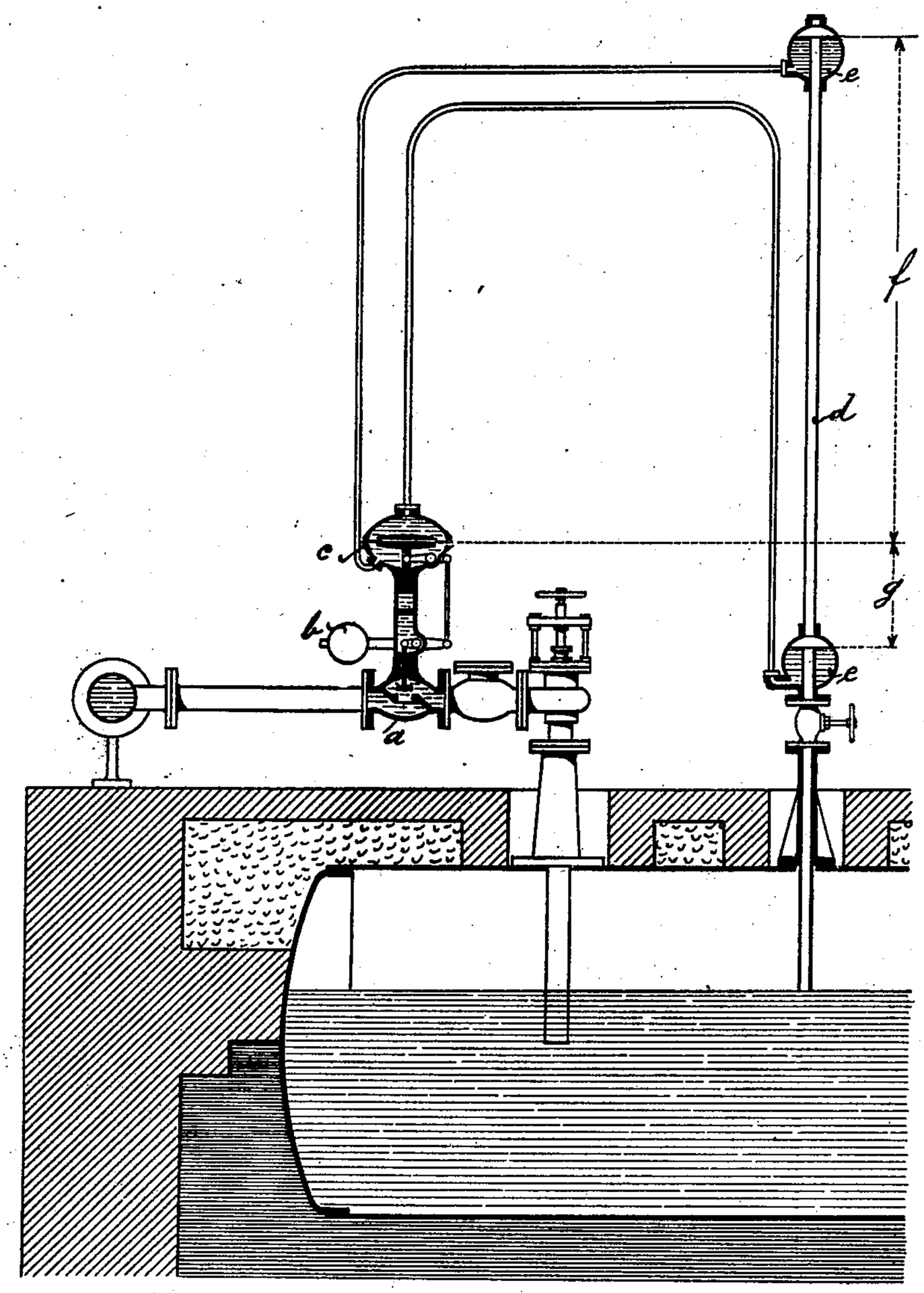
No. 722,700. PATENTED MAR. 17, 1903.

N. E. HANNEMANN.

FEED WATER REGULATOR.

APPLICATION FILED MAY 5, 1902.

NO MODEL.



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UNITED STATES PATENT OFFICE.

NIKOLAUS EMIL HANNEMANN, OF CHARLOTTENBURG, NEAR BERLIN, GERMANY.

FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 722,700, dated March 17, 1903.

Application filed May 5, 1902. Serial No. 106,003. (No model.)

To all whom it may concern:

Be it known that I, NIKOLAUS EMIL HANNEMANN, engineer, a subject of the German Emperor, residing at 22 Rönnestrasse, in the city of Charlottenburg, near Berlin, German Empire, have invented a certain new and useful Feed-Water Regulator, of which the following is a specification.

This invention has reference to a feed-water regulator or automatic feeder for steam-boilers of that class where the water admission to the boiler is controlled by means of a flexible diaphragm in such a manner that on the water-level falling too low a valve, a cock, a throttle-valve, or the like provided upon the water-admission pipe is opened, the said valve being then closed when the normal water-level is reached. A pump is used to effect the feeding of the water. My invention is distinguished from the apparatus of this kind as heretofore in use by connecting the top and bottom of the casing containing the diaphragm with either one of two reservoirs communicating with the interior of the boiler by a pipe reaching down to the lowest water-level, so that the combined pressure of water and steam may act on either side of the diaphragm, which is moved by the difference in pressure exerted by those two agents, thereby operating the regulating-valve, which in its turn is connected to said diaphragm or a piston and controls the supply of water to the boiler.

My invention is shown by way of example on the accompanying drawing as applied to an ordinary boiler.

In the drawing, *a* is the closing-valve.

b is the weight attached to the cone of the valve.

c is the diaphragm.

d represents the gage-pipe, with the water sumps or reservoirs *e*.

When the entire apparatus has been filled with water, an equal pressure exists on both sides of the diaphragm or membrane *c*, and the load *b* keeps the valve on its seat until the water-level in the boiler has fallen below the lower end of the gage-pipe *d*. As soon as this takes place the water flows back from the gage-pipe into the boiler, so that the water-pressure upon the under side of the membrane or diaphragm equals the steam-pressure increased by the water column *f*, while at the same time the pressure upon the upper surface of the membrane or diaphragm is equal to the steam-pressure less the water column *g*. By the action of the water-pressure, increased by the pressure of the water column *g*, the valve is opened and the weight is raised, which results in the admission of the water into the boiler until the water has reached the pipe *d* and until this pipe by the condensation of the steam contained therein has again become filled with water, so that the water-pressure on both sides of the diaphragm or membrane is balanced, whereupon the weight *b* closes the valve.

For plants with several boilers each boiler is provided with the above-described apparatus. If a so-called "duplex" pump is used as a feed-pump, the arrangement described is entirely sufficient, inasmuch as this kind of pump will be stopped when the regulating-valves are closed, while it will run again when the valves are opened. In the case of pumps, however, which are operated by special mechanisms it becomes necessary to provide a special safety-valve upon the pressure-conduit, this valve allowing the remaining water to flow back into the suction-conduit when the regulating-valves are closed. If but one boiler is to be fed by the pump, the regulating-valve may also be arranged upon the steam-conduit leading to the pump, or it may be arranged on a circulation-pipe before the pressure-conduit or upon the suction-pipe.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. Feed-water regulator for boilers comprising the combination with a feed-valve and a casing containing a diaphragm connected to said feed-valve of two water reservoirs, tanks or sumps, arranged one above the other, and connecting-pipes between said reservoirs, tanks or sumps and between the top and bottom of the casing respectively and a pipe reaching from the lower reservoir or sump through the shell of the boiler and terminating at the normal or lowest water-level.

2. In a feed-water regulator the combination with a feed-valve, a diaphragm connected to said feed-valve and a casing inclosing

said diaphragm, two water reservoirs, tanks or sumps, arranged above each other and pipes reaching from the bottom of said tanks or sumps respectively to the bottom and to the top of said casing and pipes connecting said tanks or sumps with each other and with the interior of the boiler and terminating within the said tanks or sumps above the openings for the connecting-pipes with the said casing.

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

NIKOLAUS EMIL HANNEMANN.

Witnesses:

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WOLDEMAR HAUPT.