

No. 664,644.

Patented Dec. 25, 1900.

J. KELLING.

LOW PRESSURE STEAM HEATING APPARATUS.

(Application filed July 22, 1899.)

(No Model.)

Figure 1.

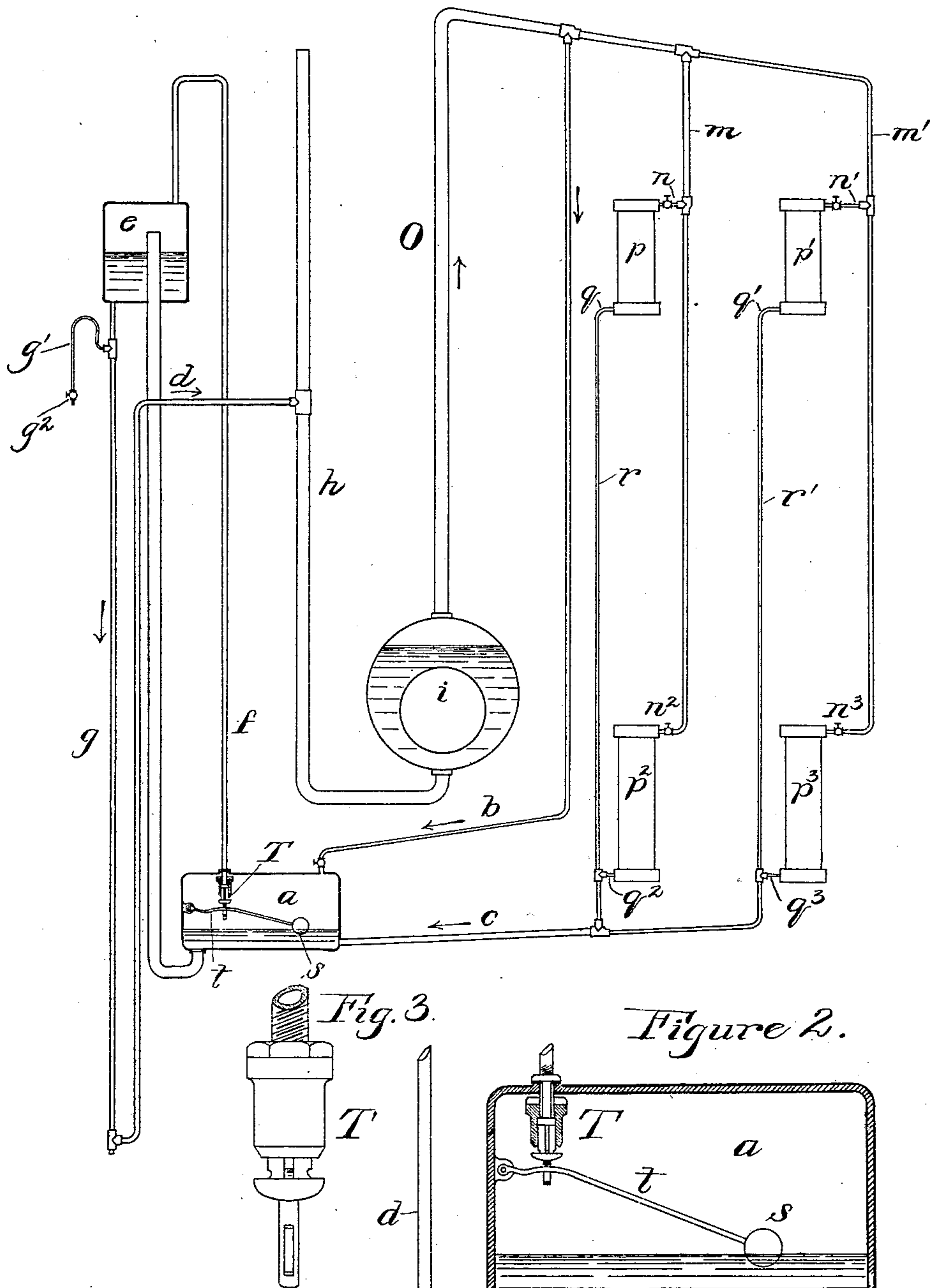
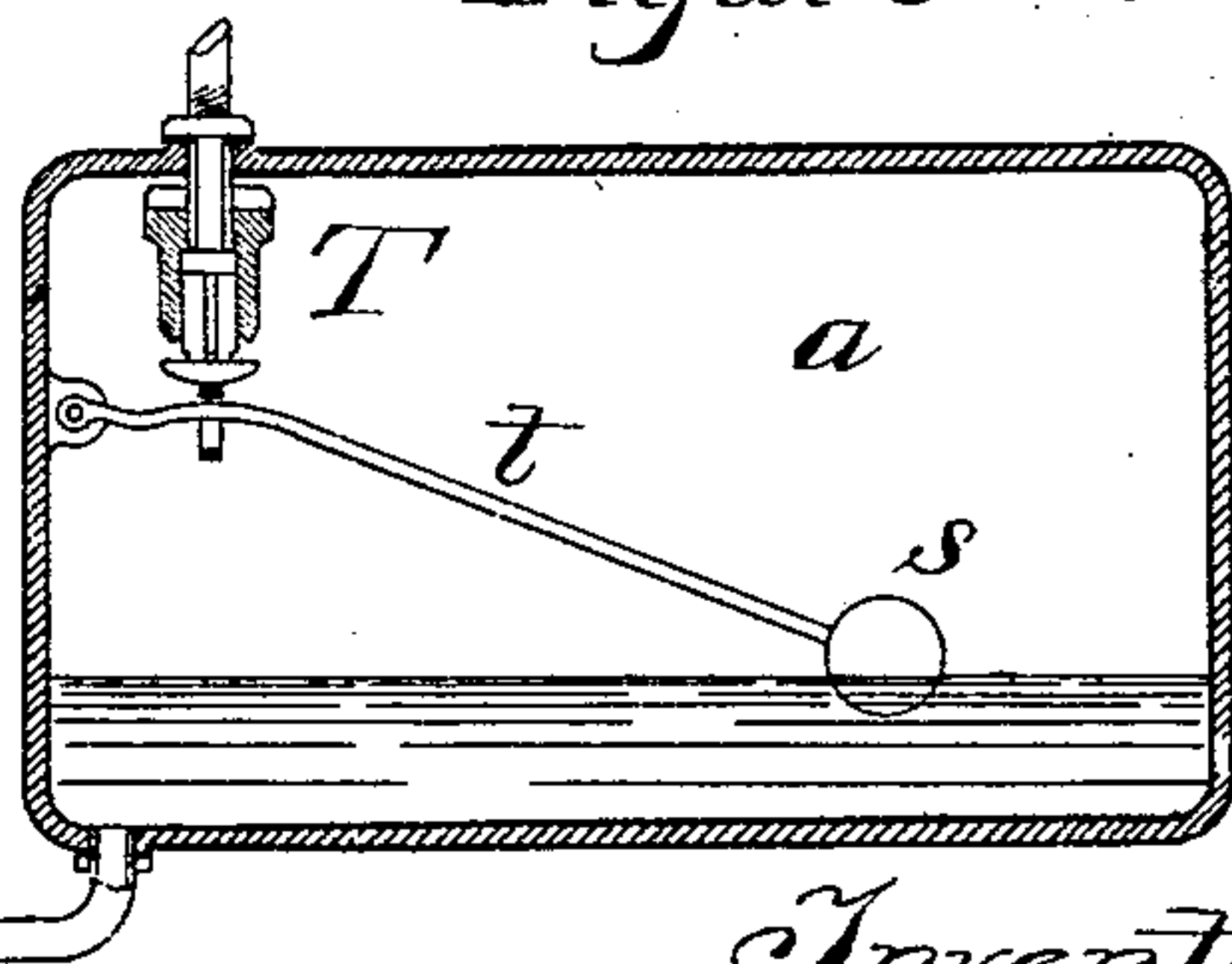


Figure 2.



Witnesses,
George D. Richards
P. P. Horick.

Inventor,
Johannes Kelling
by W. H. Babcock
Attorney

UNITED STATES PATENT OFFICE.

JOHANNES KELLING, OF VIENNA, AUSTRIA-HUNGARY.

LOW-PRESSURE STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 664,644, dated December 25, 1900.

Application filed July 22, 1899. Serial No. 724,868. (No model.)

To all whom it may concern:

Be it known that I, JOHANNES KELLING, engineer, a citizen of Germany, residing at Vienna, Austria-Hungary, have invented certain new and useful Improvements in Low-Pressure Steam Heating Apparatus; and I do hereby 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.

The object of this invention is to provide satisfactory means for returning water of condensation to the boiler of a steam heating apparatus or system with a regular and even flow, the same being governed by a vacuum-box and connected devices.

To this end the said invention consists, primarily, in the combination of a reservoir which receives the water of condensation and means governed by a vacuum for automatically maintaining a regular supply of this water from the said reservoir to the generating device of the heating apparatus.

The said invention also consists more particularly of certain constructions, combinations, and arrangements of parts hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a side view, partly in elevation and partly in vertical section, of the device embodying my invention. Fig. 2 represents a vertical longitudinal detail section, enlarged, of the reservoir *a*, the float-valve and pipe *d* being shown in elevation; and Fig. 3 represents an enlarged detail view of the valve in elevation.

The boiler *i* is connected by its main outlet-pipe *o*, branch pipes *m m'*, and their short lateral branches *n n' n² n³* to steam-heaters *p p' p² p³*. These heaters allow the water of condensation to flow through branches *q q' q² q³*, branch pipes *r r*, and pipe *c* into a reservoir *a*. An inlet steam-pipe *b* extends down from the pipe *o* between the boiler and the first branch pipe *m* to the said reservoir. An outlet steam-pipe *f* extends from the upper part of the interior of this reservoir to the upper part of a vacuum-box *e*. A water-pipe *d* extends from the bottom of the said reservoir up through the bottom of the said vacuum-box to a point above the middle of

the latter. An outlet water-pipe *g* extends from the bottom of this vacuum-box to the inlet-pipe *h* of the boiler *i*, completing the water-circuit. This pipe *g* is constructed with a long bend below the level of its point of discharge in order that any steam carried by the water may be cooled and liquefied. It is also provided near its upper end with a short branch pipe *g'*, having a cock *g²* at its end whereby water may be drawn from it as needed. Within the reservoir *a* a small arm or lever *t* is pivoted to the side wall of the same for vertical motion and has on its free end a float *s*. It also carries a valve *T*, which closes the lower end of pipe *f* aforesaid when the float *s* is in its highest position. While this continues the steam in the pipe *f* and the upper part of box *e* not being reinforced will contract in volume by condensation, making a partial vacuum. As a result thereof the water of condensation in reservoir *a* will be forced up into the said vacuum-box by the pressure of steam coming through pipe *b* until the level in the reservoir is so far reduced that the said float and valve are allowed to sink, opening the said pipe *f*. Steam then flows up through the pipe *f* into the said vacuum-box *e*, and the flow of water through pipe *d* ceases by reason of diminished pressure behind it and increased resistance in front. The steam thus flowing into vacuum-box *e* reinforces the action of gravity in causing the water to flow from box *e* through pipe *g* to inlet-pipe *h* and boiler *i*. This action continues until the water of condensation accumulating in reservoir *a* raises the said float and valve *T*, so as to close the pipe *f*. Thus an automatic regulating action is maintained, insuring a tolerably even flow of the water of condensation back to the boiler, the same being governed by the said vacuum-box and the float and valve, with the necessary tubular connections.

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

1. A boiler and its inlet and outlet pipes, in combination with a reservoir *a* for water of condensation, a pipe conveying such water from the outlet-pipe to the said reservoir, a steam-pipe *b* extending from the said reservoir to the said outlet-pipe, a vacuum-cham-

ber *e*, a steam-pipe *f* connecting the upper part of the said reservoir with the upper part of the vacuum-chamber, a water-pipe *d* extending from the lower part of the said reservoir up into the said vacuum-chamber, a pipe *g* extending from the bottom of the said vacuum-chamber to the inlet-pipe *h*, and a float and valve arranged within the said reservoir for the purpose of closing the steam-pipe *f* when the water reaches a certain height and opening it as the water falls below the same, thereby maintaining an approximately even and continuous return of the water of condensation to the boiler by the use of a single float, substantially as set forth.

2. A boiler and its inlet and outlet pipes, in combination with a heating system supplied by said boiler, a reservoir *a* for water

of condensation, pipes *b*, *c*, leading into the said reservoir from the outlet-pipe and heaters respectively, a vacuum-chamber, a steam-pipe leading from the said reservoir to the said chamber, a float and valve in the said reservoir, automatically opening or closing the said steam-pipe as the water of condensation falls or rises, a water-pipe connecting the said reservoir and chamber and an additional water-pipe connecting the latter with the inlet-pipe *h* of the boiler, substantially as set forth.

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

JOHANNES KELLING.

Witnesses:

LOUIS PAPPENHEIM,
ALVESTO S. HOGUE.