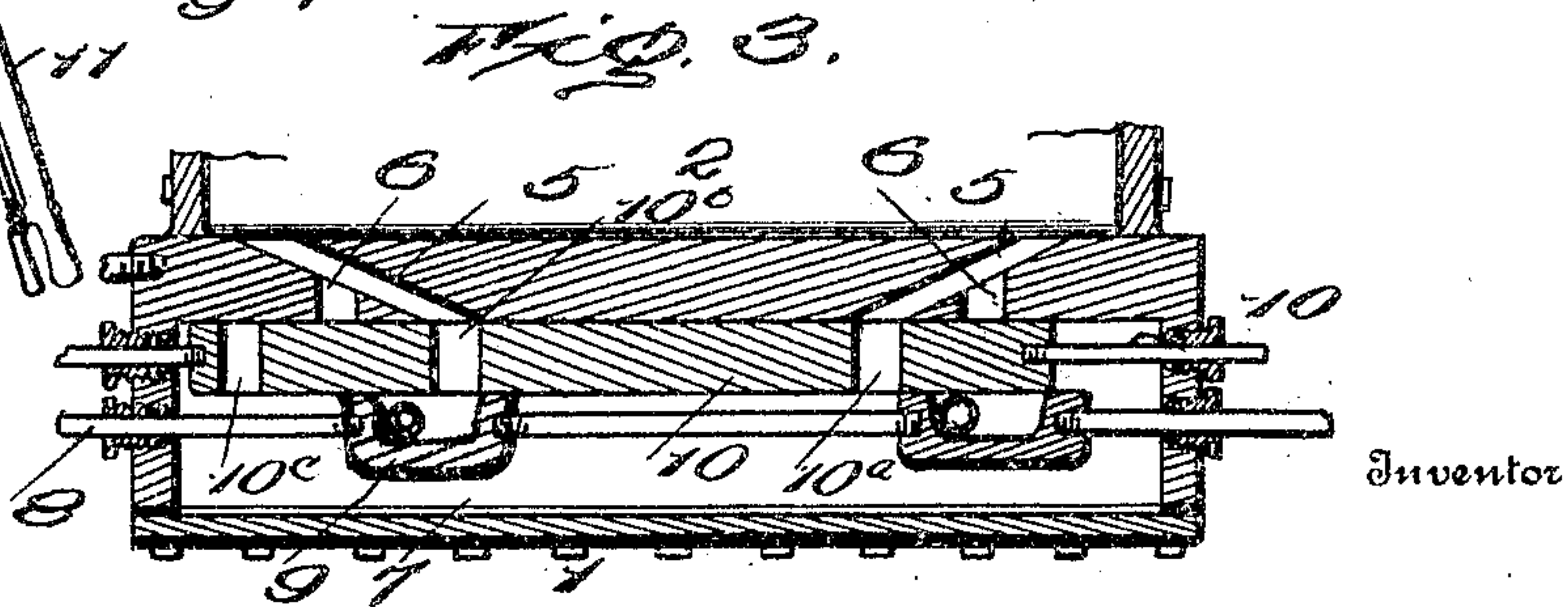
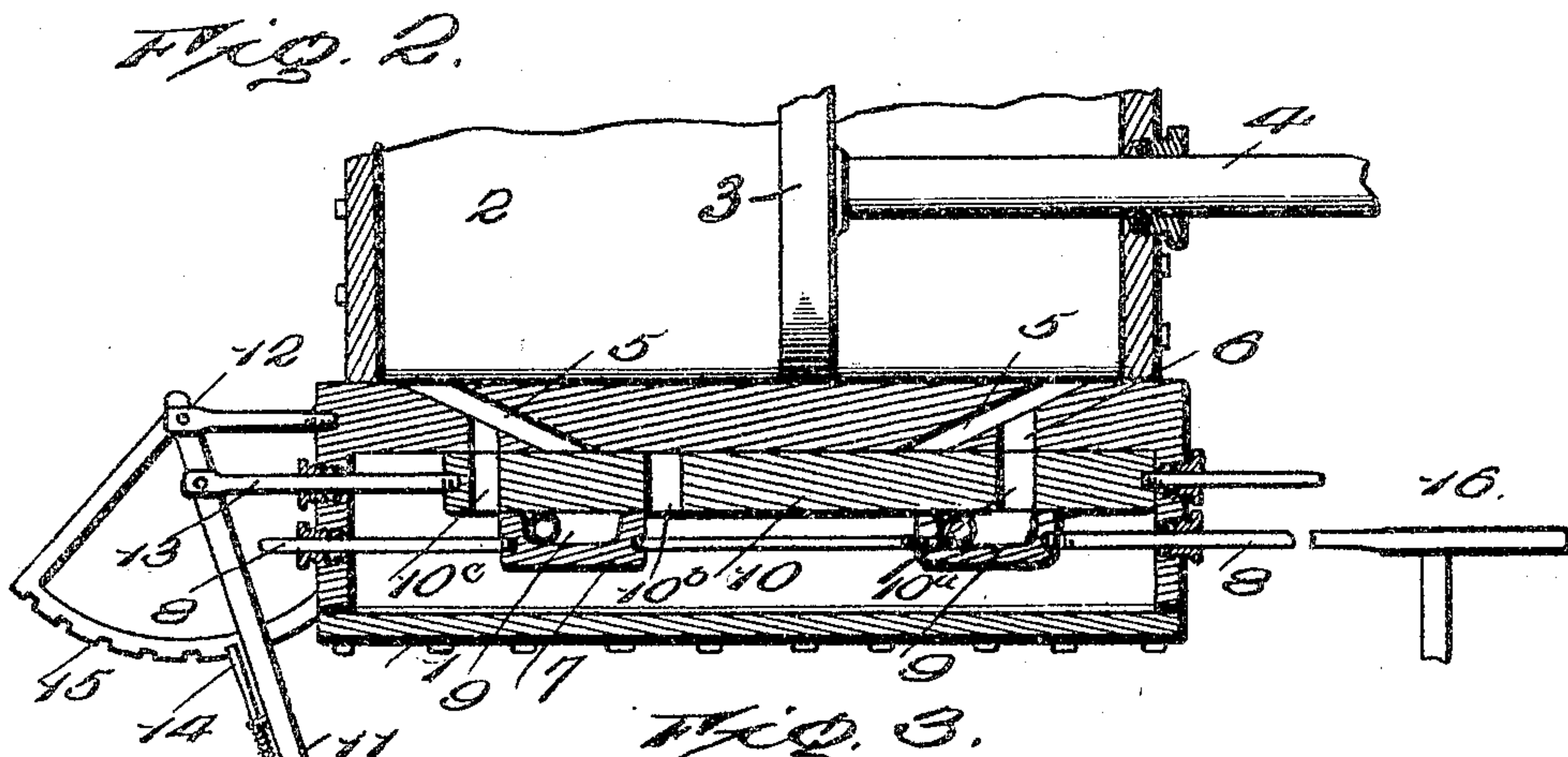
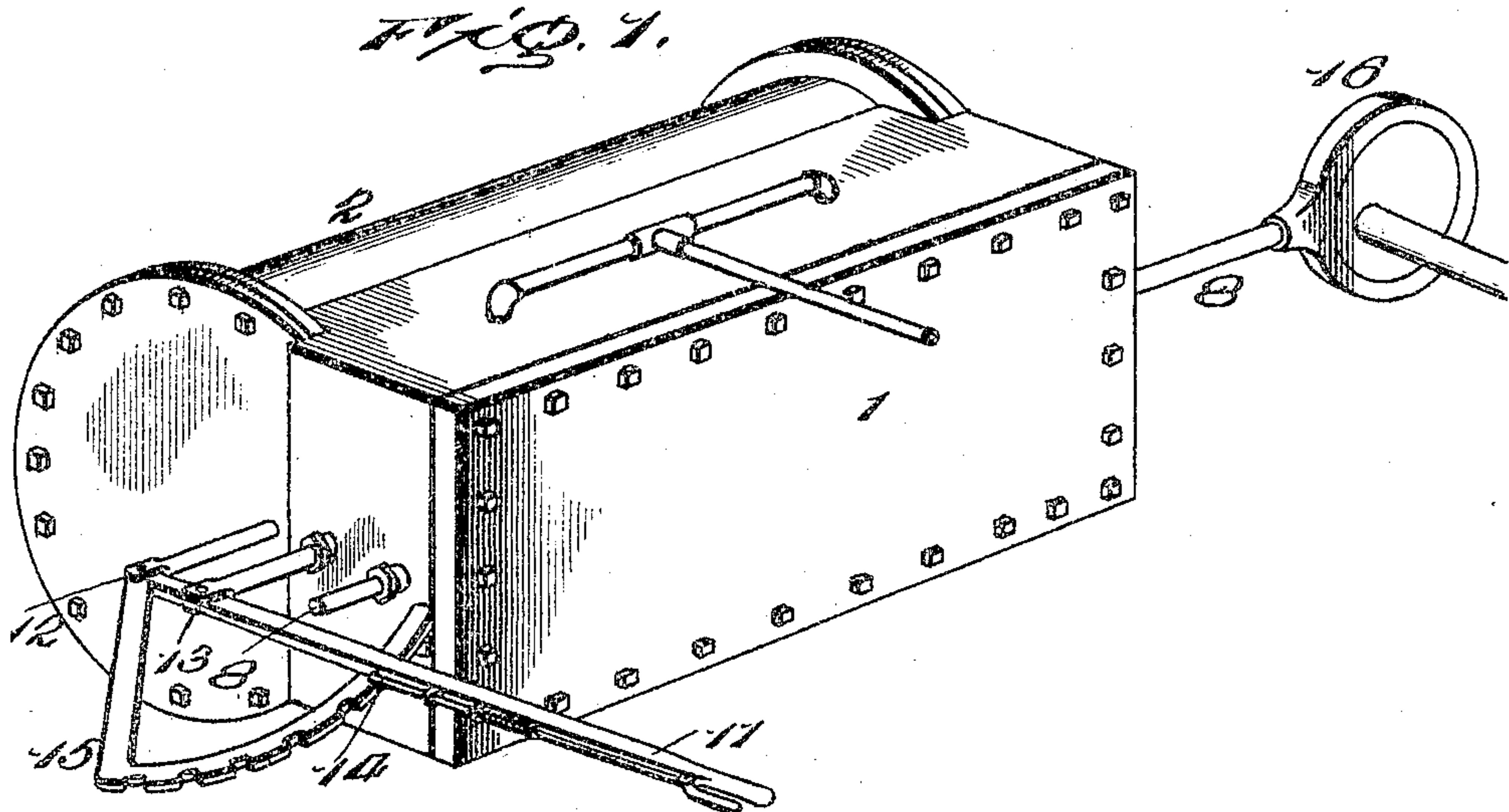


No. 794,596.

PATENTED JULY 11, 1905.

T. DUGAN.  
STEAM ENGINE VALVE.  
APPLICATION FILED FEB. 13, 1904.



Witnesses

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By

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# UNITED STATES PATENT OFFICE.

THOMAS DUGAN, OF LARNED, KANSAS, ASSIGNOR OF ONE-HALF TO  
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## STEAM-ENGINE VALVE.

SPECIFICATION forming part of Letters Patent No. 794,596, dated July 11, 1905.

Application filed February 13, 1904. Serial No. 193,441.

*To all whom it may concern:*

Be it known that I, THOMAS DUGAN, a citizen of the United States, residing at Larned, in the county of Pawnee and State of Kansas, have invented certain new and useful Improvements in Steam-Engine Valves, of which the following is a specification.

This invention aims to simplify the construction and manner of assembling the operating parts of steam-engine valve mechanisms.

The invention particularly relates to the provision of a novel form of reversing means whereby the commonly-employed link-motion is dispensed with. The improved mechanism admits of direct connection of the slide-valve with an actuating-eccentric or the like, the above being of obvious advantage, as will be readily appreciated.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings.

While the essential and characteristic features of the invention are susceptible of modification, still the preferred embodiment of the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view showing the embodiment of the invention. Fig. 2 is a sectional view showing more clearly the disposition of the reversing and slide valves, the steam-chest being shown broken away. Fig. 3 is a view similar to Fig. 2, parts being broken away, showing the position of the reversing-valve when in reversed position from that illustrated in Fig. 2.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In carrying out the invention the usual steam-chest 1 is provided, as well as the adjacent cylinder 2. A piston 3 is movably mounted in the cylinder 2, and the piston-rod 4 of the said piston may be suitably connected for operation as desired. From the steam-

chest 1 inclined ports 5 lead into the cylinder 2, and other steam ports 6 extend from the ports 5 into the steam-chest. A slide-valve 7 is slidably mounted in the steam-chest, valve-rods 8 extending from the opposite ends of said valves through the opposite end portions of the steam-chest. The valve-rods 8 pass through stuffing-boxes in the ends of the steam-chest 1 in the usual manner. Exhausting-ports 9 are provided upon the valve 7, and said ports 9 are adapted to register with an ascertained port in the reversing-valve 10. The reversing-valve 10 is mounted for slidable movement between the slide-valve 7 and the cylinder 2, and the said reversing-valve is actuated by means of an operating-lever 11, which is pivotally mounted adjacent one end of the steam-chest, as at 12. The reversing-valve is provided with a connecting-rod 13, which is secured to the lever 11, and the said lever 11 is provided with a spring-latch 14, adapted to engage a toothed segment 15 to fix the position of the operating-lever. The position of the operating-lever determines the position of the reversing-valve in a manner clearly apparent, since a pivotal movement of the said lever will impart a reciprocal movement to the reversing-valve 10. The reversing-valve 10 is provided with a plurality of ports 10<sup>a</sup>, 10<sup>b</sup>, and 10<sup>c</sup>, which ports are adapted to establish communication between the cylinder-chamber and the steam-chest to permit entrance of the steam into the cylinder. The ports 10<sup>a</sup> and 10<sup>c</sup> are adapted to register with the ports 6, which extend from the inclined ports 5, and the ports 10<sup>a</sup> and 10<sup>b</sup> are adapted to register directly with the inclined ports 5. As shown in Fig. 2, the ports 10<sup>a</sup> and 10<sup>c</sup> of the reversing-valve are in register with the ports 6, leading into the cylinder 2. When the reversing-valve is in the above position, the slide-valve 7 coöperates to close and open the said ports 10<sup>a</sup> and 10<sup>c</sup> alternately in its reciprocal movement. It will thus be seen that when the parts are in the position shown in Fig. 2 the steam passes from the steam-chest through the port 10<sup>c</sup> in the reversing-valve 10 and from thence through the ports 6 and 5, leading into the cylinder 2. The



exhaust-ports 9 of the slide-valve 7 are of course alternately brought into registry with the ports 10<sup>a</sup> and 10<sup>c</sup> to permit exhaust of the steam from the cylinder 2.

5 In reversing the engine the reversing-valve 10 is thrown into the position shown in Fig. 3—namely, with the ports 10<sup>a</sup> and 10<sup>b</sup> in registry with the ports 5. The steam is thus directed from the steam-chest through one of  
10 the ports 5 into the end of the cylinder 2 opposite that which would have received the steam had the ports 10<sup>a</sup> and 10<sup>c</sup> been in registry with the ports 6, as will be clearly seen by reference to Fig. 3 aforementioned. The  
15 exhaust-ports 9 of the slide-valve 7 move in relation to the ports 10<sup>a</sup> and 10<sup>b</sup>, which are now in registry with the ports 5, in the same manner as the said ports were moved as described in Fig. 2, the only difference being that  
20 the exhaust-ports communicate with the ports 10<sup>a</sup> and 10<sup>b</sup> instead of the ports 10<sup>a</sup> and 10<sup>c</sup>.

The operation of the invention is very simple, and it will be understood that in view of the foregoing disposition of the structural  
25 parts an extreme simplicity is attained which cheapens the cost of production of the invention, though the same amount of power is produced. The slide-valve 7 may be actuated reciprocally by an eccentric 16, located adja-

cent thereto, said eccentric being connected 30 to one of the valve-rods 8 of the cut-off valve. The ports 5 and 6, specifically speaking, are arranged in sets adjacent the ends of the cylinder 2, and the operation of the engine consists, essentially, in the movement of the re- 35 versing-valve, so as to throw certain ports provided therein into registry with corresponding ports 6 or 5 of the sets of ports through which the steam is admitted to either end of the cylinder. 40

Having thus described the invention, what is claimed as new is—

In combination, an engine-cylinder and chest, the intervening part between them having inclined ports 5 and straight ports 6, a re- 45 versing-valve provided with port 10<sup>a</sup> in one end and with ports 10<sup>b</sup> and 10<sup>c</sup> in the opposite end, connected slide-valves operating on the reversing-valve and acting jointly with the ports thereof to supply and exhaust the steam, 50 and operating means for the slide and reversing valves, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS DUGAN. [L. s.]

Witnesses:

DAN. JORDAN,  
C. L. GROVE.