No. 715,514. Patented Dec. 9, 1902.

L. J. M. ROUQUAUD.

HEATING SYSTEM.

(Application filed May 1, 1900.)

(No Model.)

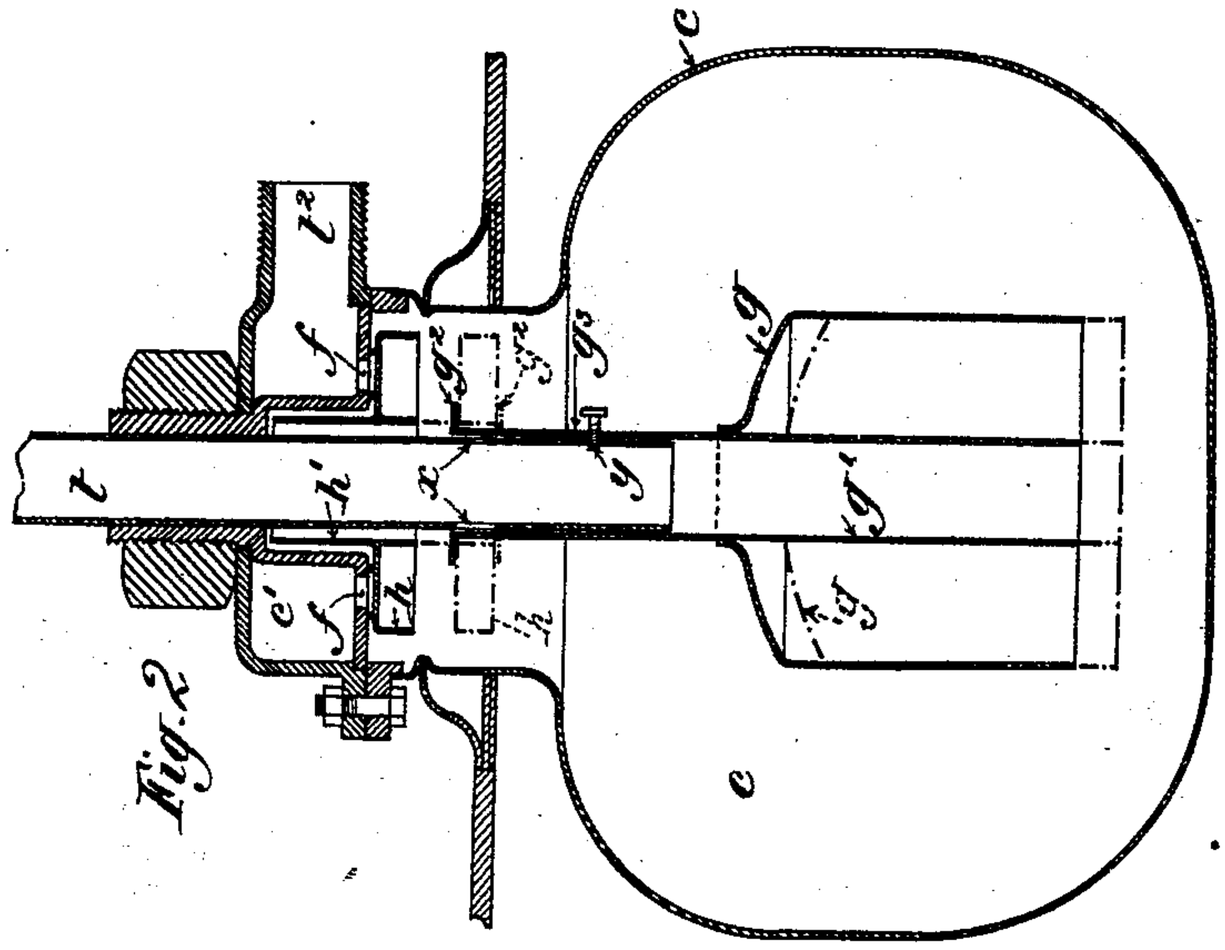
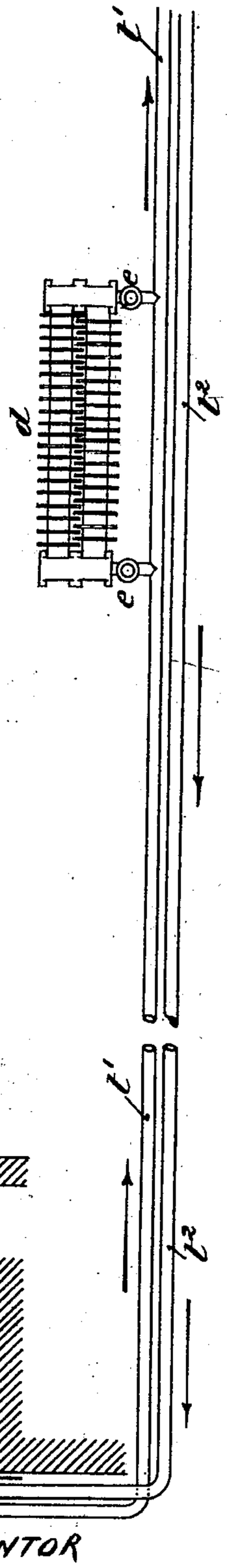


Fig. 2

Fig. 1



WITNESSES:

F. C. Wright

J. C. Connor

INVENTOR

LUCIEN J. MODESTE ROUQUAUD

BY

Howson and Howson

HIS ATTORNEYS.

UNITED STATES PATENT OFFICE.

LUCIEN JEAN MODESTE ROUQUAUD, OF KIEFF, RUSSIA.

HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 715,514, dated December 9, 1902.

Application filed May 1, 1900. Serial No. 15,096. (No model.)

To all whom it may concern:

Be it known that I, LUCIEN JEAN MODESTE ROUQUAUD, a resident of Kieff, Russia, have invented a certain new and useful Improved Heating System, of which the following is a specification.

This invention relates to an improved heating system.

The arrangement is characterized by the combination of a mechanical and intermittent circulation apparatus of peculiar construction intended to heat the water and an arrangement of circulation-pipes for the said hot water with a view to its distribution to the heating apparatuses proper, such as radiators, stoves, and the like.

Though I have confined myself in this application to the description of a hot-water heating system, it will be understood that the essence of my invention—*i. e.*, the securing of an intermittent circulation—may be applied to numerous apparatus requiring such circulation—such, for instance, as tea-urns, coffee-pots, samovars, and the like—as illustrated in my application, Serial No. 15,095, filed May 1, 1900.

The improved heating arrangement is shown in the accompanying drawings, in which the same letters indicate similar parts in both figures.

Figure 1 is a view of the whole of the heating apparatus, and Fig. 2 represents a detail in section of the apparatus for mechanical and intermittent circulation intended for heating the water.

As may be seen from the drawings, the system comprises a boiler *c* of peculiar construction and variable form. Said boiler is mounted in a suitable furnace, such as *b*—for instance, a kitchen fire—the one represented in the drawings being provided with double walls *b'*, between which the water intended for feeding the boiler *c* may circulate. Above this latter a reservoir *r* is arranged, into which the hot water arising from the said boiler *c* is discharged. *a* is a second reservoir intended for making good the losses due to evaporation, and in the interior of the reservoir *a* a coil *a'* is arranged for condensing the steam, as will be hereinafter explained. A retaining-valve is placed at *k*, which insures the feeding of the system.

t is a discharge-pipe conveying water from the boiler *c* to the reservoir *r*. *t'* is the pipe by means of which the radiators *d*, stoves, or other suitable heating apparatuses are fed with warm water. t^2 is the return-pipe of this series of pipes and which returns the cool water back to the boiler *c*, passing through the reheater *b'*. A special pipe t^3 places this reheater in communication with the reservoir *r*. On the pipe t^3 a tap t^4 is arranged, which is normally closed, but which allows of communication being established between the reservoir *r* and the reheater *b'* in the event of steam being formed in the interior of the latter or the water expanding and then requiring a means of escape. Taps *e*, arranged at the entrance and exit of the radiators *d*, enable the passage of the hot water into the said apparatuses to be regulated.

The boiler intended for heating the water, which is shown in detail in Fig. 2, comprises a chamber *c*, forming the boiler proper, and a chamber *c'* in communication with a return-pipe t^2. These two chambers may mutually communicate by means of openings *f*. The discharge-pipe *t* opens toward the center of the boiler *c* and serves as guide for a pipe *g'*, attached firmly to a bell *g*, forming a float, as will be hereinafter explained. A second float *h*, firmly attached to a pipe *h'*, is arranged above the former float *g*. The pipe *h'*, surrounding the pipe *t*, serves as a guide and also limits the descent of the float *h* by resting on a shoulder or projecting part g^2, which terminates the tube *g'*. It will be noticed that the pipe *t* is provided with openings at *x* and the pipe *g'* of the float *g* is provided at g^3 with a notch, in which a screw *y*, firmly mounted in the pipe *t*, engages.

The following is the working of this heating arrangement when in action: The pipes *t' t²* and the radiators *d* are filled with water; also, the reservoir *r*, this latter only to a certain extent. If the boiler *c* be considered as being full of water, the float *h* will occupy its highest position, (shown in full lines in Fig. 2,) and the float *g*, owing to its weight, will

occupy the lowest position, (indicated in dotted lines in the same figure,) which position it will maintain until steam which has been generated occupies the interior of the bell *g* to the practical exclusion of water, whereupon the float will rise. When the boiler *c* is full of water, the float *h* will rise on account of its buoyancy and close the opening *f*, the pipe *g'* of the float *g* at that time uncovering the openings *x* of the pipe *t*. Under the action of the heat developed in the furnace *b* the temperature of the water contained in boiler *c* rises progressively until steam is produced, which then accumulates in the upper part of the interior of bell, forming the float *g*. In proportion as the quantity of steam produced increases, it is evident that it will occupy a larger space under the bell *g* and will expel what water may be in the bell, and consequently lighten the float, which, sliding on the pipe *t*, will at a given moment close the openings *x* by means of the pipe *g'*, when the two floats will occupy the position shown in Fig. 2. From this moment the steam produced in the boiler *c*, which might escape by the said openings *x*, accumulates under the upper float *h*, which it holds in place even when the level of the water is lowered in the boiler by reason of the evaporation of the liquid. The steam produced in the boiler is compressed, and under its action the water contained in the latter is ejected by the pipe *t* into the reservoir *r*. In the course of this ejection the moment is reached when the float *g* by reason of its weight and the ejection of the surrounding water falls back into its primitive position. In consequence of this movement the openings *x* are uncovered and the steam in the boiler escapes by the pipe *t* in order to pass into the resorvoir *r* and from thence to the condenser *a'*. The float *h* being no longer subjected to the pressure of the water contained in the chamber *c'* falls onto the projection g^2 in the position shown in dotted lines in Fig. 2, thus giving passage to this water, which again fills the boiler. It will be seen from the foregoing that though I term the part *h* a "float" it has only the function of a true float part of the time, as it is held in place part of the time by steam-pressure on its under side. The float *h*, lifted by the water when its level rises in the boiler *c*, again closes the openings *f*, and the boiler is again exactly in the same condition as it was at the moment when the description of the working of this apparatus was commenced. A fresh ejection of hot water into the reservoir *r* is produced in the same manner as the previous one, then a third, &c., in an intermittent manner. The reservoir *r* is thus continually fed with hot water arising from the boiler *c*. The water of this reservoir after each feed from the boiler *c* tends to return toward the latter, which is placed at a lower level than it, and there is thus a circulation established in this direction through the pipes t' t^2. The hot-water radiators or stoves *d* exchange a portion of their cold water for an equal portion of hot water delivered by the pipe *t*, which feeds all the heating apparatuses proper.

The taps *e*, regulating the feed of these apparatuses, enable the heating to be modified or increased according to requirements, and thus to spread the distribution of the hot water over all the radiators, the first as well as the last in the series, with the object of producing a practically equal heating in spite of the cooling of the water in circulation in the pipe t'. If, in fact, the two end radiators of the same size are to be regulated it will be easy to do this in a practical manner; the taps *e* of the first remaining half open only for the rise of, for instance, ten liters of water at 90°—say nine hundred calories per hour—while the taps *e* of the second radiator, which are more widely open, will allow fifteen liters of water at 60° to pass—say, also, nine hundred calories per hour.

It is easy to understand that the water returned toward the boiler *c* by the pipe t^2 and which enters first of all the reheater *b'* will be considerably cooled by reason of the exchanges operated successively between the pipes and the radiators. It will also be noticed that the quantity of water necessary in this system of heating is constant and is maintained so by the reservoir *a*, which plays the part of a float-tank and communicates with the pipe t^2 by means of a pipe *k'*, on which the retaining-valve *k* is mounted.

I claim as my invention—

1. An apparatus for securing the intermittent circulation of liquid, comprising a boiler provided with an admission-passage in its upper part, and ejection-pipe having an opening providing communication at all times with the boiler, and a second opening above the first also providing communication with the boiler means for controlling said second opening, and a valve adapted to automatically control the admission-passage as and for the purpose described.

2. An apparatus for securing intermittent circulation of liquid, comprising a boiler having an admission-passage in its upper part and an ejection-pipe having an opening at its lower end at all times communicating with the boiler, a valve controlling the admission-passage, a bell adapted to float at different levels and passages to the ejection-pipe above said float but below the admission-passage, said ejection-pipe passages being adapted to be automatically closed by the bell at its higher level, substantially as described.

3. An apparatus for securing intermittent circulation of liquids, comprising a boiler having an admission-passage and an ejection-pipe terminating within the boiler in an open-ended tube, a valve at the admission-passage,

a float-bell surrounding said open-ended tube, said bell being adapted to assume different levels at admission and ejection, said open-ended tube having passages in its upper portion and means to close them when the bell is in its higher position, as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LUCIEN JEAN MODESTE ROUQUAUD. [L.S.]

Witnesses:

BOLESKAW HARODZINKY,

NIASINERCRC NIVASSOVIRKY.