

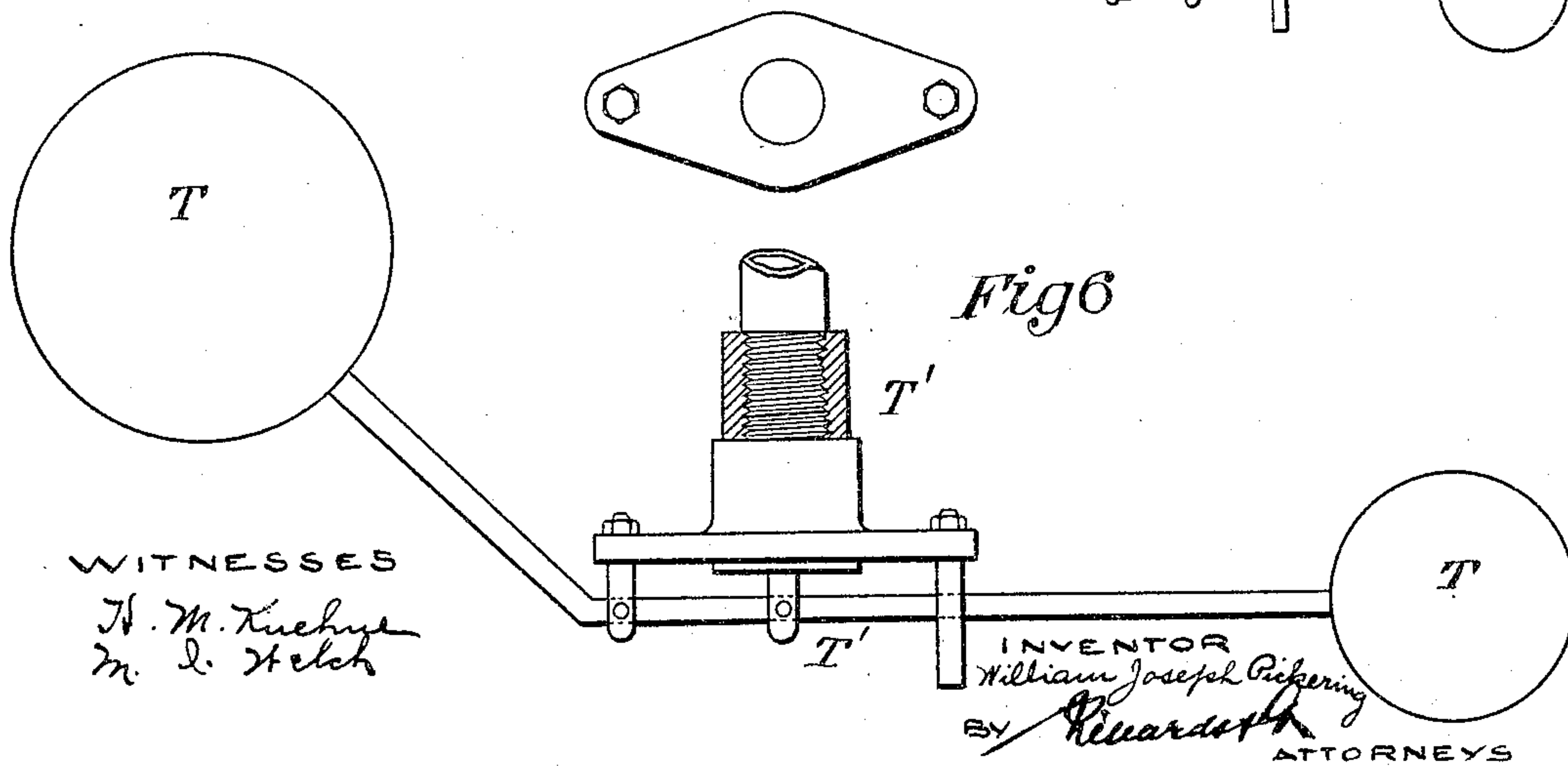
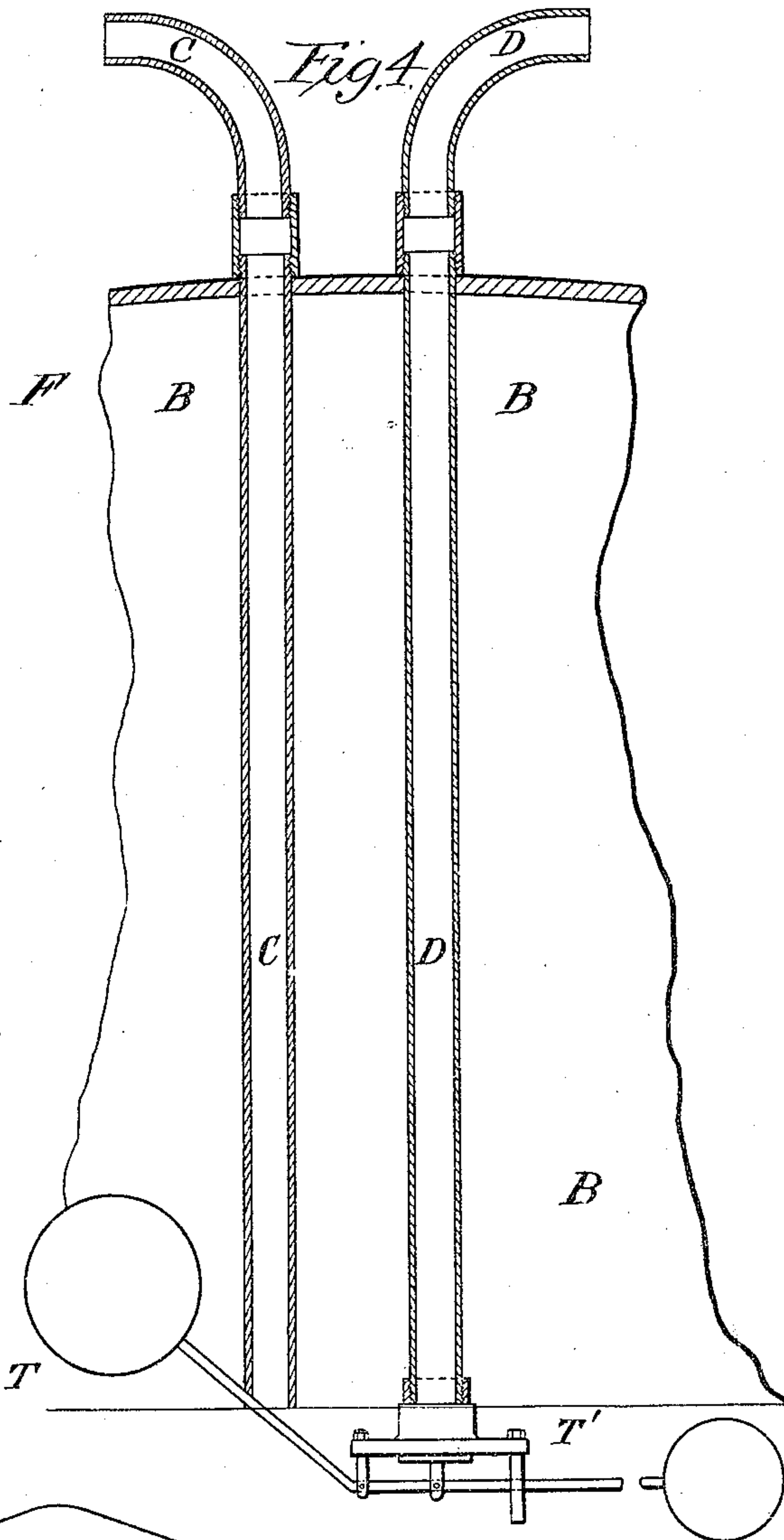
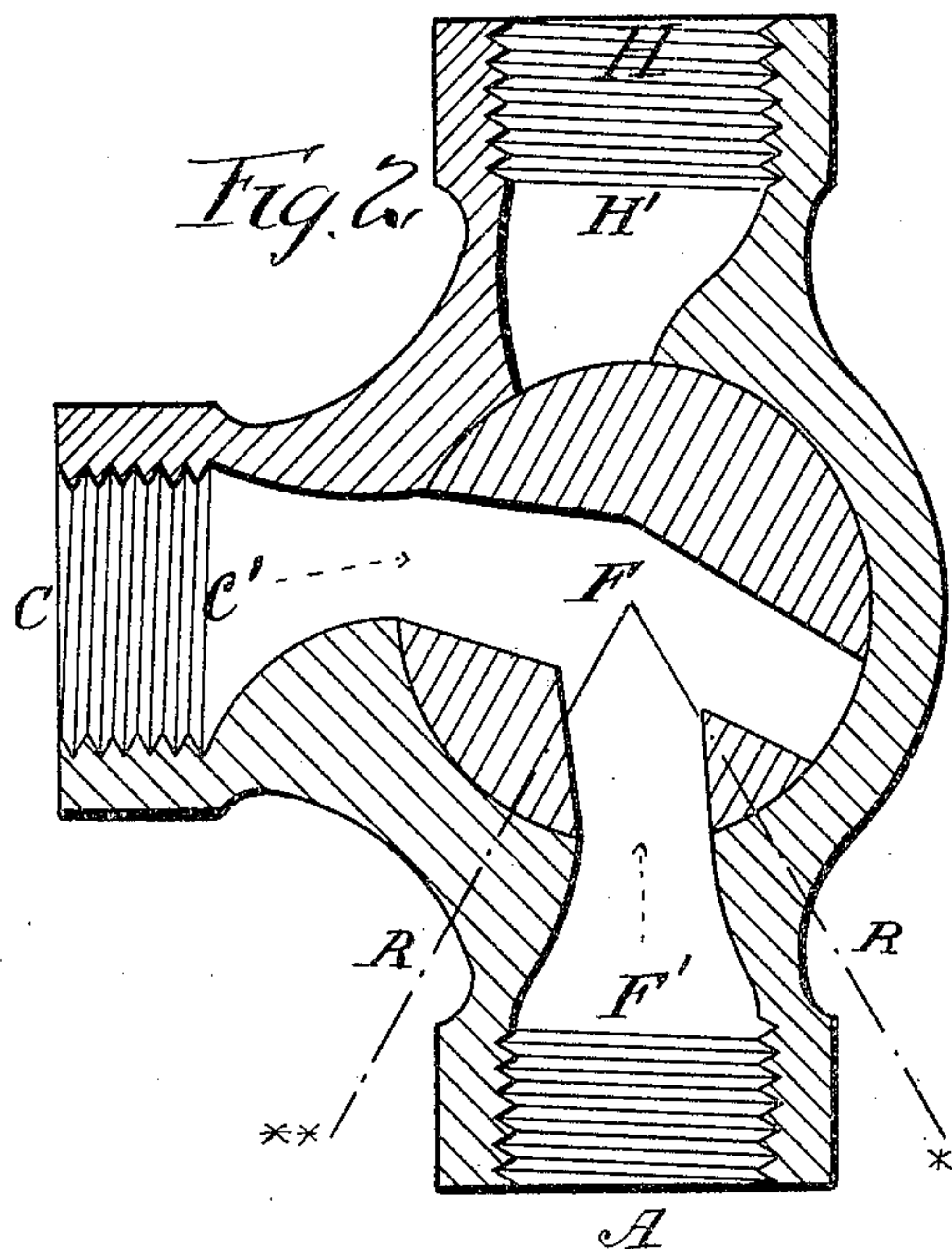
No. 793,741.

PATENTED JULY 4, 1905.

W. J. PICKERING.
FEEDER FOR STEAM BOILERS.

APPLICATION FILED MAY 1, 1903.

5 SHEETS--SHEET 2.



WITNESSES

H. M. Kuehn
M. L. Hetch

INVENTOR
William Joseph Pickering
BY *Richardson*
ATTORNEYS

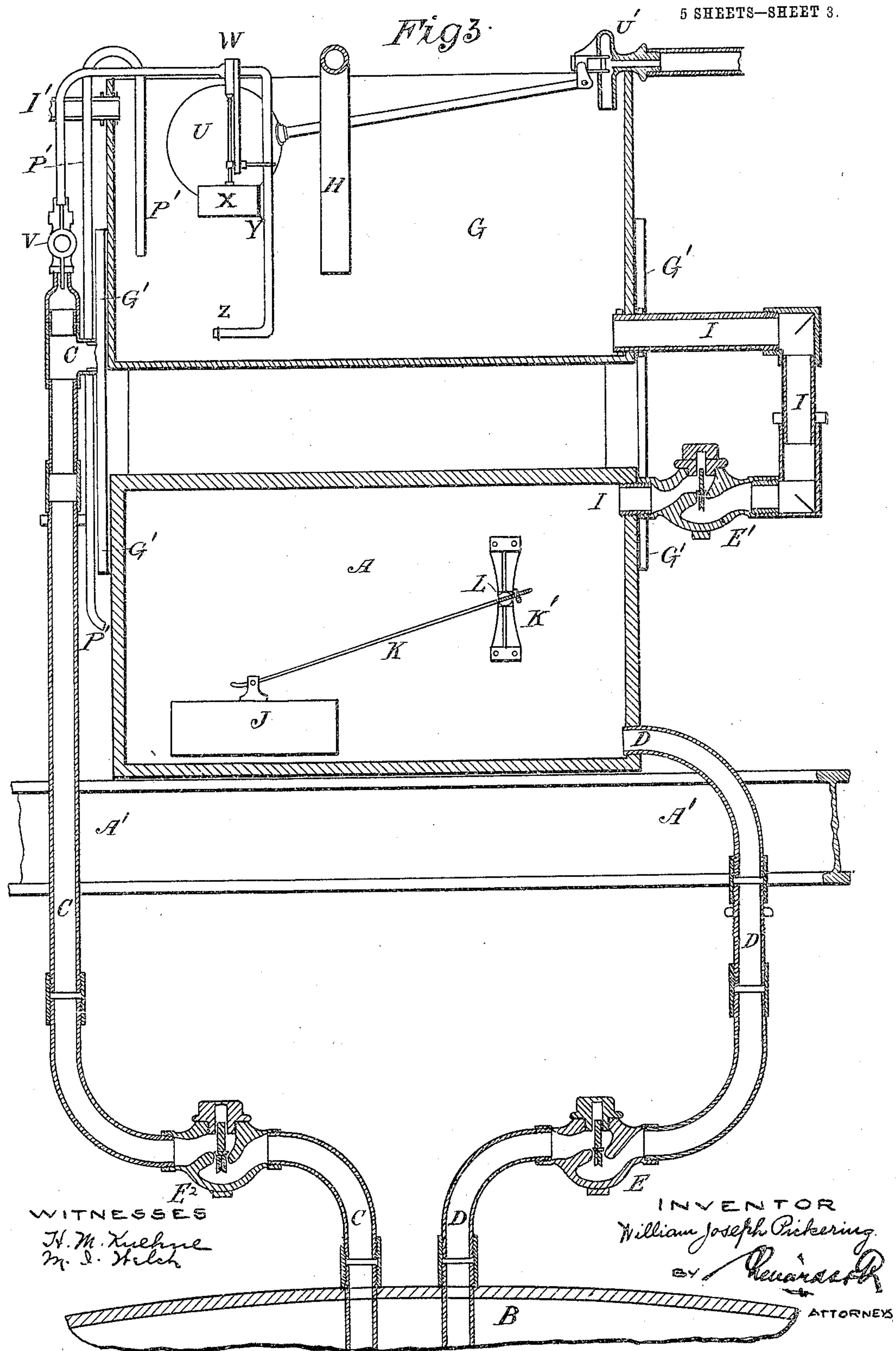
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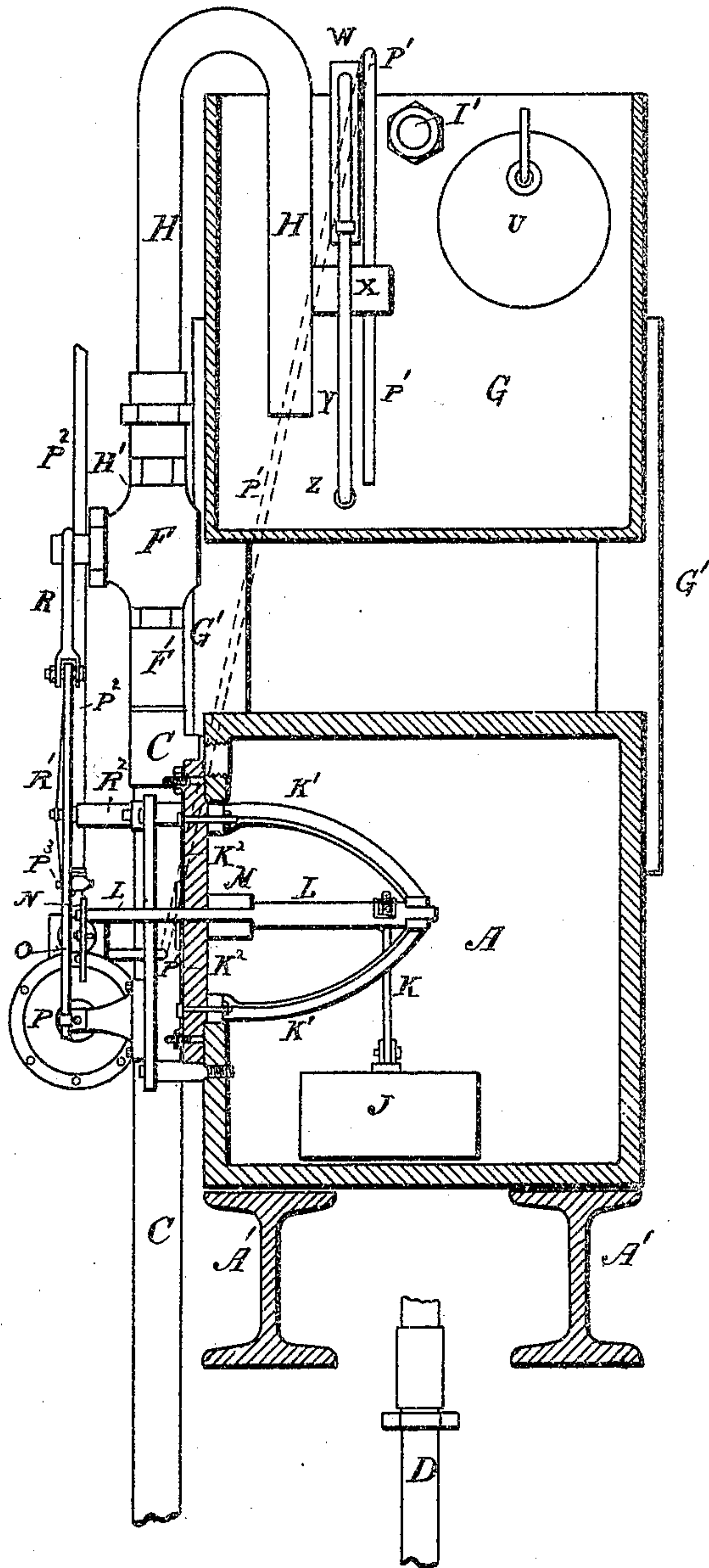
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Fig 5



WITNESSES

H. M. Kuehne
M. L. Stelzer

INVENTOR

William Joseph Pickering

BY

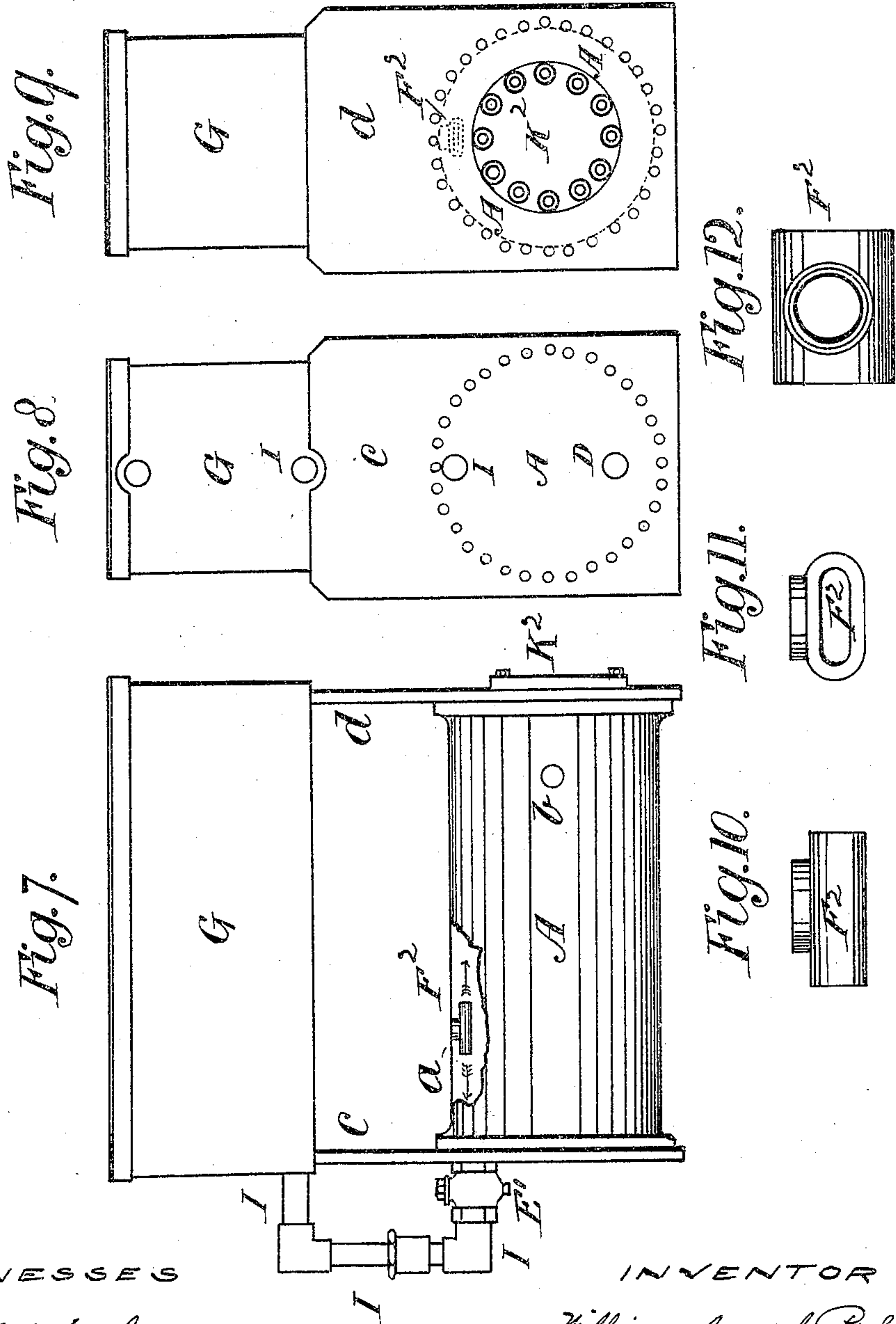
Richard R.

ATTORNEYS

W. J. PICKERING.
FEEDER FOR STEAM BOILERS.

APPLICATION FILED MAY 1, 1903.

5 SHEETS—SHEET 5.



WITNESSES

W. M. Kuehn
John A. Percival

INVENTOR

William Joseph Pickering
BY *Richard G. [Signature]*

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM JOSEPH PICKERING, OF HAMPTON IN ARDEN, ENGLAND.

FEEDER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 793,741, dated July 4, 1905.

Application filed May 1, 1903. Serial No. 155,220.

To all whom it may concern:

Be it known that I, WILLIAM JOSEPH PICKERING, a subject of His Majesty King Edward VII of Great Britain and Ireland, and a resident of Bickenhill, Hampton in Arden, in the county of Warwick, England, have invented a certain new or Improved Feeder for Steam-Boilers, (for which I have applied for patents in Great Britain, Nos. 24,040 and 26,107, bearing date, respectively, November 4 and November 27, 1902,) of which the following is a specification.

The object of my invention is to provide new and improved means for feeding steam-boilers either automatically or otherwise by the use and application of certain arrangements, whereby the said steam-boilers are fed by gravitation under steam-pressure, which method, as far as I am aware, has not hitherto been adopted.

Referring to the drawings which form a part of this specification, Figure 1 is a front view of my apparatus. Fig. 2 is a detail of the working of a tap in connection with same, shown to a larger scale in horizontal section. Fig. 3 is a vertical section, partly in elevation, of Fig. 1. Fig. 4 is a continuation of Fig. 3, showing the pipes in connection with the apparatus passing through the top of boiler to the water-level. Fig. 5 is a cross-sectional elevation of Figs. 1 and 3. Fig. 6 is a detail of a float and valve I employ in connection with the apparatus. Figs. 7, 8, and 9 are views of a modification. Figs. 10 and 11 are respectively side and end elevations of the spreader used in connection with the cylindrical tank. Fig. 12 is a plan view of same.

Like letters of reference indicate like parts on each figure.

For my purpose I place a suitably-closed tank A, which may be supported upon girders A', over the steam-boiler B, (the top only of which latter is shown for convenience of illustration, but which will be understood.) Two pipes C D connect the tank A with the boiler B. The water will run into the boiler from the tank by gravitation under steam-pressure when the steam is turned into the tank from the boiler, as hereinafter fully explained. The pipes C D enter the boiler B not higher

than the required water-level or go down to the required water-level from a higher position. The one pipe D leaves the tank A at or near to the bottom of same and may, if preferred, be carried below the water-level and is provided with a check-valve E, which allows it to supply the boiler B, but does not allow of the water or steam, as the case may be, returning into the tank A. The other pipe C, which enters the tank A at any convenient position, (preferably at or near to the top of same,) is provided with and regulated by means of a three-way tap F, preferably of the kind shown in Fig. 2. This tap F is situated above the tank A or in any convenient position, the working action of which is described later. A pipe H, leading from the third way H' of the tap F, is carried up and over the top of an open upper tank G above the tank A or at a higher level and which may be supported by brackets G', said pipe H being bent over, as shown, and continued down to within a few inches (more or less) of the bottom of the tank G for the purpose of ventilating or relieving the pressure in the bottom tank A when the steam is shut off and the tap is open between the tank A and the pipe H. The supply-pipe I from the open tank G to the closed tank A is furnished with a check-valve E', which is for the purpose of preventing either water or steam from escaping from the inclosed tank A. The pipe I' on the tank G provides an overflow.

When the tank A is full and the three-way tap F is turned in such a position as to be open, between the steam-pipe at C and the inclosed tank A, so as to allow the steam to pass from the pipe C into the tank A, on the pressure rising sufficiently the water in the tank A will run into the boiler B through the pipe D by gravitation. When the tank has emptied itself, upon reversing the three-way tap F the pressure in the tank A will be released into the tank G through the pipe H. It will then fill itself again from the tank G through the pipe I. The action of the tap F is brought about by the movement of the lever R a one-sixth part of the circumference of the plug, so that when in the position seen in Fig. 2 at * it is open from the pipe C and

at F' to the tank at A and when the lever is brought to the position shown at * * the tap is then open from the pipe H to the tank G.

I will now proceed to describe the method and arrangement by which the apparatus is rendered completely automatic in its action.

I employ an ordinary float J, which is situated inside the inclosed tank A and is connected to the spindle L by the arm K, which spindle is supported by a bracket K', Fig. 5, bolted onto the cover-plate K², which is placed over the circular manhole on the face of the tank A. The spindle L projects outside the tank A through a packing-box M and is provided with a small lever N upon the outside end and which operates the slide-valve O of an ordinary double-action cylinder P by means of a connecting-rod Q.

P' is an exhaust-pipe from the cylinder P, which pipe may be bent over and dipped into the upper tank G for the purpose of saving any waste of steam.

The steam which charges the cylinder P through the pipe P² should preferably be supplied from any convenient source where dry steam can be obtained and not from the pipe C. A tap P³ is provided upon the pipe P² to shut off steam, if required.

The three-way tap F, previously referred to, is provided with the lever R, which is worked by the piston-rod S of the cylinder P by another lever R' working on a fulcrum R².

When the tank A is full, the position of the float J inside the tank A so regulates the valve O as to cause steam to be injected into one end of the cylinder P, and by reason of the action of the cylinder reversing the tap F by means of the levers R and R' the steam is injected through the pipe C into the tank A, which causes the water therein to be injected into the boiler B through the pipe D by gravitation under steam-pressure, as above described. When the tank is empty, the alteration in the position of the float J causes steam to enter the other end of the cylinder P, and thus reverses the tap F, so that the pressure in the tank A is relieved through the pipe H into the tank G, as above described, after which the water again runs into the tank A from the tank G through the pipe I, and because the pipes C D enter the boiler B not higher than or go down to the water-level it makes it impossible for the apparatus to inject water into the boiler B after the water in the boiler is up to that level, since the tank A cannot empty itself without steam taking the place of the water, and the steam cannot get in to do so when water in the boiler B is up to the mouth of the steam-pipe C; but if the steam-pressure in the boiler B should at any time run down, thus causing a vacuum in the boiler, in order to prevent water being drawn into it from the tank G through the tank A the pipe C may be provided with a check-valve E², which will only allow steam or water to leave

the boiler B and not for it to return into same, and the bottom of the pipe D at the water-level in the boiler B is provided with a float T and valve T', preferably such as shown, by which when the water rises to the required height the action of the float closes the valve, as will be understood.

The upper or open tank G may be supplied from any convenient source through an ordinary ball-valve, such as U U'. The heat of the feed-water can be regulated as desired by means of a tap V, which supplies steam for the purpose through a slide-valve W, which latter is regulated and governed by a float X and delivered through the pipe Y in the tank G, so that the said valve W is only closed when the tank G is full or thereabout.

Any extra quantity of steam must be regulated by hand by operating the tap V according to the heat the water is required. The bottom of the pipe Y, which leaves the valve W and terminates near the bottom of the tank G, is provided with a steam-whistle Z at its end, so that in the event of the supply of water through the ball-valve U U' running short this whistle Z will blow as soon as the water in the tank G has sunk down to it, and so act as a telltale. The ends of the pipes H and Y may be fitted with a silencer to check any noise created by the steam entering the water.

The action of the apparatus is thus rendered by the means herein described absolutely automatic for the feeding of steam-boilers by gravitation under steam-pressure.

I will now refer to a modification as to the formation of the lower tank and its connections, which tank I may sometimes prefer to make of cylindrical form.

Fig. 7 is a side elevation in diagram of the two tanks, the lower one being cylindrical and the upper one rectangular. Figs. 8 and 9 are respectively end views of same. The tank A takes the form of a cylinder instead of being rectangular, as previously described, and in this case the pipe connection F' from the three-way tap F to the tank A, as previously referred to, will be so arranged as to enter the cylindrical tank at the top of same, as at *a*, instead of at the upper part of the side of the tank, as shown in the first arrangement, and an iron spreader consisting of an inverted-T-shaped piece F² will be provided attached to the end of the pipe F' from the tap F for the purpose of spreading the steam over the top of the water contained in the cylindrical tank, said spreader appearing as in Fig. 7. The pipe F' is not shown, but will be understood. The arrows indicate the passage of the steam over the top of the water, and the stuffing-box M, before described, will be screwed into the hole *b*. In this arrangement the manhole and cover-plate K² appear on the end of the tank A. The upper tank G is shown resting upon the end plates *c d* of the

tank A. In other respects the general arrangements of operative parts and the mode of working will be practically the same as previously described and shown with reference to the first-named arrangement of the tanks and their auxiliary accessories.

I do not desire to limit myself to the particular formation and arrangement of the apparatus and its connections herein more fully described for feeding steam-boilers by gravitation under steam-pressure, as the same may be varied without departing from the general principle of my invention.

The valve T upon the end of pipe D in the boiler is regulated and governed by a stone or brick float T' on the one end of a lever bent upward, so that the float is upon the water-level when the valve T on the end of pipe D is several inches below. The other arm of the valve projects upward to a higher level than the float T' and carries a balance-weight T², which counterbalances the unnecessary weight of the stone or brick float T'. The operation of the valves T and F², together with a small check-valve on the supply-pipe to the cylinder, prevents water at any time or under any conditions from being drawn into the steam-boiler when the water is up to the required level.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent of the United States of America, is—

1. In combination a steam-boiler, a closed tank above the same having a pipe connecting the bottom of the tank with the boiler below the normal water-line, an open supply-tank located above the closed tank and having a pipe connection from its lower portion to the closed tank, a steam-pipe connection from the boiler to the closed tank, said steam-pipe connection having an exhaust branch, a three-way valve controlling said steam-pipe and exhaust branch, a rock-shaft journaled in the wall of

the closed tank, an arm carried by the shaft within the tank and connected to a float, a cylinder on outside of the tank having its piston operatively connected to the three-way valve, a steam-supply to said cylinder, a slide-valve controlling said steam-supply, and an arm on the rock-shaft outside the closed tank connected to the slide-valve, substantially as described.

2. In combination with a boiler, two tanks A and G, the upper one open and the lower one closed, the pipe I furnished with check-valve E' leaving bottom of upper tank and entering top of lower tank, a water-pipe D leaving bottom of lower tank and entering boiler below water-line and furnished with check-valve E close to boiler, a slide-tap F with which is included cylinder P and piston-rod S the whole fixed on the front of lower tank, pipe F' leaving top of lower tank and entering base of slide-tap pipe C leaving boiler at water-line in boiler and entering face of slide-tap, pipe H leaving base of slide-tap and extending upward and turning into water in upper-tank float J, arm K, balance-weight J' spindle L and eccentric-rod Q operating the valve in steam-chest O, substantially as described.

3. In combination with the cylindrical tank A a steam-pipe connected therewith and a spreader in said tank connected with the end of the steam-pipe for spreading the steam over the surface of the water and thus quickening the action of the apparatus by preventing the steam from being injected into the water and hence condensed with resulting loss in pressure, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILLIAM JOSEPH PICKERING.

Witnesses:

EDWD. BURTON PAYNE,
ALBERT NEWBY.