston to the other side of the part A'. Springs E, mounted in suitable recesses in the body A, act to press the packing away from the solid part A', and thus to extend the packing with gentle force. The spaces at the ends of the packing which receive the ends of the springs

E tend to widen as the packing wears. These open spaces will come so near the bottom line, where the body of the piston is always in contact with the hollowed seat, as to prevent the passage of the steam. The part A' is a little wider than the ports, and is a part of the body-casting A. The packing-ring or partial ring fits a little easy in its recess, and is pressed axially or endwise by the force of the steam. This allows the steam to enter under it and fill the entire space under, but it fits so tightly against the opposite side of its recess that the steam cannot pass. The rabbet D<sup>3</sup> is certain to be empty by reason of the free escape of the steam therefrom across the body of the piston, so that the pressure of the steam under a corresponding area of the packing will be unbalanced, and will be effective in holding out the packing. In a piston-valve the pressure of the steam is always felt on one face or end of the valve and not on the other; consequently one packing-ring, D, as shown, will suffice. The invention applies also to pistons in which the steam pressure alternates from one side to the other, but for such application two packing-rings are required—one to serve for each side.

In the use of the invention, the packing is pressed out not simply by the gentle constant force of the springs E, but by the same in addition to the direct pressure of the steam on its inner face. This latter force varies with the pressure of the steam, and will, in ordinary cases, much exceed the former.

My construction of the piston or piston-valve and packing insures a tight fit of the packing, not only against the piston, but also against the interior of the cylinder at all points, except on the lower side of the piston.

Figs. 3 and 4 represent a piston constructed according to this invention, without any continuous part corresponding to the part A' above. The packing extends quite around the piston, excepting the small space at the lower side where the springs apply. The two sets of packings are wide apart, and separated by a portion of the piston-body. It will be understood that only one of the packing-rings is pressed out by the steam to be effective at a time.

In Figs. 5, 6, and 7 is represented a corresponding arrangement of the packing, but with



the packing-rings inclosed within the body of the piston instead of on each face. In this and all the modifications the application of the packing in separate pieces allows the piston-body A to be made in one piece without a follower. In this modification, Figs. 5, 6, 7 show the form of the recess or rabbet somewhat modified. The rabbet does not extend continuously around, but leaves each end of each packing-piece bearing its full width against the interior of the cylinder, and also bearing its full depth against the body of the piston.

Figs. 8 and 9 are different views of a packing-piece detached. These are intended for the modification of the piston-body shown in Figs. 5, 6, and 7.

Figs. 10 and 11 are modifications of the packing-rings. They are formed and intended to be used in continuous pieces. A single piece extends nearly around the piston, leaving simply a small opening, which may receive springs, as in the other forms. Spiral springs, partially sunk into recesses in each end, may be employed in any instance, if preferred. In this modification, Fig. 10 is a central section, and Fig. 11 an end view, of a continuous packing-ring in which there is a rabbet at each end extending continuously around, and also cavities to produce an increased area of unbalanced pressure endwise. These latter cavities are distributed at intervals. I can, if preferred,

make these areas for end pressure also continuous, and make the ring of a uniform section throughout, but this latter construction does not allow the same flexibility.

I would call attention to the obvious fact that the rabbet around one of the outer edges of a packing-ring, or a series of recesses similarly placed to insure a corresponding empty space, has the effect not only to promote the spread of the packing outward by the unbalanced pressure under the packing, but also to promote the movement or pressure of the packing axially against the adjacent face of the piston-body. It forms an unbalanced space to induce the packing to press both endwise and outwardly.

I claim as my invention in piston-valves and pistons—

In combination with the packing D D<sup>3</sup> and spring or springs E, the continuous surface A' in the body A, adapted to lie in steam-tight contact with the lower part of the interior of the inclosing-cylinder, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 27th day of March, 1873, in the presence of two subscribing witnesses.

A. K. RIDER.

Witnesses:

THOMAS D. STETSON,  
WM. C. DEY.