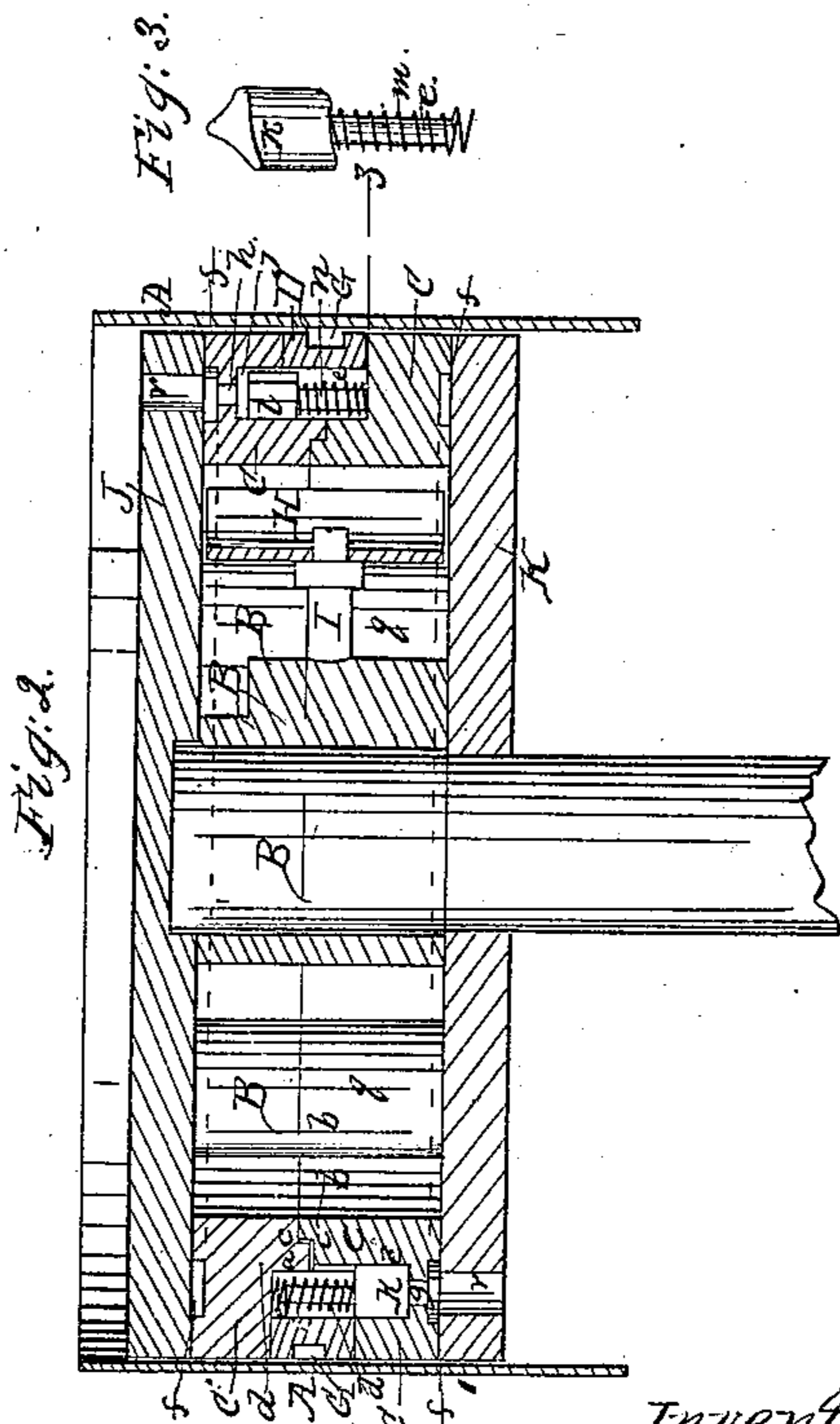
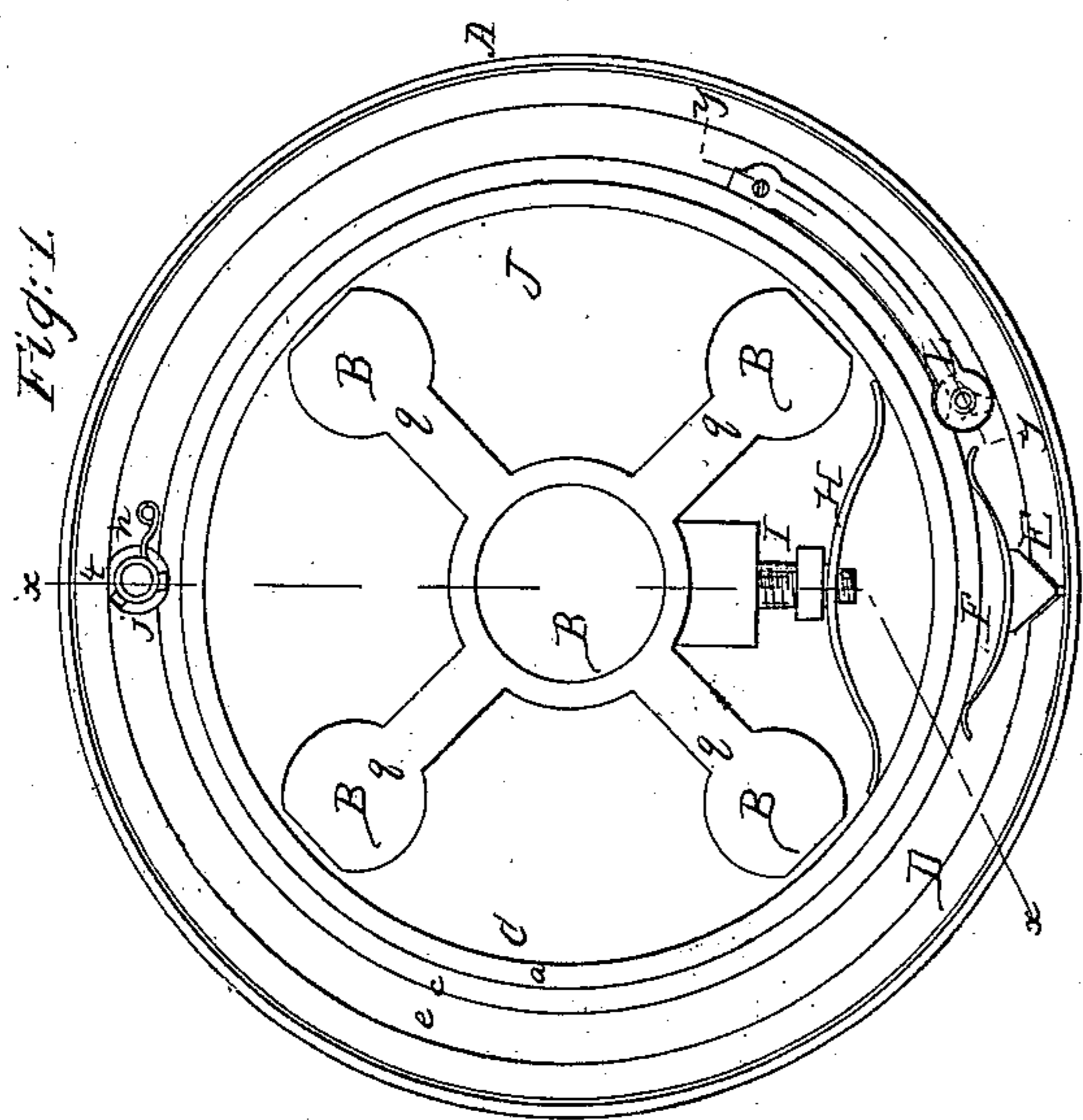
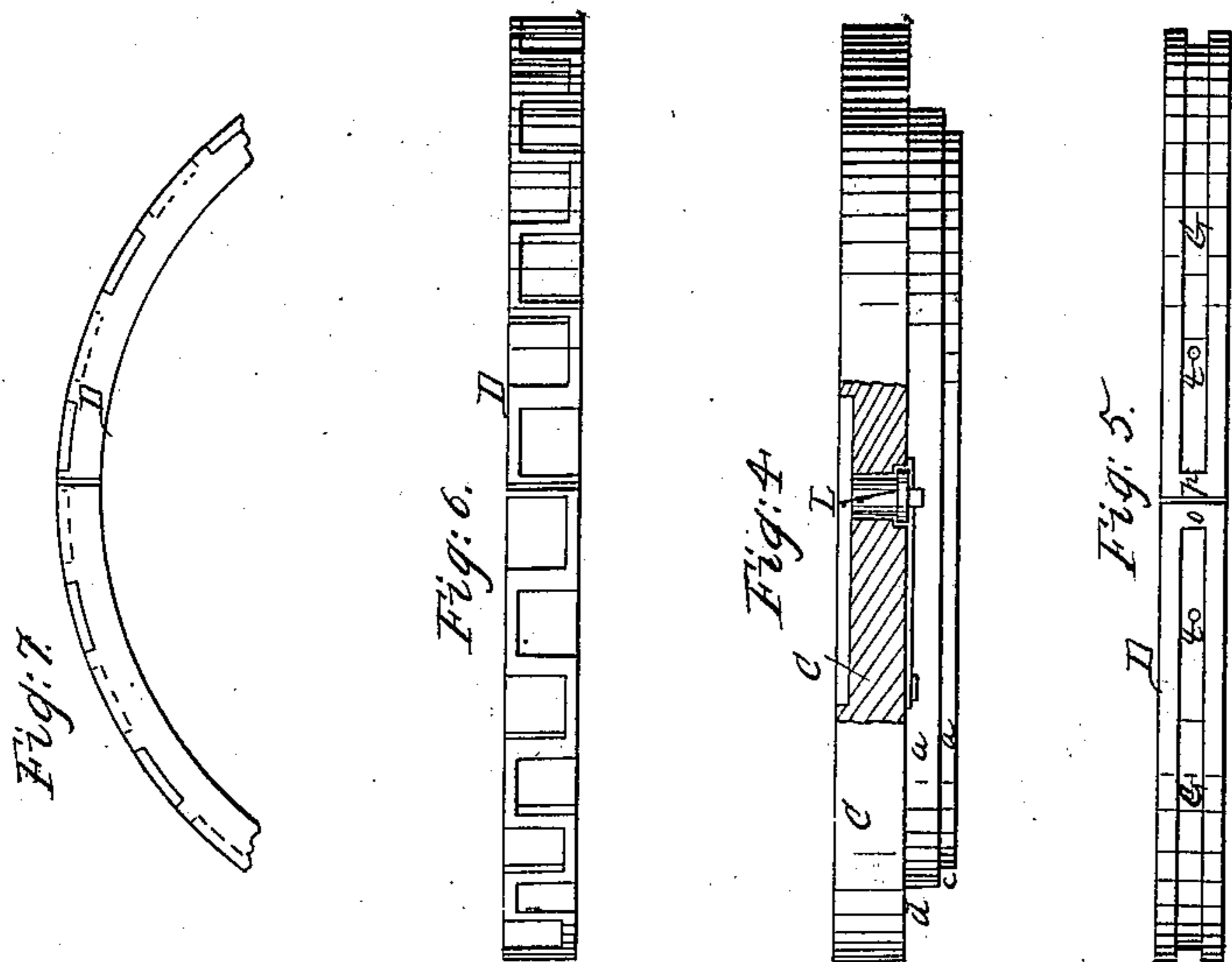


D. R. Fraser,
Piston Packing.

N^o 34,749.

Patented Mar. 25, 1862.



Witnesses.

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UNITED STATES PATENT OFFICE.

D. R. FRASER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN PACKING FOR PISTONS.

Specification forming part of Letters Patent No. 34,749, dated March 25, 1862.

To all whom it may concern:

Be it known that I, D. R. FRASER, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Packing Steam-Engine 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, forming part of this specification, in which—

Figure 1 is a vertical sectional view of the piston in the line $z z$ of Fig. 2. Fig. 2 is also a vertical sectional view in the line $x x$ of Fig. 1. Fig. 3 is a perspective view of one of the valves. Fig. 4 is a section in the line $y y$ of one portion of one of the uncut packing-rings of the piston. Fig. 5 is an edge view of the cut packing-ring. Figs. 6 and 7 are views of the packing-ring slightly modified.

The same letters of reference in the several figures indicate corresponding parts.

The nature of my invention consists, first, in so adjusting cut and uncut rings within a piston that both shall be free to move independently of the piston-head and followers; second, in the combination of channels in the outer faces of the uncut rings with the steam inlet-passages of the followers of the piston, so that a portion of the entering steam shall first act upon the faces of the uncut rings; third, in the use of uncut rings with face-channels for holding the cut ring steam-tight; fourth, in the combination of uncut rings and the spring-wedge, so that the force of the steam and the action of the spring-wedge shall hold the cut ring steam-tight and distended; fifth, in the combination of two or more valves, shouldered uncut rings, channeled or unchanneled cut ring, and piston-head, so as to produce an improved piston which has its packing expanded, as herein-after set forth, and, sixth, in the combination of the two springs and the screw and wedge, so as to suspend the moving parts of the piston in proper position relatively to the axis of the piston head or axis of the engine-cylinder.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is intended to represent a steam-engine cylinder. It is not drawn in proportion to the other parts, but will serve to illustrate

the manner in which my piston operates within it.

B is a common piston-head; C C', two solid uncut rings, with raised ribs $a b$ on the inner faces of each, said ribs being of smaller diameter than the rings, and each forms a compound right-angled shoulder $c d$, the shoulders $c c$ constituting the joint between the two rings and the shoulders $d d$ inclosing a steam and packing space e , as shown. These rings have a narrow circular channel f cut in their outer faces near their outer circumferences, and at one point these channels run at right angles to the direction of the face of the rings through the angular parts $d d$ of the rings into the space e , as shown, the passages $g h$ thus formed constituting inlet steam-passages of smaller diameter than the width of the channels and valve-seats $i j$ of larger diameter than the inlet-passages. In the valve-seats three-cornered valves $k l$ are arranged so as to be always kept closed by springs $m n$ when the pressure of the steam is not acting against the outer ends of the valves. These valves are of such size and form relatively to the steam-passages and the seats that when they are acted upon by the springs and not by the steam they close off the entrance of the steam by their central solid portion; but when they are acted upon by the steam they allow a passage of the steam between their corners and their seats.

D is the cut packing-ring arranged between the shoulders $d d$ in the outer portion of the space e formed by said shoulders. The cut in this ring is of V form, and in it a wedge-piece E fits steam-tight, said piece being held in position by a spring F, which bears against the shoulders d , as shown. Around and in the central part of the circumference of the packing-ring a groove G is cut and made to extend all round, except at the point where the V-slit is cut, at which point the groove is stopped by means of two shoulders $o p$, so that steam shall not enter the groove through the slit if it were possible for it to pass by the wedge-piece. From the inner circumference of the packing-ring to the groove G one or more small passages t are formed, so that steam from the inner portion of the space e may flow into the channel or groove G, and thus in a measure counteract the superior outward pressure of the steam in said space.

The rings C C' and the cut ring D are adjusted round the piston-head B by means of the spring H and set-screw I, and sustained in a concentric position by means of said spring and screw and the spring F and wedge-piece E, while the piston is being finished and while in use. The parts thus adjusted and sustained are bolted together by applying perforated followers J K to the respective ends of the piston-head and passing bolts through said heads and through the arms *q q* of the piston-head. In this place I will mention a distinguishing characteristic of my invention—to wit, the bolts do not pass through the uncut nor the cut rings of the piston. Neither do they bind said uncut rings so firmly that the rings have no chance to move toward one another; but, on the contrary, the uncut rings are allowed a slight freedom, in order that the pressure of the steam in the channels *f f* shall force one ring tight against the other at the point where the joint between them is formed, and thus produce a slight bind upon the sides of the cut ring, which bind prevents the cut ring from wobbling in the space *e*, and also makes a steam-tight joint on the sides of the ring D.

When the followers J K are in place on the piston-head, their steam-passages *r r*, corresponding with those in the uncut rings, are in line with the said passages in the uncut rings, and therefore when the piston moves in one direction steam is admitted into the space *e* by one of the valves and shut off from the same by the other valve, and vice versa, when the piston moves in an opposite direction.

The steam when admitted acts against the sides of the uncut rings in the channels thereof, making a tight joint between the uncut rings and the cut ring, then acts against the inner circumference of the cut ring and causes it to expand in diameter, then flows into the groove G, and to a certain extent counteracts the superior outward pressure upon the inner circumference of the cut ring. While the steam is thus acting the wedge-piece is forced into the V-slit and caused to make a steam-tight joint and aid in supporting and maintaining the cut ring in its proper expanded condition. The same operation takes place when the piston changes its direction of motion.

It is obvious that the steam is effectually prevented from escaping by the spring-valves, and therefore it must condense in the space *e*, and in order to provide for the escape of the condensed steam a water-valve L is pro-

vided near that part of the space *e* which stands nearest the bottom of the engine-cylinder, as shown.

It will be observed that I have located one of the receiving-valves near the bottom of the piston; but this is not its proper position in practice, and it is only so located in order to make plain the alternate operation of the two valves in the drawings. In practice I prefer to locate both of the receiving-valves near the top of the piston, but out of line with each other. I also have shown the passages in the followers J K as undivided. They, however, may be covered by wire-gauze or finely-reticulated plates, and by changing the construction of the uncut rings the passages might be located to admit steam within the circle of said rings. The packing-ring D may also be constructed with right and left cavities to receive steam, instead of with a continuous groove G. Figs. 6 and 7 show this proposed modification.

My plan of packing pistons by two free uncut rings and a cut ring, in combination with the wedge-screw and springs, might be used to advantage, whether steam be used or not for expanding the packing.

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

1. Adjusting within a piston cut and uncut rings, so that both shall be free to move independently of the follower and piston-head, substantially as described.
2. The combination of the channels *f* and the passages *r*, substantially as and for the purpose described.
3. The use of the uncut rings with face-channels *f*, for holding the cut packing-ring steam-tight, substantially as described.
4. The combination of the uncut rings and the spring-wedge, so that by the force of steam and the action of the wedge the cut ring shall be held both steam-tight and distended, substantially as and for the purpose described.
5. The combination of the piston-head valves, shouldered uncut rings, and the cut ring, for the purpose set forth.
6. The combination of the two springs, screw, and wedge, substantially as and for the purpose described.

Witness my hand, in the matter of my application for patent on mode of packing pistons, this 12th day of February, A. D. 1862.

D. R. FRASER.

Witnesses:

THOS. CHALMERS,
PETER S. THOMPSON.