

(No Model.)

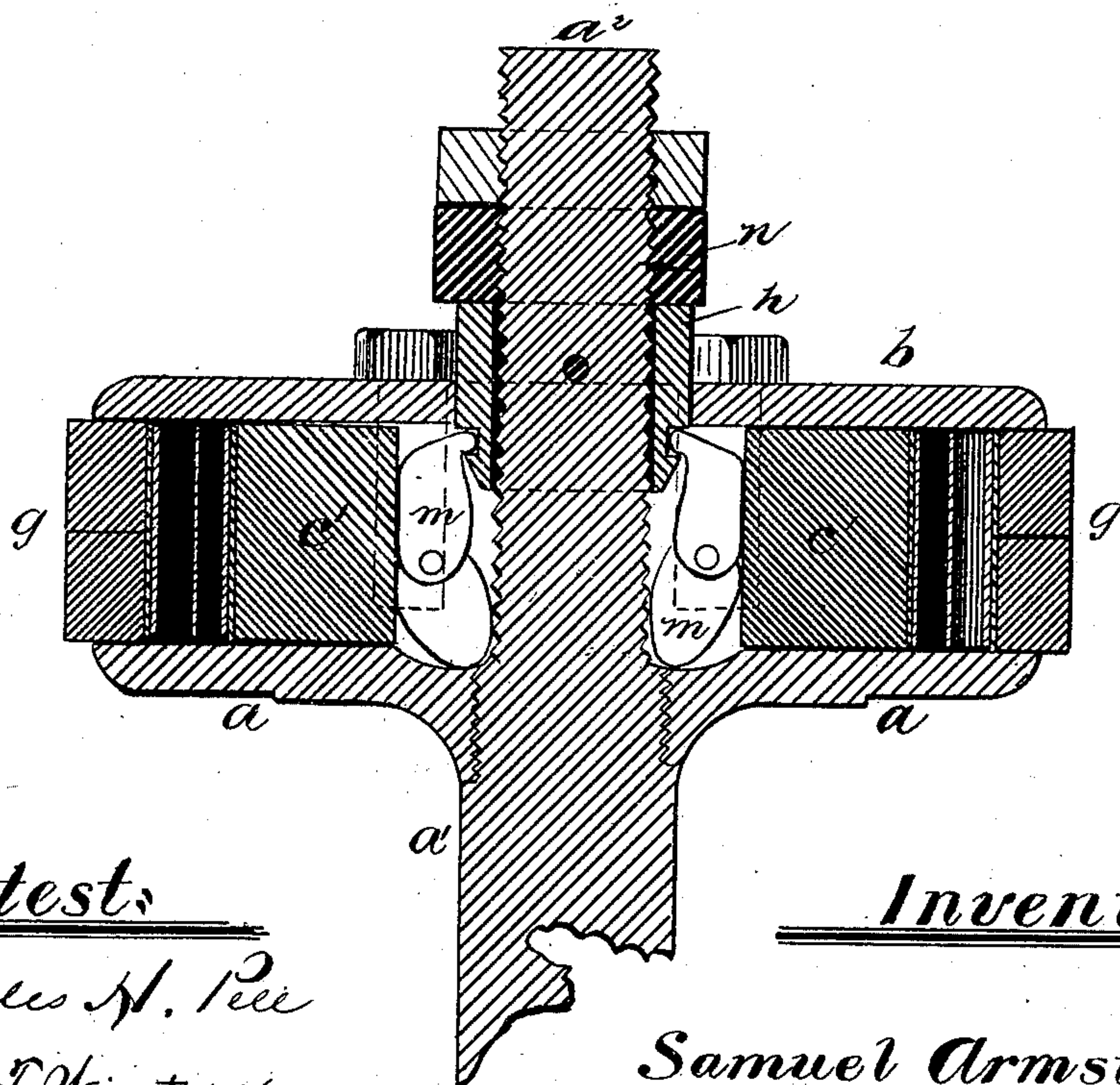
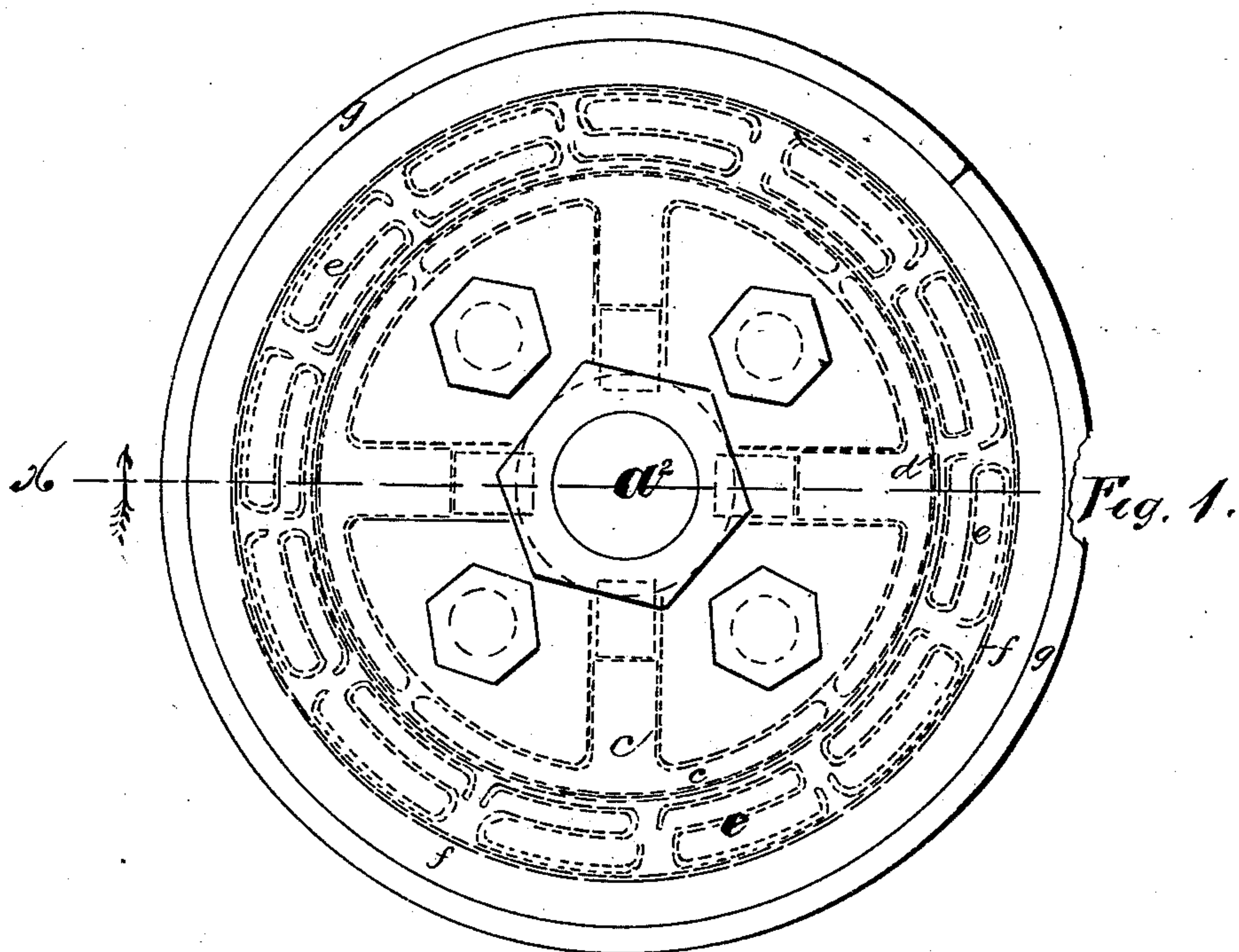
S. ARMSTRONG.

2 Sheets—Sheet 1.

PISTON.

No. 268,167.

Patented Nov. 28, 1882.



Attest:

Charles H. Pee  
Chas. T. Winters.

Inventor:

Samuel Armstrong,  
by  
O. Drake. atty.

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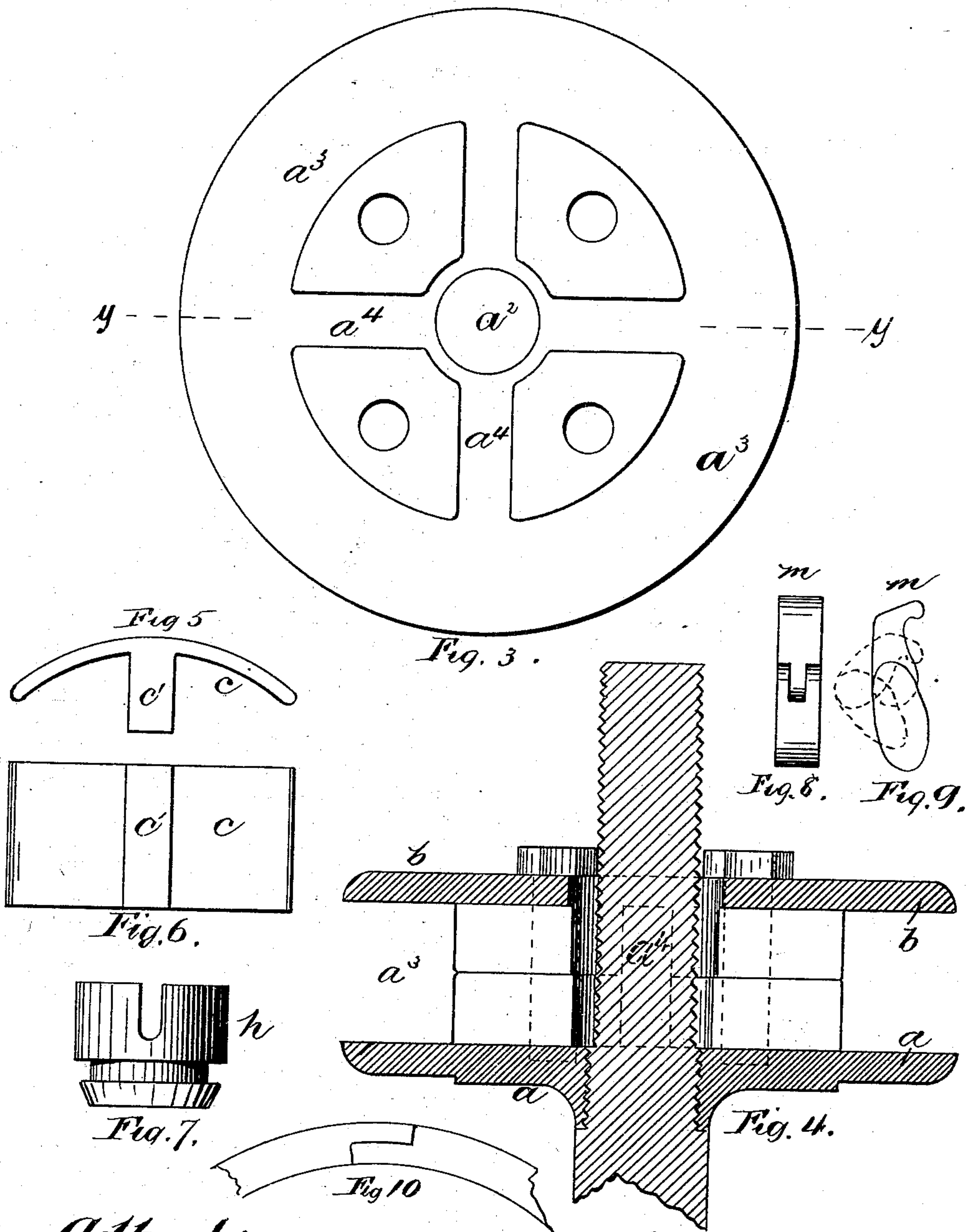
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# UNITED STATES PATENT OFFICE.

SAMUEL ARMSTRONG, OF NEWARK, NEW JERSEY.

## PISTON.

SPECIFICATION forming part of Letters Patent No. 268,167, dated November 28, 1882.

Application filed April 29, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL ARMSTRONG, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Pistons; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification, in which drawings—

Figure 1 is a plan of a piston-head or pump-plunger, showing in outline the internal arrangement of the parts and their relation to one another. Fig. 2 is a vertical section of the same, taken through line  $x$ . Fig. 3 is a plan of the inner side of the head. Fig. 4 is a vertical section through line  $y$  of said head, together with the co-operating follower, showing clearly the mutual relation of said parts, the expanding mechanism being removed for that purpose. The remaining figures illustrate certain details, all of which will be hereinafter fully set forth.

In said figures,  $a$  is the head, secured upon the end of the piston or pump rod  $a'$ , and  $b$  is the follower, adapted to co-operate with said head to hold or carry the expanding mechanism, the two parts being stationary in their relation to one another, as shown in Fig. 4. The central portion of said head and follower are considerably thicker than the peripheral portions, as shown in Figs. 3 and 4, which thicker portions engage with one another and are radially grooved, as shown in Fig. 3, so that when the two said plates are bolted together the head, as a whole, is peripherally recessed and has radial passages therein, as will be readily understood upon further reference to Figs. 3 and 4, wherein  $a^3$  indicates the location of the peripheral recess, and  $a^4$  the location of the radial passages. Said recess and passages receive the expanding mechanism, hereinafter described.

In Figs. 5 and 6 are shown in side elevation and plan view a segment,  $c$ , having an arm,  $c'$ , projecting from its concaved side. A number of segments equal to the number of passages  $a^4$  are arranged around the thicker portions

of the head and follower, to form substantially a continuous ring, the arms  $c'$  extending a portion of the way up the radial passages and adapted to work or slide backward and forward therein, the width and depth of the arm being equal to that of the passage. Surrounding the sliding segments I arrange a spring-band,  $d$ , having overlapping extremities and approximately equal in width to the width of the recess  $a^3$  and adapted to expand and contract as required, said spring-band being indicated in outline in Fig. 1. Around said band are arranged a series of springs,  $e$ , which I prefer to form S shape, as indicated, although I do not wish to limit myself to said shape. Said series of springs are inclosed by a second outer spring-band, similar to the first, having overlapping ends and adapted to be expanded and capable of contraction, said band being lettered  $f$ . Around the outside of said outer band are arranged strips of rubber, fiber, or other appropriate packing,  $g$ , or segments of metallic rings, which may be formed and cut as shown in Fig. 10. Said packing projects beyond the edges of the plates  $a$   $b$  and engages with the sides of the cylinder or pump to form a steam-tight joint.

The extreme end of the piston-rod  $a^2$  is threaded and projects through the follower  $b$ , as shown in Figs. 2 and 4, which said follower has a central recess considerably greater in size than the diameter of the rod, leaving an annular recess around said rod, within which recess I arrange a collar,  $h$ , which may slide upon said rod  $a^2$  or be screwed thereon. Said collar engages with the upper extremities of a series of knuckle-joints,  $m$ , Figs. 2, 8, 9, each formed of two sections of metal pivoted together and arranged in an upright position around the piston-rod in the chamber back of the segments, the pivotal centers of said sections not, however, being in a line with the line of contact with the collar. The fronts of the knuckle-joints  $m$  engage with the segment-arms and, when the collar is forced down, force the latter forward, the action of said knuckle-joints being illustrated by Fig. 9.

It will be thus observed that the diameter of the head, as a whole, may be expanded without a reduction of the thickness or packing-surface thereof—a feature of great practical importance.



The operation of the device is substantially as follows: As the packing wears away the nuts *n* are screwed up, forcing the collar downward, which action causes the knuckles *m* to throw the segments outward, which action in turn expands the spring-band *d*, throws the springs *e* forward, and expands the bands *f* and packing *g*.

The arrangement of the springs and bands gives great elasticity to the packing, so that said packing will automatically conform to the wall of the cylinder or pump and form a steam or water tight joint, and as the packing wears away the springs automatically act to take up said wear until they arrive near their normal condition, when it becomes necessary to again screw up the nut *n*, which will give fresh energy to the spring and place the piston in working condition at but a comparatively small expense of time and trouble. It is also evident that a large wastage of packing is prevented.

Having thus described my invention, what I claim, and wish to secure by Letters Patent, is—  
1. In a piston-head or pump-plunger, the knuckles *m* and expanding means, arranged,

combined, and adapted to operate to expand the packing, substantially as and for the purposes herein set forth.

2. In a piston-head or pump-plunger, the combination, with the series of knuckle-joints *m*, of sliding segments and expanding mechanism, arranged and operating substantially as and for the purposes herein set forth.

3. In combination, in a piston-head, the collar *h*, knuckle-joints *m*, segments *c*, springs *e*, and packing, arranged and combined substantially as herein set forth.

4. In combination, in a piston-head or pump-plunger, the collar *h*, the knuckle-joints engaging therewith, the segments, the springs *e*, the spring-bands *d*, *f*, and the packing, the whole being arranged and combined substantially as herein set forth and shown.

In testimony that I claim the foregoing I have hereunto set my hand this 13th day of April, 1882.

SAMUEL ARMSTRONG.

Witnesses:

CHARLES H. PELL,  
C. T. WINTERS.