G. F. PATTERSON.

FEED WATER REGULATOR.

APPLICATION FILED JAN. 17, 1911.

1,002,080. **Patented Aug. 29, 1911.**

Fig. 1.

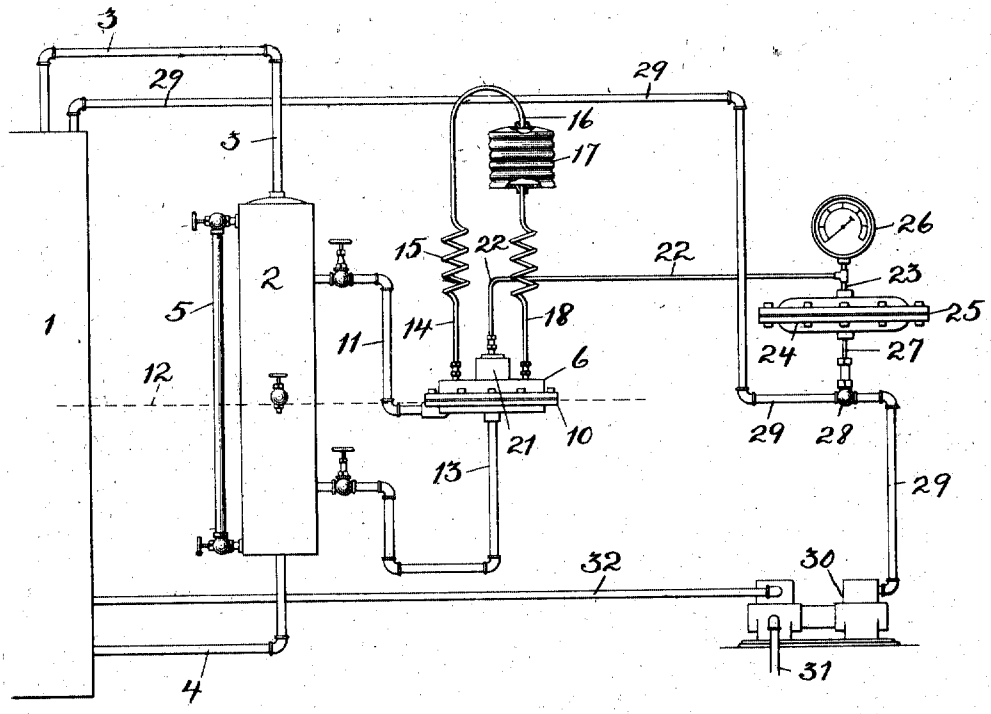
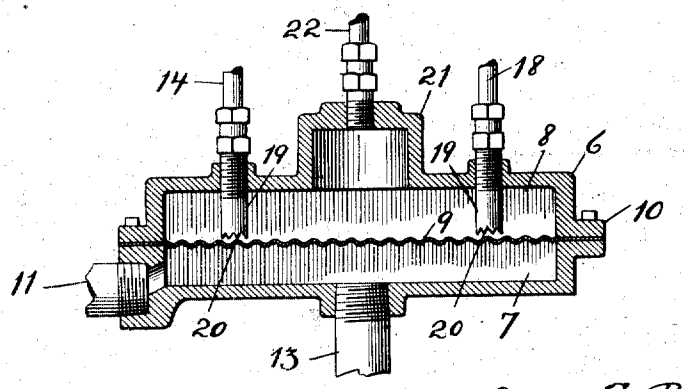


Fig. 2.



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FEED-WATER REGULATOR.

1,002,080. Specification of Letters Patent. Patented Aug. 29, 1911.

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To all whom it may concern:

Be it known that I, GEORGE F. PATTERSON, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Feed-Water Regulators, of which the following is a specification.

This invention relates to improvements in water level regulators and has for its object to provide a comparatively simple device of this character which will be delicate in operation and which will maintain the level of the water in boilers at practically a predetermined point.

The invention consists in the novel construction, combination and arrangement of the parts hereinafter described and claimed reference being made to the accompanying drawings wherein,—

Figure 1, is a diagrammatic view of a boiler; a water column and regulating devices connected thereto and of a pump for supplying water to the boiler, and Fig. 2, is a vertical sectional view through the auxiliary generator for heating water by the action of steam from the boiler to generate a pressure for actuating the regulator valve.

Referring to the drawing the numeral, 1, designates a steam boiler; 2, the water column; 3, the steam pipe between the boiler and water column and, 4, a water pipe connecting the boiler below the water line and the water column. The water column or receptacle, 2, is provided with the usual glass tube, 5, to show the actual water level in the boiler.

An auxiliary generator, 6, is provided and by reference to Fig. 2, it will be noted that in the present instance this generator consists of a casing having a lower compartment and an upper compartment, 8, with a corrugated partition, 9, separating said two compartments and held in place by the clamping action of flanges, 10, on the casing which is formed in two parts. A steam pipe, 11, extends from the water column receptacle, 2, above the water level and enters the lower compartment, 7, of the auxiliary generator at a point close to but slightly below the water line, 12, while a water pipe, 13, also enters the said lower compartment, 7, of the auxiliary generator and connects that compartment with the water column receptacle, 2, below the water-line, 12. Thus it will be noted that the position of the auxiliary generator is such that the corrugated partition, 9, therein is on the normal water level of the boiler so that normally the lower compartment, 7, of said generator will be filled with water. A pipe, 14, communicates with the upper compartment, 8, of the auxiliary generator and extends vertically therefrom and is provided with a coil, 15, between its lower and upper ends and said latter end, 16, enters the upper side of a small corrugated reservoir, 17. Another pipe, 18, communicates also with the upper compartment, 8, of the said generator and enters the lower side or bottom of the reservoir, 17, and this pipe also has a coil therein. Thus it will be seen that a circulating system is provided that includes the upper compartment, 8, pipe, 14, reservoir, 17, and pipe, 18.

By reference to Fig. 2 it will be noted that short nipples, 19, are screwed into the lower ends of pipes, 14, and, 18, and have lower notched ends, 20, which terminate in close proximity to the upper side of the corrugated partition, 10, in the compartment, 8, all for a purpose presently to be explained. The auxiliary generator, 6, has a central dome, 21, which communicates with the upper compartment, 8, and a pipe, 22, leads from said dome and communicates with a short pipe, 23, that enters the upper side of a diaphragm regulator, 24, having the usual flexible diphragm, 25,—the short pipe, 23, terminating above the upper side of said diaphragm. By this arrangement communication will be maintained between the upper compartment, 8, of the auxiliary generator and the upper side of the diaphragm in the regulator, 24. A suitable gage, 26, is preferably provided over the regulator which is so attached as to be exposed to pressure in the pipes, 22, and 23, and also in the regulator above the diaphragm,—the latter being also affected by such pressures in the usual manner. A stem, 27, projects from the bottom side of the diaphragm of the regulator, 24, and enters a valve casing, 28, that is interposed in a steam line, 29, from the boiler,—the stem carrying a valve to open and close the passage in said steam line. This steam line leads to a pump, 30, of any suitable construction, so that when pressure is generated in the circulating system it will operate the diaphragm in the regulator, in the well known manner and thereby actuate stem, 27, to operate the lower end thereof and open the passage in the steam line and permit steam to pass from the boiler to the

pump to set the latter in operation. A water supply pipe, 31, enters the pump and another pipe, 32, leads from the pump to the boiler to supply water to the latter while the pump is operating.

In operation, the water in the boiler, when at its normal level on the line, 12, will fill the lower compartment, 7, of the auxiliary generator. Water will also be provided in the upper compartment, 8, of the generator. When the water in the boiler falls below the normal level line, 12, it will also fall in the lower compartment, 7, of the auxiliary generator and steam will pass by pipe, 11, from the water column receptacle, 2, into the lower compartment, 7, and heat the partition, 9, therein. The heat from the partition will be imparted to water that is maintained in the upper compartment, 8, and in the pipes, 14, and, 18,—the nipples, 19, being close to said partition lead the hottest water therein off and deliver the coldest water to the hottest part thereby effecting a rapid generation of steam in the circulating system of pipes. The steam thus generated will back up through pipe 14, to receptacle, 17, and also in pipe, 22, leading to the diaphragm regulator, 24, which operates stem, 27, and permits steam to pass through pipe or line, 29, to the pump which latter immediately begins to operate and force water through pipe, 32, into boiler, 1. When the water in the boiler has risen so as to again fill compartment, 7, in the auxiliary generator, the partition wall, 9, will cool sufficiently to permit the steam in the circulating system,—including pipe, 14, receptacle, 17, and pipe, 18, and also in pipe, 22, to condense and thus allow the diaphragm to retract the stem, 27, and close the passage in the steam line to the pump.

The object in providing the pipes, 14, 18, and reservoir, 17, is to allow for the expansion and contraction and also to aid in effecting a rapid condensation after the water level has been restored.

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

1. In a water level regulator the combination with a boiler, of an auxiliary generator having two compartments; two connections to one of said compartments,—one of said connections being to a point above the water line and the other to a point below the water line; two connections to the upper of said compartments and said latter connections being in communication to form an independent circulating system to and from said upper compartment of the auxiliary generator; a diaphragm regulator, a connection between the upper compartment and the regulator to actuate the latter; a pump, and means actuated by said regulator to control the operation of the pump.

2. In a water level regulator the combination with a boiler, of an auxiliary generator having a lower compartment and an upper compartment; means for maintaining water in the lower compartment while the water in the boiler is at a predetermined level; means for admitting steam to said lower compartment when the water in the boiler drops below said level; a diaphragm regulator; a pump; a steam connection to the pump; a valve actuated by the diaphragm regulator to control the passage of steam to the pump; a water connection between the pump and boiler; a pipe leading from the upper compartment of the generator and communicating with the regulator and means for maintaining an independent circulation of fluid pressure from and back to the said upper compartment of the auxiliary generator.

3. In a water level regulator the combination with a boiler, of an auxiliary generator having a lower compartment and an upper compartment separated by a division wall; means for maintaining water in the lower compartment while the water in the boiler is at a predetermined level; means for admitting steam to said lower compartment when the water in the boiler drops below said level; a diaphragm regulator; a pump; a steam connection to the pump; a valve actuated by the regulator to control the steam to the pump; a water connection between the pump and boiler; two pipes entering the upper compartment of the auxiliary generator and terminating close to the division wall that separates said upper and lower compartments and said two pipes being in communication with each other outside of the said upper compartment of the auxiliary generator and a pipe leading from the regulator and also communicating with the upper compartment of said auxiliary generator.

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

GEORGE F. PATTERSON.

Witnesses:

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