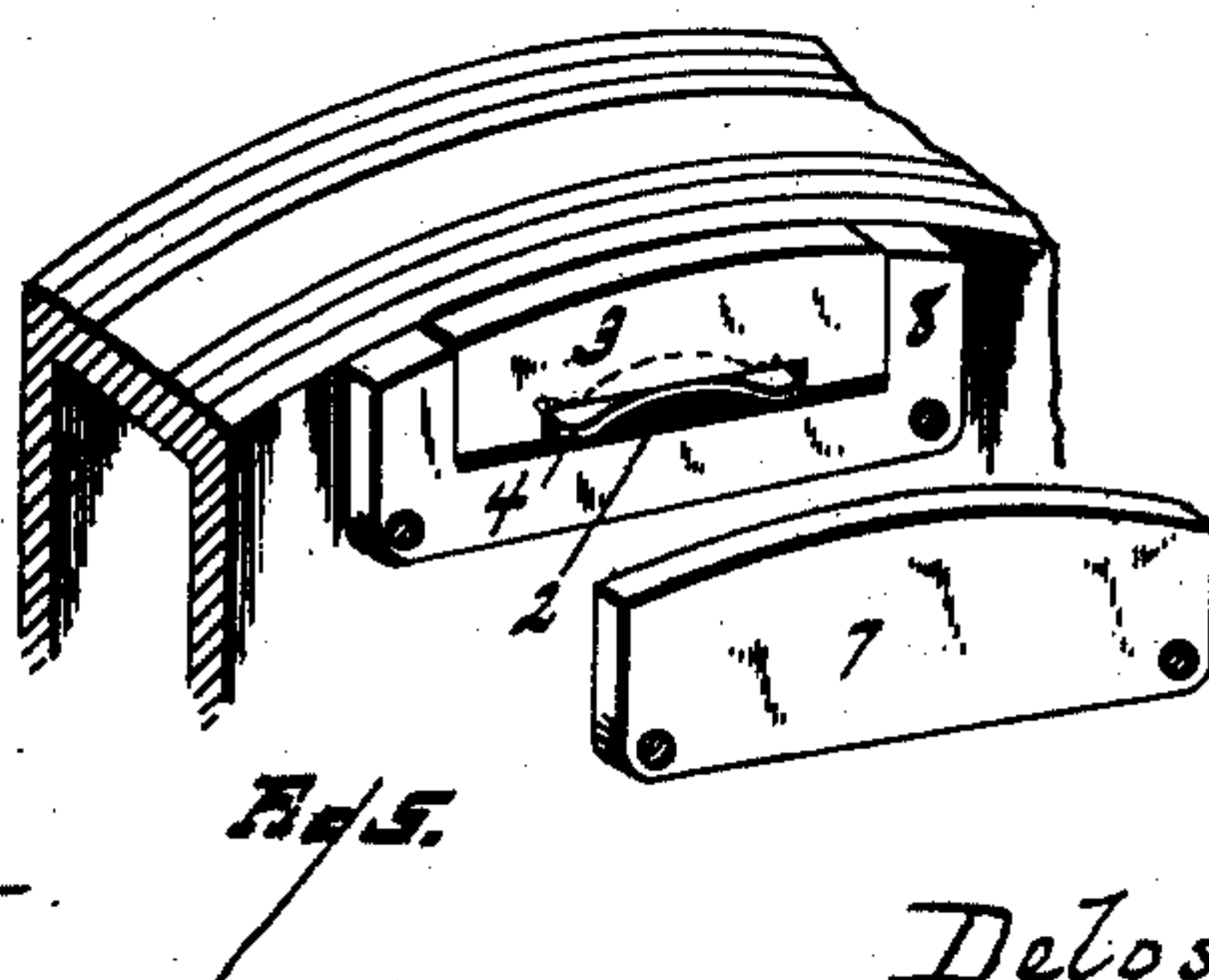
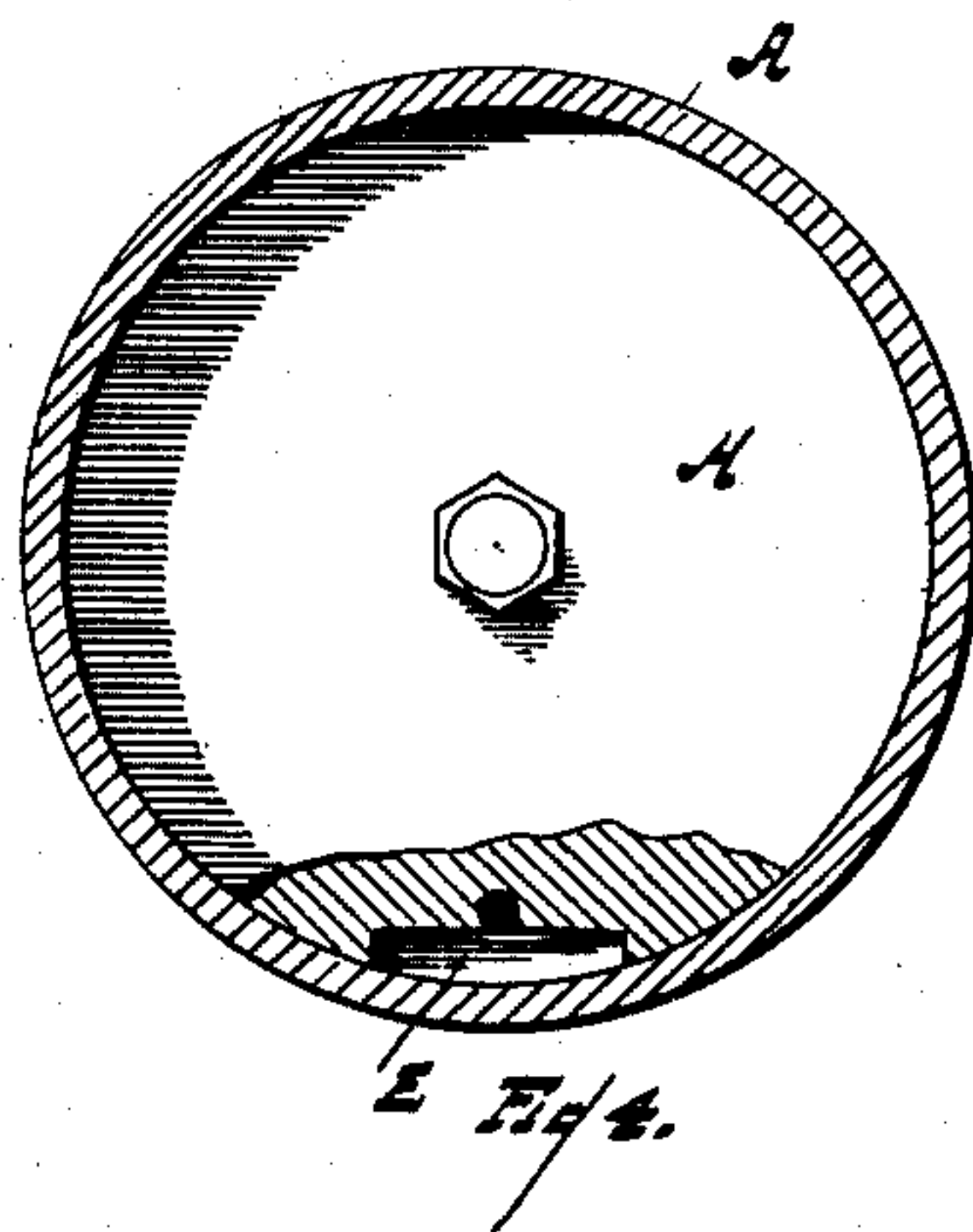
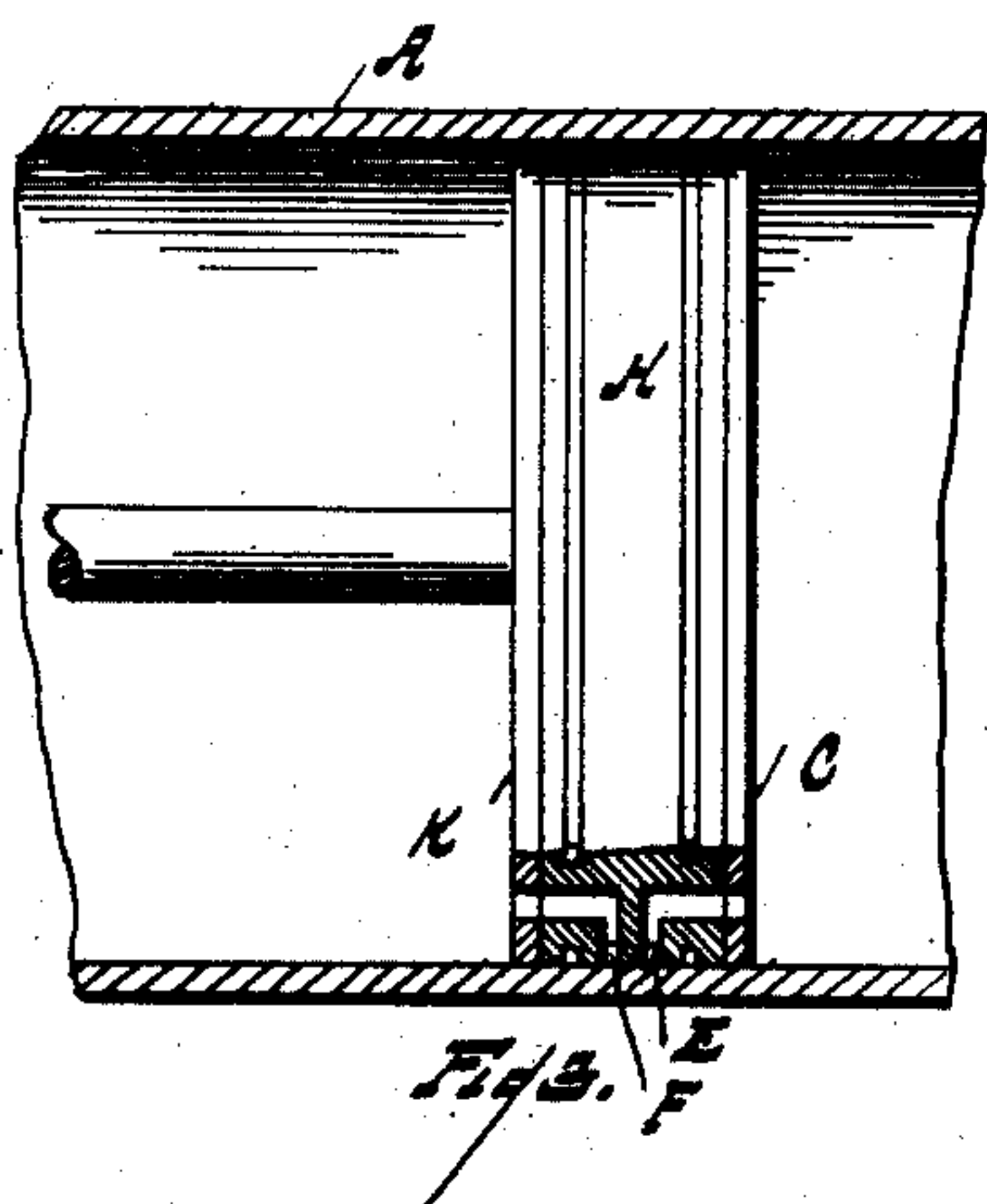
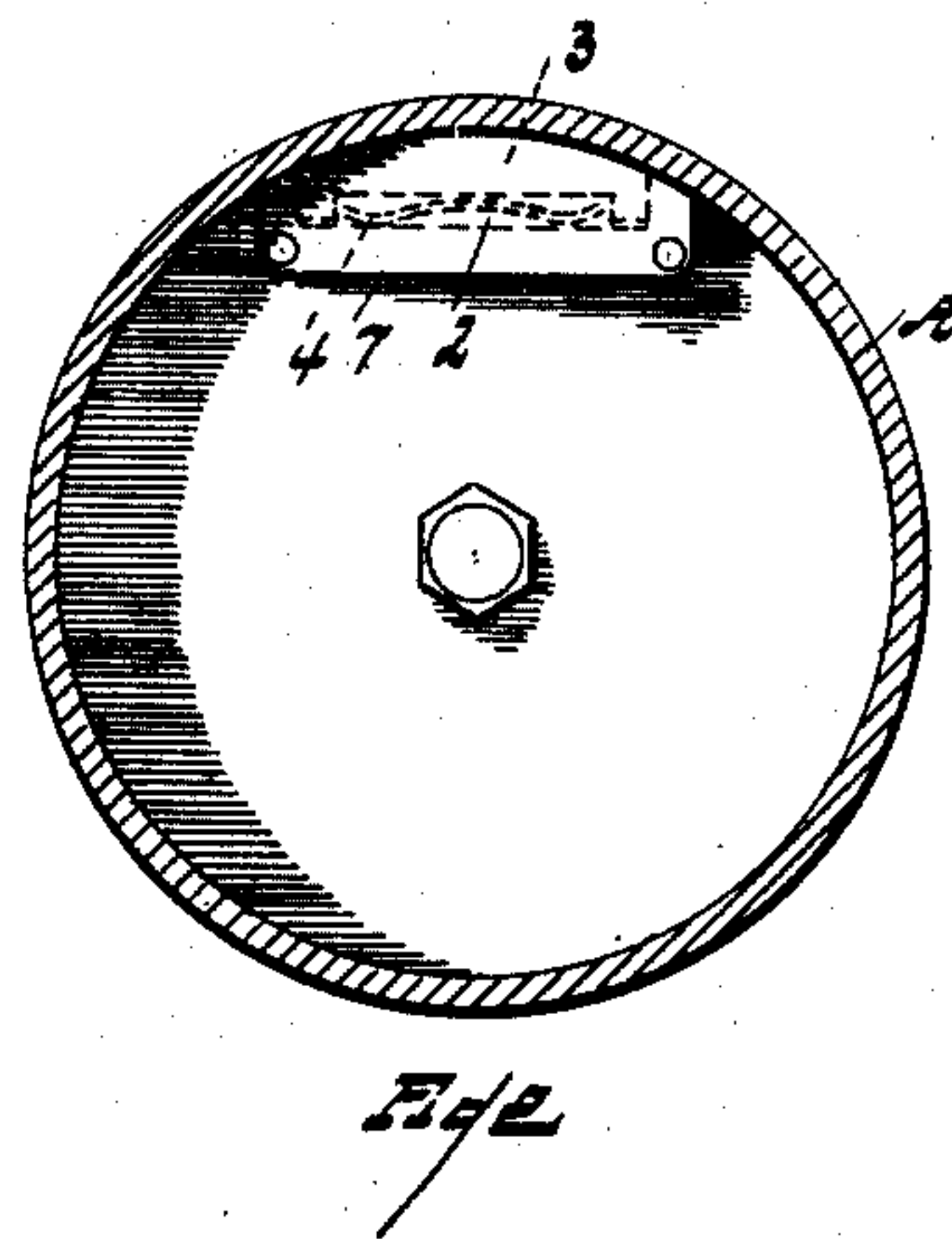
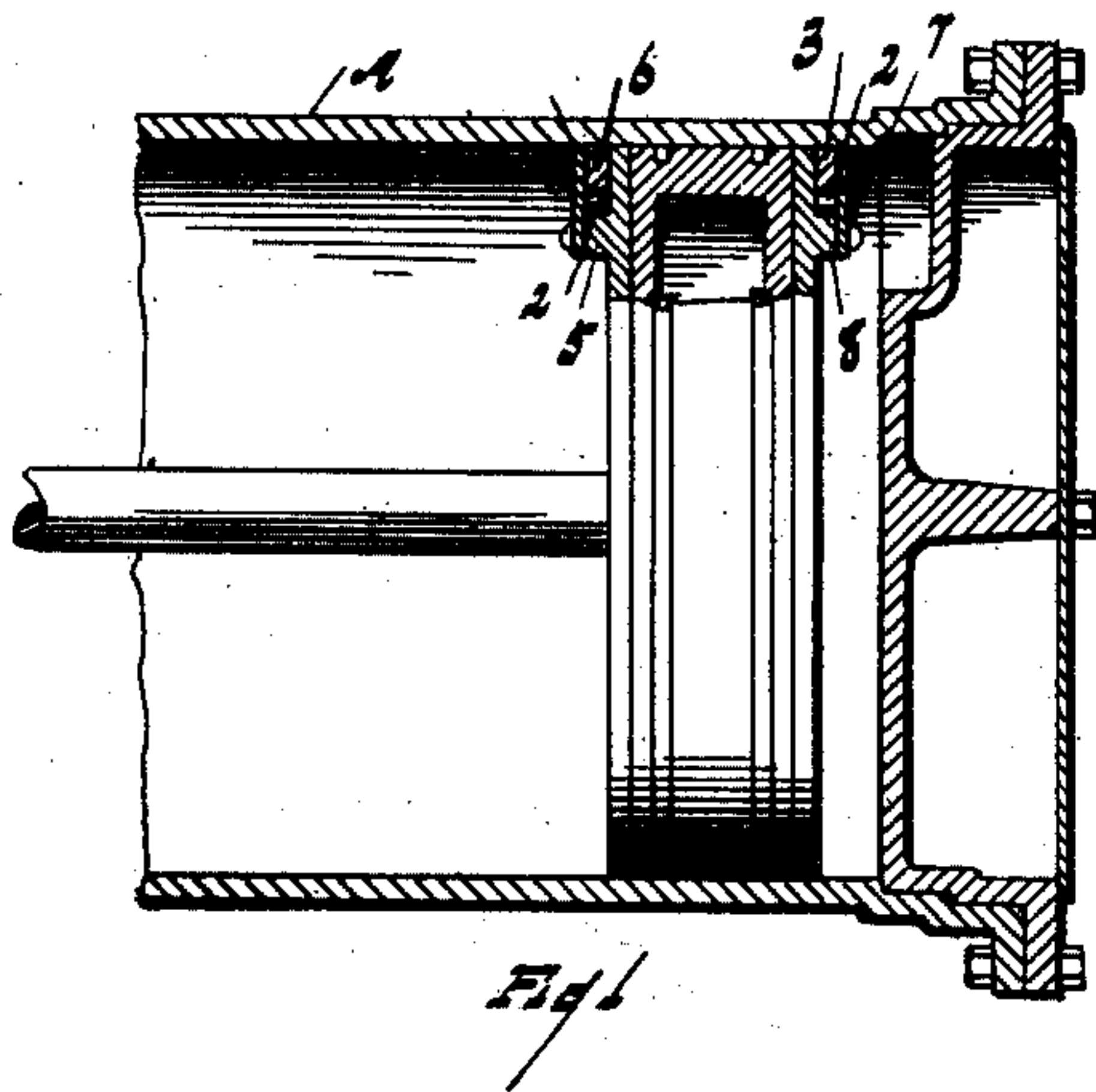


No. 736,781.

PATENTED AUG. 18, 1903.

D. E. RICE.  
BALANCED PISTON FOR STEAM ENGINES.  
APPLICATION FILED OCT. 28, 1901.

NO MODEL.



WITNESSES  
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# UNITED STATES PATENT OFFICE.

DELOS E. RICE, OF DETROIT, MICHIGAN.

## BALANCED PISTON FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 736,781, dated August 18, 1903.

Application filed October 28, 1901. Serial No. 80,171. (No model.)

*To all whom it may concern:*

Be it known that I, DELOS E. RICE, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Balanced Pistons for Steam-Engines; and I declare the following to be a full, clear, and exact description of the invention, such as it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to steam-engines, and has for its object an improved horizontal engine in which the piston is provided with a means for lifting it from off the bottom of the cylinder to such an extent as to prevent and overcome the tendency of both the piston and the cylinder to wear to an irregular shape.

It is well known that in horizontal engines the weight of the piston resting on the bottom of the cylinder tends to wear the walls of the cylinder and tends to wear off the surface of the piston, and an engine that has been injured by such wear requires more oil to lubricate and more steam to run it, is more liable to leakage past the piston than it should be, and in time the injury increases to such an extent that the cylinder must be rebored and the piston refitted to it. I overcome these objections by the devices shown in the accompanying drawings, in which—

Figure 1 is a section longitudinal of the cylinder and of the piston and rod, showing the improvement. Fig. 2 is an end view of the piston-head, showing the improvement. Fig. 3 is a section of the cylinder longitudinal of the piston and rod, showing a modified form. Fig. 4 is an end view of the piston of Fig. 3. Fig. 5 is a perspective of the attachment to the piston-head.

In Figs. 1, 2, and 3 the lifting-chamber is formed at the end of the piston by bolting an attachment thereto on each face of the piston. The attachment is fixed near the top side of the piston. 2 indicates a steam-tight box made by bolting a plate 7 and fillet 8 to the face of the piston. In the steam-tight box is a section of a packing-ring 3, which is held by the pressure of a spring 4 against the top of the cylinder. The structure makes an addition to the top of the piston which furnishes

a bearing for steam-pressure that lifts the piston and is not counterweighted by the admission of steam into the box or behind the packing 3. On the opposite face of the piston is a similar box 5 and a similar packing 6, making provision for the lifting of the piston head and rod on its back stroke.

In Fig. 4, A indicates the walls of the cylinder, and H the piston-head, provided with two packing-rings. On the bottom of the piston-head are two chambers E and F, running circumferentially for a short distance to either side of the extreme bottom point of the piston-head and extending crosswise of the piston-head. Into each of these chambers leads a steam-passage through the adjacent face of the piston, the passage leading into the chamber E leading through the face C of the piston, and the passage into the chamber F leading through the face K of the piston. The size of the chamber is determined by the normal steam-pressure used in the engine and by the weight of the head. For example, if one hundred pounds steam be used and a piston head and rod weighing one hundred pounds the area of the upper surface of the chamber should be a square inch in order that the lifting force of the steam pressing upward may exert sufficient force to counteract the weight of the piston-head, and such a chamber is formed to be filled with steam and exert an upward pressure of one hundred pounds, counteracting the weight of the piston when the piston is moving in either direction. The two chambers E and F act alternately, steam being freely admitted into the chamber E through the passage from the face C when the piston is moving forward and steam being admitted freely into the chamber F from the passage through the face K when the piston is traveling backward.

In both cases the mechanism introduced into the engine in carrying out my invention enables the steam which is employed to drive the piston to act against the weight of the piston and to lift it from the under wall of the cylinder.

The size of the surface contact of the packing-ring against the cylinder is determined by the weight of the piston and steam-pressure in the cylinder, the same is in Figs. 4 and 5.

In either of the forms shown there is a face

or surface of the piston exposed to pressure that tends to lift the piston, and this face or surface has no opposing face or surface exposed to the same steam-pressure and tending  
5 to depress the piston.

What I claim is—

In combination with a piston, a steam-tight box secured to the face thereof and arranged to furnish a surface against which the steam  
10 impinges, a packing inclosed in said box, and a spring arranged to produce a steam-tight

joint between the packing and the cylinder-walls, whereby there is produced an unbalanced condition of the piston tending to lift it, substantially as described.

In testimony whereof I sign this specification in the presence of two witnesses.

DELOS E. RICE.

Witnesses:

MAY E. KOTT,  
C. C. JENNINGS.