A. C. Stimers,

Steam-Boiler Tube.

No. 41,545. Patented Feb. 9, 1864.

Fig. 3.

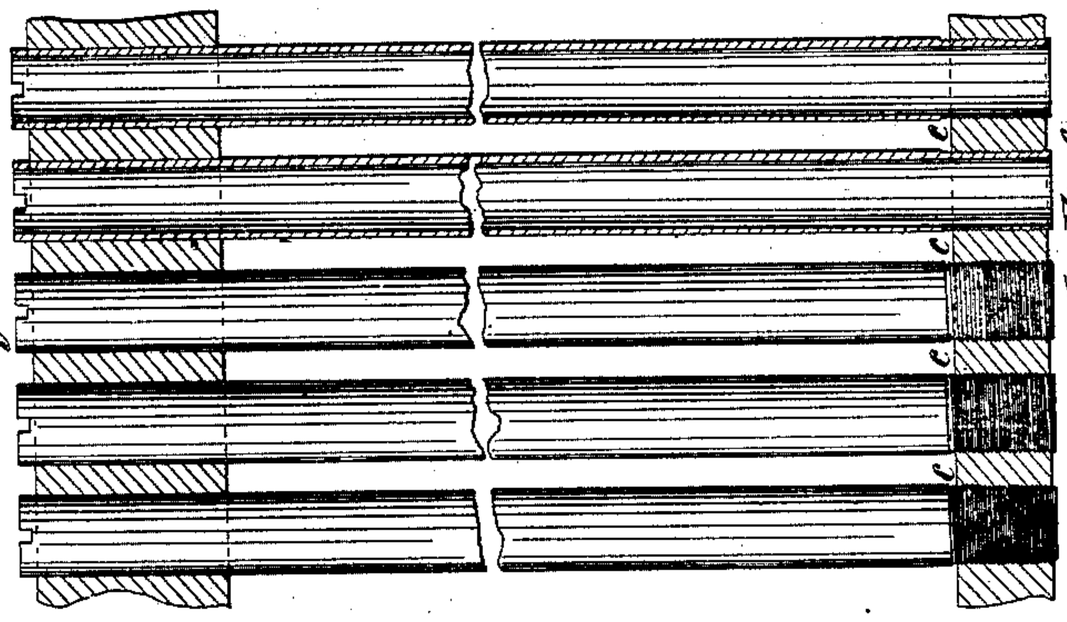


Fig. 6.

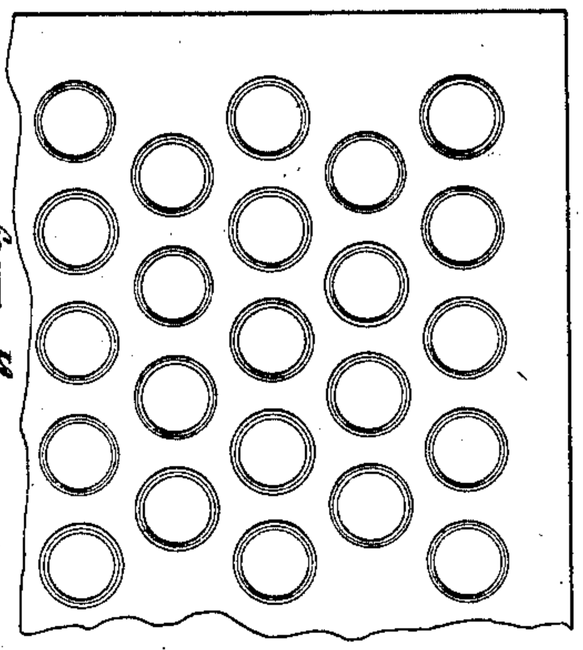


Fig. 2.

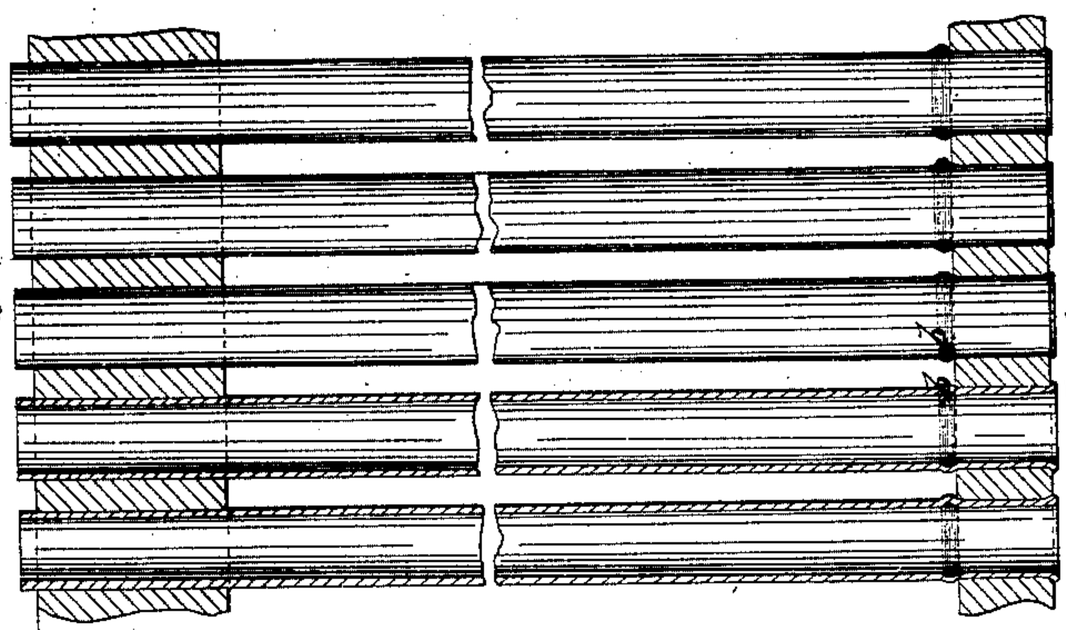


Fig. 5.

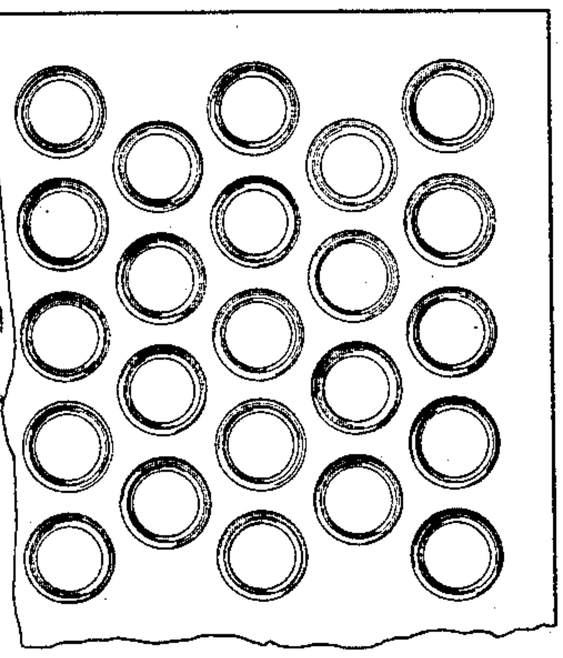


Fig. 7.

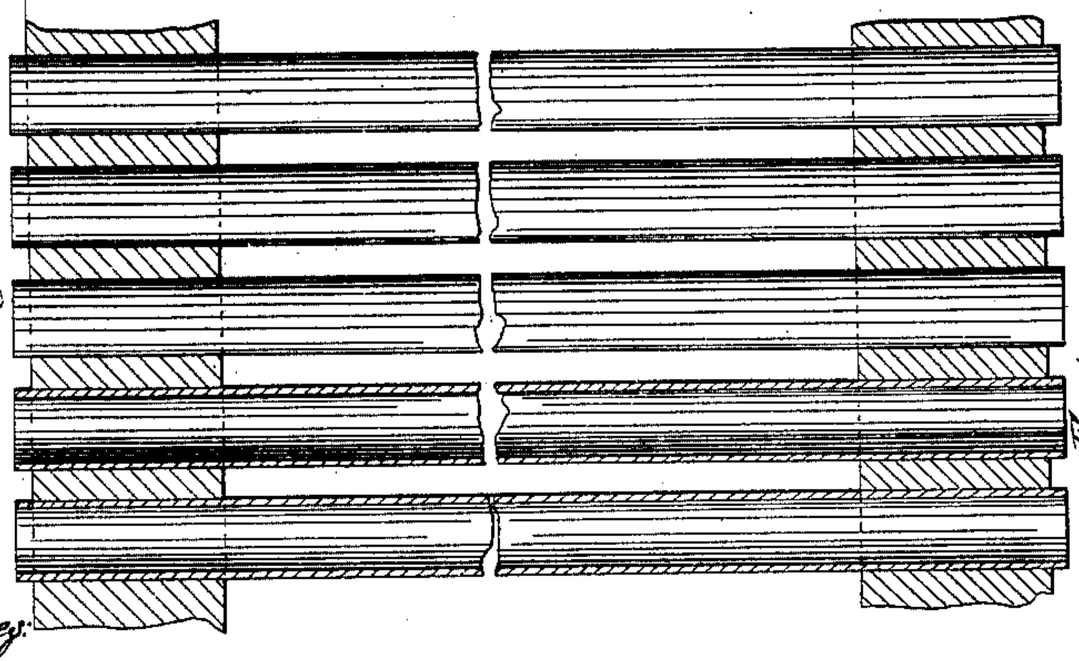
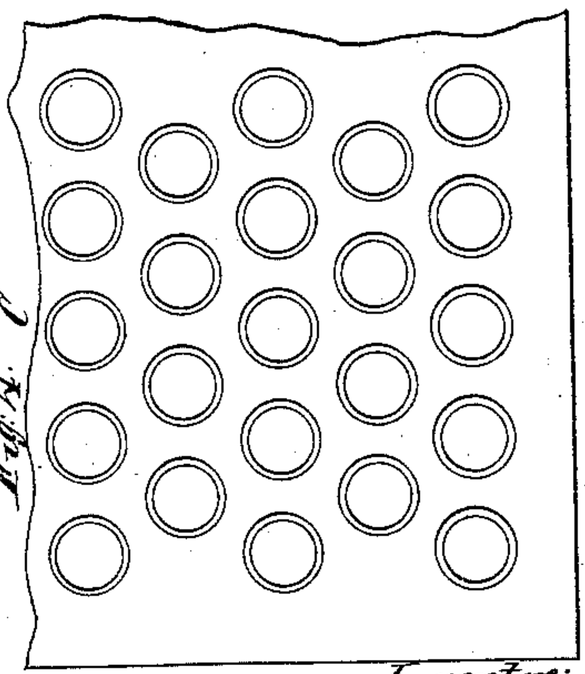


Fig. 4.



Witnesses:
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R. B. Lockwood

Inventor:
Allen C. Stimers
By his Attys Munn & Brosson

UNITED STATES PATENT OFFICE.

ALBAN C. STIMERS, OF NEW YORK, N. Y.

IMPROVEMENT IN SURFACE-CONDENSERS.

Specification forming part of Letters Patent No. **41,545**, dated February 9, 1864.

To all whom it may concern:

Be it known that I, ALBAN C. STIMERS, of the city and county and State of New York, have invented a new and useful Improvement in Surface-Condensers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the annexed drawings, making part of this specification, in which—

Figures 1, 2, and 3 represent sections through a condenser made upon my plan, showing the tubes longitudinally; and Figs. 4, 5, and 6 show a section through such a condenser, exhibiting the tubes transversely.

The different figures illustrate the different manners in which I propose to embody my invention.

To enable others skilled in the arts to which my invention appertains to make and use the same, I will proceed to describe its nature, construction, and application.

It is well understood by engineers that the intermittent admission of steam to the condenser of a steam-engine causes the tubes to be expanded by each influx of the steam by the elevation of their temperature, and that they contract again during the intervals by the depression of their temperatures, due to the absorption of the heat by the condensing-water, and that, unless this expansion and contraction is provided for in the construction of the apparatus, the joints made between the ends of the tubes and the tube-plates are destroyed, and the benefits to be derived from surface-condensation lost. This provision has already been effected in several different modes by different persons before me—such as Hall's arrangement of a stuffing-box around each tube, having each an independent gland; Ericsson's plan of uniting one of the tube-plates to the outer case by a broad elastic flange, thus permitting the entire plate to vibrate with the pulsative expansion and contraction of the tubes; Pirsson's method of making one tube-head independent of the outer casing, and thus permitting it to vibrate; Sewell's invention of the rubber ferrule around each tube, the whole number being pressed upon by a single plate of the same dimensions as the tube-plate, thus permitting each tube to expand and contract, independently of the others, through what is really a stuffing-box, as in Hall's arrangement.

My invention has reference to this question of the expansion and contraction of the tubes, and realizes the advantages of the independent stuffing-box system, without its first great cost or its complex details, which add so materially to the labor of attendance and repair.

Experiments and general observations in hydraulics have shown that the flow of water through pipes is directly as the area of the pipe multiplied into the square root of the pressure, and inversely, as the wetted perimeter multiplied into the length of the pipe. Now, if a simple round hole is drilled through a plate, and a tube inserted which is of the precise diameter required to permit of its easy movement, there will practically be a small space around the outside of the tube within the hole. The area of this space will, however, be very small compared to the surface forming the wetted perimeter. A thickness of plate and consequent length of crescent-shaped pipe may be conceived which will give a coefficient of friction equal to the area multiplied into the pressure, and there would consequently be no flow of water whatever—that is to say, no leakage. If, now, we conceive this hole through the plate to be reamed with the care usually bestowed upon such work in a steam-engine establishment, and the tube expanded tightly within it by a cylindrical expander, we can readily see that with the present perfection of such workmanship the tube-plate would not require to be inconveniently thick to give friction enough, compared with the area of the space remaining between the tube and the interior of the hole, to prevent any flow of water and consequent leakage.

In the experimental condenser, which was made upon this plan, I made the tube-plate one and a half inches thick for five-eighths of an inch tubes, and found it quite sufficient. I have, therefore, adopted this in practice; but it is obvious that every person can use his own judgment with regard to the exact thickness which would be required in any given case, by keeping in view the considerations hereinbefore given.

The tubes may be fitted in this manner at each end, as in Fig. 1, or they may be secured at one end, as shown in Figs. 2 and 3, or in any of the well-known methods for making a fixed joint between a tube and tube-plate—

such as expanding them, as at *b* in the accompanying drawings, or they may be screwed in, as at *c*. This last method is the one I prefer, but I make no claim for either of these arrangements as arrangements.

Among the advantages growing out of this method of securing the tubes may be enumerated cheapness, simplicity, and little liability to derangement. I do not, however, wish to be understood as claiming a water or air tight slip-joint made by merely extending the length of the joint, irrespective of its application for the improvement of any manufacture, as that would amount to a claim for a principle which has before been applied to pumps, musical instruments, and the like, but the application of this principle to the improvement of surface-condensers—that is to say,

I claim—

Making the tube plate of a surface condenser so thick that a water-tight slip-joint can be made around the tubes by a simple parallel expansion of them in the plate and without the aid of stuffing-boxes or other similar devices, substantially as described

ALBAN C. STIMERS.

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