No. 666,537. Patented Jan. 22, 1901.

M. LEVI & G. RADONICICH.

SUPERHEATING APPARATUS FOR FEED WATER OF MARINE BOILERS.

(Application filed Feb. 21, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig: 1.

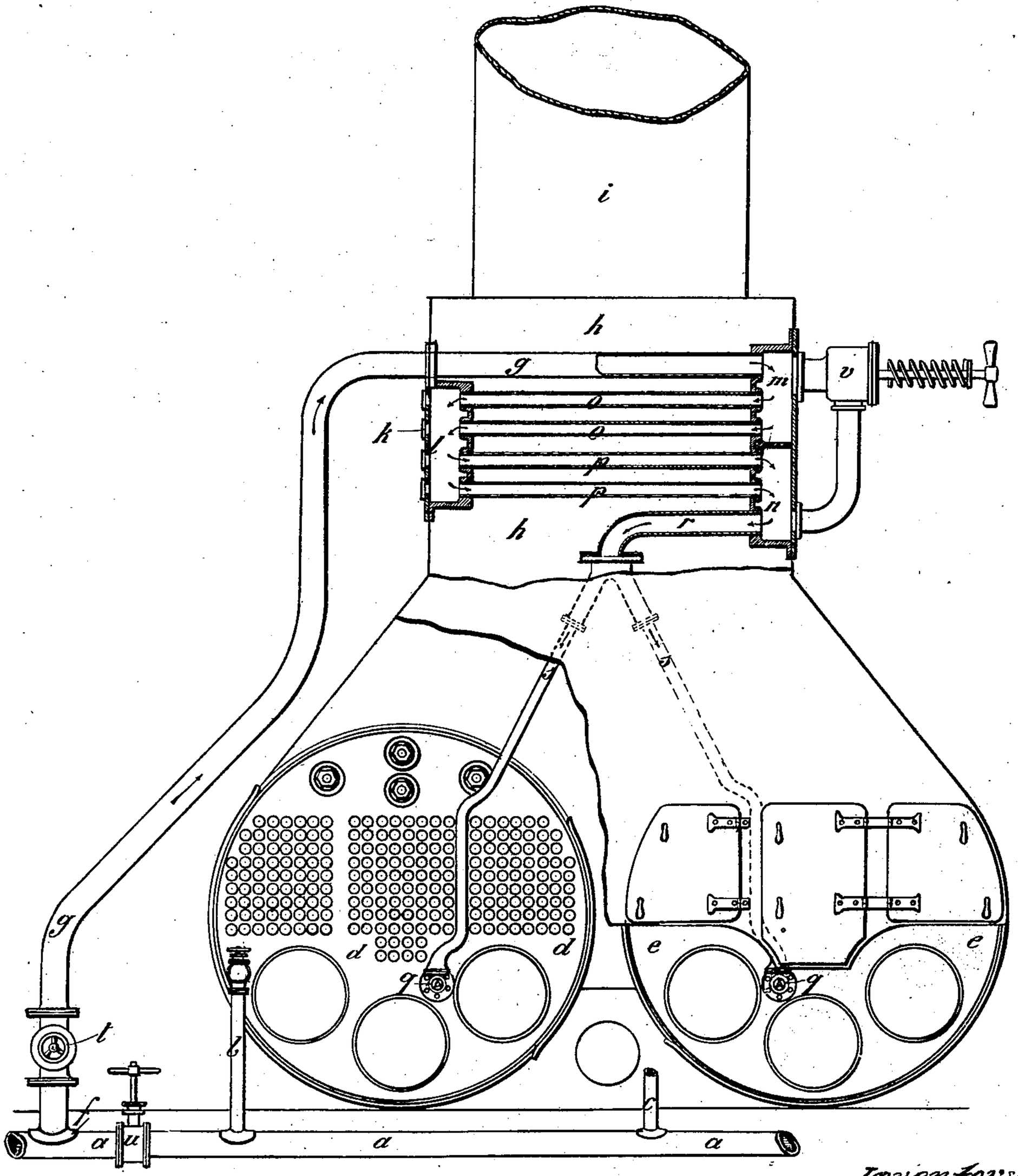

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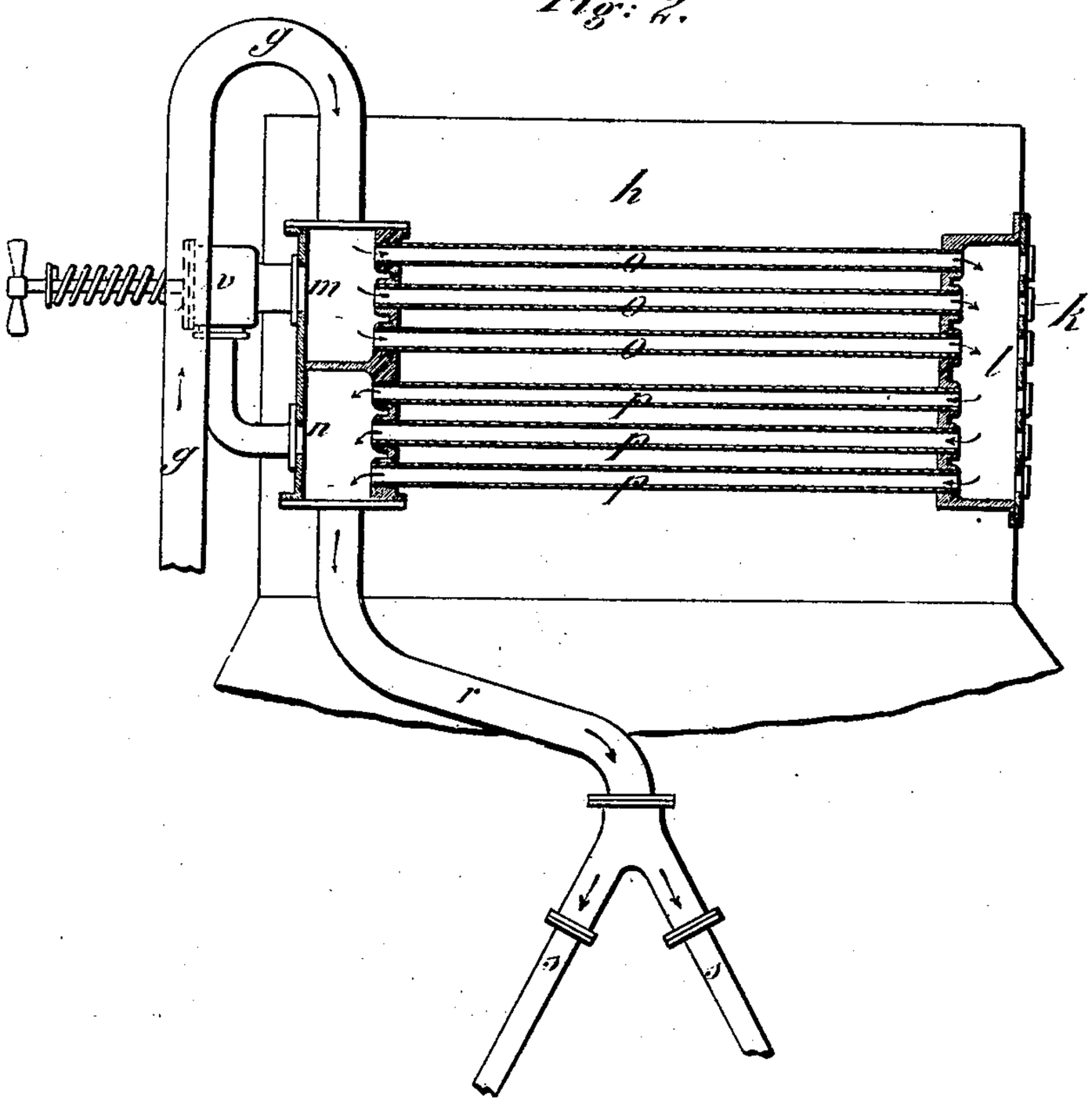
Fig: 2.



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UNITED STATES PATENT OFFICE.

MASSIMO LEVI AND GIACOMO RADONICICH, OF VENICE, ITALY.

SUPERHEATING APPARATUS FOR FEED-WATER OF MARINE BOILERS.

SPECIFICATION forming part of Letters Patent No. 666,537, dated January 22, 1901.

Application filed February 21, 1900. Serial No. 6,113. (No model.)

To all whom it may concern:

Be it known that we, MASSIMO LEVI and GIACOMO RADONICICH, citizens of the Kingdom of Italy, residing at Venice, Italy, have invented a new and useful Improvement in Superheating Apparatus for the Feed-Water of Marine Boilers; and we do hereby declare the following to be a full, clear, and exact description of the same.

This invention has for its object to provide in the smoke-boxes of steam-boilers in general, but of marine boilers in particular, economizing tube arrangements through which the feed-water is compelled to pass before being fed into the boiler for the purpose of causing it to absorb heat from the gases of combustion in the smoke-box, whereby the expenses for fuel may be considerably diminished. Hitherto a large amount of energy has been dissipated with the hot gases into the atmosphere.

One example of apparatus according to our invention as applied to marine boilers is shown in the accompanying drawings, in which—

Figure 1 is a front elevation, partly in section, of two marine boilers with a smoke-box in their upper part and a common funnel. Fig. 2 illustrates a modification of the flow of water through the tube arrangement.

a is the main feed-pipe of the boiler in communication with the feed-pump, and *b* and *c* are branch pipes leading the water to the boilers *d* and *e* in the usual manner. A branch water-pipe *g* is connected at *f* to the main feed-pipe *a* and extends to the smoke-box *h* at the base of the funnel *i*. In the smoke-box there are located two chambers *l* and *m* *n*, the latter being divided by a diaphragm into two distinct compartments *m* and *n*. The chamber *l* communicates through the tubes *o* with the compartment *m* and through the tubes *p* with the compartment *n*. The branch pipe *g* discharges into the compartment *m*, and from the compartment *n* there extends a pipe *r*, that branches off into two feed-pipes *s*, provided with check-valves *q* for the admission of the water into the boilers. In the chamber *l* holes closed by doors *k* are provided for cleaning the tubes *o* and *p* or for substituting new ones therefor. On the main pipe *a* there is a valve *u* and on the branch pipe *g* a valve *t*. When the valve *t* is shut and the valve *u* is open, the water coming from the feed-pump is fed into the boilers through the pipes *b* and *c*. In this case the hereinbefore-described economizing apparatus is not used. When the valve *u* is shut and the valve *t* is open, the water passes through the pipe *g* into the compartment *m* and flows through the tubes *o* into the chamber *l* and from the chamber *l* through the tubes *p* into the compartment *n*. Thereupon the water, which is heated in its passage through the apparatus by the gases of combustion in the smoke-box, is fed into the boilers through the pipes *r* and *s*. Between the compartments *m* and *n* a relief-valve *v* is provided for preventing hammering.

Fig. 1 shows an arrangement in which the pipe *g* terminates in the upper compartment of the right-hand chamber, and the circulation of the water takes place accordingly; but this is immaterial, and the water may circulate in other directions, as shown by the arrows in Fig. 2. Furthermore, the pipes *o p* need not necessarily be arranged one above another in the same vertical plane, but may be and preferably are arranged so that those of one horizontal series are not vertically over those of the horizontal series next below in order that the gases of combustion may transmit a larger amount of heat to the water.

This invention may obviously be applied to one or more steam-boilers.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is—

The combination with a boiler and its smoke-box, of a chamber located on one side of said box, two chambers located on the opposite side of the smoke-box, a set of pipes extending within the smoke-box and connecting the chamber on one side with one of the chambers on the other side, another set of pipes connecting the other chamber with the one first mentioned, a normally-closed relief-valve controlling the communication of the two chambers which are located on the same side of the smoke-box, and connections from the said two chambers to the feed-water pipe and to the boiler respectively.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

MASSIMO LEVI.
GIACOMO RADONICICH.

Witnesses:
LETTERIO LABSUETTA,
A. RAZZI.