

No. 710,608.

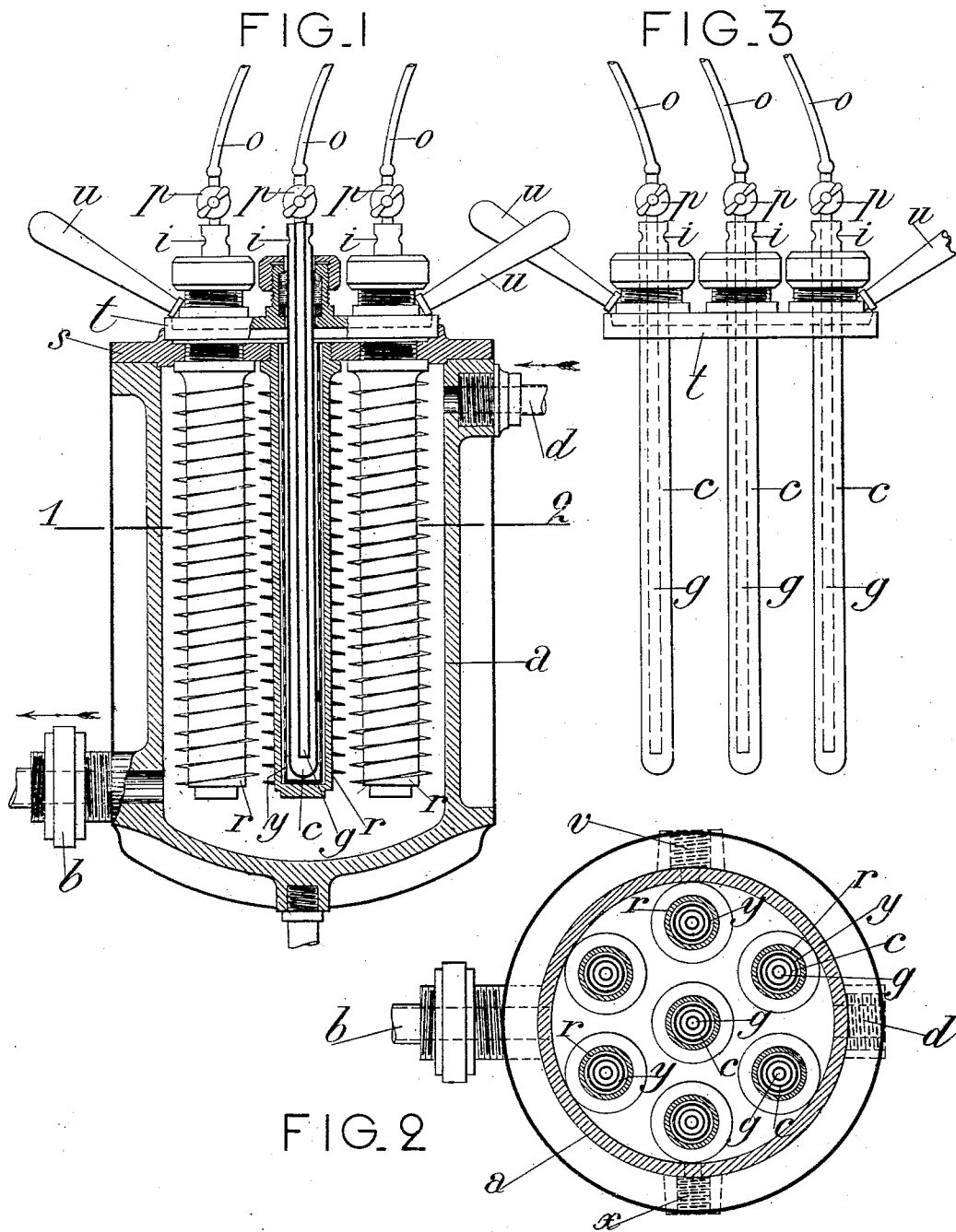
Patented Oct. 7, 1902.

A. PRAT.

APPARATUS FOR HEATING LIQUID OR GASEOUS BODIES UNDER PRESSURE.

(Application filed Mar. 11, 1902.)

(No Model.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR HEATING LIQUID OR GASEOUS BODIES UNDER PRESSURE.

SPECIFICATION forming part of Letters Patent No. 710,608, dated October 7, 1902.

Application filed March 11, 1902. Serial No. 97,749. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTIN PRAT, a citizen of France, residing at Lyons, Rhône, France, have invented certain new and useful

5 Apparatus for Heating Liquid or Gaseous Bodies Under Pressure, of which the following is a full, clear, and exact description, and for which I have made application for patent in France, dated the 19th day of August, 1901.

10 The invention has for its object the heating of liquids and gases under pressure by means of a larger or smaller number of heating elements arranged within a strong casing traversed by the fluids to be heated. Each heating element consists, essentially, of a platinum tube previously heated to redness and the incandescence of which is maintained by a current of carbureted air circulating in the interior.

20 The accompanying drawings represent the arrangement of an apparatus intended for the heating of air and comprising seven heating-tubes.

25 Figure 1 is a vertical axial section of the apparatus. Fig. 2 is a horizontal section drawn on the line 2-2 of Fig. 1. Fig. 3 shows the heating or burner tubes separately.

30 *a* is a strong casing, in the interior of which are fixed winged or gilled tubes *r*, of conducting metal and of varied number, seven of which are represented in the apparatus. These tubes are fixed by screw-thread to the cover *s* of the apparatus. They are closed at the lower end and open at the upper end to receive in the interior the heating-tubes *c c*, fixed to a movable plate *t*, furnished with two handles *u u*. Each heating-tube consists of a platinum tube *c*, closed at the lower end and fixed to the plate *t* by a stuffing-box, which enables them to be readily changed. A small tube *g* conducts to the interior of the platinum tube *c* the carbureted air intended to maintain its incandescence. This air, taken from the channel for the air to be heated or forced by a special pump, passes through a carbureter of any suitable kind and is delivered into the tubes *g* by a similar number of flexible tubes *o o*, furnished with regulating-cocks *p p*. After having served its purpose this air escapes by the openings *i i*, formed at the top of the tube *c*.

To start the incandescence of the tubes *c*,

they are withdrawn from the apparatus, as shown at Fig. 3, and heated to redness by a suitable furnace, the cocks *p* being closed. The tubes *c* being replaced in position and the cocks *p* opened, the current of carbureted air which passes through the interior of these tubes maintains the incandescence as long as it is desired.

60 To prevent the heating-tube *c* from being cooled in consequence of an accidental fall of temperature, it is advantageous to surround it with one or several perforated metallic tubes *y*, inclosed within the winged or gilled tubes *r*. These tubes form a reservoir of caloric which will sustain the temperature of the heating-tube during an accidental slackening of the source of heat.

70 The apparatus is provided with two tubular connections *v* and *x* to receive a manometer, safety-valve, or other apparatus serving to control the operation.

It is evident that in the heating-tubes the platinum might be replaced by another metal or alloy having the property of being maintained incandescent by a current of carbureted air.

75 The apparatus thus arranged can serve not only for the heating of air, but also for the heating and evaporation of water or other liquids and for the superheating of steam. It is only necessary to cause these liquids or vapors to pass into the reservoir *a* and to regulate its delivery so that they leave it at the desired temperature. In each case the necessary heating-surface will be given to the apparatus by varying the number or the dimensions of the heating-tubes and their casings. These latter can be furnished or not with wings or gills, according to requirements. This apparatus may therefore be used either as an ordinary steam-generator by providing it with a feeding apparatus maintaining a constant level or an instantaneous steam-generator by causing the water to come into contact with the tubes *r* in small quantities, or as a superheater for air or steam. It might also be applied to the heating of water and other liquids for industrial or domestic purposes.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an apparatus for heating liquid or

gaseous bodies, the combination of a strong reservoir *a* traversed by the fluid to be heated, a plurality of tubes *r* closed at the lower end and open at the upper end and descending into the said reservoir, heating elements of similar number to that of the tubes *r* and each composed of a platinum tube *c* closed at the lower end and of an interior tube *g*, a flexible tube *o*, connected to tube *g* for conducting carbureted air to the bottom of the platinum tube, the said parts being fixed to a plate *t* which enables them to be introduced all together into the tubes *r* and of withdrawing them to start the heating, substantially as herein set forth.

2. In an apparatus for heating liquid or gaseous bodies, the combination of a strong reservoir traversed by the fluid to be heated, an inlet and an outlet orifice to such reservoir for said fluid, a plurality of heating-tubes immersed in said reservoir and closed at their lower ends and open at their upper ends, heating elements of similar number to that of the heating-tubes and each consisting of a platinum tube closed at its lower end and having openings at its upper end and an interior tube for conducting carbureted air to the bottom of the platinum tube, and a removable plate to which the heating elements are fixed, substantially as herein set forth.

3. In an apparatus for heating liquid or gaseous bodies, a heating element consisting of an outer heating-tube closed at the lower

end and fixed at its upper end to the end plate or cover of a strong reservoir traversed by the fluid to be heated, a platinum tube closed at its lower end and having openings at its upper end, a tube in the interior of the platinum tube to conduct carbureted air to the lower part of the platinum tube, a movable plate to which the heating element is fixed, and a flexible tube and regulating-cock applied to the interior tube, substantially as herein set forth.

4. In apparatus for heating liquid or gaseous bodies, a heating element consisting of an outer heating-tube closed at the lower end, a strong reservoir traversed by the fluid to be heated, an end plate or cover therefor to which said tube is fixed at its upper end, a platinum tube closed at its lower end and having openings at its upper end, a tube in the interior of the platinum tube to conduct carbureted air to the lower part of the platinum tube, a perforated metallic tube interposed between the platinum tube and the outer heating-tube, a movable plate to which the heating element is fixed, and a flexible tube and regulating-cock applied to the interior tube, substantially as herein set forth.

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

AUGUSTIN PRAT.

Witnesses:

GASTON JEAUNIAUX,
MARIN VACHOR.