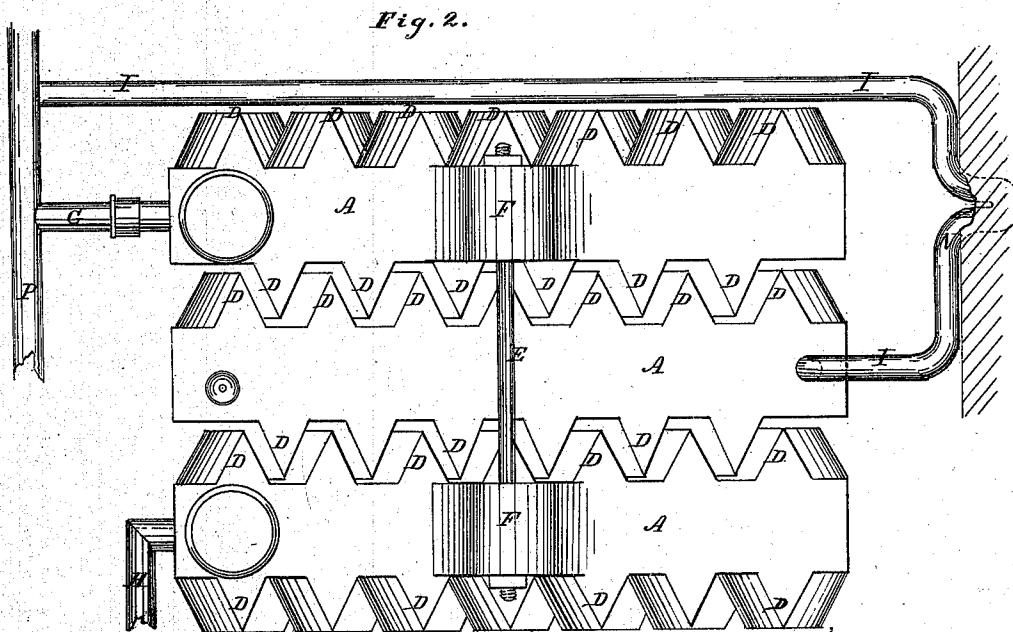
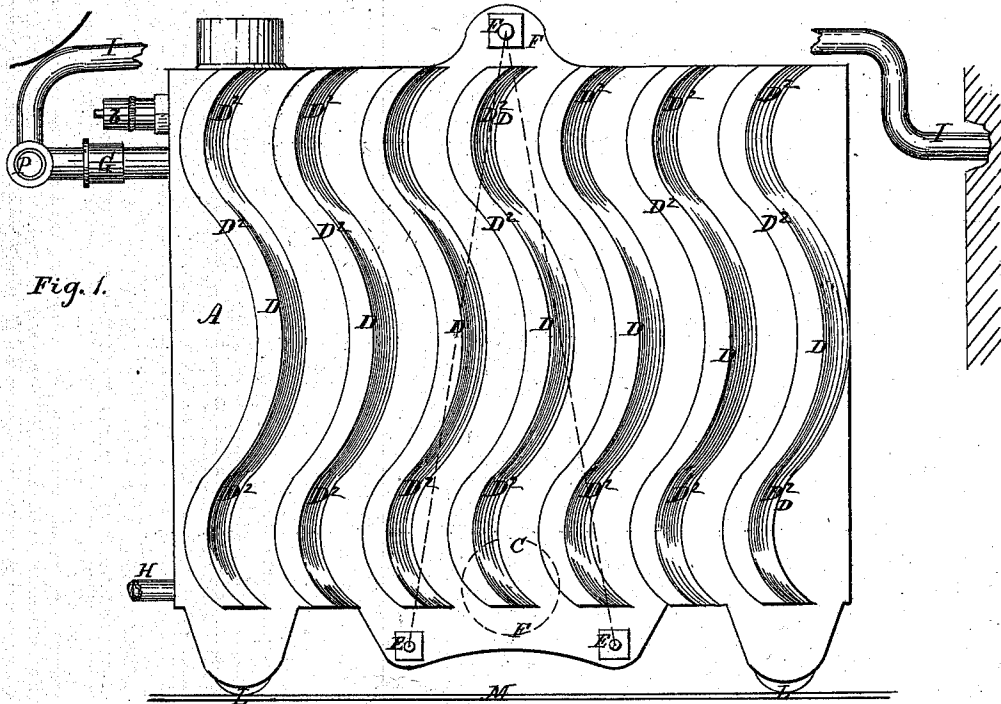


N. BOWEN.

Improvement in Steam Heaters.

No. 115,423.

Patented May 30, 1871.



Witnesses:

E. C. Adams
J. West Wagner

NOAH BOWEN, Inventor;
by Johnson, Klauke & Co.
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Fig. 3.

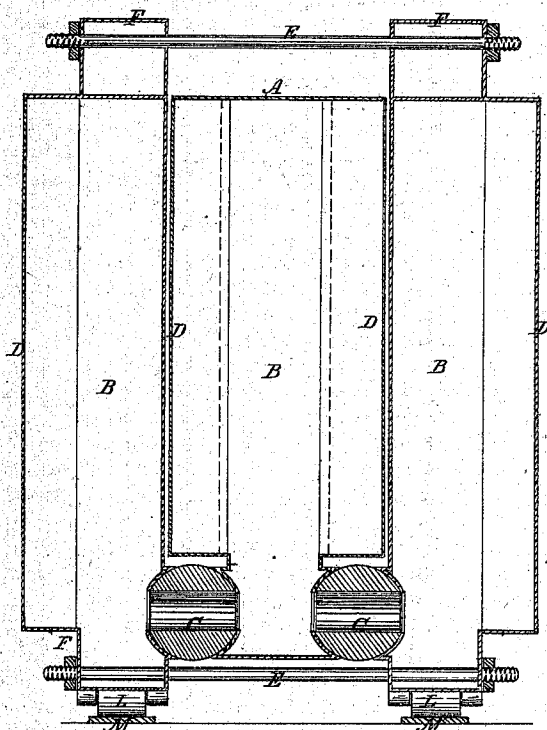


Fig. 4.

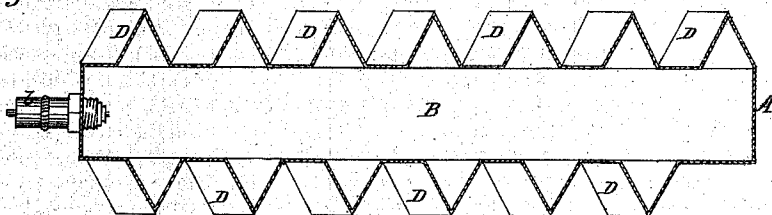
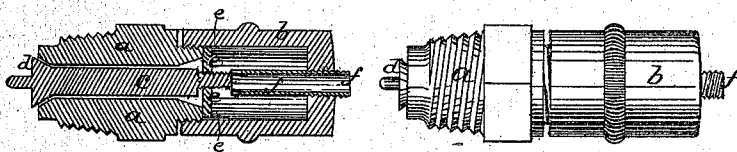


Fig. 5.



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UNITED STATES PATENT OFFICE.

NOAH BOWEN, OF COLUMBUS, OHIO.

IMPROVEMENT IN STEAM-HEATERS.

Specification forming part of Letters Patent No. 115,423, dated May 30, 1871.

I, NOAH BOWEN, of Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Steam-Heating Apparatus, of which the following is a specification:

My invention relates to apparatus for heating buildings by steam; and the object of my improvements is to obtain a greater heating-surface and a more durable apparatus than heretofore constructed. For this purpose my invention consists, first, in uniting two or more hollow heating-sections so as to communicate with each other by means of ground ball-joints, which remain tight under different conditions of temperature and prevent leakage; second, in mounting the heating apparatus upon rollers so as to move upon a track, and thus afford facility for accommodating itself automatically to the expansion and contraction occasioned by changes in temperature, thus preventing the breaking of the connections with the steam-generator, leakage from loose joints, rendering expansion-joints unnecessary, and facilitating the removal of the apparatus for repairs or otherwise; third, in uniting the several heating-sections together so as to adjust their ball-joint connections and render their separation easy and convenient; fourth, in providing one or more sections with a separate pipe, which extends into a hot-air flue in the wall and returns and communicates with the adjacent section, for the purpose of increasing the draft of said flue and facilitating the heating of the nest of sections; and in the construction of the adjustable tube-valve for moistening the air with steam, and for letting the air out the sections when heating the apparatus.

In the accompanying drawing, Figure 1 represents an elevation of a heating apparatus embracing my invention. Fig. 2 represents a top view of a nest of heating sections bolted together. Fig. 3 represents a vertical cross-section through the ball-joint connections of the same. Fig. 4 represents a horizontal section of one of the sections, showing the steam and air valve as applied thereto; and Fig. 5 represents the adjustable steam-valve in section and elevation, full size.

The heating apparatus consists of two or more sections, A, which form steam-chambers B, placed parallel to and communicating with

each other by means of hollow ball-joints C, arranged in any convenient position. The ball-joints C are ground and fitted in openings in the adjacent sides of the sections, so as to accommodate themselves to the expansion and contraction of the sections A, and maintain a tight and durable joint without packing. Hollow projecting ribs D are cast on each side of these sections of such form as will admit of matching the one within the other, so as to bring the sections close together, afford a larger steam-chamber, and increase the hollow radiating surface in such proportion that five sections with hollow ribs will give out as much heat as seven sections with solid ribs. In the example shown these hollow ribs are of double *cyma-reversa* form, having a V-shaped cross-section, and extend either vertically or horizontally the height or length of the heating-chamber. The heating-sections thus constructed are secured together by three bolts, E, passing through flanges or projections F on the two outside sections, and having such relation to the ball-joints C as to bring and hold them to a true bearing—that is to say, the top bolt E is arranged vertically over the ball-joints, and the two lower ones on the opposite sides thereof, so as to form the figure of a triangle, within the adjusting points of which the ball-joints C are embraced, as shown in Fig. 1. The intermediate section or sections are supported vertically upon and by the ball-joints C, and held in position endwise by their hollow ribs D interlacing with those of the adjacent sections, as represented in Figs. 2 and 3 of the drawing. The outside heating-sections are supported upon rollers L, or a carriage adjusted upon a track, M, for the purpose of allowing the heater to accommodate itself with respect to its connections, automatically, by the expansion and contraction of the metal under varying temperatures, thereby relieving the joints of all strain and rendering the use of expansion-joints unnecessary, and preventing leaking or breaking of joint-flanges. The introduction of steam into the branch pipe G causes the metal to expand and move the apparatus toward the wall-flues with which it connects, and upon the decrease of the temperature the contraction of the branch pipe G will draw the apparatus back from the flue-connections, and thus utilize the

force created by the heat and cold to render the apparatus self-adjusting upon its yielding supports. Moreover, the rollers afford facility for moving the apparatus for repairs or other purpose. The steam is introduced into one of the outside sections by a branch-pipe connection at G, and passes out by a similar branch-pipe connection at H, of the other outside section, as shown in Figs. 1 and 2, the inlet-branch pipe G connecting with the main steam supply-pipe P in any convenient manner. A separate pipe, instead of entering the section A directly from the main pipe of the steam-generator, may pass up into the hot-air flue in the wall a short distance and return, and then enter one of the sections at I for the purpose of increasing the draft of said flue by the heat which the pipe gives out, and also heating the nest of sections much quicker, by reason of increasing the volume of hot steam therein, by the separate pipe. One or more of the heating-sections may be provided with an adjustable tube-valve, for letting out steam for moistening the dry air and bringing it to a healthy temperature. †

The *cyma-reversa* form of the ribs D is very advantageous in arresting the ascent of the heated air so as to retard its passage up between the ribs by causing it to impinge upon and against the opposite bends or curved sides D² of each rib D, and thereby greatly facilitate the heating of the air between the several sections without the intervention of division-plates for that purpose. This valve consists of a tube, a, screwed into the steam-chamber, and a tubular screw-cap, b, on its outer end. The inner tube a has a stem, c, with a conical valve, d, on its inner end, and an adjustable plate or stop, e, on its outer end; and the screw-cap b has a small central exit-tube, f, the inner end of which strikes against the end of the stem a when the cap is screwed up, and thus opens the conical valve and allows the steam and air to escape. The escape of steam and air can be regulated by adjusting the stop-plate e so as to admit of a greater or lesser motion of the conical valve. By unscrewing the cap b the conical valve d will be closed by the pressure of the steam in the heater, and by screwing up the cap b the valve d is opened the de-

sired degree, and held in such position by the contact of the cap-tube f with the valve-stem c, as shown in Fig. 5 of the drawing.

Having described my invention, I claim—

1. The hollow sections A of a heating apparatus united so as to communicate with each other by means of ball-joints C, for the purpose described.

2. The middle heating section or sections A supported endwise by the intermatching hollow ribs D of the outside sections, and vertically by and upon the communicating ball-joints, thus dispensing with fastenings for the middle sections, as described.

3. The pipe I, when arranged to enter the section A after having first passed directly from the boiler-pipe into the hot-air flue, for the purpose of increasing the draft by increasing the heat of said flue, and also heating the nest of sections quicker, as described.

4. The several sections A of the heating apparatus secured together by means of bolts E, arranged in a triangular form so as to embrace within their bearings the hollow globe-joints C, and their communicating tube-connections to equalize the adjustment of the joints, as described.

5. To compensate for the expansion and contraction of the heating apparatus under varying temperatures of heat and cold, mounting the two outside sections upon rollers fitted to move upon a track, and thus prevent the breaking of the joints of the steam-pipes connecting the apparatus with the generator, as described.

6. The valve d, with its adjustable stop-plate e and tubular screw-cap b, as applied to one or more sections of a steam-heating apparatus, as described.

7. The combination of the heating-sections A, the intermatching hollow ribs D, the ball-communicating and sustaining joints C, the connecting-rods E, the induction and exhaust pipes G and H, and the regulating escape-valves, the several parts being constructed and arranged as and for the purpose described.

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Witnesses:

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