

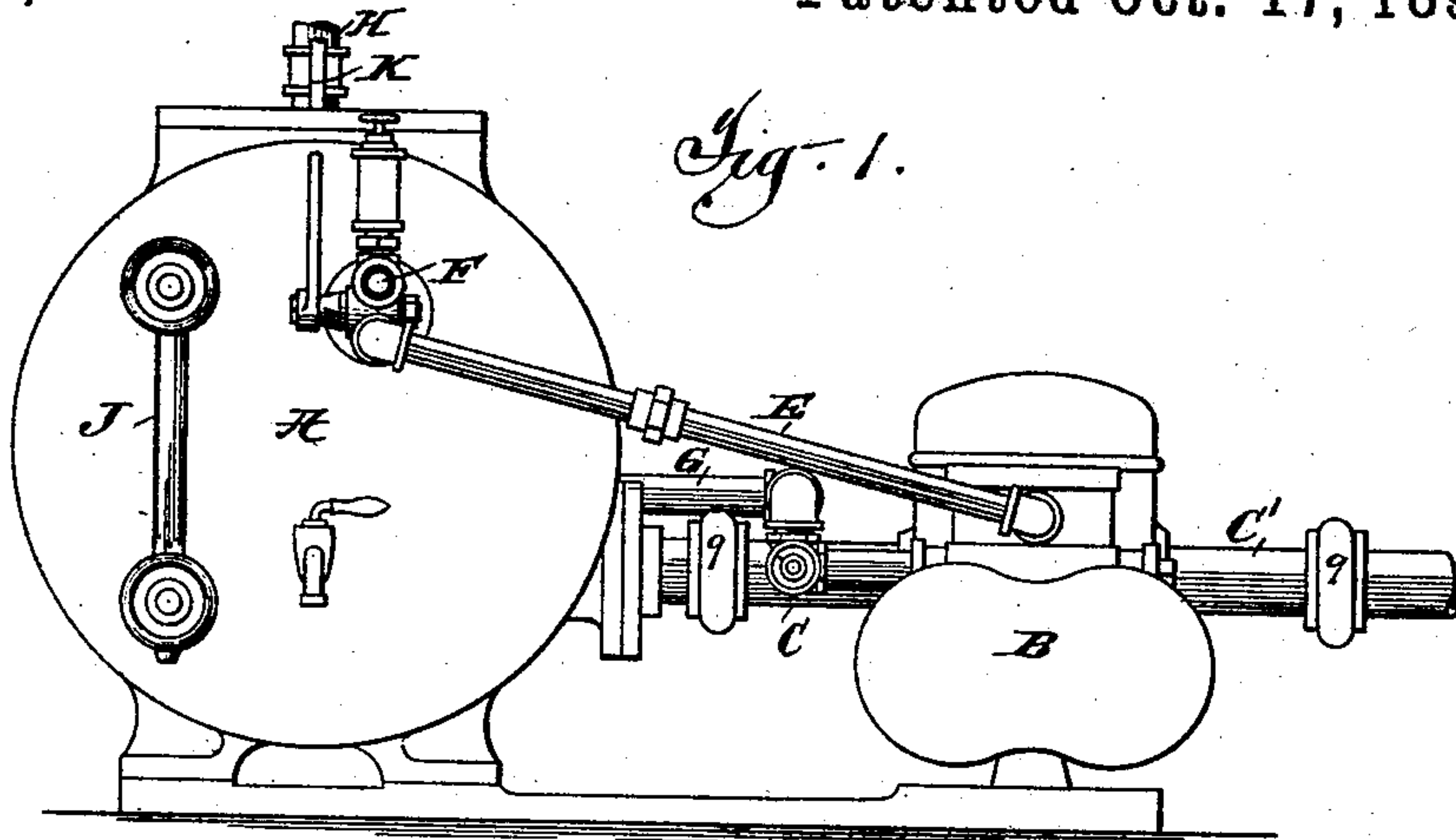
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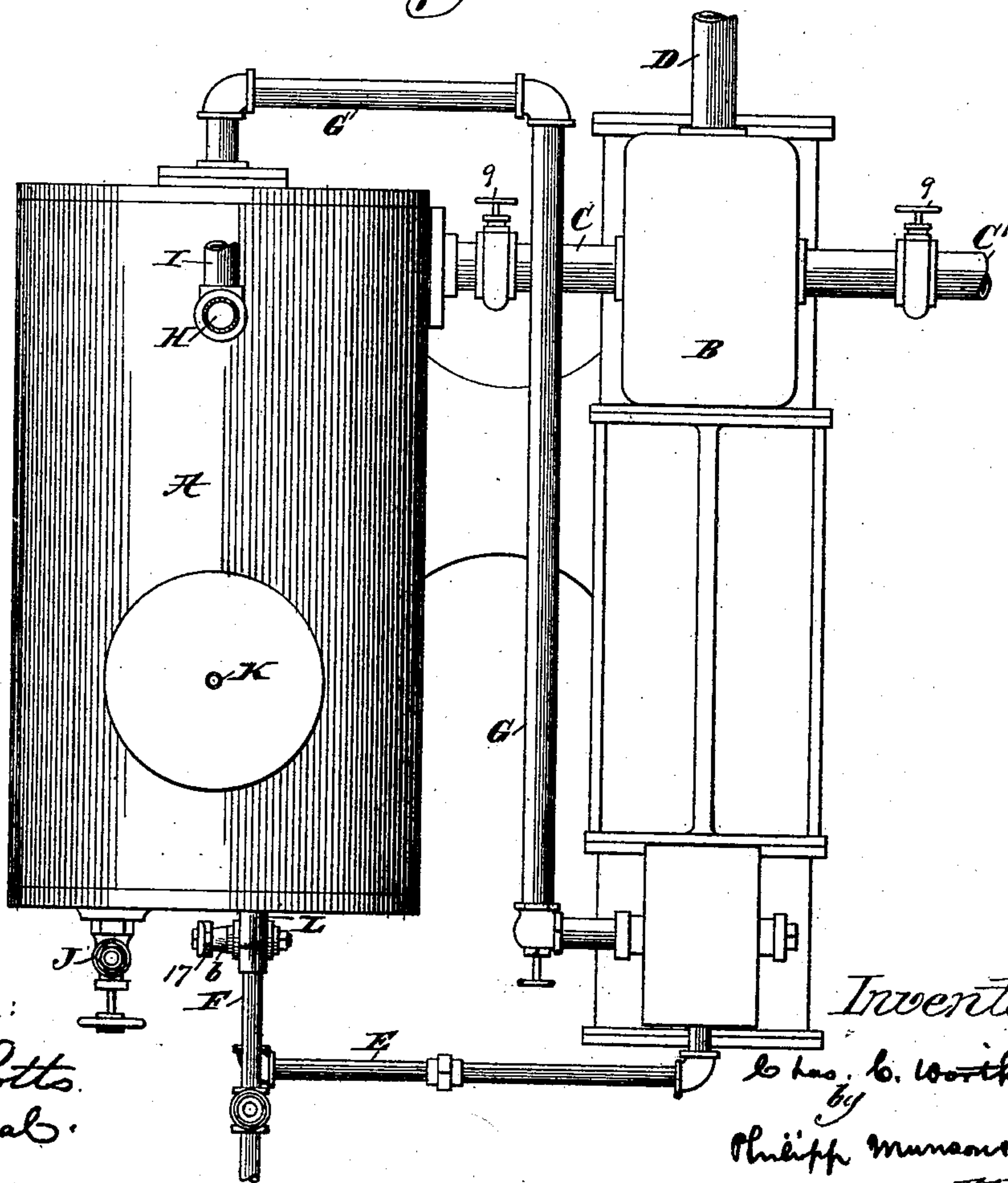
C. C. WORTHINGTON.  
FEED WATER SYSTEM FOR STEAM ENGINES.

No. 506,805.

Patented Oct. 17, 1893.



*Fig. 2.*



Attest:  
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S. H. H. H.

Inventor:  
C. C. Worthington  
by  
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Att'y.

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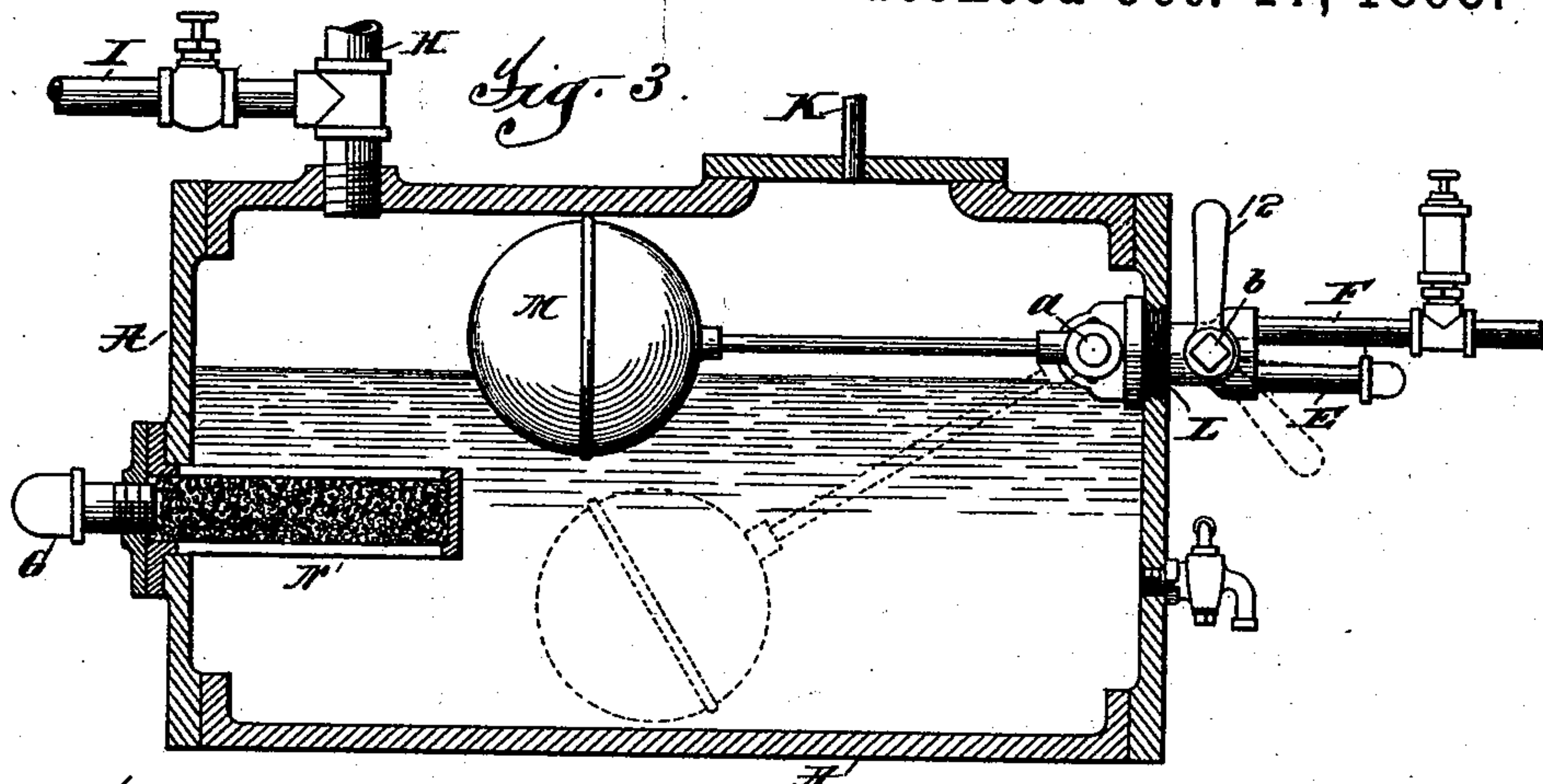
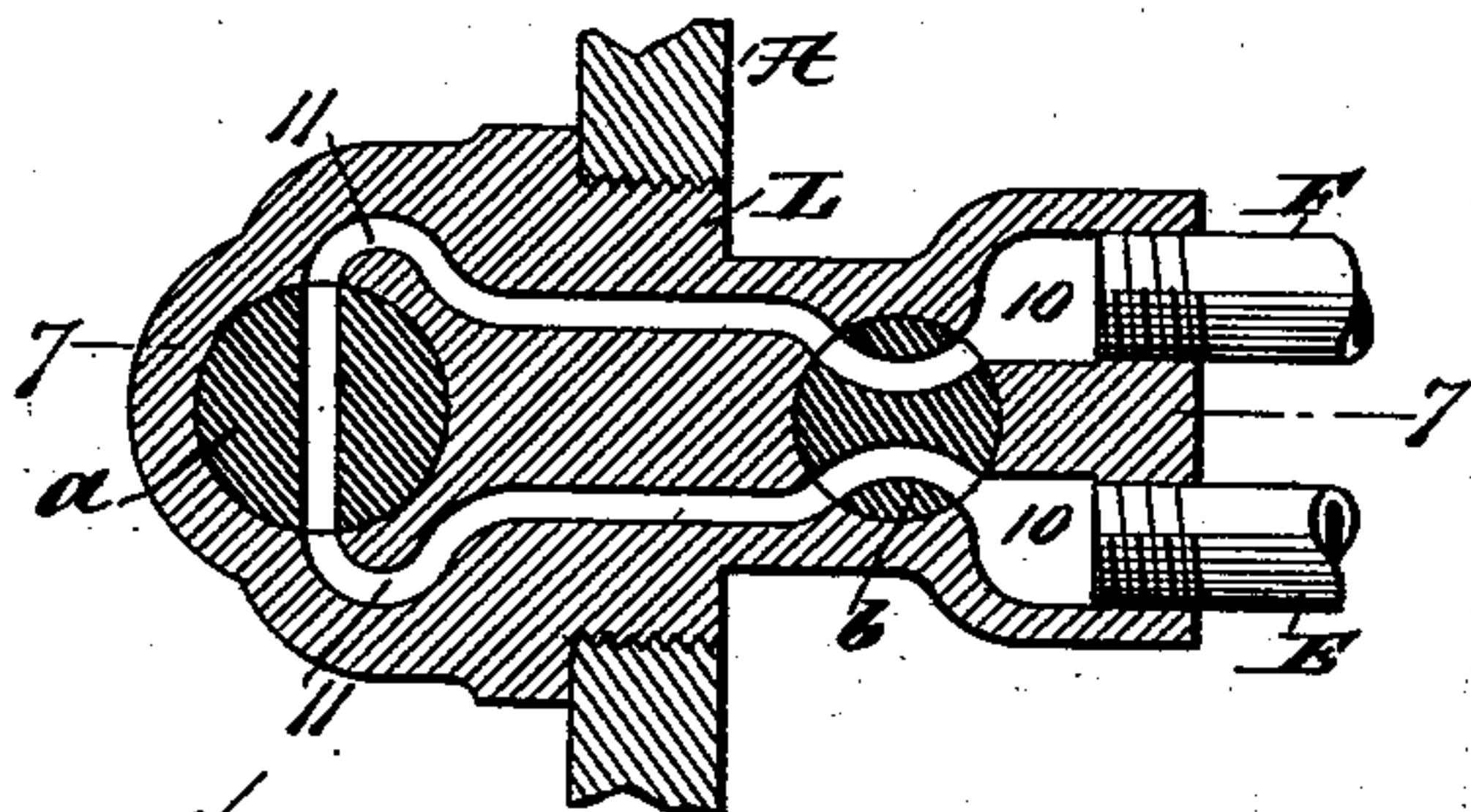


Fig. 4.



*Fig. 5.*

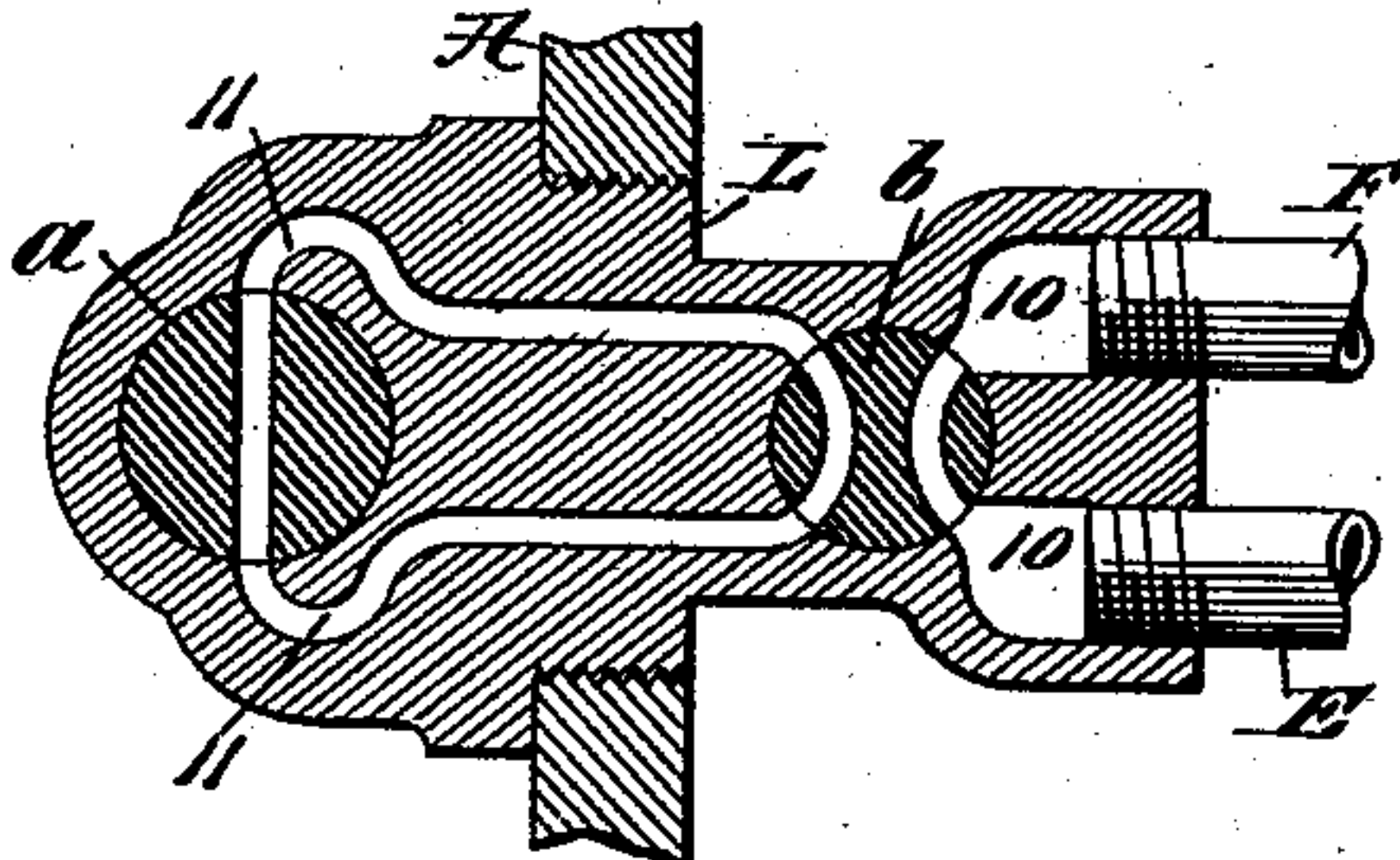


Fig. 7.

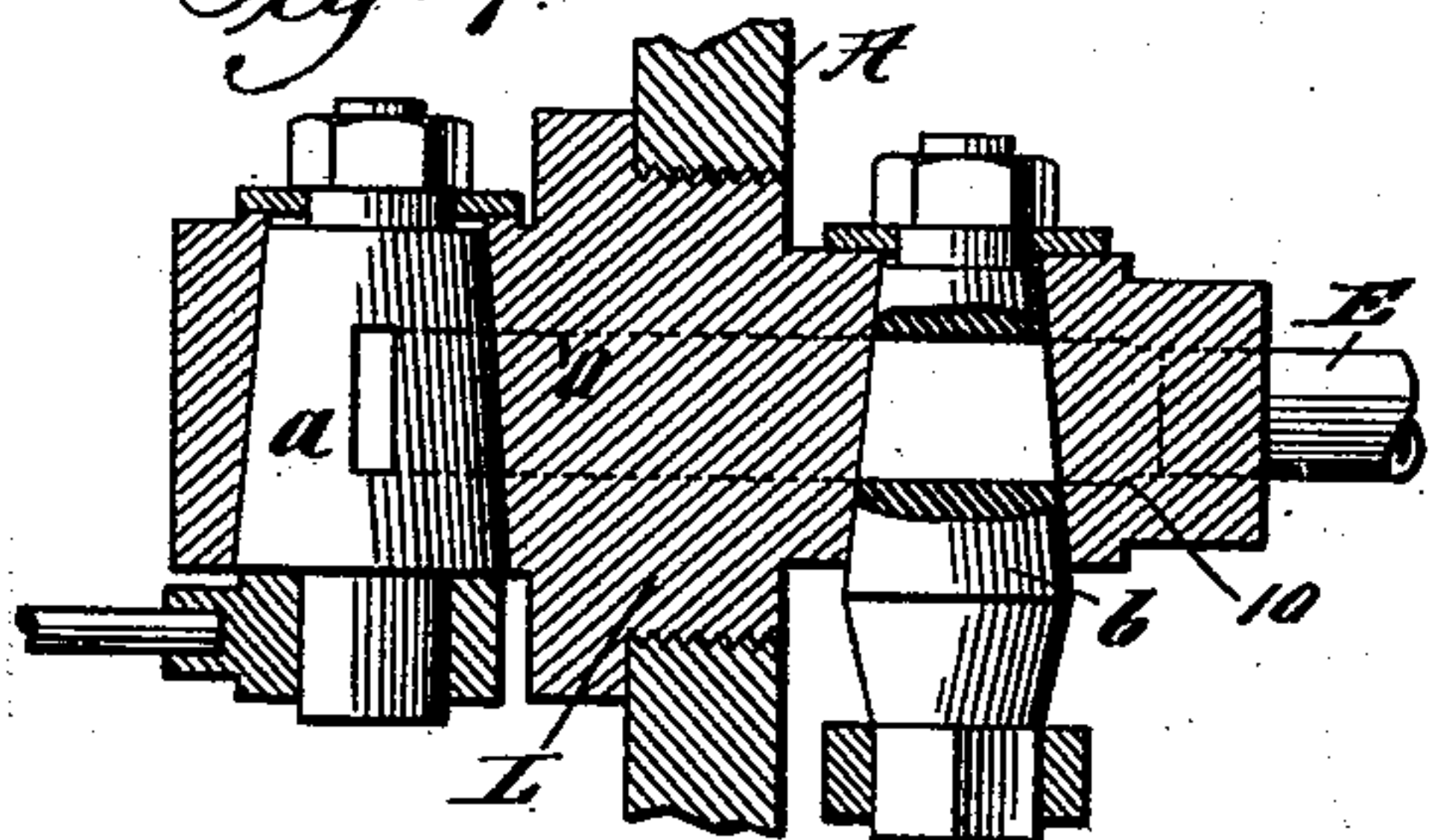
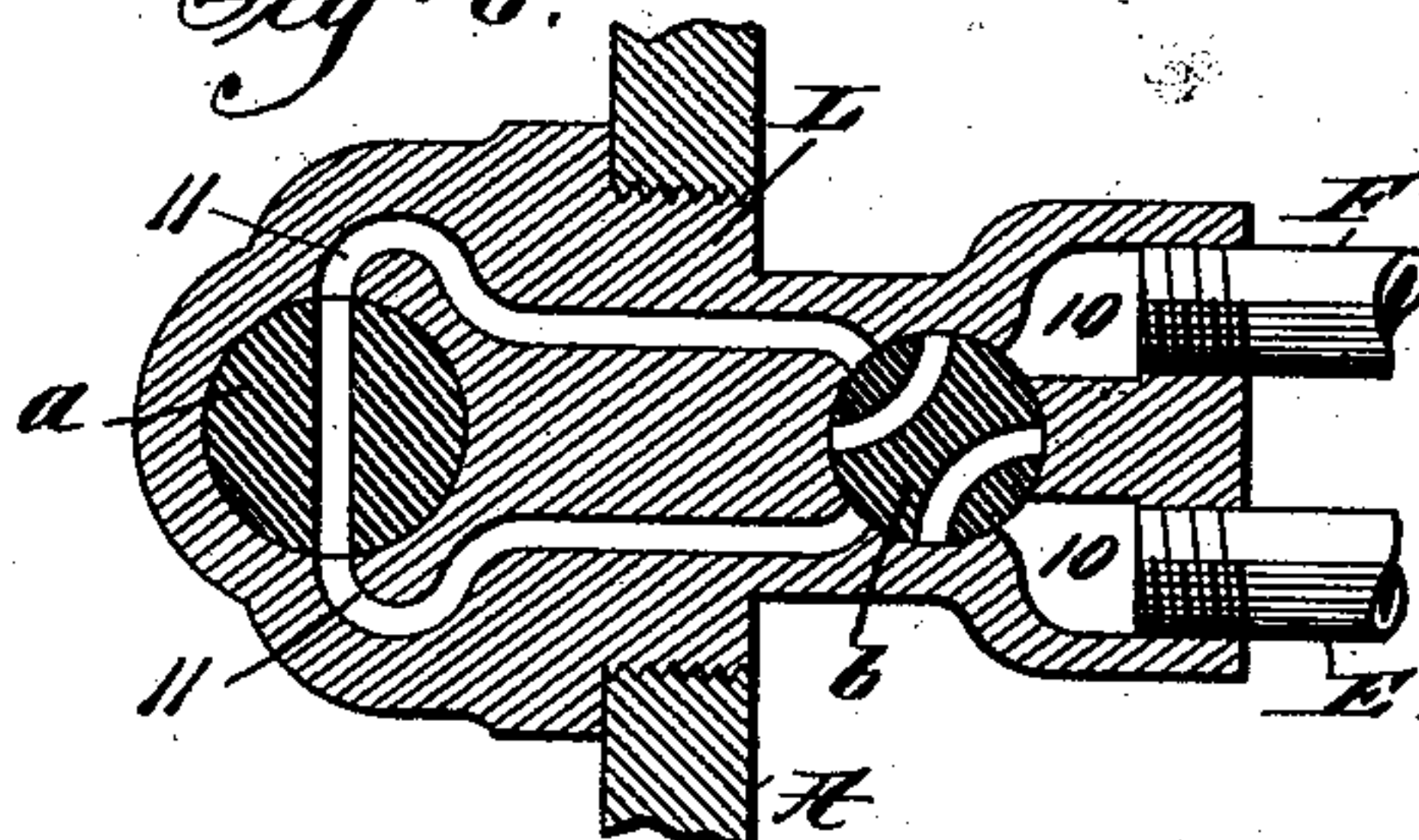


Fig. 6.



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*Inventor:*

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# UNITED STATES PATENT OFFICE.

CHARLES C. WORTHINGTON, OF IRVINGTON, NEW YORK.

## FEED-WATER SYSTEM FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 506,805, dated October 17, 1893.

Application filed April 4, 1892. Serial No. 427,746. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES C. WORTHINGTON, a citizen of the United States, residing at Irvington, county of Westchester, and State of New York, have invented certain new and useful Improvements in Feed-Water Systems for Steam-Engines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to feed water constructions for steam engine and radiator systems employing a hot well which receives the water of condensation from the condenser or coils and from which the heated feed water is drawn and delivered to the boiler by the feed pump.

One object of the invention is to provide a valve and float construction for the automatic control from the hot well of the supply of steam to the feed pump, so that the automatic control devices may readily be thrown into or out of commission and the steam supply made independent of the automatic control or cut off.

A further object is to provide a construction by which the steam used for heating the water in the hot well shall be controlled by the amount of water in the hot well, so that the steam received shall be dependent upon the amount of water to be heated.

For a full understanding of my invention a detailed description of a construction embodying the same will now be given in connection with the accompanying drawings forming part of this specification, and the features forming the invention specifically pointed out in the claims.

Referring to said drawings:—Figure 1 is an end elevation of the hot well and pump. Fig. 2 is a plan view of the same. Fig. 3 is a central longitudinal section of the hot well. Figs. 4, 5 and 6 are detail cross sections of the valve construction showing the parts in different positions and Fig. 7 is a detail section of the valve construction on the line 7 of Fig. 4.

A is the hot well.

B is the pump receiving its supply from the hot well A through suction pipe C or from an independent supply through suction pipe C' and delivering through force pipe D, these

suction pipes being controlled by throttles 9 so that either may be used. Steam is supplied to the pump through pipe E connecting through a valve chest presently to be described with steam supply pipe F and the exhaust steam from pump B is preferably conveyed to the hot well A by a pipe G to heat the water in the hot well. In the construction shown, the condensed steam from the condenser and air pump of the engine or from the radiator coils enters the hot well through pipe H and cold water may be introduced through pipe I.

J is the usual gage on the outside of the hot well, and K a pipe for the escape of air and steam.

It is desirable that the exhaust steam from pump B entering the hot well through pipe G should be finely divided so as to mix more quickly and thoroughly with the water in the hot well, and to prevent concussion, and for this purpose the end of pipe G enters a receiver N within the hot well, the walls of which are finely slotted or perforated, and the receiver N is preferably filled with gravel or other suitable material to aid in distributing the steam.

Referring now to the parts forming my improved automatic control valve construction, a valve chest is provided of such a construction that the steam supply may be controlled automatically from the inside of the hot well and by hand from the outside, this chest being formed preferably as shown, of a plug L screwed into the wall of the hot well, this construction avoiding all necessity for packing joints. This plug L is constructed outside the chest to receive the two pipes E, F, and is provided with a steam passage forming a direct connection between the pipes and with a steam passage 11 connecting therewith and controlled by a single way valve or cock *a* which is connected to a float M so as to be controlled thereby in the usual manner, the valve being closed as the supply in the hot well falls below a certain point and opened as the water rises. The passages 10, 11, are controlled by a two way valve or cock *b* actuated by a handle 12 outside the hot well and constructed so as to connect the pipes E, F through the passage 11 and valve *a* in one of its three positions, and either to form a di-



rect connection between the pipes through passage 10 or to cut off communication between the pipes E, F by closing passage 10 in its other positions. Thus the steam supply through pipes E, F may be made dependent upon the automatic control of valve *a* and float M, or the steam supply may be made constant and independent of this automatic control, or the steam supply cut off by turning the handle 12 into the proper one of its three positions.

The positions of the handle 12 are shown in full and dotted lines in Fig. 3, and the corresponding positions of the valve *b* in Figs. 4, 5 and 6. When the handle 12 is vertical, as shown in full lines in Fig. 3, the valve *b* is in the position shown in Fig. 4 and the steam supply is controlled by valve *a*. When the handle is thrown a quarter way around into the horizontal position shown in dotted lines in Fig. 3, the valve *b* is in the position shown in Fig. 5 and the steam supply is constant and independent of the automatic control. With the handle 12 thrown downward from the last position, as shown in dotted lines in Fig. 3, valve *b* is in the position shown in Fig. 6 and the steam is cut off. By this simple construction the steam supply for the pump may be controlled automatically from the hot well, or when it is desired to run the pump B independently of the hot well, the suction pipe C is closed and pipe C' opened by throttles 9, and the steam supply made independent of the float M by turning the single valve *b*, thus enabling the pump to be readily thrown into commission for a constant delivery, when desired.

It will be seen that the supply of steam for heating the water in the hot well is controlled from the latter, so that as the water falls below a certain point, the heating steam is cut off, by reason of the action of the automatic valve in cutting off the supply of live steam to the steam pump B and that the steam is never admitted when the water is low in the hot well. By my construction also, in which the steam for heating the water in the hot well is taken from the feed pump delivering water from the hot well, a single float and valve controls both the action of the pump and the admission of heating steam.

It will be understood that that feature of the invention which consists in the special valve and float construction provided with means for cutting out the float so as to make the steam supply independent of the automatic control or cut it off is of general application in all cases in which it is desired to control a steam supply automatically and at the same time make the supply constant or cut it off independently of the automatic control, and that while the pump has been shown as connected to and controlled from its supply tank, so that the steam supply is cut off as the water in the tank falls, the same construction is applicable when the tank is a receiver for the pump, in which case the sup-

ply would be cut off as the water in the receiver rises, and other applications of the invention are obvious. The construction shown may be varied readily by those skilled in the art without departing from my invention, and I am not to be limited to the exact form of any of the devices shown.

What I claim is—

1. In a feed water system, the combination with the hot well, feed pump, and steam supply pipe for said pump, of a valve apparatus constructed to control the supply pipe automatically by a float in said tank or be controlled by hand to make the steam supply constant or cut it off independently of said float, substantially as described.
2. In a feed water system, the combination with the hot well, feed pump, and steam supply pipe for said pump, of a pipe for conducting the exhaust steam from said pump to the hot well for heating the feed water, a float in said hot well, and a valve actuated by said float to increase the steam supply as the water in said hot well rises and diminish the steam supply as the water in said hot well falls, substantially as described.
3. In a feed water system, the combination with the hot well and feed pump, of a pipe through which the steam for heating the water in said hot well passes, a float in said hot well, and a valve controlling said pipe and actuated by said float to increase the amount of heating steam as the water in said hot well rises and diminish the amount of heating steam as the water in said hot well falls, substantially as described.
4. In a feed water system, the combination with the hot well and feed pump, of a pipe through which the steam for heating the water in said hot well passes, a valve controlling said pipe, and means for actuating said valve in accordance with the level of the water in said hot well and operating to increase the amount of heating steam as the water in said hot well rises and diminish the amount of heating steam as the water in said hot well falls, substantially as described.
5. The combination with a tank and pump connected therewith and a steam supply pipe for said pump, of a valve controlling said pipe and controlled by a float in said tank, and a hand valve constructed to cut out the float controlled valve and to open or close communication through the steam pipe independently of said valve, substantially as described.
6. The combination with tank A, of pipes E, F and a valve chest connecting said pipes, valve *a* controlled by float M in said tank and controlling connection between said pipes, and two way hand valve *b* constructed to connect pipes E, F through said valve *a* or independently thereof, or to close communication between said pipes, substantially as described.
7. The combination with tank A, of a valve chest consisting of plug L secured in the wall of said tank, steam passages 10, 11 in said plug, valve *a* controlling said passage 11 and



controlled by float M in said tank, and hand valve *b* controlling passages 10, 11, substantially as described.

5 8. A valve chest consisting of a plug provided with passages 10, 11 and adapted to receive the pipes to be connected, and having valve *a* and two way valve *b* controlling said passages, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES C. WORTHINGTON.

Witnesses:

LOUIS R. ALBERGER,  
CHAS. S. HENRY.