

No. 857,060.

PATENTED JUNE 18, 1907.

J. HEIZMANN.
HEATING APPARATUS.
APPLICATION FILED DEC. 29, 1904.

Fig. 4.

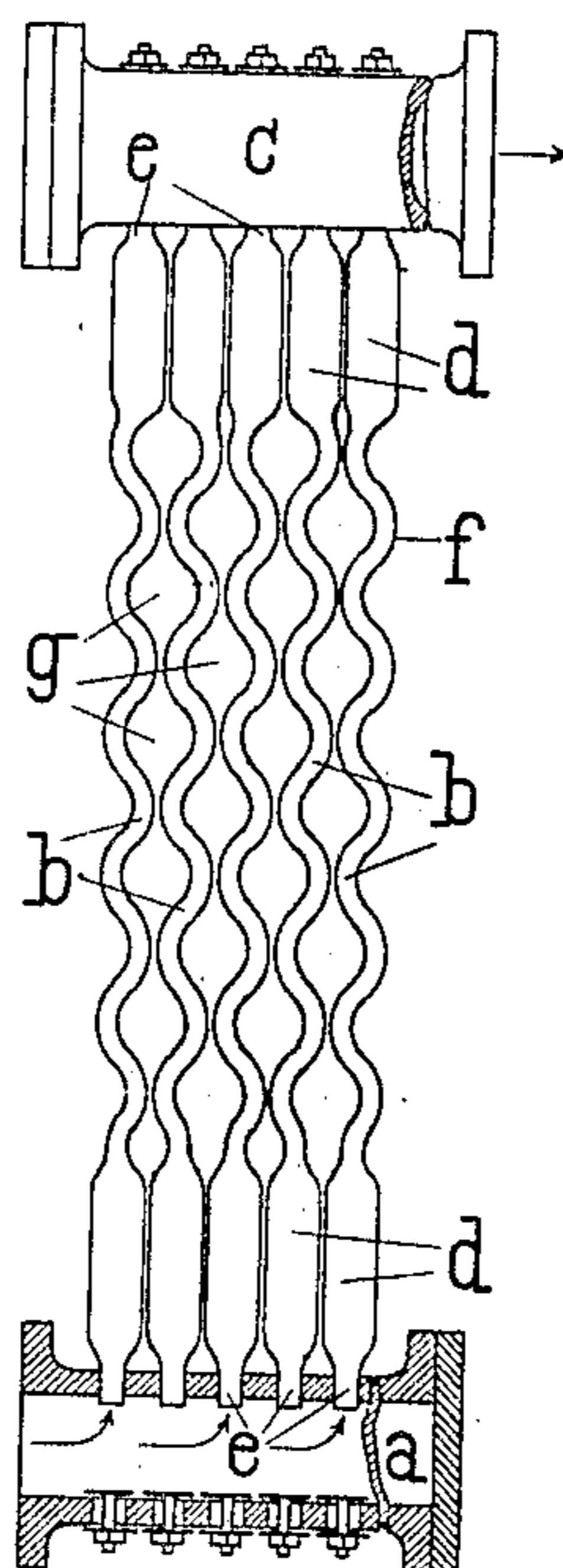


Fig. 2.

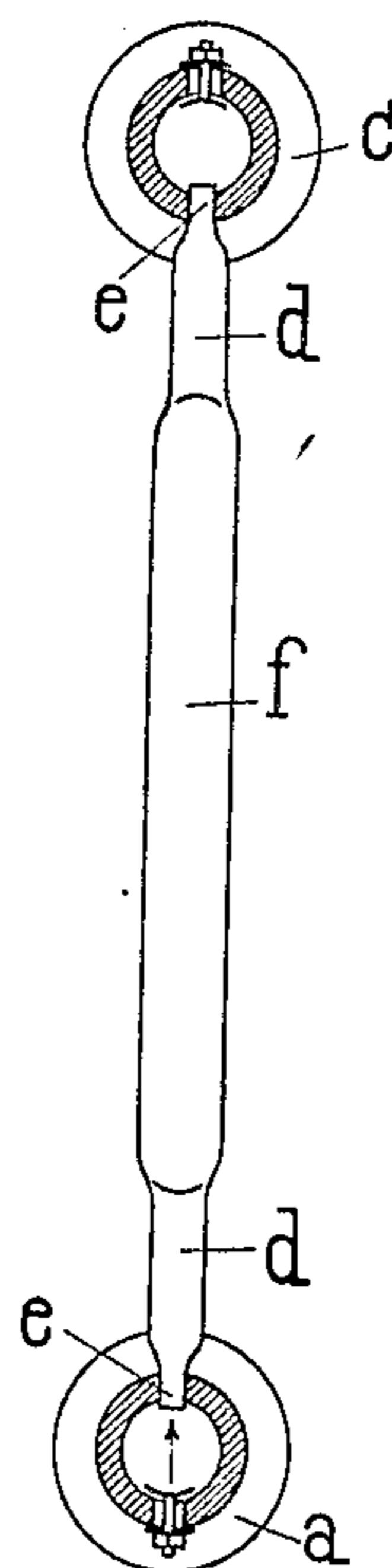
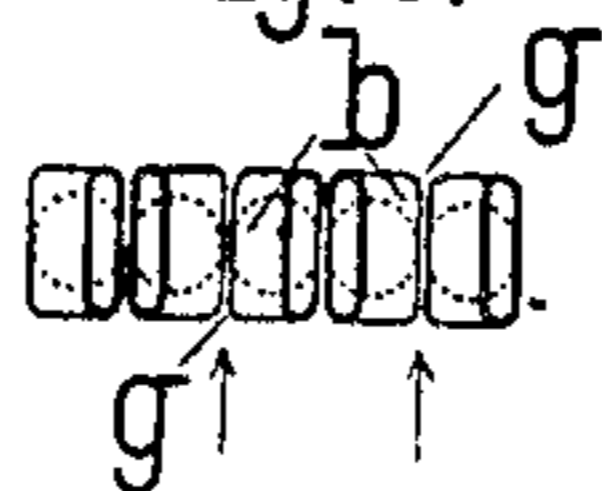


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

JULES HEIZMANN, OF STRASSBURG, GERMANY.

HEATING APPARATUS.

No. 857,060.

Specification of Letters Patent.

Patented June 18, 1907.

Application filed December 29, 1904. Serial No. 238,736.

To all whom it may concern:

Be it known that I, JULES HEIZMANN, a subject of the German Emperor, residing at Strassburg, Alsace, Germany, have invented certain new and useful Improvements in Heating or Cooling Apparatus, of which the following is a specification.

In the many constructions used for cooling, heating, superheating or the like, and consisting of tubes of constant diameter that conduct in various curvatures from a common supply member to a collecting member, the obtained working effect is not in keeping with the amount of space taken up, since the space allotted to the movement of the heating gases between the tubes, necessarily must be great, if a correspondingly large exchange of heat is to take place.

The object of the present invention is an improved heating or cooling device, shown as a superheater, the tubes of which are so formed as to insure an exceedingly intimate contact of the tube walls with the steam particles, insuring thereby a very rapid exchange of temperature.

In the drawing Figure 1 represents a side elevation and part section of the new device; Fig. 2 is a front view thereof; Fig. 3 shows a cross section.

Through the tube *a* the liquid to be warmed or the steam to be superheated enters the device. Tubes *b* then carry the steam or the like to the pipe *C*. The tubes *b* are of peculiar construction and it is this construction that forms the essential part of my invention.

I take a round tube of ordinary construction and contract each end, as at *e, e*, to a very much smaller caliber, in this instance to substantially one third the diameter of the original tube as at *d, d*. I also flatten the central portion of each tube as at *f*, the smaller diameter of such flattened portion being substantially equal to the diameter of each of the contracted end portions *e, e*, and its greater diameter being probably about four times as much. Each tube, therefore, consists of two unaltered portions *d, d*, of the original tube, two contracted ends *e*, and a central flattened portion *f* connecting the unaltered portions *d, d*. The flattened portion *f* is now bent into undulated form, and a number of tubes *b* are connected up to a tube

a and pipe *C*, the undulations of the parts *f* of adjacent tubes being so placed as to form spaces *g* between them through which the heating gases pass in heating the tubes.

The fluid to be heated or superheated in passing through tubes *b* passes into tube *a* and thence through the contracted ends *e* into portions *d* which serve as expansion chambers, where it is permitted to expand and is thus somewhat delayed in passage whereby it is longer subjected to the heat of these portions of the tubes *b*. It next is passed from said expansion chamber portions *d* into the flattened, undulated portions *f*, and the cross-sectional area of these portions being less than that of the expansion chambers *d*, the fluid is still further delayed in its passage and, owing to the flattened form of such undulated portion, almost every atom of the passing fluid comes in direct contact with the highly heated walls thereof thereby effectually heating or superheating the fluid. From these undulated portions the highly heated fluid now passes into the exit portions *d* and *e* of the tubes *b* into the pipe *C*.

This device may be used as a heater, superheater, pre-heater, or condenser of the fluid passing through tubes *b*, or a heater for the surrounding air by passing a heating gas or other fluid through said tubes.

What I claim as new is:—

A device of the character described comprising two hollow members and tubes connecting them, said connecting tubes each comprising two cylindrical portions or expansion chambers, a greatly contracted portion connecting each expansion chamber with one of the hollow members, and a central undulated flattened portion connecting the two cylindrical expansion chambers, the undulated portions of adjacent tubes being arranged to form substantially circular passages between them for the passage of a heating medium, substantially as and for the purpose set forth.

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

JULES HEIZMANN.

Witnesses:

GUSTAV SCHWEISS,
JOSEPH ROHME.