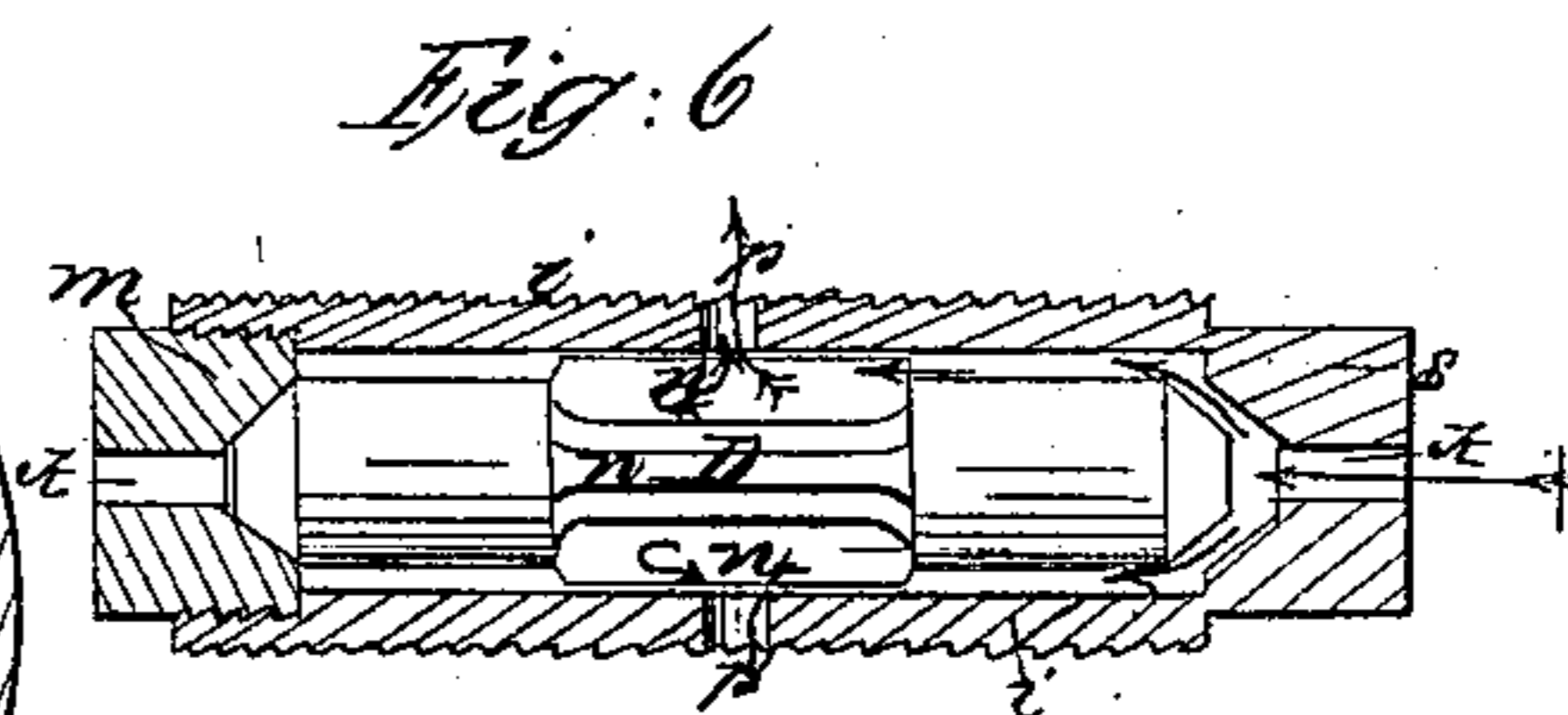
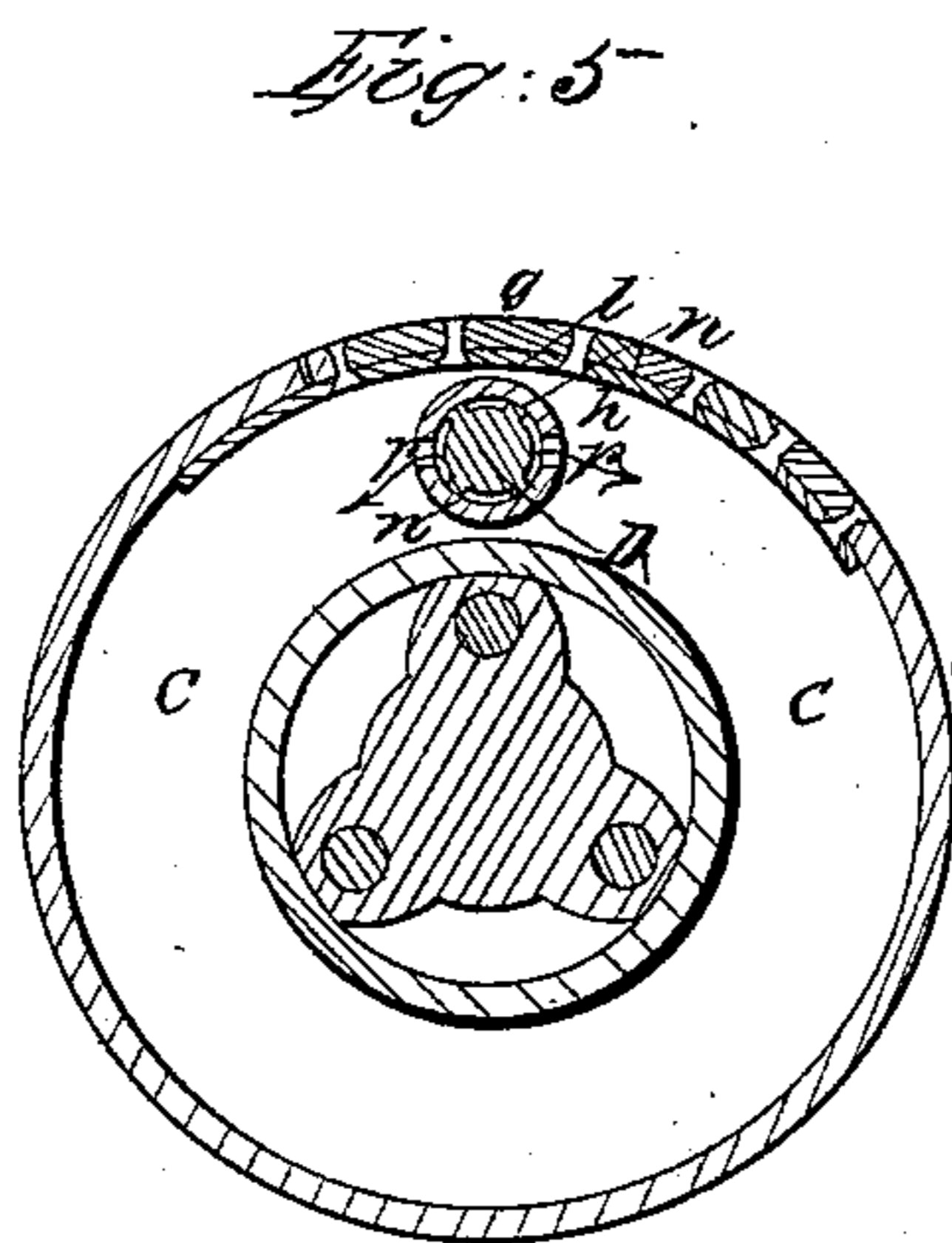
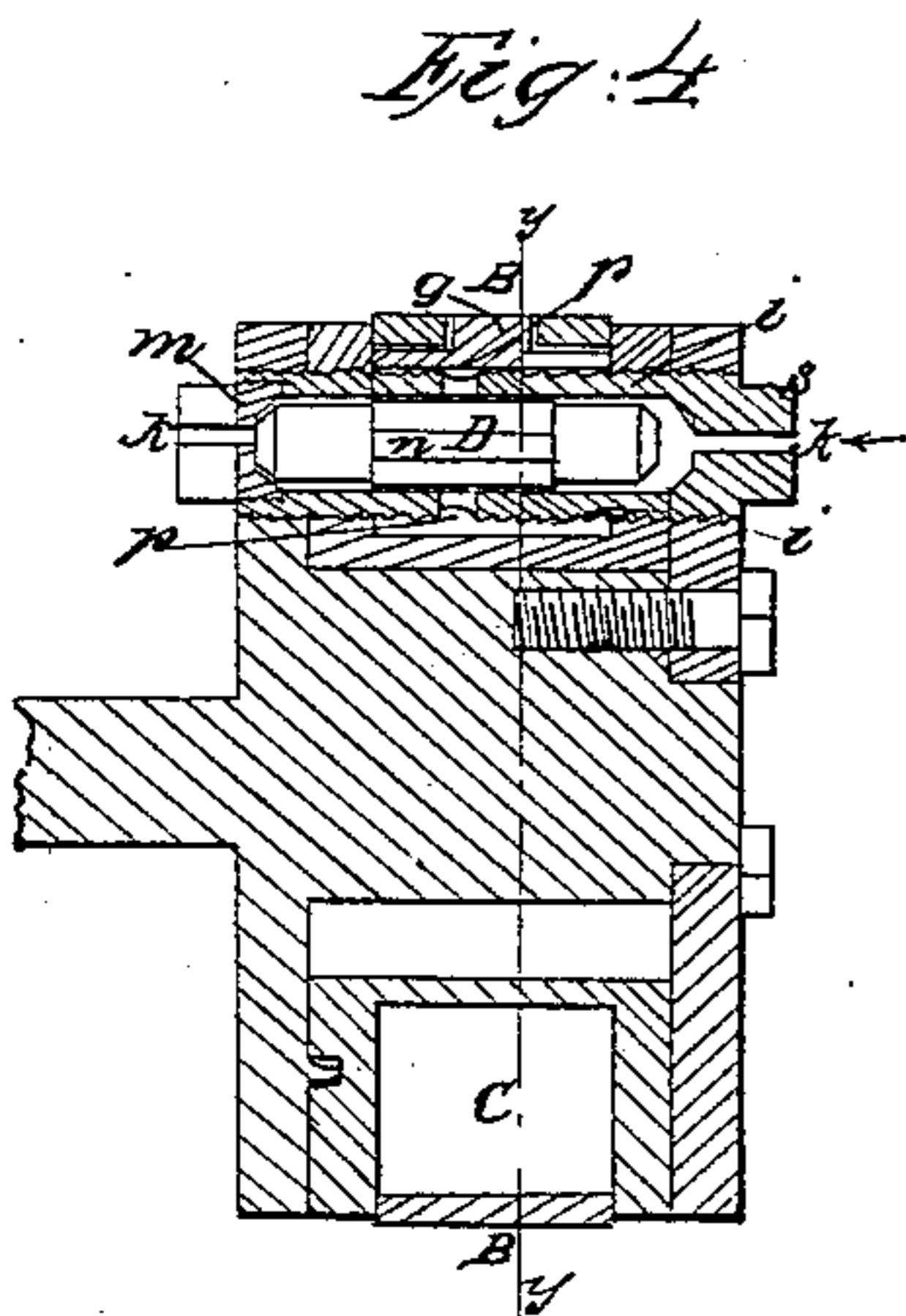
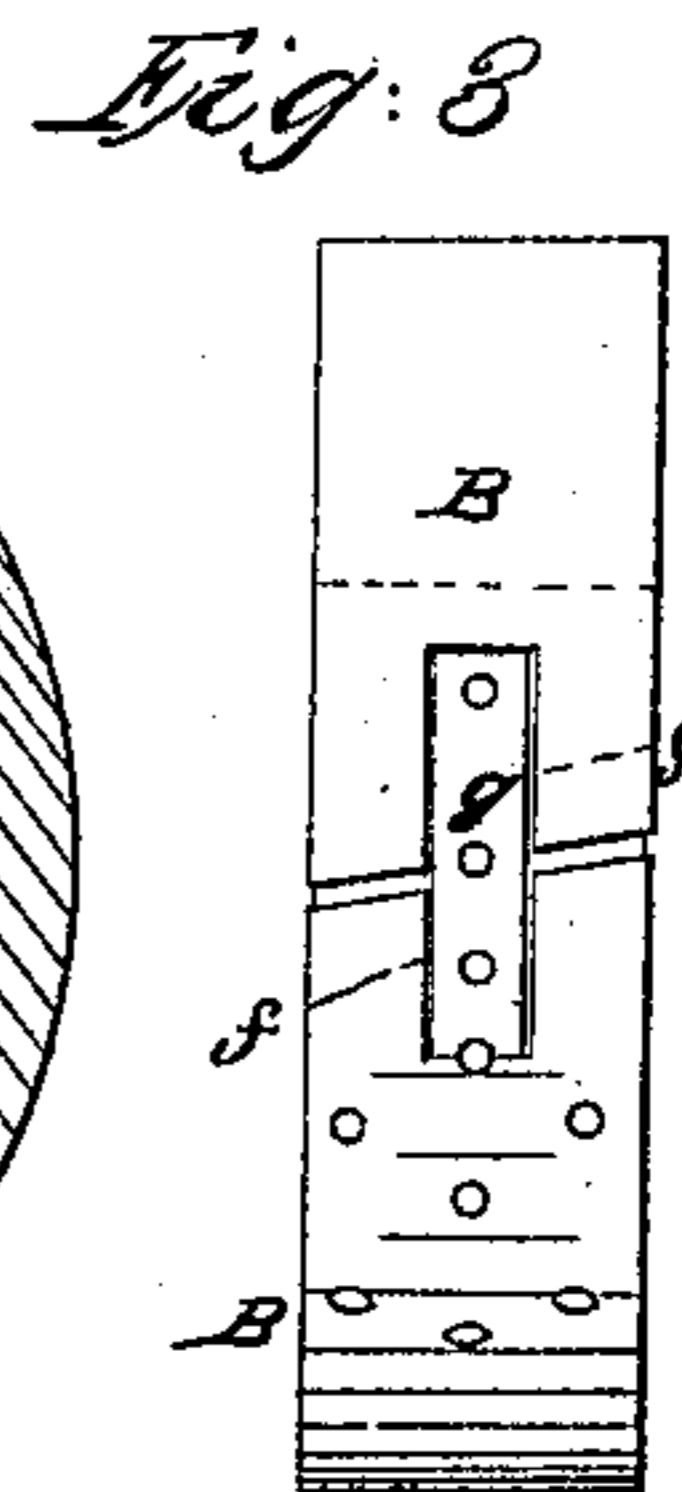
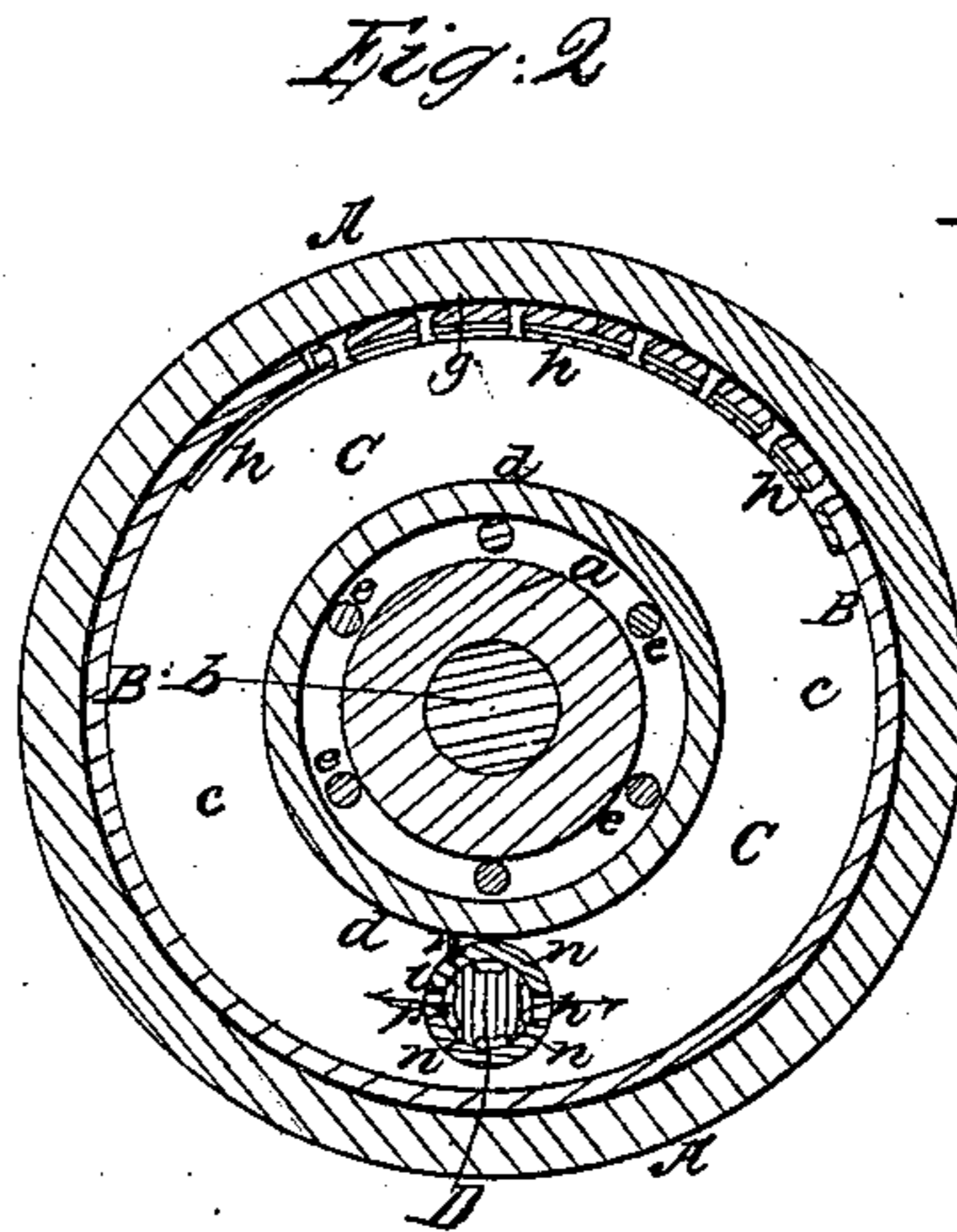
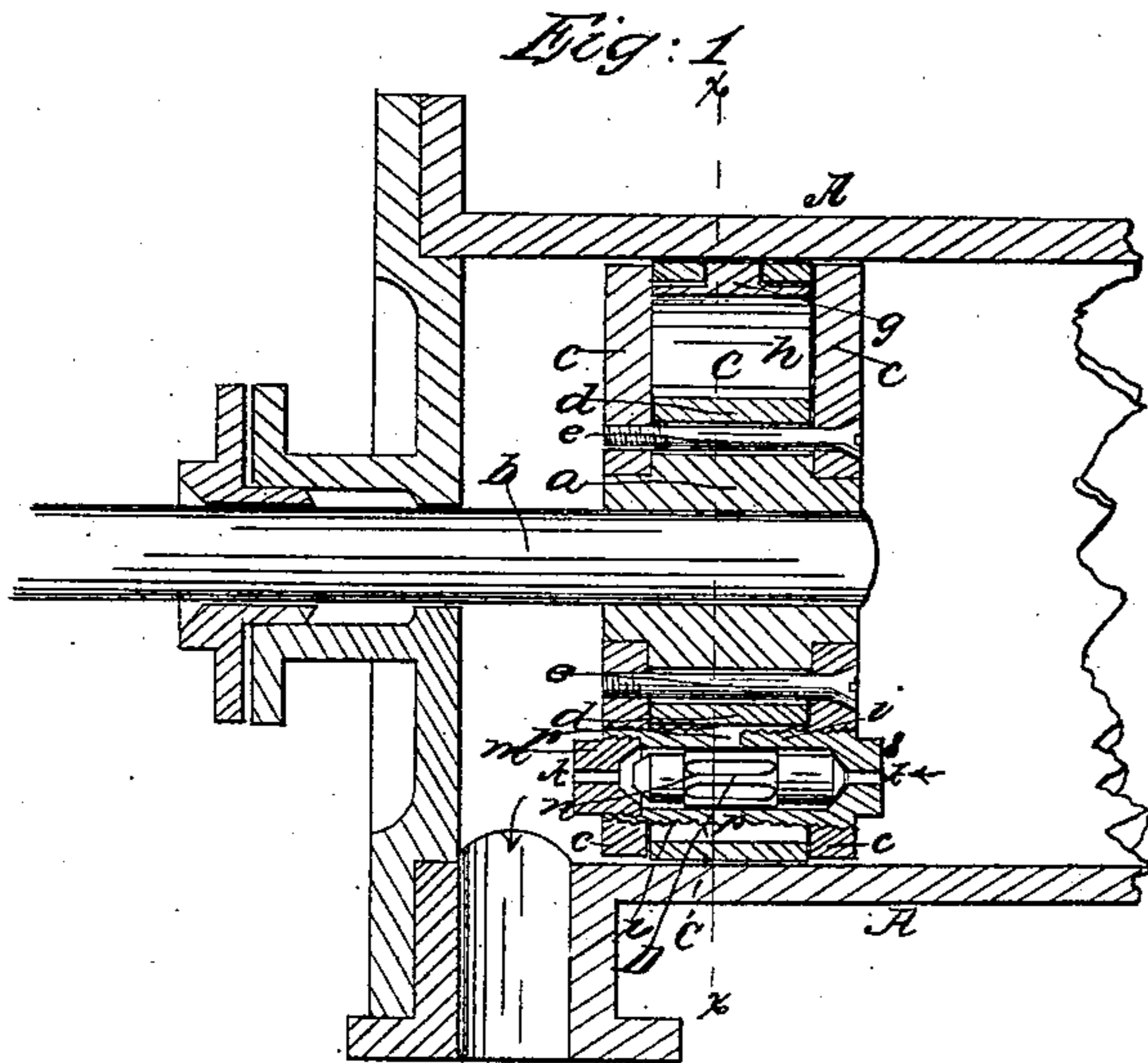


B. F. Hedden,
Steam-Engine Piston.

N^o 39,397.

Patented Aug. 4, 1863.



Witnesses:
R. D. Campbell.
E. Schaefer.

Inventor:
Bray: F. Hedden
by his atty
Mason, Munick & Lawrence.

UNITED STATES PATENT OFFICE.

BENJAMIN F. HEDDEN, OF NORWICH, CONNECTICUT.

IMPROVEMENT IN PISTONS FOR STEAM-ENGINES.

Specification forming part of Letters Patent No. 39,397, dated August 4, 1863.

To all whom it may concern:

Be it known that I, BENJAMIN F. HEDDEN, of Norwich, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Steam-Pistons; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents my invention applied to a section of a steam-cylinder. Fig. 2 is a transverse section through Fig. 1, taken in the plane indicated by red line *xx*. Fig. 3 is a side view of the metallic packing-ring detached from the piston. Fig. 4 is a diametrical section through a steam-piston, having one of its flanges and its core cast or otherwise formed on the piston-rod, with my invention applied to it. Fig. 5 is a transverse section through Fig. 4, taken at the point indicated by red line *yy* thereon. Fig. 6 is an enlarged view of the valve-tube, showing, by a longitudinal section through the same, the puppet-valve and the screw-cap for removing it.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to that class of steam-pistons in which the steam that is let into the cylinders is admitted within the piston and made to expand the packing-ring, thus causing the piston to work steam-tight and to continue in this condition for a considerable time.

It frequently happens that the valve and valve-seat which are used in the class of pistons to which my invention belongs require to be adjusted, repaired, and renewed from time to time, and it is therefore desirable that these parts be so constructed and applied to the piston that they can be removed without removing the piston from the cylinder or taking the piston apart.

To this end the nature of my invention consists in a hollow screw adapted to receive a valve, and so constructed and applied to a hollow piston, which is surrounded by an expansible packing-ring, that the screw and valve constitute a removable double cut-off for admitting steam into the piston and causing the same to expand the packing-ring, and thus to make the piston work tight and to keep it tight during the movement of the same, all as will be hereinafter described.

To enable others skilled in the art to make

and use my invention, I will proceed to describe its construction and operation.

In the accompanying drawings, A represents a portion of a common steam-cylinder, inclosed within which is a piston consisting of a solid hub, *a*, which is suitably secured on the end of the piston-rod *b*. The hub *a* is constructed with annular recesses on its ends, which receive the piston-heads *c c*, the diameter of which is slightly less than that of the interior of the cylinder A, as shown in Fig. 1. Between these two piston-heads *c c* is a cylinder, *d*, which is considerably smaller than the diameter of the heads *c c*, and this cylinder forms, when in place, two annular chambers, and admits of the screw-bolts *e e* being passed through the heads *c c* for confining these heads on the hub *a*, without allowing steam to escape through the holes made for these bolts. The inside surfaces of the heads *c c* are ground to fit the sides of the cylinder *d* and the metallic packing-ring B, so that the chamber C, which is between the packing-ring B and cylinder *d*, will thus be made steam-tight.

The packing-ring, which constitutes the circumference of the cylindrical piston, is made of a strip of metal of even thickness, bent in the form of a hoop, with the abutting ends cut off obliquely and parallel to each other, as shown in Fig. 3. Two slots, *ff*, are cut in the ends of this ring B to receive an oblong plate, *g*, which is riveted to a plate, *h*, that is itself riveted to one of the ends of the hoop inside, so that both the plates *g* and *h* break joints with the oblique ends of the ring B, as shown in Figs. 1, 2, 3, 4, and 5. This mode of constructing the packing-ring allows it to expand when steam is let into the chamber C, and at the same time prevents the escape of steam through the opening at the junction of the ends of this ring. In putting these parts together one of the piston-heads *c* is put on the reduced end of the hub *a*. Then the cylinder *d* is put over the hub *a*; then the ring B. The other piston-head *c* can now be put in its place, and the whole bolted together, as represented in the sectional view, Fig. 1.

A hole is drilled through the two piston-heads *c c* in a line parallel with the piston-rod *b*, and this hole is then tapped to receive a hollow screw-rod, *i*, which is equal in length to the thickness of the piston. This hollow screw is drilled out longitudinally, and a valve-

seat is formed in one end with a small opening or port, *k*, through the center of this end. The opposite end of this screw-rod *i* is tapped inside to receive the male screw-thread of a screw-cap, *m*, in which is formed a valve-seat, which corresponds with the seat at the opposite end of the screw-rod, as shown clearly in Fig. 6. This cap or nut *m* also has a small port, *k'*, through its center. Within this hollow screw I place a puppet-valve, *D*, which has two valve-ends corresponding to the valve-seats in the ends of the hollow screw *i*, and these valve-ends are kept in the center of the chamber by means of wings *n n*, which fit the sides of the chamber, while the cylindrical valves are somewhat smaller in diameter than their chamber, as shown in Fig. 6. This construction of a double or puppet valve allows steam to enter at one or the other of the ports, and pass around the valve-stems, thence between the radial wings *n*, and out through one or both of the openings *p* through the middle of the screw-rod *i*, as indicated by the arrows in Fig. 6.

The steam can only pass into one of the ports *k k'* at a time, as the pressure of steam, which is brought to act alternately upon the piston, will close the port in the screw-rod *i* which is next to the exhaust side of the piston, and permit the steam which is pressing upon the opposite side of the piston to escape through the ports in the screw rod which are not closed. In Figs. 1, 2, 4, and 5 I have shown this hollow screw-rod *i*, with its valves, ports, and steam-passages, applied to the piston in such a manner that the steam which enters one or the other of the ports *k k'* from the cylinder *A* is conducted into the annular chamber *C* and caused to act uniformly upon the expansible packing, which latter forms the outer inclosing-ring for this chamber, thus forcing the circumference of the packing against the inside of the cylinder *A*, and fitting the piston tightly within this cylinder.

From this description it will be seen that while I am enabled to expand the packing-ring by means of steam admitted alternately into the piston, I am also enabled to remove the screw-rod *i*, with its valve and valve-seats, without taking the piston apart; and, furthermore, I am enabled to apply my invention to all varieties of hollow or flanged pistons by simply drilling and tapping a hole through the same to receive the hollow screw-rod *i*, with its valve ports and steam-passages. The nut projection *s* is made to receive a wrench, whereby the screw-rod *i* may be removed or replaced at pleasure. The screw-cap *m* is also formed with a nut projection for receiving a wrench, which is used in adjusting this cap when it is desired to increase or to diminish the longitudinal play of the valve *D*, for admitting more or less steam into the chamber *C* of the piston.

I am aware that ball and other valves have been applied to expansible-packing steam-pistons, wherein one valve-seat is formed in one of the heads of the pistons and the other seat formed in a screw-cap; but in no instance can the whole device, which admits of the entrance and escape of steam by means of valves, be removed or applied to a common flanged piston. I therefore do not claim such as my invention; but

What I do claim as my invention is—

The sectional removable hollow screw-rod *i*, provided with steam-ports *k k'*, *p p*, valve *D*, and valve-seats, in combination with an expansible-packing-ring piston, the whole being constructed and arranged substantially as herein described.

Witness my hand in the matter of my application for patent on improved steam-piston.

BENJAMIN F. HEDDEN.

Witnesses:

E. D. MOORE,
R. J. KIMBALL.