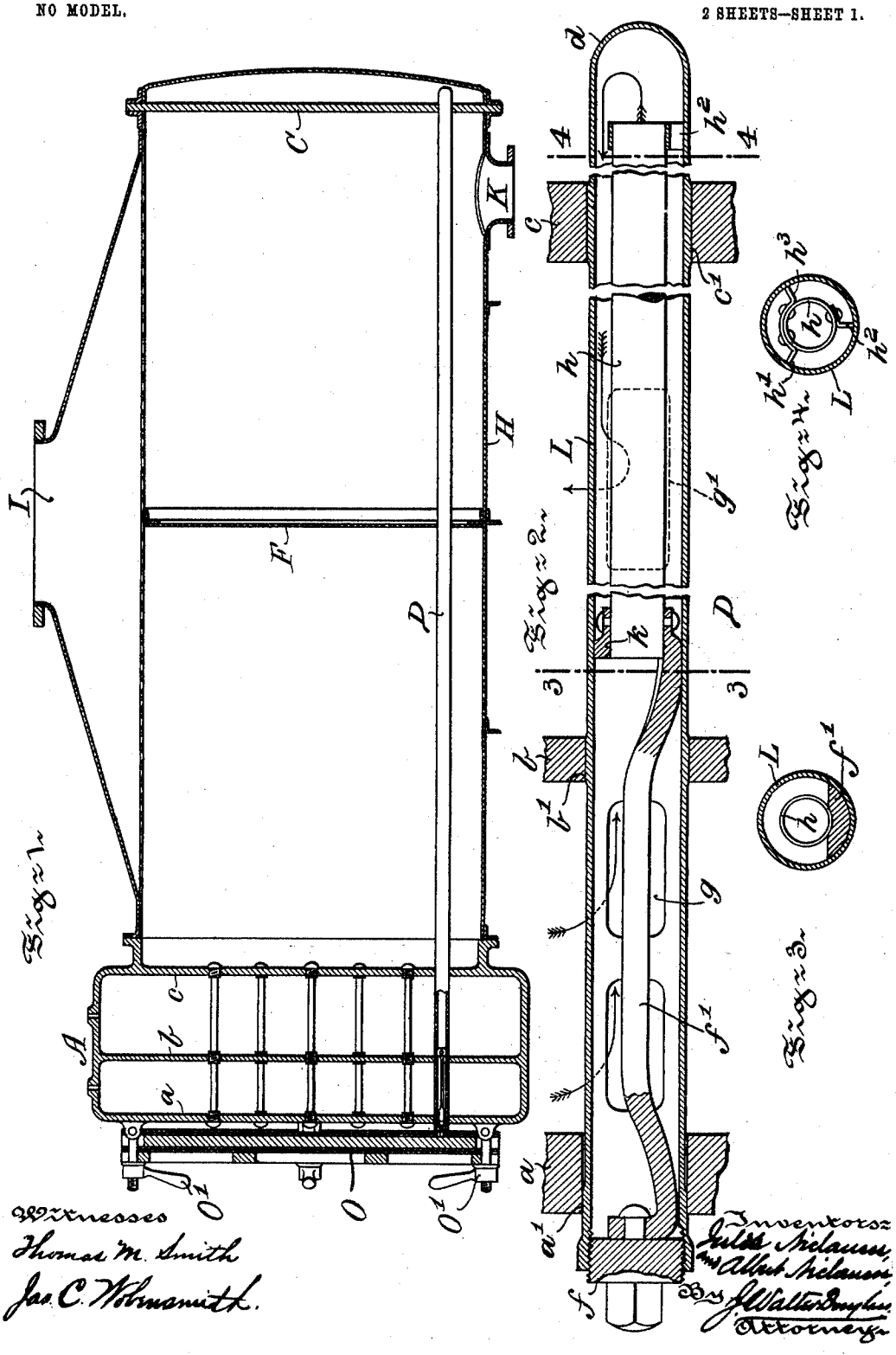
No. 760,475. PATENTED MAY 24, 1904.

J. & A. NICLAUSSE.

TUBE FOR BOILERS.

APPLICATION FILED FEB. 4, 1902.

NO MODEL. 2 SHEETS—SHEET 1.



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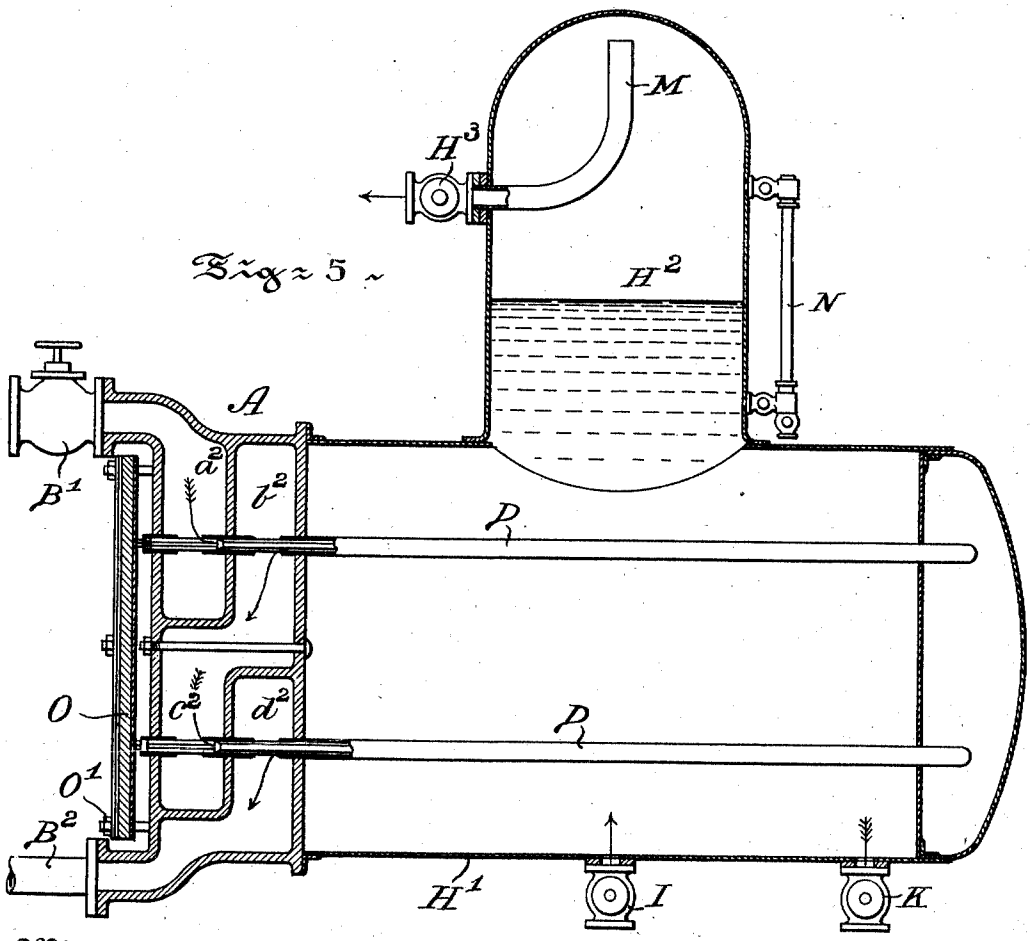
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Fig. 5.



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No. 760,475. Patented May 24, 1904.

UNITED STATES PATENT OFFICE.

JULES NICLAUSSE AND ALBERT NICLAUSSE, OF PARIS, FRANCE.

TUBE FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 760,475, dated May 24, 1904.

Application filed February 4, 1902. Serial No. 92,524. (No model.)

To all whom it may concern:

Be it known that we, JULES NICLAUSSE and ALBERT NICLAUSSE, both citizens of the Republic of France, residing at Paris, in the Republic of France, have jointly invented certain new and useful Improvements in Circulating-Tubes, of which the following is a specification.

Our invention has relation to a means or apparatus whereby the excess of temperature in one fluid or liquid may be readily transferred or exchanged to another fluid or liquid of less high temperature—as in water-heating, for instance, or, vice versa, as in water-cooling, for instance—and in such connection it relates to the construction and arrangement of a tubular body for effecting such transfer or exchange.

In our previous patents, No. 646,556, dated April 3, 1900, and No. 658,391, dated September 25, 1900, we have described a system of circulatory tubes for use in steam boilers or generators, and in these patents a special form or forms of tubular bodies are described adapted to receive in an internal tube the water to be vaporized and to vaporize in an external surrounding tube said water prior to its delivery to the steam-receiver. In our present invention we have progressed farther in the construction and arrangement of tubular bodies of similar character whereby said bodies may be utilized as a means for exchanging temperature between liquids or fluids of varying temperatures—as, for instance, in an apparatus wherein exhaust-steam is condensed by surface contact with steam-condensing tubes, in an apparatus for superheating steam, or in an apparatus for evaporating water.

The nature and scope of our invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a longitudinal sectional view of a steam-condenser embodying main features of our invention, all but one of our improved tubular bodies being removed for the sake of clearness of illustration. Fig. 2 is an enlarged longitudinal sectional view of one of the tubular bodies. Figs. 3 and 4 are cross-sectional views taken, respectively, on the lines 3 3 and 4 4 of Fig. 2; and Fig. 5 is a longitudinal sectional view of an evaporating-boiler wherein our tubular bodies are employed.

Referring to Figs. 1 to 4 of the drawings, the tubular bodies of our invention in their simplest form are illustrated as applied for use in a steam-condenser wherein the heat of exhaust-steam may pass to the water employed for circulation, and thus cause circulation of steam. The condenser consists, mainly, of the collector A, comprising a metal casing divided by a central partition *b* into two compartments. Through conical holes pierced in this partition *b* and the side walls *a* and *c* of the collector are passed one end of the tubular bodies D, as illustrated in detail in Figs. 2 to 4. To one side of the collector A is arranged the condenser consisting of the casing H, preferably provided with an intermediate partition F and an end partition C, through which the tubular bodies D may be passed with but slight friction. The exhaust-steam enters through the inlet I and expands through the whole length of the casing H, thus coming in contact with the whole length of each tubular body D, projecting beyond the collector A within the casing H. The water of condensation passes out through the pipe or outlet K, preferably located at the base of the casing adjacent to the end partition C. Referring now to Figs. 2 to 4, one form of the tubular body D is illustrated in detail. It consists, essentially, of an outer tube L, having at one end three conical enlargements *a'*, *b'*, and *c'*, for the purpose of making a tight joint with the partition *b* and walls *a* and *c* of the collector A. Between the partition *b* and wall *a* the tube L is perforated, as at *g*, and between the partition *b* and wall *c* the tube L is also perforated, as at *g'*. The tube L is closed at one end, as at *d*, while the other end is open and extends through the wall *a* of the collector A. The open end of the tube L is screw-threaded to receive a plug *f*, carrying a strap *f'*, to the flange *k* of which one end of an inner and direction tube *h* is secured. The other end of the tube *h* is centered within the outer tube L by straps *h'*, h^2, and h^3, as illustrated in Fig. 4. The flange *k*

forms a closure or wall separating the tube L into two sections—one, the inlet-section, extending to beyond the partition v, and the other, the circulating and outlet section, extending to the closed end d of the tube. The flange k and tube h permit the fluid in the front end of the tube L to pass through the pipe h into the lower end of the tube L and to circulate within said tube L back to the outlets g', discharging into the right-hand compartment of the collector A. The tube h, in effect, divides the free end of the tube L into two concentric compartments to permit of the circulation of the fluid through the inner compartment h to and through the outer compartment L and thence by the outlets g' into the outlet-chamber of the collector A. The working of the condenser is as follows: A large number of tubular bodies D traverse the collector A and the casing H, although for convenience of illustration but one body D is shown in Fig. 1 of the drawings. Exhaust-steam enters the casing H through the inlet I, and the water of condensation passes out through the outlet k. The circulation-water enters the left-hand compartment of the collector A, then passes by the inlets g into the tube L. It then passes first through the tube h of Figs. 2 to 4 and then backward through the tube L and passes out through the outlets g' into the discharge-chamber of the collector A.

In Fig. 5 is illustrated an apparatus for evaporating water, wherein the tubular bodies D may be successfully employed. In this apparatus the boiler H′ contains a number of tubular bodies D, fixed in the collector A, divided, as required, into two or more compartments a^2, b^2, c^2, or d^2. It has an inlet-pipe B and an outlet-pipe B^2. Above the casing H′ is arranged a reservoir H^2, provided with a valve H^3, located outside the reservoir H^2 upon a curved pipe M, extending upward into the reservoir H^2. In operation the reservoir H^2 and the casing H′ are filled with water or the liquid to be evaporated to a level indicated by the glass N and approximately the level shown in Fig. 5. Steam under pressure is forced through the compartment a^2 of the collector A from the pipe B′. It then passes through the two compartments of a tubular body D and discharges into the compartment b^2. It then enters the compartment c^2 and passing through another tubular body D enters the compartment d^2, from whence it discharges into the outlet-pipe B^2. The heat of the steam upon the outer tube L of the tubular bodies D heats the water in the casing H′ until steam is generated therein. This steam traverses the reservoir H^2 and passes therefrom by the pipe M and valve H^3 into the receptacle or condenser. In all forms of apparatus in which the tubular bodies D are used the bodies D are held tightly in the walls of the collector A, not only by reason of their conical joints a', b', or c', but there is also provided an elastic plate O, clamped down upon the front wall of the collector A and bearing upon the forward or left-hand end of each tubular body. This plate O is clamped by removable clamping-nuts O′, as clearly illustrated in Figs. 1 and 5. The free closed ends of the tubes L of the tubular bodies are, however, loosely supported within the casing H or H′, so that that portion of the tube outside the collector A is free to expand or contract.

Having thus described the nature and objects of our invention, what we claim as new, and desire to secure by Letters Patent, is—

The combination with a collector, comprising a casing divided by a partition into two chambers, the walls of said casing and the partition having conical openings for the reception of circulating-bodies, of a series of circulating-bodies traversing the collector, each body having on its exterior deformations fitting tightly into the conical openings of said collector, each body having an inlet and an outlet passage at its inner end in communication with the chambers of the collector and having an outer closed end, a casing loosely traversed by the outer closed ends of the tubular bodies, and an elastic clamping-plate detachably secured to the front of the collector and arranged to be advanced against the front ends of the tubular bodies.

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

JULES NICLAUSSE.
ALBERT NICLAUSSE.

Witnesses:
PAUL DE MESTRAL,
EDWARD P. MACLEAN.