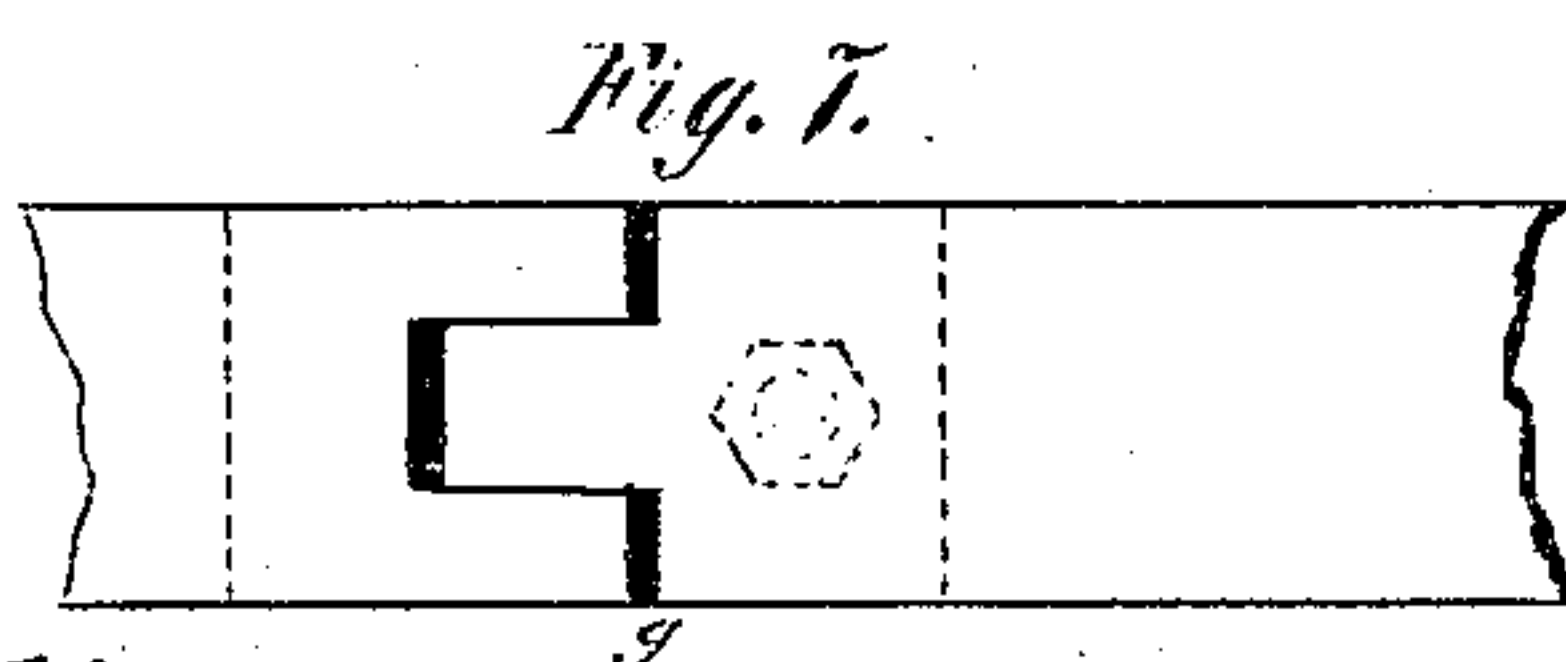
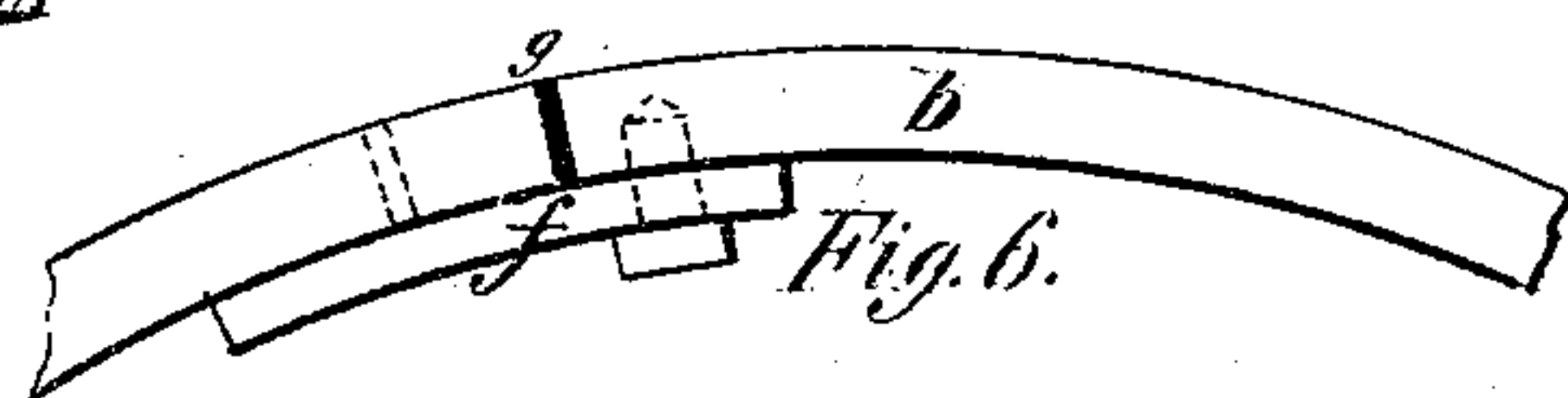
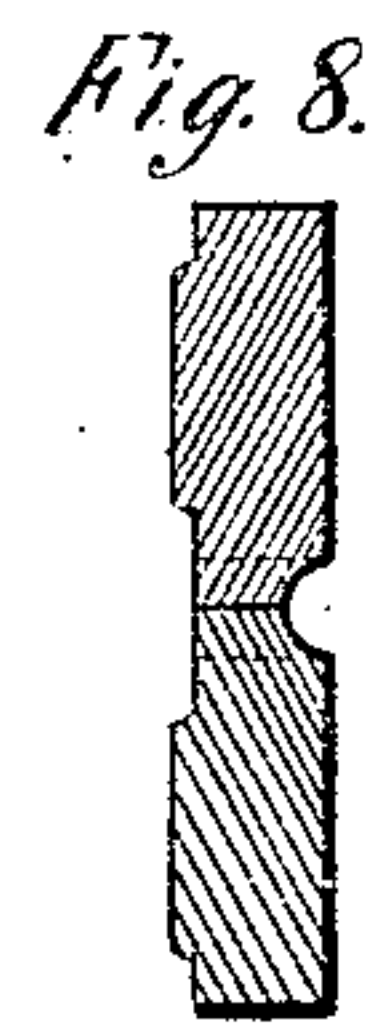
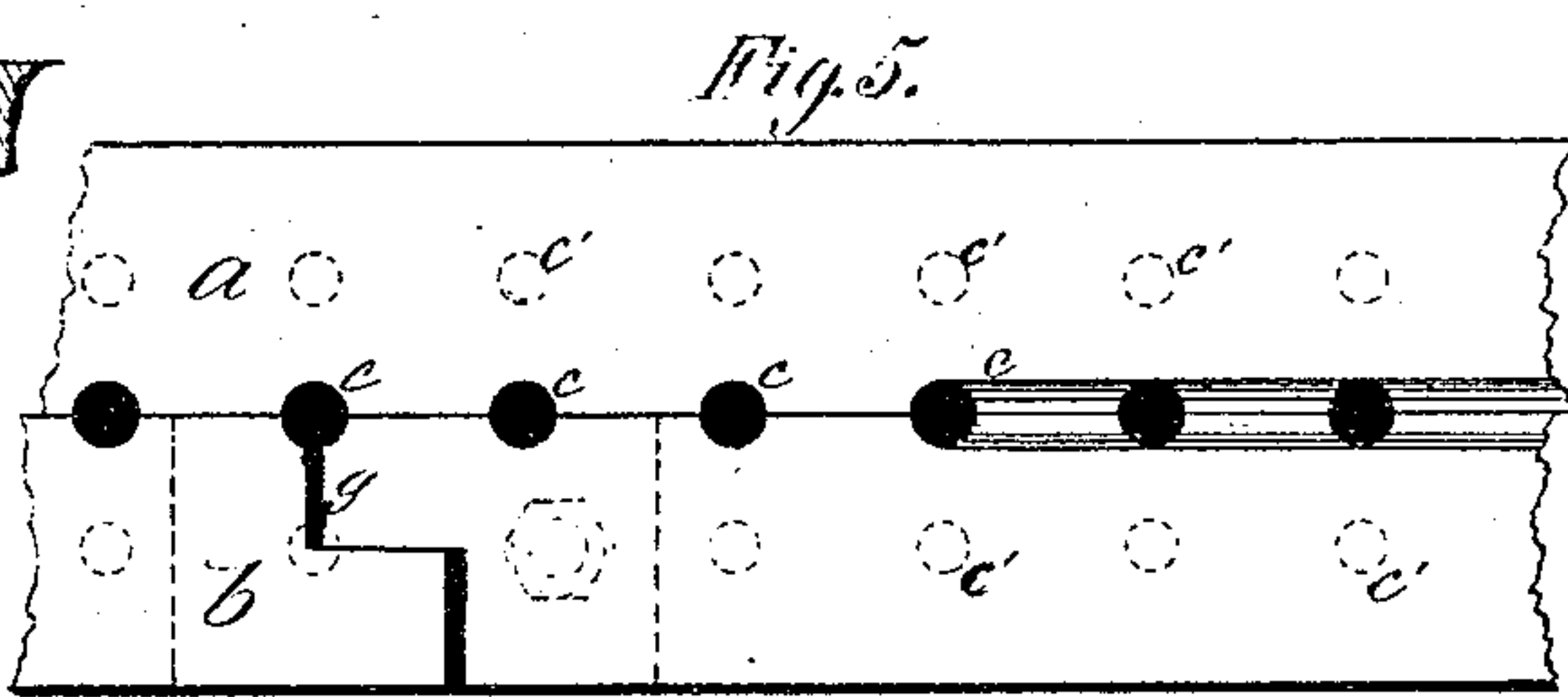
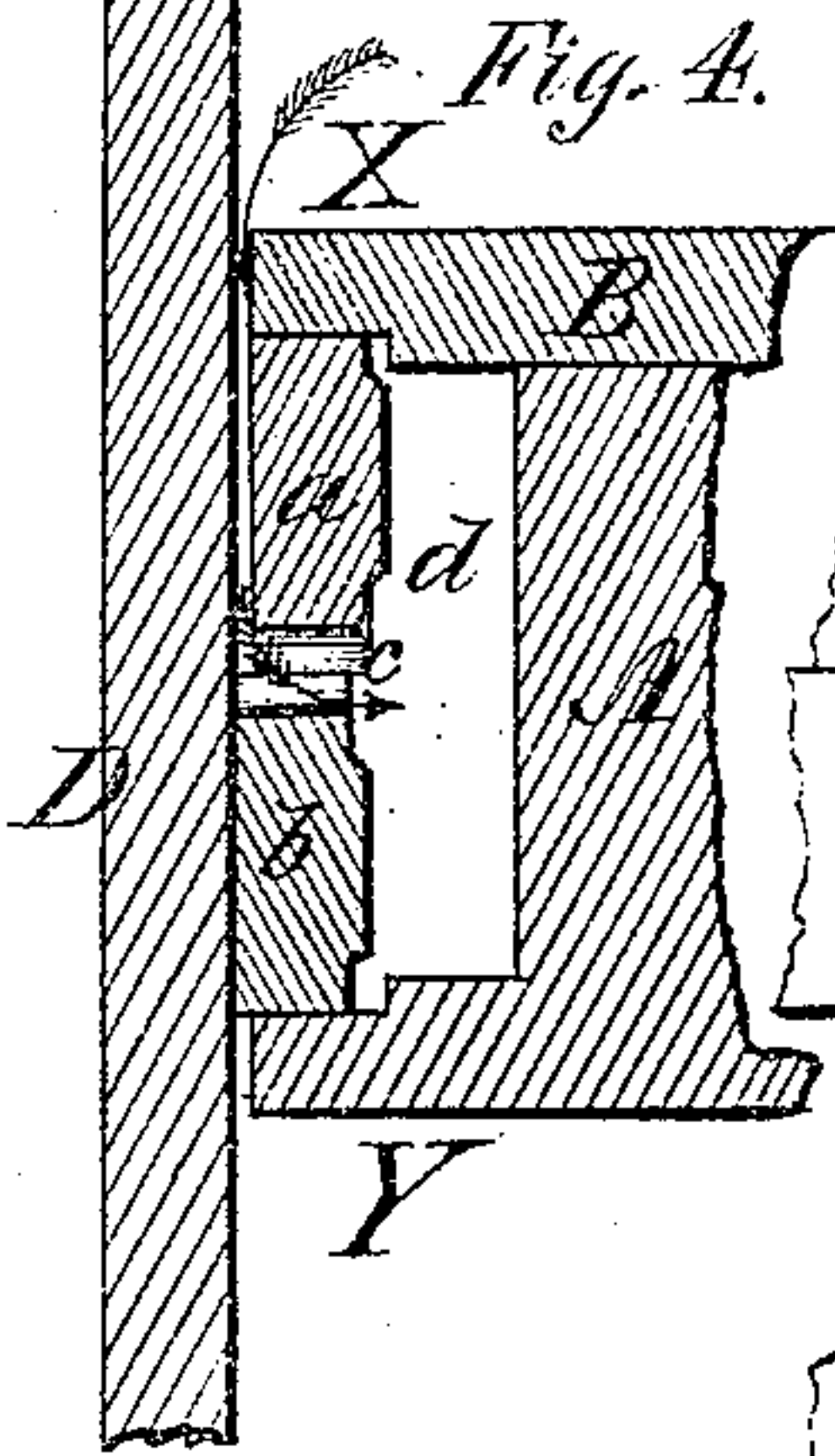
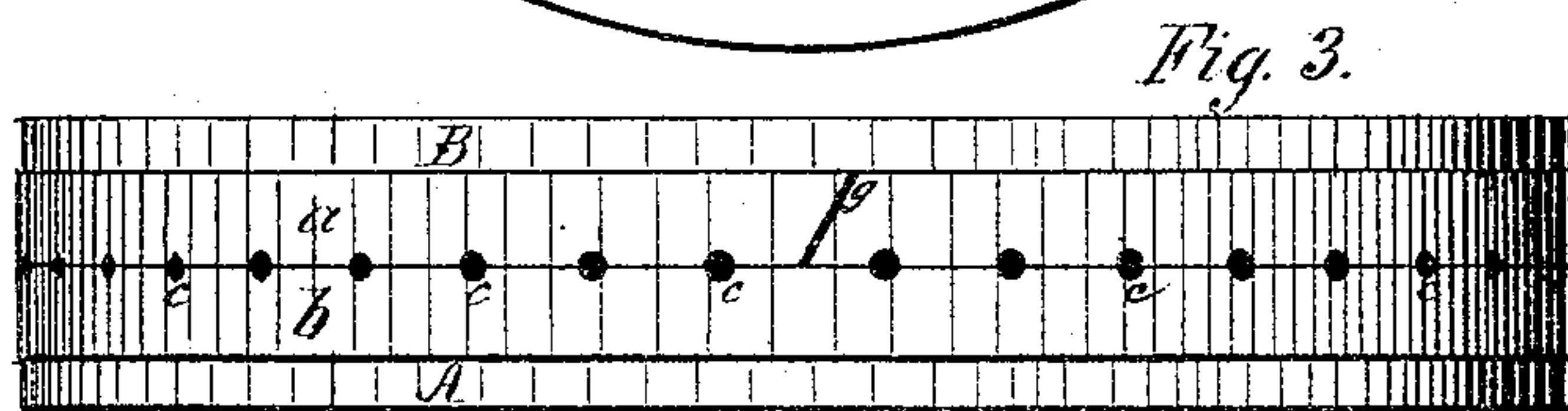
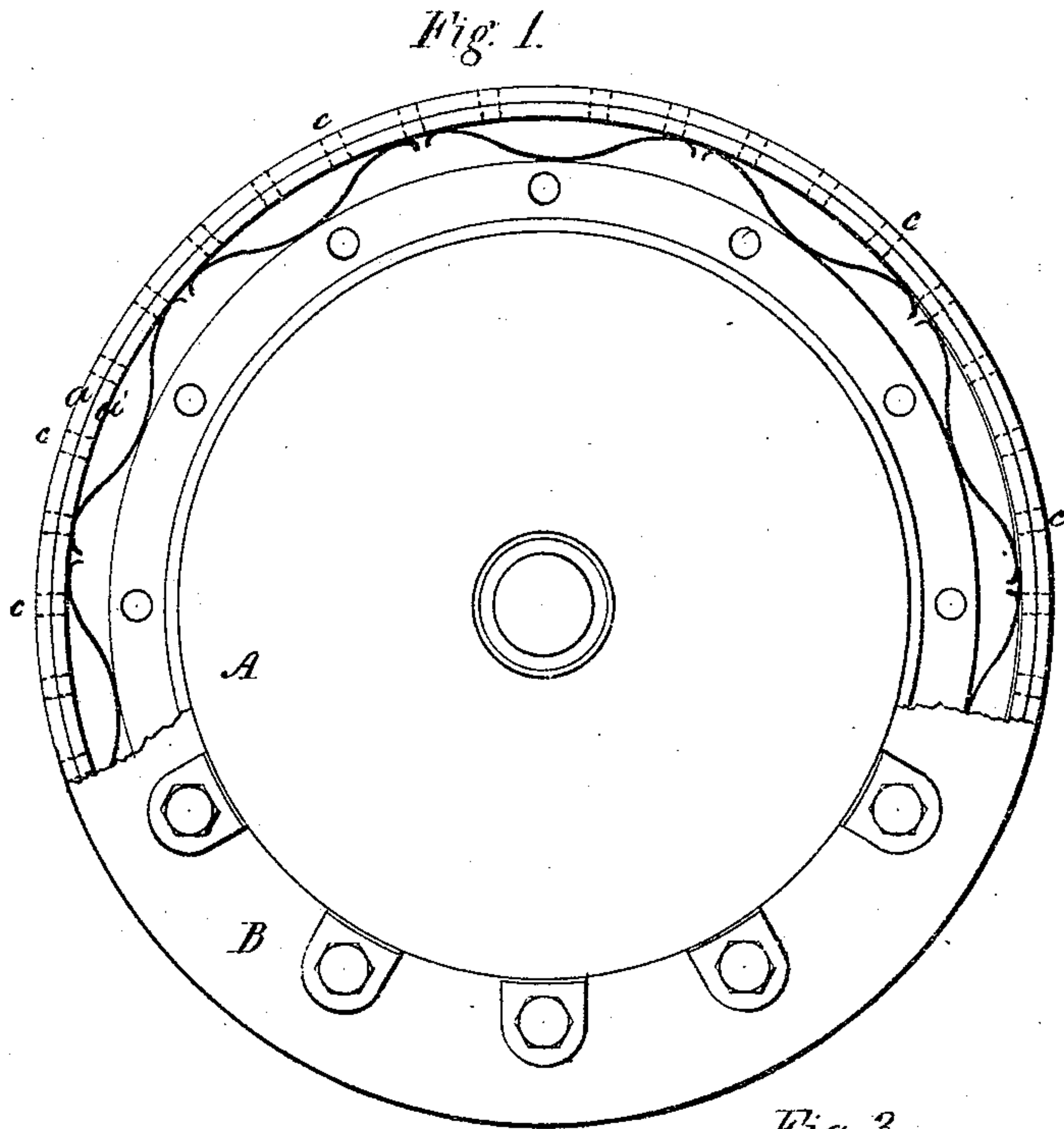
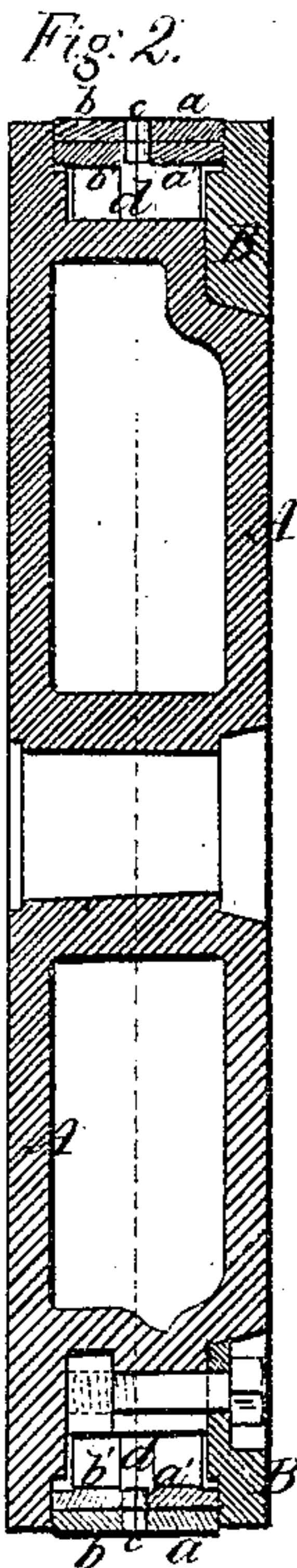


C. E. EMERY.

Pistons.

No. 153,216.

Patented July 21, 1874.



Witnesses

Thomas C. Courney.
A. E. Beecher

Inventor.

Chas. E. Emery

UNITED STATES PATENT OFFICE.

CHARLES E. EMERY, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN PISTONS.

Specification forming part of Letters Patent No. **153,216**, dated July 21, 1874; application filed February 20, 1874.

To all whom it may concern:

Be it known that I, CHARLES E. EMERY, of Brooklyn, Kings county, New York, (office New York city,) have invented a new and useful Improvement in Pistons; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings making part of this specification.

After extended trials of the principal kinds of piston in use, I have found that, while steam-packing of approved construction operates with little friction, and in many cases remains tight for extended periods, yet, particularly in marine engines, such packing often becomes inoperative through the jamming fast of the rings with grease and dirt. The common piston, on the other hand, though little affected by collections of grease, &c., requires that the springs be set out very tight to prevent leakage past the rings. This causes loss by friction, and great care in adjustment and lubrication is necessary to prevent the cylinder from being cut. The result is that few pistons are really tight. The engineers using the ordinary pistons take the safe course, and set out their packing moderately to avoid cutting the cylinders, and so long as there is no decided "blow through" they do not consider that a material portion of the steam used is noiselessly passing the piston and reducing the efficiency of the engine.

My invention has for its object to obtain a tight piston combining the advantages of both of the two systems mentioned.

The nature of the invention is clearly set forth in the claim.

In the drawings, Figure 1 represents a face view of a piston embodying my improvements, with a portion of the follower removed, thereby exposing the edges of the rings. Fig. 2 is a central cross-section of the same, and Fig. 3 is a side view of the same. Fig. 4 is a cross-section of part of a piston and cylinder, showing the operation of the packing. Fig. 5 is a corresponding side view of part of the rings. Fig. 6 is a corresponding face view of the latter. Fig. 7 is a side view of part of a ring with a different kind of joint, and Fig. 8 is a cross-section of the rings shown in Fig. 5.

The same letters in all the figures refer to corresponding parts.

A designates the body of the piston, and B the follower. In the preferable mode of construction I make the piston proper precisely like an ordinary piston; but I construct the packing-rings in two sections, *a* and *b*, each capable of limited independent motion parallel with the piston and follower-faces, and through the faces of the rings, or at the junction of the two sections, (half-hole in each,) I make openings *c c c c* from the exterior of the rings to the interior, whereby if the steam forces in either direction it finds its way underneath the rings, and assists the springs in forcing them out against the cylinder.

In Fig. 4, D represents a section of the cylinder, against which the sections or rings *a* and *b* bear, and if steam be admitted to the side X of the piston, and the ring *a* be not held out sufficiently tight against the cylinder to prevent leakage, such ring will be forced in, as shown, and steam will enter between the ring and cylinder, (see arrows,) pass through opening *c*, and fill the chamber *d*, and assist in forcing out the other section, *b*, against the cylinder, and thereby prevent leakage by the piston to the side Y of the same. Were steam admitted to the side Y of the piston, the section *b* would, on the other hand, be forced in and section *a* out against the cylinder. The sections *a* and *b* may be composed of one ring each, as shown in Fig. 4, in which case the ends of same may be made with a notch-joint, as shown in Fig. 5, or a tongue-and-groove joint, as shown in Fig. 7, each covered by a plate, *f*, inside, as shown in Fig. 6, or in some other ordinary way. Again, the sections *a* and *b* may each be composed of two or more rings.

In Figs. 1, 2, and 3, the sections are shown composed of outer and inner rings, *a* and *a'* and *b* and *b'*, said inner and outer rings being made of the same width, so that each section will be capable of independent motion. The openings may be made either in the face of each section, as shown in Fig. 5 at *c' c' c'*, &c., or through the line of junction of the two sections, (half-hole in each,) as shown at *c c c* in Figs. 2, 3, 4, and 5.

The sections *a* and *b* are to be spring-packed in any customary manner, to keep the rings out to place, and overcome any tendency to stick fast due to the collection of grease and dirt, as, for instance, by springs in the space *d*, those of the ordinary elliptical form being shown in Fig. 1. As represented in Figs. 2 and 4, I prefer to shape the interior of the rings so that the springs will only bear at the center of each.

A piston constructed in this manner operates exactly like an ordinary piston until the steam-pressure overcomes the resistance of the springs, in which case each section in turn acts as a valve to admit steam inside the other, or rather to the chamber *d* under both sections. It is probable that the chamber *d*, in practice, fills with water or steam at substantially a constant pressure of sufficient intensity only to assist the springs and prevent leakage, while it is believed that the admission of steam under the rings adds little pressure, but acts more to balance the same, so that the springs will be free to act. Still this arrangement is so perfectly automatic that as soon as the pressure is sufficient the rings are forced out and cut off the supply, thus preventing any further increase of pressure, and such slight movement is necessary to secure this result that in practice no clicking noise whatever has been observed.

The several openings, *c c* or *c' c'*, may evidently be connected by a groove in the outer surface of the rings, as shown in dotted lines in Fig. 5, and in cross-section at Fig. 8; but

such groove should not extend to the cross-joints *g g* in the rings.

More than two sections of rings may evidently be employed so long as steam is admitted from each side alternately, and the two sections may, if desired, be separated by one or more solid rings.

To avoid repetition, the description has been used with reference to the use of steam; but evidently the device may be used in a piston working in any gas or fluid.

I am aware that devices have previously been invented to admit steam between and under two complex ring-sections to form a steam-packing.

My invention is distinctive in providing, for the ordinary spring-packing constructed in two sections, openings extended from the outer wearing-surfaces to the interior packing-space, in order, as previously explained, to retain the advantages of spring-packing and use the steam as a reserve, which will automatically come into action whenever and to the extent needed.

I claim as my invention, and desire to secure by Letters Patent—

The combination, with spring-packed piston-rings constructed in two or more sections, of openings extended from the outer wearing-surfaces to the interior of such rings, substantially as and for the purposes specified.

CHAS. E. EMERY.

Witnesses:

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