

No. 670,795.

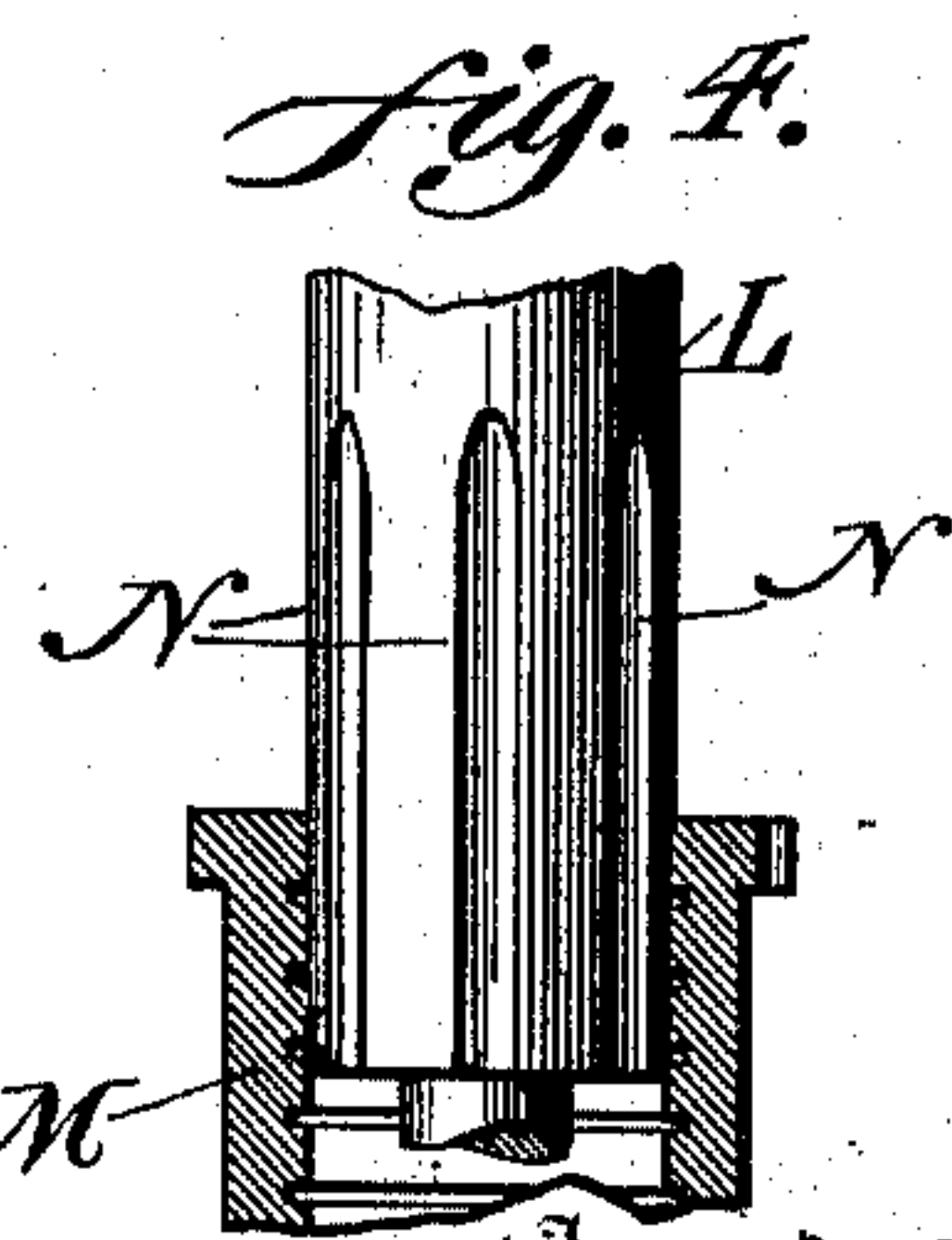
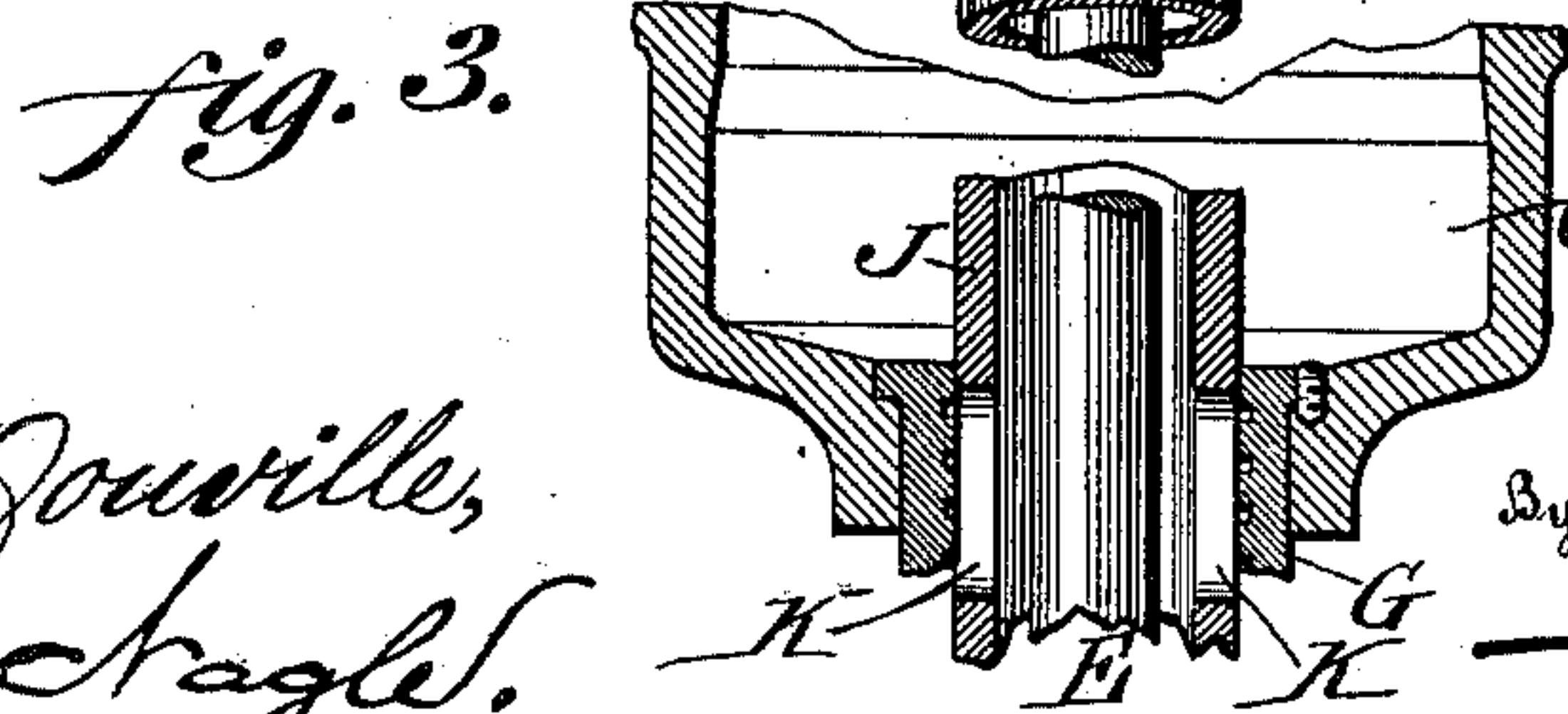
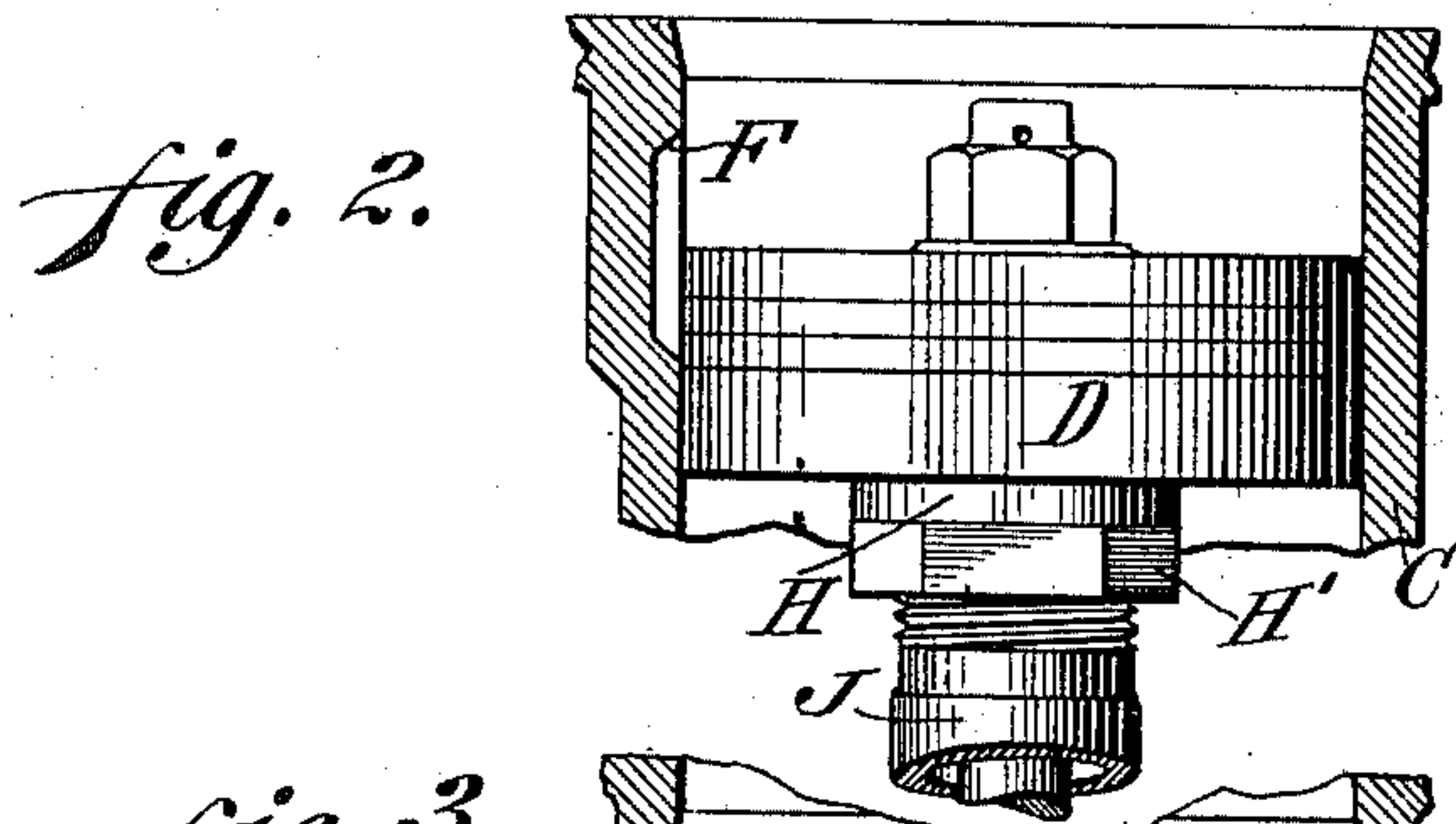
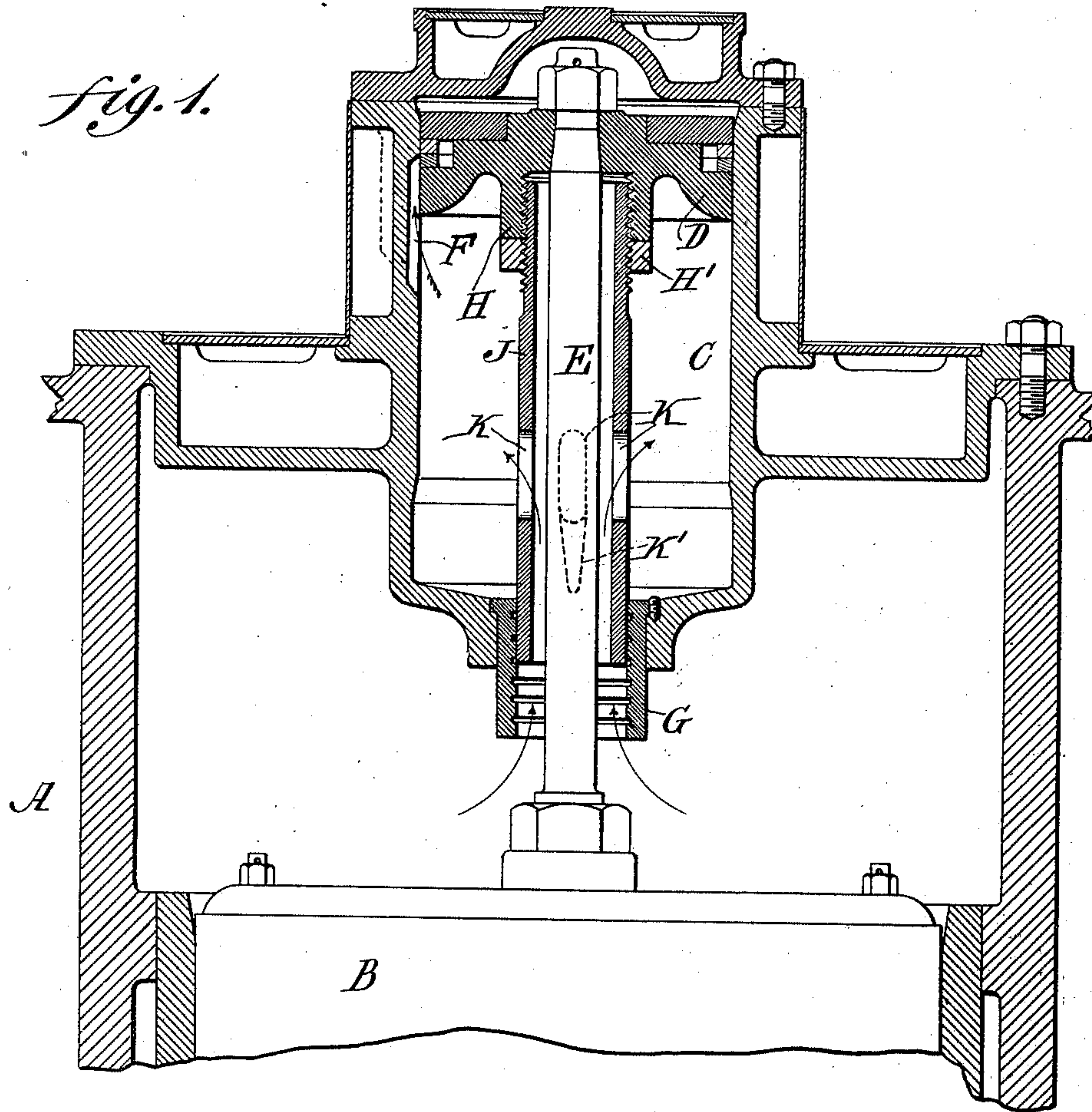
Patented Mar. 26, 1901.

L. D. LOVEKIN.

BALANCING DEVICE FOR ENGINE VALVES.

(Application filed July 12, 1900.)

(No Model.)



Witnesses  
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# UNITED STATES PATENT OFFICE.

LUTHER D. LOVEKIN, OF PHILADELPHIA, PENNSYLVANIA.

## BALANCING DEVICE FOR ENGINE-VALVES.

SPECIFICATION forming part of Letters Patent No. 670,795, dated March 26, 1901.

Application filed July 12, 1900. Serial No. 23,294. (No model.)

*To all whom it may concern:*

Be it known that I, LUTHER D. LOVEKIN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Balancing Devices for Steam-Engine Valves, which improvement is fully set forth in the following specification and accompanying drawings.

10 My invention consists of an improved construction of a balancing device for balancing the slide and piston valves of steam-engines, as will be hereinafter fully described and claimed.

15 Figure 1 represents a central vertical section of a balancing device embodying my invention. Fig. 2 represents a fragmentary view of the upper portion of the balancing device, showing the piston in another position. Fig. 3 represents a similar view of the lower portion of the balancing device to illustrate the piston-rod thereof in another position. Fig. 4 represents a fragmentary sectional view showing a modified construction  
25 embodying my invention.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings, A designates a steam-chest, and B a valve therein. At the  
30 upper end of the steam-chest A is the balancing-cylinder C, containing the piston D, that is connected with the valve B by the piston-rod E. Near the upper end of the cylinder C is a by-pass F, through which the steam  
35 passes to the upper portion of the cylinder and above the piston D.

Heretofore, as far as I am informed, in the class of balancing devices to which my invention relates the piston-rod E passed freely  
40 through the opening in the lower end of the cylinder C, and being thus unsupported is capable of and is subjected to lateral vibration. This materially affects its efficiency and interferes with its perfect operation. To  
45 overcome this objection, I have provided a construction whereby the piston-rod is guided at all times and throughout its stroke independently of the piston or valve in the lower end of the cylinder. This prevents any lateral vibration of the piston-rod or piston. In  
50 Figs. 1, 2, and 3 the opening of the lower end of the cylinder is provided with a bushing G.

The lower side of the piston D is provided with an interiorly-screw-threaded collar H to receive the threaded upper end of the sleeve J, 55 whose interior diameter is greater than that of the piston-rod E to provide an annular space therebetween. A jam-nut H' upon the sleeve abuts against the lower end of the collar H, whereby the sleeve can be adjusted and held 60 securely in its adjusted position. This sleeve J fits and slides within the bushing G, and its length is such that when the piston is at the outer limit of its stroke the end of the sleeve is still guided by the bushing, it being noted 65 that the lower end of the sleeve is open. The said sleeve is provided with ports K, situated between its ends, through which the steam may pass into the cylinder C.

In the operation of this balancing device it 70 is obvious that when the ports K pass beyond the inner end of the bushing G—for instance, as shown in Fig. 1—steam enters from the steam-chest A through the bushing G, sleeve J, and ports K into the cylinder C. Before 75 the piston D has opened the inner end of the by-pass F the pressure of the steam is exerted against the inner side of said piston; but as soon as the by-pass is opened by the outward movement of the piston the steam from the 80 cylinder C passes therethrough to the outer end of the cylinder to form a steam-cushion and to counterbalance the weight of the valve and overcome its inertia. When the piston moves in the opposite direction and the ports 85 K in the sleeve J are moved to the position shown in Fig. 3 and the piston D closes the by-pass F, a steam-cushion is formed below the piston to counterbalance the weight of the valve and overcome the inertia at this end of 90 the stroke. It is thus seen that the compression by the piston at each end of the stroke of the valve effectually counterbalances said valve and gear, while throughout each stroke the said piston D and its rod E are guided by 95 the sleeve J without interfering in any manner with the operation thereof. The said sleeve J, however, prevents any lateral vibration of the piston and its rod, as above referred to, and thus insures a successful and 100 proper operation thereof.

In Fig. 4 is shown a modified construction embodying my invention, wherein instead of employing a sleeve provided with ports for



the purpose of guiding the piston and its rod and controlling the connection between the steam-chest and cylinder said piston-rod is enlarged, as shown by L, so that it fits the bushing M. In the outer face of this piston-rod, however, are a plurality of ports or channels N, extending from the inner end of the enlarged portion L and through which the steam passes into the balancing-cylinder, the length of said ports or channels N controlling the cut-off, as with the ports K in Figs. 1 and 3.

To permit the escape of the water of condensation from the cylinder C while the piston D is yet near the center limit of its stroke, one or more of the ports K may be longer than shown in full lines in Fig. 1—for instance, as shown by the dotted lines K' in said figure.

It will be apparent that various changes may be made in this art which will come within the scope of my invention, and I do not desire to be limited in every instance to the exact construction I have herein shown and described.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with a steam-chest and valve, a cylinder communicating with said steam-chest and provided with a piston, and a connection between said piston and valve provided with means controlling the communication between said steam-chest and cylinder, said connection being guided upon said cylinder throughout its stroke.

2. In a balancing device of the kind specified, a connection between the piston of the cylinder and the valve provided with means controlling the communication between the steam-chest and cylinder, said connection being guided throughout its stroke independent of the piston and valve.

3. In combination with a steam-chest and valve, a cylinder communicating therewith, a piston in said cylinder, and a connection between said piston and valve provided with means controlling the communication between the steam-chest and cylinder, said connection being guided throughout its stroke in the opening in the end of the cylinder through which the steam passes from the steam-chest.

4. In combination with a steam-chest and

valve, a cylinder communicating therewith, and a piston in said cylinder having a piston-rod connected with said valve and guided throughout its stroke in the opening in the end of the cylinder through which the steam passes from the steam-chest, said piston-rod being provided with ports controlling the communication between the steam-chest and cylinder.

5. In combination with a steam-chest and valve, a cylinder communicating with said steam-chest, and a piston in said cylinder provided with a piston-rod connected with said valve, said piston-rod being fitted to slide in the opening in the cylinder through which the steam passes from the steam-chest, and provided with ports controlling the communication between the steam-chest and cylinder.

6. In combination with a steam-chest and valve, a cylinder communicating with said steam-chest, a piston in said cylinder provided with a piston-rod connected with said valve, and a sleeve connected with said piston and surrounding said piston-rod, said sleeve being guided in the opening in the cylinder through which the steam passes from the steam-chest, and provided with ports controlling the communication between the steam-chest and cylinder.

7. In combination with a steam-chest and valve, a cylinder communicating with said steam-chest, a piston in said cylinder provided with a piston-rod connected with said valve, and a sleeve adjustably connected with said piston and surrounding said piston-rod, said sleeve being guided in the opening in the cylinder through which the steam passes from the steam-chest, and provided with ports controlling the communication between the steam-chest and cylinder.

8. In a balancing device of the kind specified, a connection between the piston of the cylinder and the valve provided with adjustable means for controlling the communication between the steam-chest and cylinder.

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Witnesses:

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