

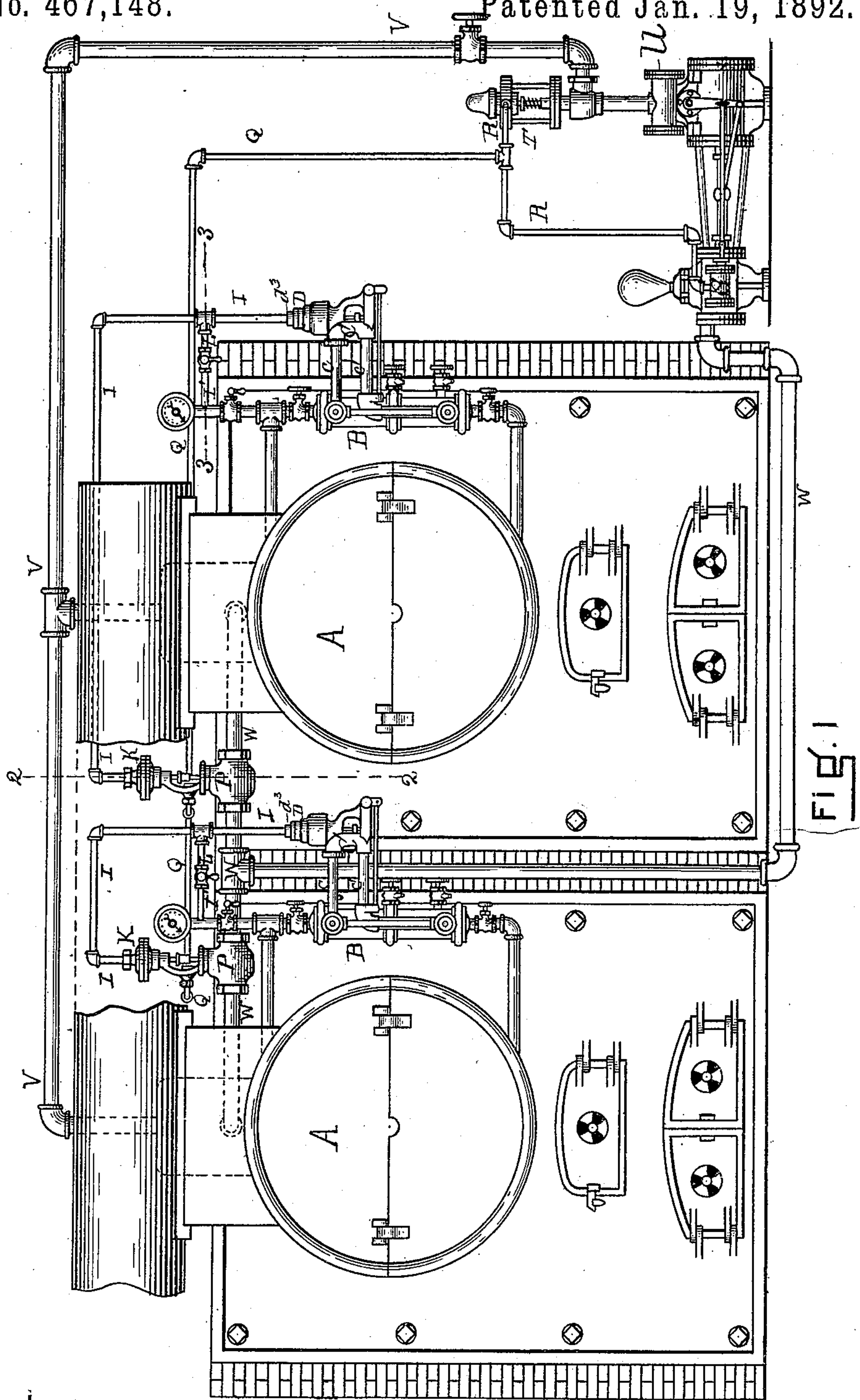
(No Model.)

3 Sheets—Sheet 1.

C. B. BOSWORTH.
AUTOMATIC BOILER FEEDER.

No. 467,148.

Patented Jan. 19, 1892.



WITNESSES

Thos. Houghton.
W. E. Barker

INVENTOR

Charles B. Bosworth
by Mr. W. H. Singleton, atty.

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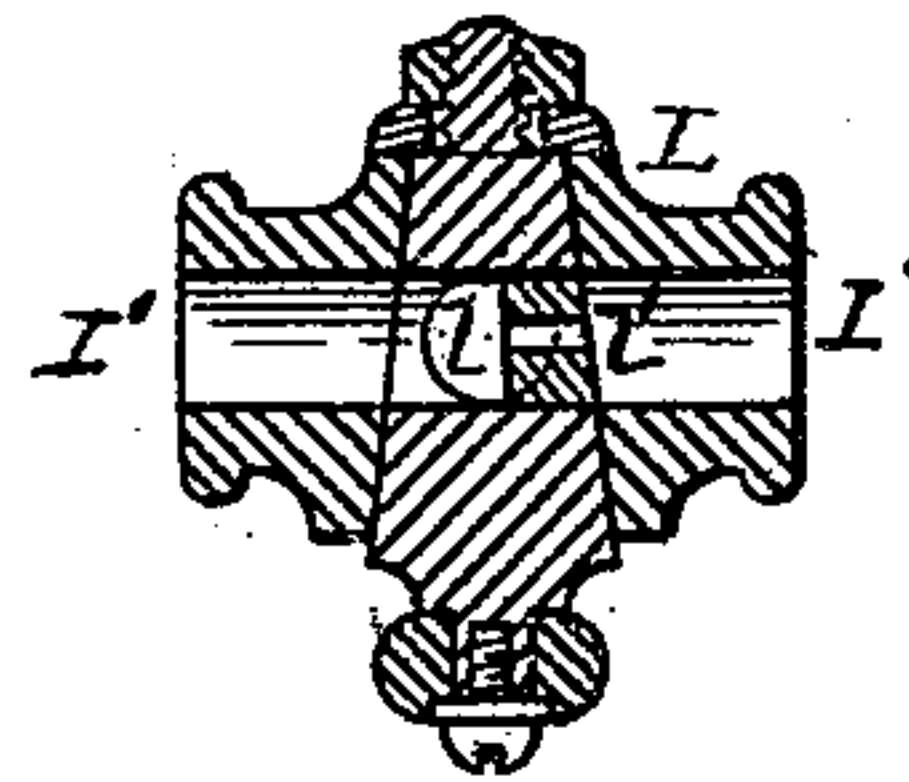
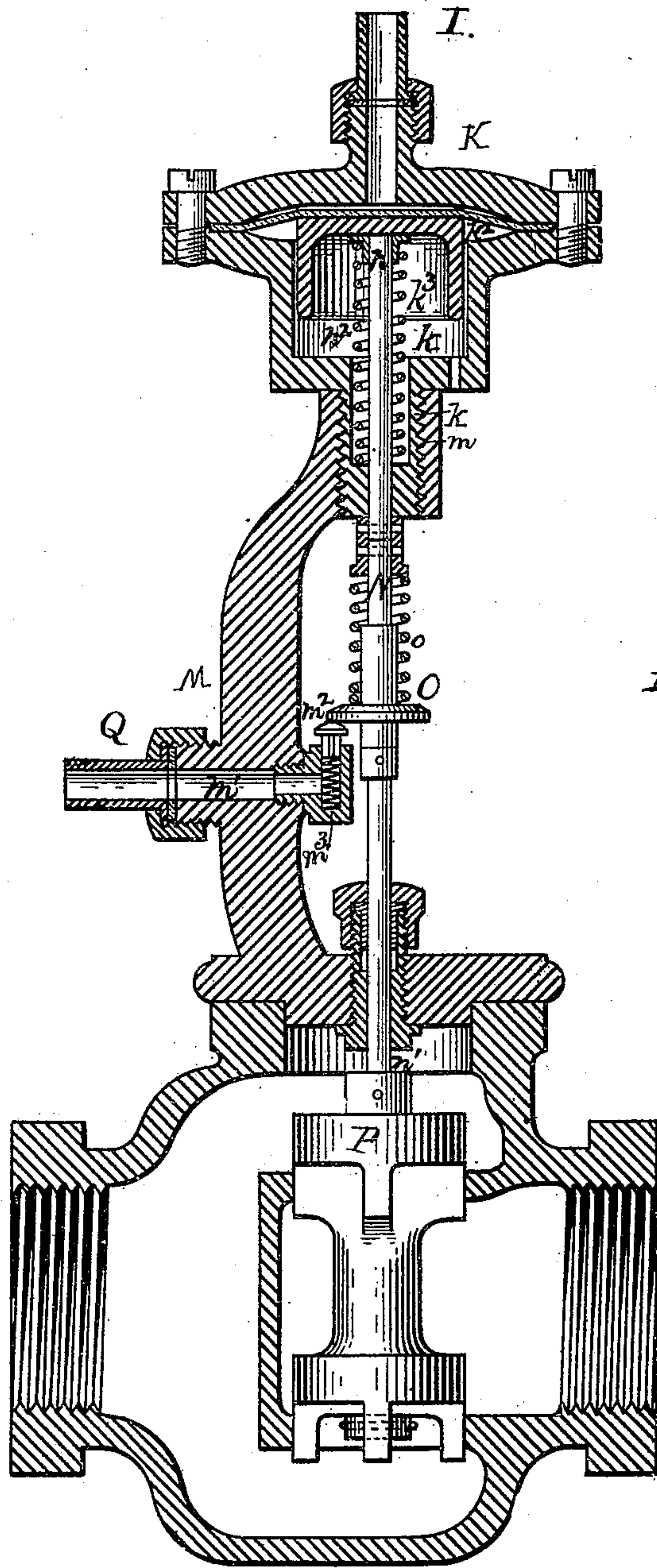


Fig. 3.

WITNESSES

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Fig. 2.

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per W. T. Singleton,
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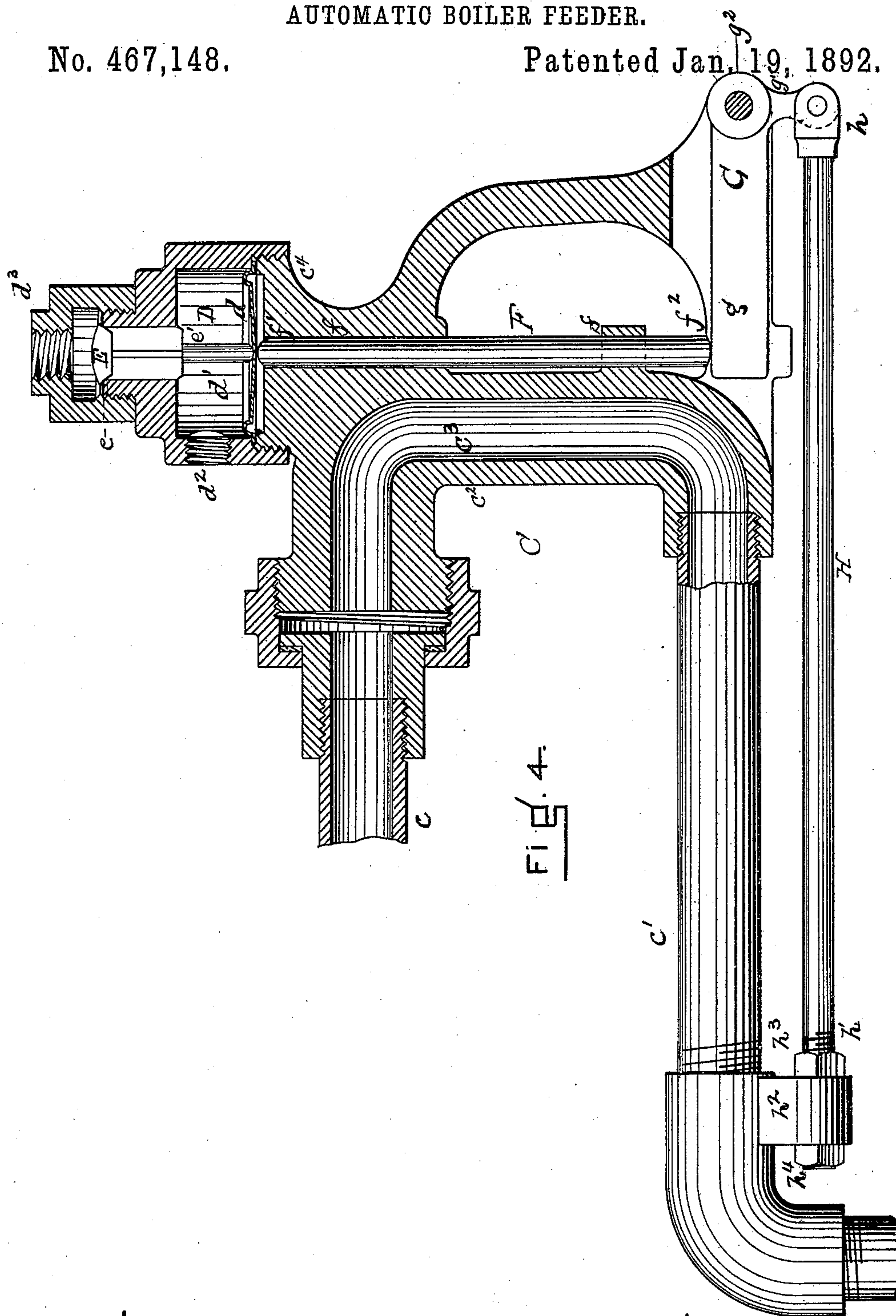
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UNITED STATES PATENT OFFICE.

CHARLES B. BOSWORTH, OF EVERETT, ASSIGNOR TO THE CROSBY STEAM GAGE AND VALVE COMPANY, OF BOSTON, MASSACHUSETTS.

AUTOMATIC BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 467,148, dated January 19, 1892.

Application filed August 1, 1891. Serial No. 401,362. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BARTLETT BOSWORTH, a citizen of the United States, residing at Everett, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in a Device for Automatically Regulating Feed-Water to Steam-Boilers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Figure 1 is a front view of the apparatus, looking toward the forward end of the boilers. Fig. 2 is an enlarged vertical section of the air and water valves on the line 2 2, Fig. 1. Fig. 3 is a longitudinal section of the steam-valve on line 3 3, Fig. 1. Fig. 4 is an enlarged view, partly in section and partly in side elevation, of the thermostat.

This invention relates to an improvement in devices for automatically supplying feed-water to steam-boilers, and relates more particularly to that class of such devices illustrated in United States Patents granted December 2, 1890, Nos. 441,740 and 441,741, to which reference is made. In these patents are shown a steam-boiler provided with a pump for supplying water to the boiler, such pump having an air-pump attachment, and a governor controlled by the air-pump, there being a thermostatic device which regulates the action of the air-pump according to the mutations of the water in the boiler.

The present invention consists in certain improvements upon these devices.

In the annexed drawings, the letters A A indicate the boilers, having the usual water columns B B.

Attached to a water column B are the pipes c c' of the thermostat C, being so placed that the pipe c leads into the steam-space, and the pipe c' into the water-space of said water column. The pipes c c' are secured to a vertical connecting-piece c^2 , containing a passage c^3 , which communicates with the bores of the pipes c c' . Threaded upon a top extension c^4 of this piece c^2 is a hollow cap D, an imperfo-

rate diaphragm d being held between the two. The top of the cap D is elongated and hollow and has a valve-seat e .

Seated upon the seat e is a valve E, the stem e' of which passes down through the cap D and rests upon the diaphragm d . The interior d' of the cap D above the diaphragm d has an opening d^2 communicating with the outer air. On top of the cap D, above the valve E, is a pipe-coupling d^3 .

In line with the valve-stem e' and under the diaphragm d there is in the piece c^2 a vertical passage f , in which is a loosely-sliding rod F, the upper end f' of which touches the under side of the diaphragm d and its lower end f^2 rests on the horizontal arm g of a bell-crank lever G. This lever G is fulcrumed at g^2 on the piece c^2 and has a vertical arm g' , which is shorter than the horizontal arm g . Hinged to the vertical arm g' is a horizontal rod H by one end h , the other end h' being held rigidly to a bracket h^2 , depending from the pipe c' , there being adjusting-nuts h^3 h^4 at such bracket.

From the coupling d^3 at the top of the cap D a pipe I communicates with the top of the hollow governor K of the water-valve. Communicating with this pipe I is another pipe I', which connects with the steam-space of the boiler and has a valve L, Fig. 3. This valve has two passages, one l larger than the other l' . The water-valve governor K is supported upon a bracket M, a threaded stem k entering a threaded hole m in such bracket.

Secured within the chamber k of the governor K at the top is a flexible diaphragm k^2 . Under this diaphragm is an inverted-cup-shaped piston k^3 , which bears against the under side of the diaphragm k^2 . The piston k^3 is supported upon the upper end n of a rod N, which passes down through the governor K and has its lower end n' connected to the water-valve P. Within the governor K and around this rod N is a spiral spring n^2 , one end of which bears against the piston k^3 and the other end against the lower part of the governor. Secured to the rod N below the governor K is a collar O, and a spiral spring o surrounds the rod N between such collar O and the under side of the governor K.

In the bracket M, a little below the line of

the collar O, is a passage m' . Secured to the bracket on the side toward the collar O and at the opening of the passage m' is a valve m^2 , which is held against the under side of the collar O by a spring m^3 . The other end of the passage m' is connected by a pipe Q with the pipe R, leading from the air-pump S to the air-governor T of the water-pump U, to which leads the steam-supply pipe V from the boilers and from which runs the boiler-water-supply pipe W to the boilers.

The construction of the air-governor T is the same as that described in United States Patent No. 441,741, the pipes Q and R communicating with the air-space thereof, as fully explained in said patent.

The operation is as follows: The pump U forces water through the pipe W, through the valve P to the boiler A, the water rising into the latter and the water column, and up into the thermostat C. The steam in the latter causes its expansion and draws on the rod H, turning the bell-crank lever G, lifting the rod F. This bearing, through the diaphragm d against the lower end of the valve-stem e' , lifts the valve E from its seat, opening the valve. The steam which passes through the pipe I' into the pipe I is thus permitted to escape through the valve at E instead of pressing upon the diaphragm k^2 of the water-valve governor K. The pressure being thus relieved, the spring n^2 raises the piston k^3 and the rod N, opening the valve P and permitting the flow of water. As this takes place the collar O is lifted from the valve m^2 , which is opened by the spring m^3 . The air from the pump S thus escapes at the valve m^2 instead of operating the governor T and affecting the action of the pump U. As the water rises in the boiler and water column and into the thermostat, the latter contracting, the rod H is moved backward, which permits the rod F to descend and the valve E to close. As this takes place the steam through the pipes I' and I, pressing on the diaphragm k^2 , depresses the piston k^3 , the rod N, and closes the valve P, thus cutting off the water-supply. At the same time the collar O, bearing on the valve m^2 , closes the latter. The air from the pump S, finding no outlet, is forced into the governor T and controls the action of the pump U. As this pump slows down all the pressures are diminished. These variations of actions ensue according as the water rises and falls in the thermostat C, so that a constant and regular supply of water is maintained, according to the requirements of the boiler. The larger or smaller opening of the valve L may be aligned with the pipe I', as desired, according to the quantity of steam desired. This is the action with one boiler. When two or more boilers are connected to one water-pump and air-pump, as shown, the action is the same. As one boiler fills it regulates its own valve,

so as to cut off its own flow of water, and the pump continues to supply the other boiler until that is supplied, when that supply is also cut off or regulated. This is true of any number of boilers which may be connected to one water and air pump.

Having thus described my invention, what I claim is—

1. A water-valve for controlling the supply of water to a boiler, in combination with an air-valve for relieving the pressure in the governor of the water-pump, the air-valve bearing against the stem of the water-valve, as set forth.

2. The combination of the water-valve P, the rod N, having the collar O, the water-valve governor K, and the air-valve m^2 and its spring m^3 , the valve m^2 being located under the collar O and bearing thereon, as set forth.

3. The thermostat C, having the hollow cap D, having the opening d^2 , the diaphragm d , and the valve E, in combination with the steam-pipe I, the valve E being located where the pipe leads into the thermostat, as set forth.

4. The thermostat C, having the pipes $c c'$, the rod H, lever G, rod F, connecting-piece c^2 , provided with the passages c^3 and f , the hollow cap D, the diaphragm d , and valve E, the latter being above the diaphragm and the rod F below the diaphragm in line with the stem of the valve E and resting on the arm g of the lever G, as set forth.

5. The combination of a boiler, a thermostat connected with the water and steam spaces thereof, a combined water and air valve provided with a governor for the water-valve, a pipe leading from the thermostat to the water-valve governor and having a steam-supply pipe connected therewith, a water-pump for the boiler, having a water-pipe running to the boiler and a steam-pipe coming from the boiler, an air-pump connected with the water-pump, an air-governor for the water-pump, and pipes leading to the air-chamber of this governor from the air-pump and from the air-valve, as set forth.

6. The combination of a thermostat for regulating the supply of water to a boiler, the water-valve and its governor, a pipe leading from the thermostat to this governor, and a steam-supply pipe leading into this pipe, as set forth.

7. A thermostat for regulating the supply of water to a boiler, a water-valve governor, a pipe leading from the governor to the thermostat, and a steam-supply pipe leading into this pipe and provided with a valve having passages of different sizes, as set forth.

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

CHARLES B. BOSWORTH.

*Witnesses:

JOSHUA H. MILLETT,
DUDLEY P. BAILEY.