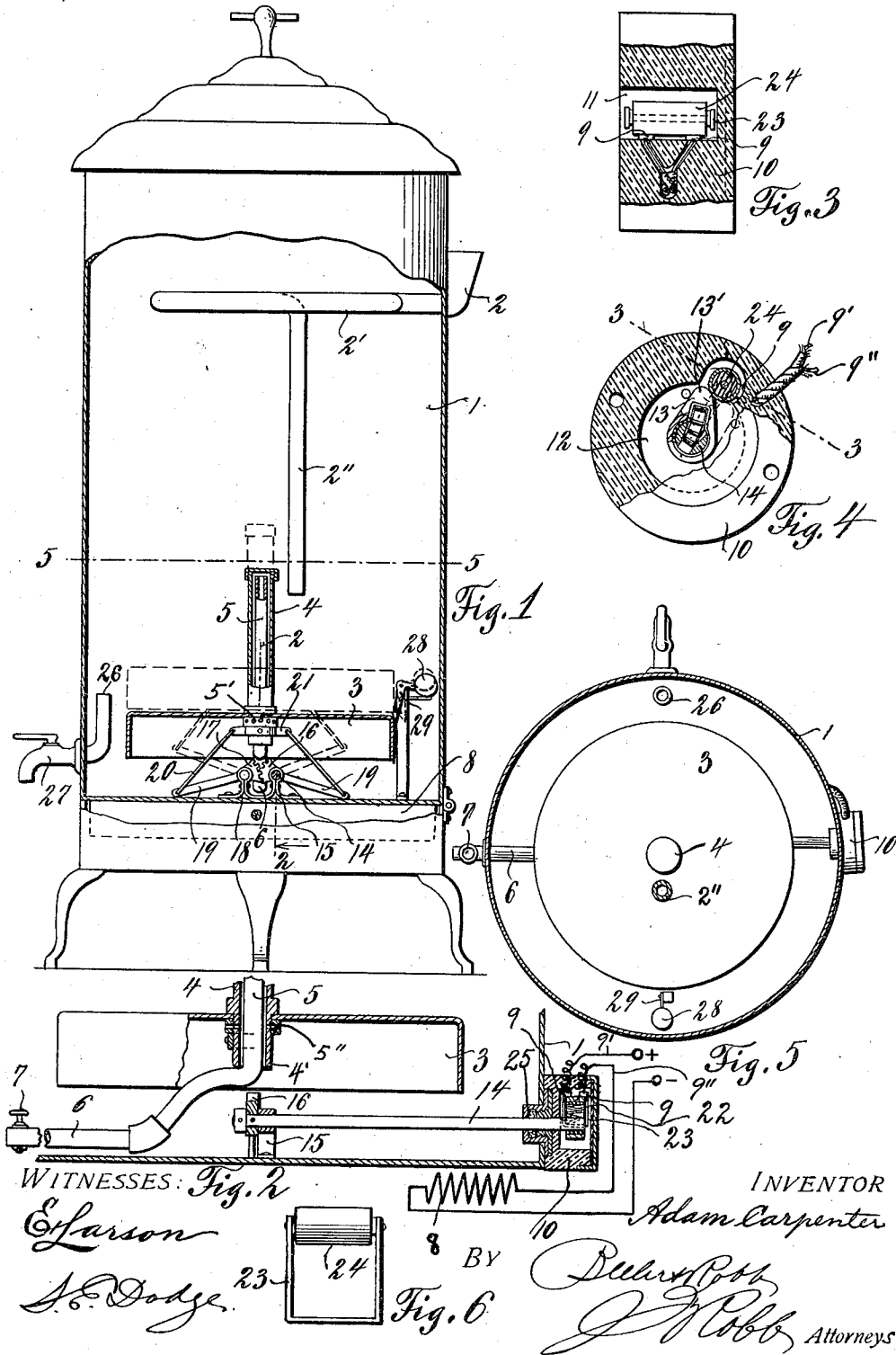


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REGULATOR FOR LIQUID BOILERS.
APPLICATION FILED NOV. 15, 1910.

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Patented June 18, 1912.



UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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Application filed November 15, 1910. Serial No. 592,501.

To all whom it may concern:

Be it known that I, ADAM CARPENTER, a citizen of the United States, residing at Tacoma, in the county of Pierce and State of Washington, have invented certain new and useful Improvements in Regulators for Liquid-Boilers, of which the following is a specification.

The primary object of this invention is to provide an improved automatic regulator for liquid boilers.

At the present time liquid boilers are employed extensively in different places such as bar rooms, lunch rooms, or the like, and very frequently continuous heating of the contents of a boiling receptacle generates steam in such quantities that the latter, in passing off from the receptacle, is often injurious to decorative furnishings. Furthermore, it is obvious that economy is subserved if, in the above class of boilers, some regulating means is employed to prevent continuous heating of the liquid after a boiling temperature has been reached, and means embodied in this invention is designed to accomplish the above result.

The present automatic regulator is constructed for application to electrically heated boilers, though its principles of operation are applicable also to other differently heated receptacles.

In the drawings, Figure 1 is a sectional view of a water or liquid boiler embodying the invention; Fig. 2 is a fragmentary sectional view of the lower portion of the boiler taken about on the line 2—2 of Fig. 1; Fig. 3 is a detail section taken about on the line 3—3 of Fig. 4; Fig. 4 is an elevation of the electric contact controlling means; Fig. 5 is a horizontal section on the line 5—5 of Fig. 1; Fig. 6 is a detail view of the yoke and electric contact carried thereby.

Specifically describing the details of the invention and referring particularly to the drawings, 1 denotes the boiler which is an inclosed receptacle of any suitable form, and of the general type used commonly for heating water, coffee, or the like. At its upper portion, the boiler has a valve inlet 2 by which water is supplied from a suitable main, the inlet 2 consisting of a pipe passing through the side of the boiler and termi-

nating within the interior of the receptacle in a coil 2' and downwardly projecting delivering extremity 2''. The delivering extremity of the water inlet is situated approximate to and above the upper limit of movement of a bell or inverted cup shaped body 3 arranged in the receptacle just above the bottom thereof. The bell 3 is a pressure operated member and is provided with a central tubular guide 4 passing therethrough so as to project slightly below the top of the bell as shown at 4'. Threaded ring nuts 5'' are applied to the guide 4 of the bell to secure the latter thereto. A pipe 5 passes upwardly into the guide 4 and consists of a vertical extension of an air outlet pipe 6 seated near the bottom of the boiler 1 and extending through a wall thereof to a point where a valve 7 is provided.

The bell 3 by the mounting of its guide member 4 on the pipe extension or tubular guide 5, is permitted to have a vertical reciprocal movement. An electrical heater 8 of any suitable form is provided at the bottom of the boiler 1 and the terminals of the electric circuit including the coils of said heater consist of contact plates 9 to which the circuit wires 9' and 9'' are connected in an insulating casing 10 exterior to the boiler 1. Said contact plates 9 are arranged in a somewhat circular recess 11 in the insulation, forming the casing 10, said recess 11 merging into a larger recess 12 in which is arranged a partially rotatable cam 13. The cam 13 is mounted on a shaft 14 which extends from the cam through the adjacent wall of the boiler 1 and has its inner terminal mounted in a suitable bearing in a bracket 15 inside the boiler on its bottom. The inner terminal of the shaft 14 carries a toothed segment 16 meshing with a similar segment 17, the latter being supported in a bearing on a separate bracket 18 adjacent to the bracket 15. Arms 19 project from the axes of the toothed segments 16 and 17, the latter being in mesh, and links 20 connect the outer terminals of the arms with a cross piece 21 secured to the lower end 4' of the guide 4. The outer end of the shaft 14 rotates in the upward movement of the ceive a spring 22, the lower end of which bears against the cross bar of a yoke 23 housed in the part 10, the opposite sides of

the yoke being connected with a roller contact 24 operating in the recess 11. The periphery of the contact 24 is preferably of electrical contacting material, whereas the body of said contact is preferably of insulation.

In practical operation, it will be apparent that when the liquid in the boiler 1 reaches a boiling temperature, the vapor bubbles generated beneath the bell 3 will raise said bell, thereby imparting movement to the shaft 14 which has link connection with the bell through its segment 16. As the shaft 14 rotates in the upward movement of the bell, the projection 13' of the cam 13 will be moved laterally by the shaft until the roller passes over the same into contact with the wall of the recess 11 opposite that on which the spaced contacts 9 are disposed. The electrical circuit of the heating means 8 is thus broken and will discontinue the operation of the heater until the temperature of the liquid in the boiler 1 lowers, permitting the bell 4 to correspondingly lower to actuate the shaft 14 and turn the cam 13 until the roller contact 24 passes over the cam back to its position in which the spaced contacts 9 are connected thereby.

The shaft 14 passes through a stuffing box 25 by which all likelihood that moisture or the liquid in the boiler 1 will reach the electrical parts 24 and 9 is eliminated. Furthermore, the delivering extremity 2" of the cold water inlet pipe 2 is so disposed that the operation of the invention will be exceedingly sensitive, in that the cool water entering the boiler will affect the bell 3 immediately, condensing any vapor or steam held within the bell so as to instantaneously decrease the pressure in the latter on lowering of the temperature below the desired normal.

A suitable draw-off pipe 26 enters the boiler 1 from a side thereof and is controlled by the usual cock 27.

A safety device is used in connection with the regulating bell 3 and consists of a float 28 connected with a dog 29 of bell crank form. When a liquid in the boiler is lowered by action of evaporation or withdrawal of the same to a point below the upper terminal of the draw-off pipe 26, it will be apparent that the float 28 will assume the full line position shown in Fig. 1, under which condition the dog 29 will engage under the rim of the bell 3 as the bell is being lowered by the falling water, retaining the bell in the dotted line position in said figure, thus preventing the bell from returning to its lowered position and thereby turning on the heater 8. The likelihood of the heater being operated when a very small quantity of water, or no water at all, is in the boiler is thus prevented, because there must be enough liquid in the boiler to hold

the float 28 up and the dog 29 out of engagement with the bell 3, or the receptacle can not be used.

The air pipe 6 has communication with the space beneath the bell 3 by means of apertures 5' in the guide tube 4 and preparatory to filling the boiler 1 with the liquid, the valve 7 is opened to withdraw the air and avoid likelihood of the formation of an air cushion beneath the bell.

Having thus described the invention, what is claimed as new is:

1. In combination, a liquid boiler and a regulator therefor comprising a pressure operated device arranged in the boiler, a heater, means controlling the operation of the heater connected with said pressure operated device, and means for locking the pressure operated device in inoperative position when the liquid in the boiler falls to a predetermined level.

2. In combination, a boiler, a heater therefor, a regulator comprising a pressure operated device in the boiler, controlling means for the heater operably connected with the pressure operated device, said pressure operated device consisting of a bell immersed in the boiler, and a float operated device for preventing movement of the bell in one direction when the level of the liquid in the boiler reaches a predetermined point.

3. In combination, a boiler, a heater therefor, an automatic regulator comprising a bell arranged in the boiler and adapted to receive and confine vapor generated in the boiler by the heater, means permitting movement of the bell according to the varying pressure of the vapor confined thereby, and a liquid inlet entering the boiler and comprising a terminal above the bell and slightly spaced from the upper limit of its movement, and means connecting the bell operably with the heater for controlling the operation of the latter.

4. In combination, a boiler, a heater therefor, controlling means for the heater, a regulator in the boiler comprising a bell connected to said controlling means, an air pipe leading into the boiler and having a vertical extension, a guide receiving said extension and connected with the bell for directing its movement, and a valve for said air pipe permitting the passage of air from beneath the bell to a point exterior to the boiler.

5. In combination, a boiler, a heater therefor, a bell vertically movable in the boiler and operably connected with the heater for controlling the latter, an air pipe leading into the boiler and having an extension passing beneath the bell, and a valve for said air pipe.

6. In combination, a boiler, a heater therefor, controlling means for said heater comprising a member movably mounted exterior

to the boiler, a shaft passing through a wall
of the boiler and operably connected at its
outer end with said member, a pressure op-
erated bell movable in the boiler, a toothed
5 segment in the boiler and mounted on said
shaft, a second toothed segment meshing
with the first mentioned segment, arms pro-
jecting from the axes of said segments, links
connecting the arms with the bell whereby

on movement of the bell, movement will be 10
correspondingly imparted to the shaft.

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

ADAM CARPENTER.

Witnesses:

J. F. ROBB,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
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