

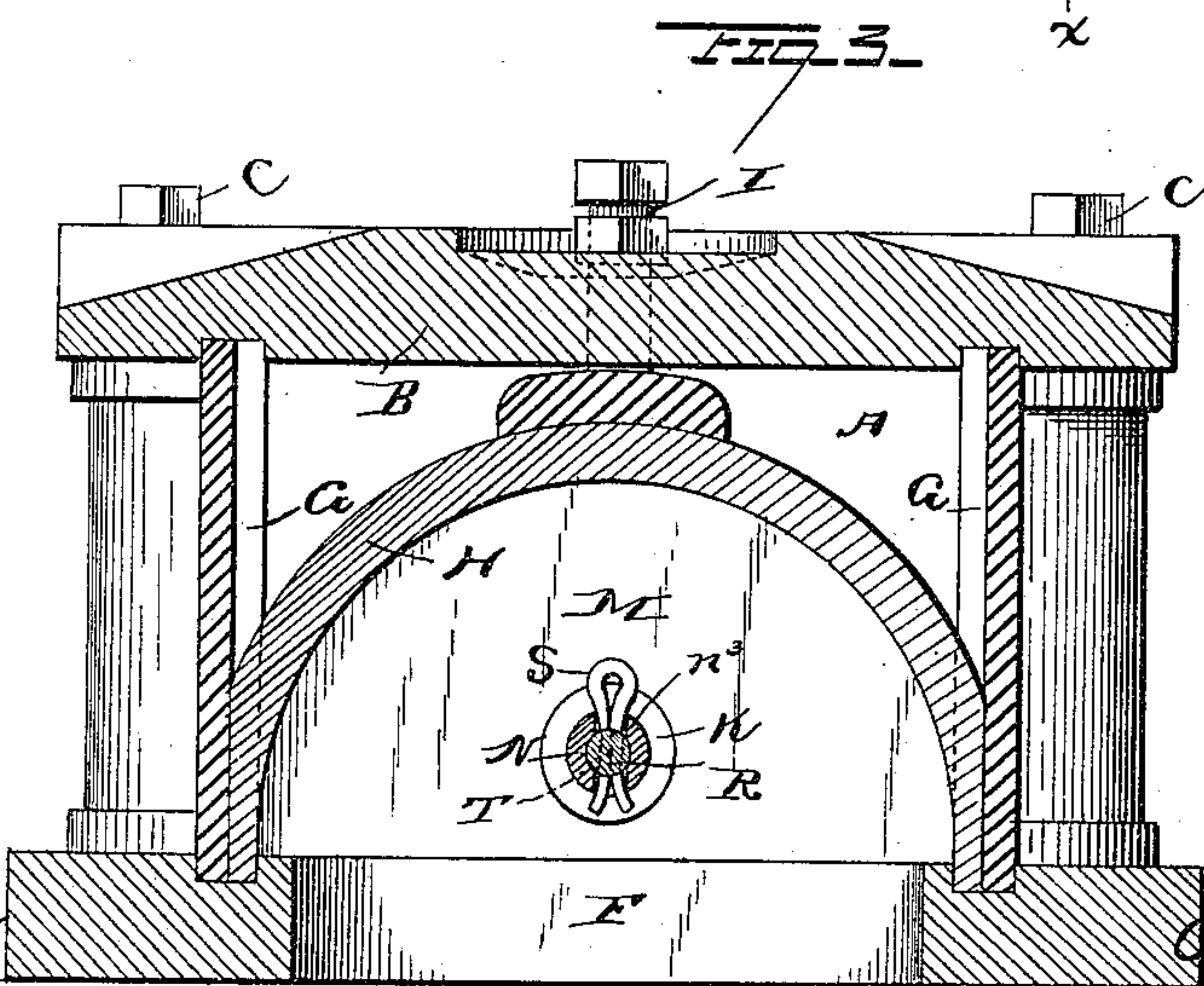
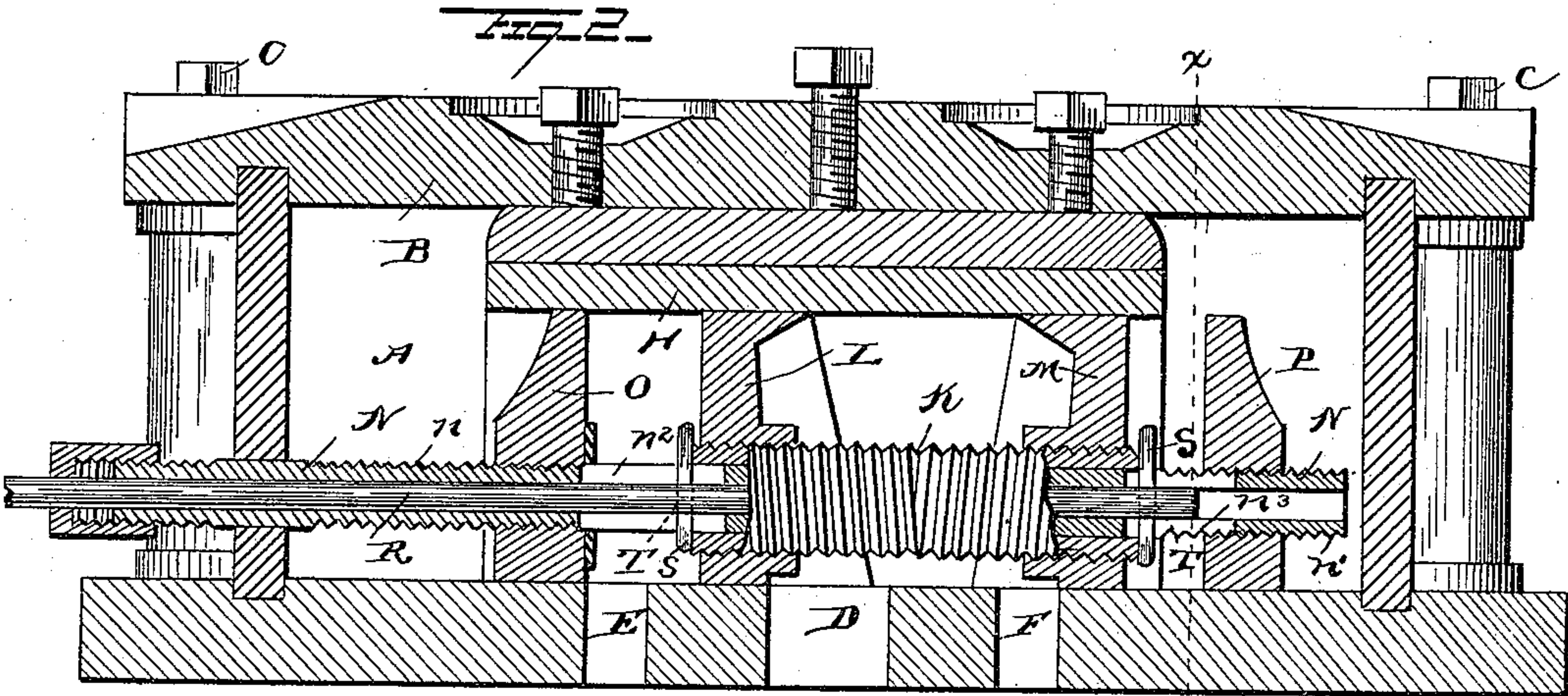
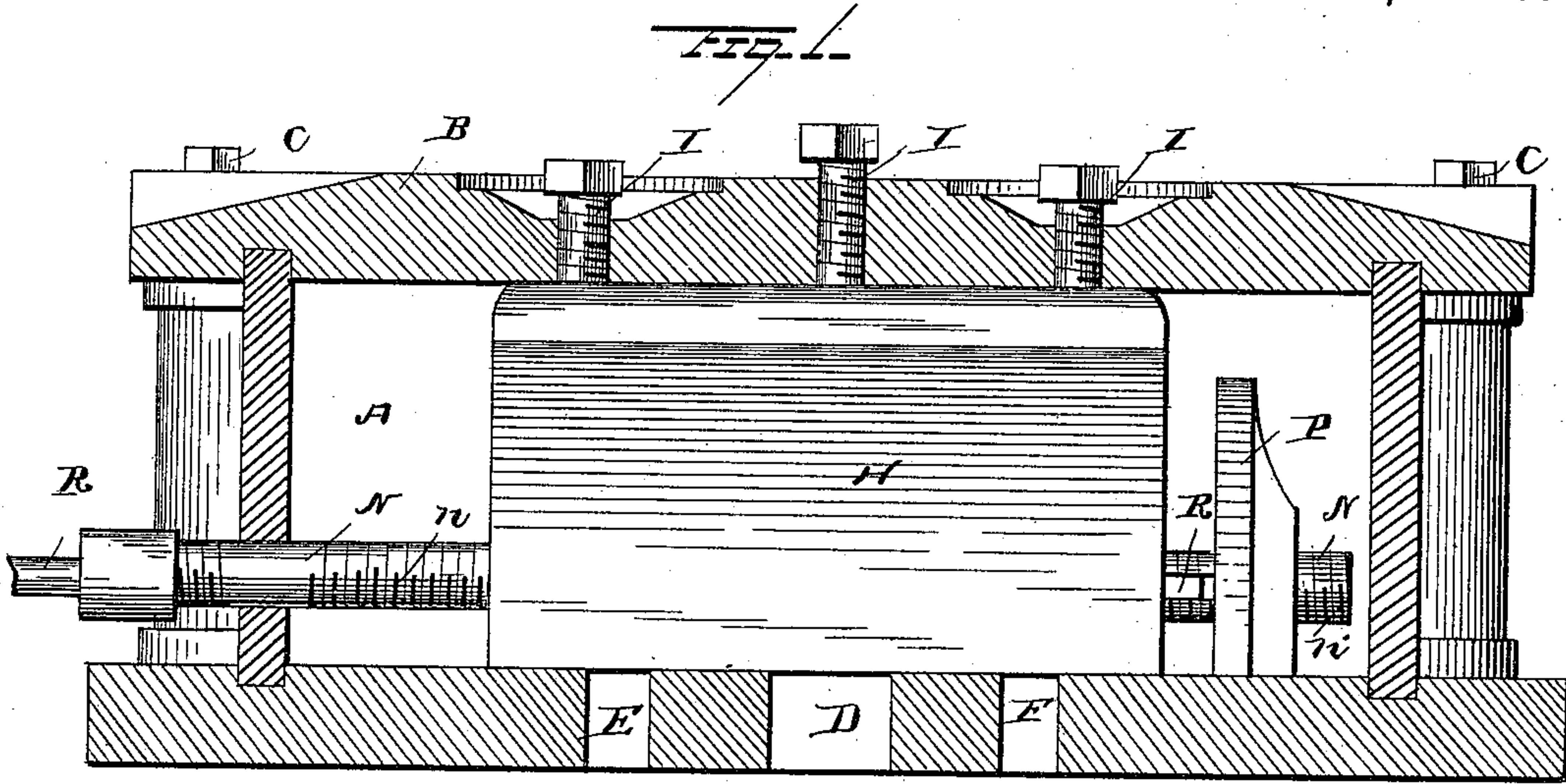
(No Model.)

J. SMITH.

VALVE FOR STEAM ENGINES.

No. 350,606.

Patented Oct. 12, 1886.



Witnesses

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UNITED STATES PATENT OFFICE.

JAMES SMITH, OF DRESDEN, NEW YORK.

VALVE FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 350,606, dated October 12, 1886.

Application filed July 7, 1886. Serial No. 207,346. (No model.)

To all whom it may concern:

Be it known that I, JAMES SMITH, a citizen of the United States, residing at Dresden, in the county of Yates and State of New York, have invented a new and useful Improvement in Valves for Steam-Engines, of which the following is a specification.

My invention relates to an improvement in valves for steam engines; and it consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

In the drawings, Figure 1 is a side elevation of my invention, partly in section. Fig. 2 is a vertical longitudinal sectional view of the same. Fig. 3 is a transverse sectional view on line *x x*, Fig. 2.

A represents the steam-chest of the engine, which is provided with the removable top plate, B, that is secured on the upper edges of the side and end walls of the steam-chest by means of bolts C. In the bottom plate of the steam-chest, at the center thereof, is made a transverse exhaust port, D, and on opposite sides of the said exhaust-port are the induction-ports E and F. On the inner sides of the side walls of the steam-chest are made vertical recesses G, which extend nearly throughout the length of the steam-chest, and in the said recesses is fitted an arch-plate, H, which extends transversely across the steam-chest and nearly from end to end thereof. The lower edges of the said arch-plate are kept in contact with the bottom plate of the steam-chest by means of set-screws I, which pass down through the top plate of the steam-chest and bear upon the central portion of the arch-plate. The under side of the arch-plate is either concave or triangular in shape, as may be preferred.

K represents a hollow valve-sleeve, which is provided with right and left hand screw-threads, which meet at the center of the valve-sleeve. On one end of the sleeve K is screwed a valve, L, and on the opposite end thereof is screwed a valve, M. The upper side of the said valves are adapted to the contour of the under side of the arch-plate and fit snugly therein, and the lower sides or edges of the

said valve bear firmly upon the bottom plate of the steam-chest.

N represents a cut off-valve sleeve, which extends through the valve sleeve K and fits snugly in the said sleeve, the said valve-sleeve N having right and left hand screw-threads *n* and *n'* at its opposite ends. That portion of the valve-sleeve N which passes through the sleeve K is plane. On the threaded portion *n* of the cut-off-valve sleeve is screwed a cut-off valve, O, and on the threaded portion *n'* of the said sleeve is screwed a cut-off valve, P. The said cut-off valves correspond with the valves L and M, and thereby bear against the under side of the arch-plate, and also against the bottom plate of the steam-chest. On the inner side of the threaded portion *n* of the sleeve N is a longitudinal slot, *n*², and a similar slot, *n*³, is cut in the said sleeve near the opposite extremity thereof.

R represents a valve-rod, which passes through the cut-off-valve sleeve and is adapted to work back and forth therein, the said rod being secured to the said sleeve by means of pins S, which pass through openings T, that are made in the said valve-rod and work in the slots *n*² and *n*³ of the cut-off-valve sleeve, thereby permitting the valve-rod to work in the cut-off-valve sleeve and independently thereof a distance corresponding to the length of the slots *n*² and *n*³.

One end of the cut-off-valve sleeve passes through one of the end walls of the steam-chest, and the rod R has one end projecting beyond the outer end of the cut-off-valve sleeve, and is connected to and actuated by the eccentric or valve gear of the steam-engine. This said eccentric or valve-gear is not here shown nor more particularly described, for the reason that it is of the well-known common construction and forms no part of my invention.

It will be seen that the valve-sleeve K is free to turn on the cut-off-valve sleeve, and as the said sleeve K is provided with the right and left hand screw-threads the valves L and M may be adjusted toward or from each other by simply rotating the sleeve K, as will be very readily understood. The cut-off-valve sleeve N may be also turned, and thereby cause

the cut-off valves O and P to be adjusted either toward or from each other.

The valve L slides over the induction port E, and the valve M slides over the induction-
5 port F.

The operation of my invention is as follows: We will assume the valves to be in their initial position, as shown in Fig. 1, when the valve M is on the outer side of the port F and
10 the valve L is on the inner side of the port E and the cut off valve sleeve is at the rearward limit of its movement, so as to move the valve O under one end of the arch-plate, the cut-off valve P being moved beyond the opposite end of the arch-plate. The steam from
15 the steam-chest is admitted past the cut-off valve P, under one end of the arch-plate, and exerts its pressure directly against the valve M. As the rod R is moved forward by the eccentric or valve gear, the valve-sleeve K, which
20 is connected to the said rod by means of the transverse pin, as hereinbefore described, will be moved forwardly with the said rod, causing the valve M to open the port F and the
25 valve L to simultaneously close the port E. The steam then passes through the port F into the rear end of the steam-cylinder, and drives the piston forward. As the rod R continues to move forward, it gradually enlarges the uncovered portion of the port F, causing the
30 pins S to move forward in the slots of the cut-off-valve sleeve, the said cut-off-valve sleeve and valves remaining stationary until the pins S reach the front ends of the slots n^2 and n^3 , when
35 the cut-off-valve sleeve is caused to move forward with the valve-sleeve K and the rod R, and thus move the cut-off valve O from under the front end of the arch-plate and draw the cut-off valve P under the rear end of the said
40 arch-plate, thereby cutting off the supply of steam from the port F and permitting the cut-off valve O to admit steam under the front end of the arch-plate to the induction-port E, when the motion of the piston will be reversed.
45 While the piston is moving forward the dead steam in the front end of the cylinder is exhausted through the port E to the central portion of the arch-plate, between the opposing inner sides of the valves L and M, and escapes
50 through the port D. By adapting the valves L and M to move for a slight distance independently of the cut off valves O and P, and by providing means for adjusting the said valves and cut-off valves toward or from each
55 other, I am enabled to cut off the steam at any desired portion of the stroke, and thus use the same expansively, and I am also enabled to give the valves any desired amount of "lead."

The arch-plate above the valves prevents
60 downward pressure of the steam in the steam-chest upon the valves, thus permitting them to slide evenly back and forth, and reducing the steam-pressure on the valves to a minimum, thereby increasing the power of the engine, and consequently effecting an economy
65 of fuel and water.

As the steam bears upon the outer sides of

both of the cut-off valves constantly, it will be seen that they are effectually balanced in the steam-chest.

Having thus described my invention, I claim—

1. The combination of the valve-sleeve having the valves L and M, and the cut-off-valve sleeve or arm N, independently movable in the
75 valve-sleeve for a suitable distance, and provided with the cut-off valves O and P, substantially as described.

2. The combination of the steam-chest having the induction and exhaust ports and the
80 arch-plate H with the valve-sleeve K, having the valves L and M, and the cut-off-valve sleeve N, independently movable in the valve-sleeve for a suitable distance, and provided with the cut-off valves O and P, substantially
85 as described.

3. The combination of the steam-chest having the induction and exhaust ports and the arch-plate H with the valve-sleeve K, having the
90 valves L and M, adjustable toward or from each other on the said sleeve, and the cut-off-valve sleeve N, passing through the sleeve K, and independently movable therein for a slight distance, the said sleeve N having the cut-off
95 valves O and P near its opposite extremity and on the outer sides of the valves, the said cut-off valves being adjustable on the cut-off-valve sleeve toward or from each other, substantially as described.

4. The combination of the steam-chest having the induction and exhaust-ports and the
100 arch-plate H with the sleeve K, having the valves L and M, the sleeve N, passing through the sleeve K and independently movable therein for a slight distance, the cut-off valves O
105 and P, attached to the sleeve N, and the rod R, extending through the sleeve N, independently movable therein for a suitable distance and connected to the sleeve K, whereby the
110 said sleeve K and the rod R may be moved together independently of the sleeve N, substantially as described.

5. The combination of the steam-chest having the induction and exhaust ports and the
115 arch-plate H with the valve-sleeve K, having the right and left hand screw-threads, the valves L and M, secured on the said sleeve, the cut-off-valve sleeve N, extending through the sleeve K, and having the right and left
120 hand threads n' and n , and the slots n^2 and n^3 , the cut-off valves secured on the threaded portions of the sleeve N, the rod R, passing through the said sleeve, and the pins working in the slots n^2 and n^3 , extending through the rod R and bearing against the ends of the sleeve K,
125 substantially as described.

6. The combination of the steam-chest having the induction and exhaust ports, and the arch-plate, with the valve stem or rod having the valves L and M, and the cut-off valves O
130 and P, which work under the arch-plate and bear directly upon the bottom plate of the steam-chest, substantially as described.

7. The combination of the steam-chest hav-

ing the induction and exhaust ports, and the arch-plate, with the valve stem or rod having the valves L and M, and the cut-off valves O and P, which work under the arch-plate and
5 bear directly upon the bottom plate of the steam-chest, the said valves and cut-off valves being adjustable on the valve stem or rod toward and from each other, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

JAMES SMITH.

Witnesses:

SETH YOUNGS,
JAMES F. REYNOLDS.