G. H. THOMAS.

Inserting and Securing Tubes in Vacuum Pans.

No. 13,832. Patented Nov. 20, 1855.

Fig. 2

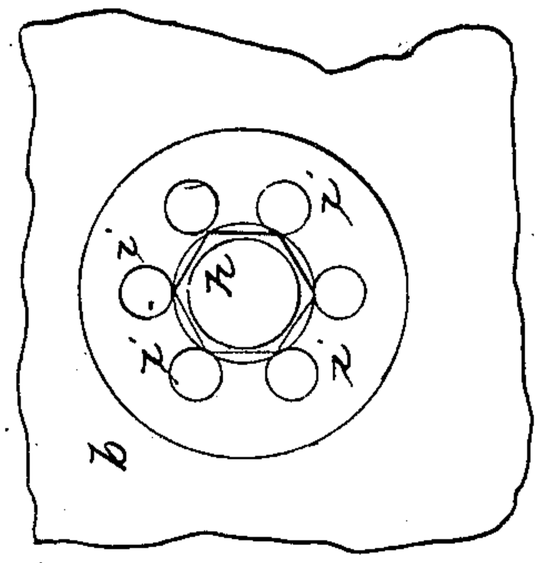
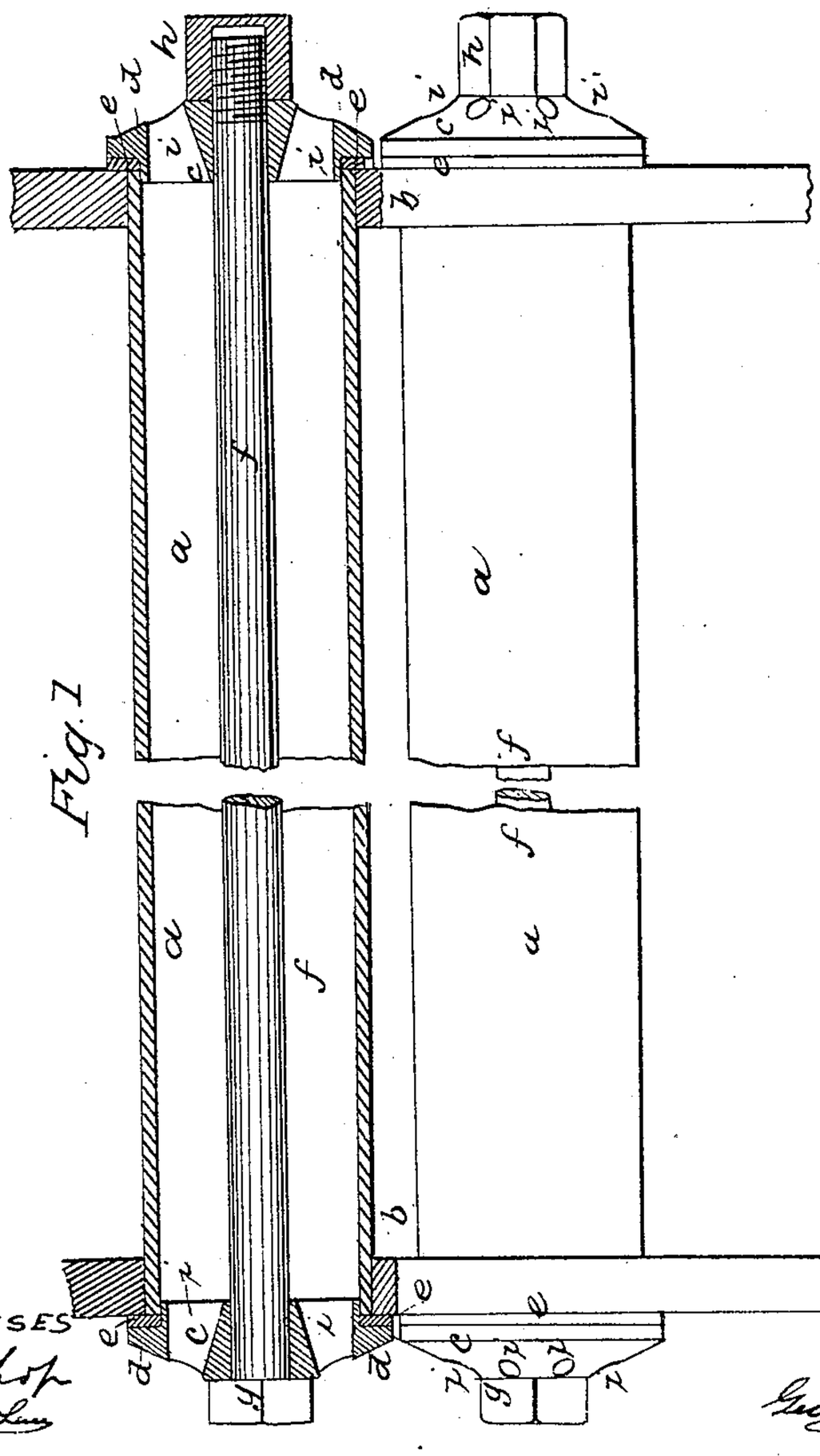


Fig. 1



WITNESSES

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IMPROVED METHOD OF INSERTING TUBES IN EVAPORATING-PANS, &c.

Specification forming part of Letters Patent No. **13,832,** dated November 20, 1855.

To all whom it may concern:

Be it known that I, GEORGE H. THOMAS, of Kingston, in the State of Massachusetts, have invented a new and useful Improvement in the Method of Inserting and Securing Tubes in Evaporating-Pans, Heaters, Condensers, and other apparatus of a like nature, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical section representing one of the tubes in elevation, and another in section; and Fig. 2, an end elevation of the method of securing the tube.

The same letters indicate like parts in the two figures.

The object of my invention is to facilitate the insertion and removal of the tubes of vacuum-pans, heaters, condensers, &c., insuring tight joints, and at the same time make allowance for the slight inequalities of expansion and contraction; and to these ends the nature of my invention consists in inserting the tubes, made without flanges or other projections on their peripheries, by passing them directly through a hole in one head of the pan, or through a tube-sheet, and into a corresponding hole in the other head or tube-sheet, until the two ends will be flush, or nearly so, with the outer surface of the two heads or plates, so that they may be readily taken out and reinserted, when this is combined with a clamp-cap at each end of the tube, and bearing against the end, and overlapping the joint, with india-rubber or elastic packing interposed, whereby the tubes can readily be inserted and removed, may be placed so near as nearly to touch, while at the same time the joints are kept tight, and the tubes may expand and contract in different degrees from the vessel to which they are secured, the elasticity of the packing admitting of such unequal expansion and contraction.

In the accompanying drawings, *a a* represent two tubes inserted and secured on my improved plan. These tubes are cylindrical from end to end, and inserted freely in holes in the two heads or tube-sheets *b b*, the ends of the tubes being flush with the outer surface of the tube-sheets *b b*. The tubes can be passed through the holes in one sheet and the end inserted in the holes in the other sheet. At each end there is a cap, *c*, fitted to enter the caliber of the tube freely, and with a projecting flange, *d*, extending all around and overlapping the end of the tube, with a ring, *e*, of india-rubber or other equivalent elastic packing interposed. These caps have each a central hole through which a bolt, *f*, passes, with a head, *g*, at one end and tapped at the other to receive a binding-nut, *h*, by which the two caps—one at each end of a tube—can be drawn toward each other to compress the packing-rings *e e* against the outer surface of the tube-sheets and the ends of the tube, whereby the joints are rendered perfectly tight. These caps are pierced with holes *i i* all around the central bolt-hole for the passage of fluid, whether liquid or aeriform, to or from the inside of the tube. In this way it will be seen that the tubes without any projection on their peripheries can be readily taken out and reinserted for cleaning or repairing, and firmly secured and held in place with perfectly tight joints, while at the same time the mode of securing them admits of unequal expansion and contraction, and of placing the series of tubes so close as almost to touch, if desired.

It will be obvious that where the tube-sheets are very large and exposed to pressure tending to force them inward they can be sustained by stay-bolts.

Although I have described the securing-caps as being perforated with numerous holes for the passage of fluid through the tubes, and with a central hole for the passage of a securing-bolt entirely through the tube and the two caps, I do not wish to be understood as limiting myself to such mode of making and securing the caps, as other equivalent modes may be substituted without changing the principle of my invention.

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

The method of securing tubes to tube-sheets by making the tubes without projections on the surface, that they may be inserted directly through holes in the tube-sheets, substantially as described, in combination with clamps at the ends, with interposed elastic packing bearing against the ends of the tubes and overlapping the joints, substantially as and for the purpose specified.

GEO. H. THOMAS.

Witnesses:

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THOS. L. THORNELL.