G. POLITZ.

TUBE JOINT.

APPLICATION FILED JUNE 29, 1907.

911,156. Patented Feb. 2, 1909.

Fig. 1

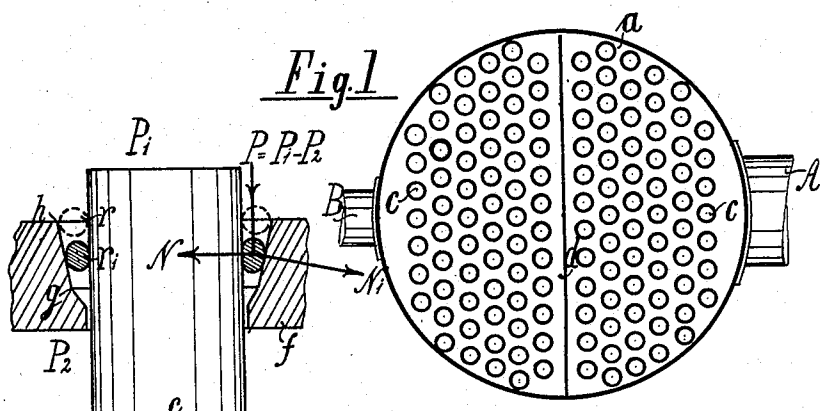


Fig. 3

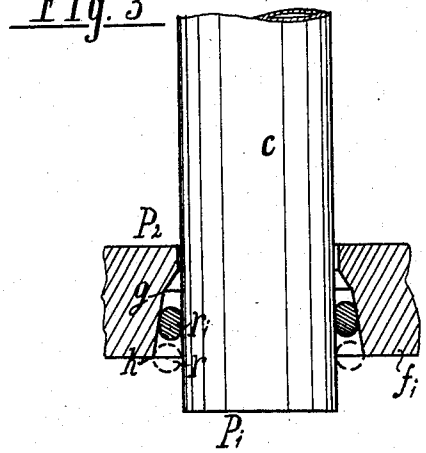


Fig. 2

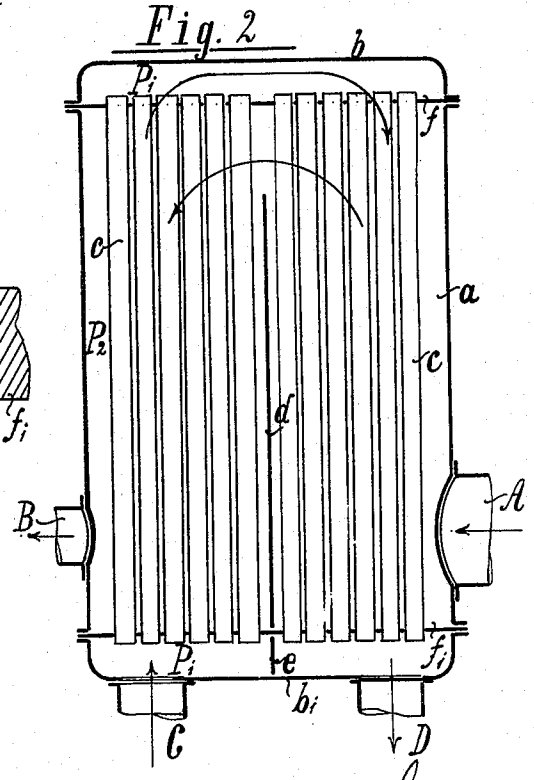
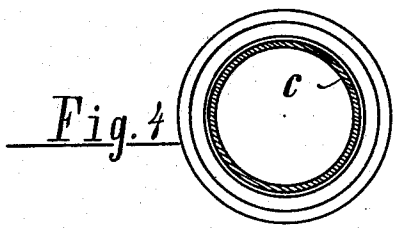


Fig. 4



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UNITED STATES PATENT OFFICE.

GUSTAV POLITZ, OF KATTOWITZ, GERMANY.

TUBE-JOINT.

No. 911,156. Specification of Letters Patent. Patented Feb. 2, 1909.

Application filed June 29, 1907. Serial No. 381,454.

To all whom it may concern:

Be it known that I, GUSTAV POLITZ, a subject of the King of Prussia, and residing at Meisterstrasse 18, Kattowitz, Upper Silesia, Germany, have invented certain new and useful Improvements in Tube-Joints, of which the following is a specification.

The present invention relates to tube-joints and in particular to tube-joints for surface-condensers.

The tube-joints according to the present invention enable the cold water tubes of surface-condensers to be readily removed for cleaning purposes and replaced again and they also remain tight when the tubes expand and also when the difference between the pressure at opposite sides of the tube plate become zero.

A tube-joint according to the present invention and its mode of application to a condenser are illustrated in the accompanying drawing, in which:—

Figure 1 is a cross-section, and Fig. 2 a vertical longitudinal section through a condenser of the kind to which the joint may be applied. Fig. 3 illustrates in section two tube-joints according to the invention, and Fig. 4 is an end of one of the joints shown in Fig. 3.

Referring in the first place to Figs. 1 and 2 which illustrate a condenser of the type to which the joint may with particular advantage be applied, *a* is the casing of the condenser, *b* and b_1 are its end-covers; *c* are the water tubes, *f* and f_1 the tube-plates forming with the casing *a* the condenser chamber, and *d* and *e* are partitions for guiding the steam and cold water in contrary directions. A is the steam admission port, B the condensed steam exhaust port, C the cold water admission opening and D the cold water emission opening. The tubes *c* pass loosely through holes in the tube-plates *f* and f_1.

Referring now to Fig. 3 a single tube *c* (shown with the middle portion absent) is represented passing at its two ends through holes in the tube-plates *f* and f_1. On the sides of the tube-plates at which the greater pressure P_1 exists slightly conical cavities *g*, *h* are made in the same round the tubes in which cavities packing rings *r* of round india rubber are inserted. These packing rings are firmly pressed into the holes *g*, *h* by the difference of pressure $P = P_1 - P_2$ which exists between the cold water and condensing chambers during working, and in their position r_1 they make a tight joint separating the two chambers one from the other. The diameter of each cavity becomes very gradually larger as the outer end of the cavity is approached, in such a way that at said outer end the diameter is somewhat larger than the outer diameter of the rubber rings. These rings when placed round the tubes and moved into position in front of the recesses are forced into the latter by the difference of pressure at their opposite sides and are clamped fast, the action being like that of a wedge, by the two components of the difference of pressure, viz. the component N perpendicular to the tube and the component N_1, perpendicular to the side of the recess. The joint-pressure in consequence of the round cross-section of the packing rings is taken up by the surfaces of comparatively small area which are formed by the flattening of the rings at the places of contact, the result being that the joints are very tight. Moreover on account of the substantially circular cross-section of the rings the latter are enabled to roll when on account of variations of the temperature a variation of the length of the tubes takes place. In this manner the tubes can expand without constraint and without wearing out the rubber rings because the latter roll on the tubes instead of the tubes sliding to and fro in the rings. The thickness of the rings and the inclination of the conical holes is according to the present invention such that the compressed rings do not resume their original round cross-section when the difference of pressure becomes zero and the tubes expand to the greatest extent. On the contrary said thickness and inclination are such that when the difference of pressure becomes zero they remain on account of friction in position against the sides of the recesses and of the tubes and that when the tubes expand they always fill up the annular space, which gradually increases in diameter toward its outer end, by tending to resume their original cross-section while rolling along the tube. The angle of inclination and the rings can be determined for each case by calculation according to the coefficient of friction and the magnitude of the differences of temperature. For average circumstances the inclination is about 1:7, the actual joint-pressure being about 7 P.

What I claim as my invention and desire to secure by Letters Patent is:

1. A device of the character described,

comprising a tube-plate having an opening therein for the reception of the tube, and a resilient annular packing encompassing the tube and received by said opening, the walls of said opening being inclined from the outer surface of said tube plate inwardly and in a direction or line, which if extended would intercept the axis of the opening and tube.

2. A device of the character described comprising a tube plate having an opening therein for the reception of the tube and an elastic annular packing circular in cross section and encompassing said tube and received by said opening, the walls of the opening being inclined from the outer surface of said tube plate inwardly and in a direction or line which if extended would intercept the axis of the opening and tube.

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

GUSTAV POLITZ.

Witnesses:

ERNST KATZ,

ERNST BLEISOH.