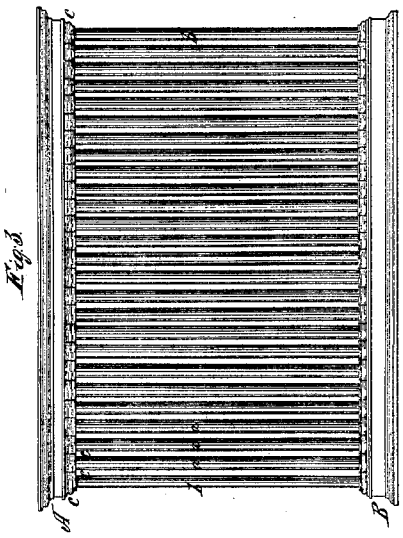
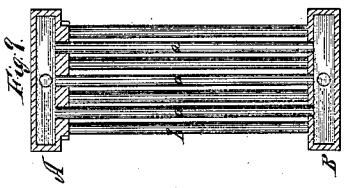
J. Nason,

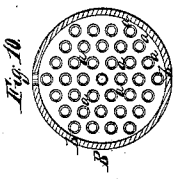
Steam-Boiler Tube.

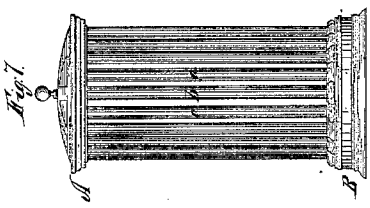
No. 16,213. Patented Dec. 9, 1856.

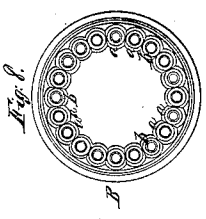


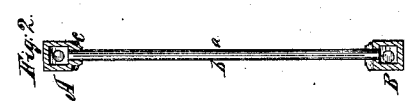


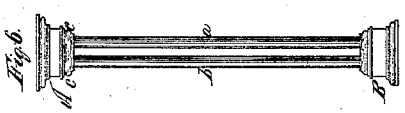


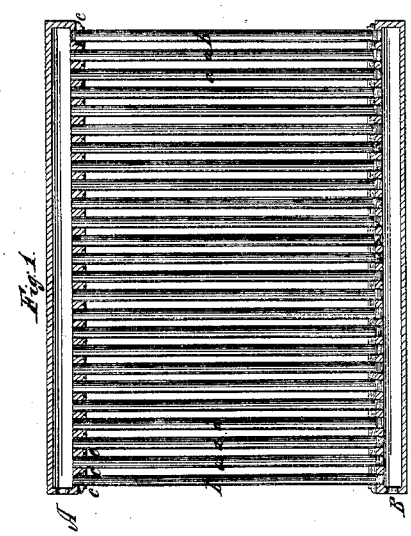


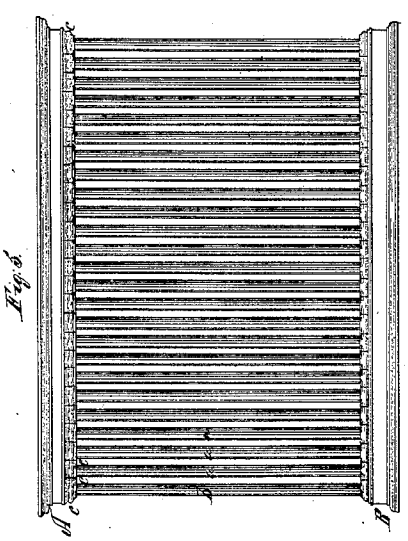












Inventor:

Jos Nason

AM. PHOTO-LITHO. CO. N.Y. (OSBORNE'S PROCESS.)

UNITED STATES PATENT OFFICE.

JOSEPH NASON, OF NEW YORK, N. Y.

IMPROVEMENT IN CONNECTING-TUBES.

Specification forming part of Letters Patent No. **16,213**, dated December 9, 1856.

To all whom it may concern:

Be it known that I, JOSEPH NASON, of the city, county, and State of New York, have invented a new and useful mode of joining the ends of a series of tubes to the cross tubes or chambers by which they are connected, to be used in the construction of steam and hot-water radiators, tubular furnaces for heating water, steam-boilers, condensers, and other apparatus, which invention is fully described and set forth in the following specification and accompanying drawings, in which—

Figure 1 is a sectional view of a series of parallel tubes and the cross tubes or chambers to which they are joined; Fig. 2, a transverse section showing a tube with a screw-joint at one end and a cylindrical joint at the other; Figs. 3 and 4, front and end elevations of a radiator with a single series of tubes; Figs. 5 and 6, front and end elevations of a radiator with a double series of tubes; Figs. 7 and 8, elevation and transverse section of a circular radiator; and Figs. 9 and 10 longitudinal and transverse sections of a cluster of tubes and the chambers to which they are joined, designed for heating or cooling water or for refrigeration.

In order to render the object of my invention more apparent, I think it well to state that the process of joining the ends of several tubes to two cross tubes or chambers with which they are to communicate is attended with much difficulty under any of the ordinary modes of making joints, and more especially if the joints are to be exposed to any considerable pressure from the incumbent steam or fluid, or disturbed by the unequal expansion and contraction from heating and cooling, to which a system of tubes thus rigidly held together is peculiarly liable. It is therefore usual to avoid this arrangement, as far as practicable, and to connect a series of parallel tubes either by return-bends or by some device which shall leave them in some degree independent of each other. Nevertheless there are many cases where it is highly desirable to retain the cross connections and the gridiron form; and my invention is intended to remove the mechanical difficulties which are inherent to the ordinary modes of construction and to counteract within certain limits the evils resulting from unequal expansion.

In the sectional view shown in Fig. 1, *a a a a b b* are parallel tubes, and A B cross-tubes to which they are joined.

Upon the proximate sides of A and B are openings to receive the tubes *a a b b*, which openings in B are threaded with right-hand screws to fit similar screws upon the lower ends of the tubes *a a b b*. The openings in A, which are designed to receive the upper ends of the tubes *a a*, are bored truly cylindrical and their depth is considerably increased by the projecting thimbles *c c c c* for the purpose of giving adequate surface to the cylindrical joints. The two openings at the extremities of A, which are to receive the upper ends of the tubes *b b*, are threaded like the openings in B, only with left instead of right hand screws. The tubes *a a* and *b b* are threaded at their lower ends with right-hand screws to fit the threaded openings in B. The upper ends of *a a* are turned or otherwise made truly cylindrical to fit the cylindrical openings in A. The upper ends of *b b* are threaded with left-hand screws to fit the threaded openings at the extremities of A.

The cross-tubes A and B and the tubes *a a* and *b b* having been prepared in the manner described, may be readily joined together by first screwing the tubes *a a* into the cross-tube B, then inserting their opposite and cylindrical ends into the corresponding openings in the cross-tube A, and lastly drawing A toward B, and the cylindrical ends of the tubes *a a* into the cylindrical openings in A by entering the threaded tubes *b b* into the right and left threaded openings in B and A and turning them in simultaneously. It will thus be seen that only two tubes in the series—namely, *b b*—contribute to support the tubes A and B and prevent the tube A from becoming separated from the cylindrical ends of the tubes *a a*. It may happen, however, that by reason of the great length of the tubes A and B or the smallness of their cross-section and the tendency to separation by internal pressure, it will not be sufficient to tie together the extremities merely of A and B, in which case additional holding-pipes *b b* are to be inserted as often as may be required in

place of the tubes *a a*. The holding-tubes *b b* may be dispensed with, and the parallel tubes, having each one screwed end and one cylindrical end, the tubes A and B may be drawn together and held by bolts and nuts or other expedients; but the holding-tubes *b b* are obviously preferable. The screwed joints may be filled with paint or other suitable material, and in some cases paint or cement may be used in the cylindrical joints. I have found, however, that for steam and hot-water purposes it is best when the tubes and chambers are of iron to rust the cylindrical joints with sal-ammoniac water or other corrosive liquid.

The mode of joining tubes here described may be applied to an indefinite number of tubes, and the cross-tubes A and B instead of being rectangular may have transversely any required figure. An example of a circular radiator is given in Figs. 7 and 8 and of a circular heater or cooler in Figs. 9 and 10, in both of which the holding-tubes are designated by *b b b* and the tubes with cylindrical ends by *a a*, as in Figs. 1 and 2.

I deem it essential that one end of each of the tubes having plain or cylindrical joints (*i. e.*, the tubes *a a*) should be firmly screwed or fastened to one of the cross-tubes A and B, as the integrity of the cylindrical joints depends mainly upon keeping the tubes *a a* unalterably in the same position.

I remark, finally, that the perfection and permanency of the cylindrical joints depend materially upon the accuracy with which they are fitted.

To facilitate the process of fitting, I have found it advantageous in practice to make a pair of cutting-tools with inside and outside cutting-teeth of exactly the same diameter, one cutter to bore the holes in A and the other to shape the ends of the tubes *a a*.

Several modes of joining the ends of straight parallel tubes to their cross-connections have been hitherto employed and are well known. In some cases the ends have all been threaded and screwed into the cross-tubes. They have also been joined with ordinary socket-joints and made tight with cement, or with flanges and bolts, and sometimes the cross-tubes have been cast upon them. I do not claim these modes, none of them being applicable to the objects contemplated in my invention.

I claim as new, and desire to secure by Letters Patent—

The mode herein specifically described of joining the straight parallel tubes *a a* and *b b* to the cross-tubes A and B by means of screws and plain cylindrical joints upon the tubes *a a* and screws upon both ends of the tubes *b b*, whereby the tubes *b b* are made to hold the cross-tubes A and B firmly in position, and the cylindrical ends of the tubes *a a* are left free to adjust themselves in their openings during the process of entering and screwing up the tubes *b b* and afterward when expanding unequally.

JOSEPH NASON.

Witnesses:
J. C. GREENOUGH,
FREDK G. BURNHAM.