

H. M. NORTON.
SECTIONAL STEAM BOILER.

No. 524,183.

Patented Aug. 7, 1894.

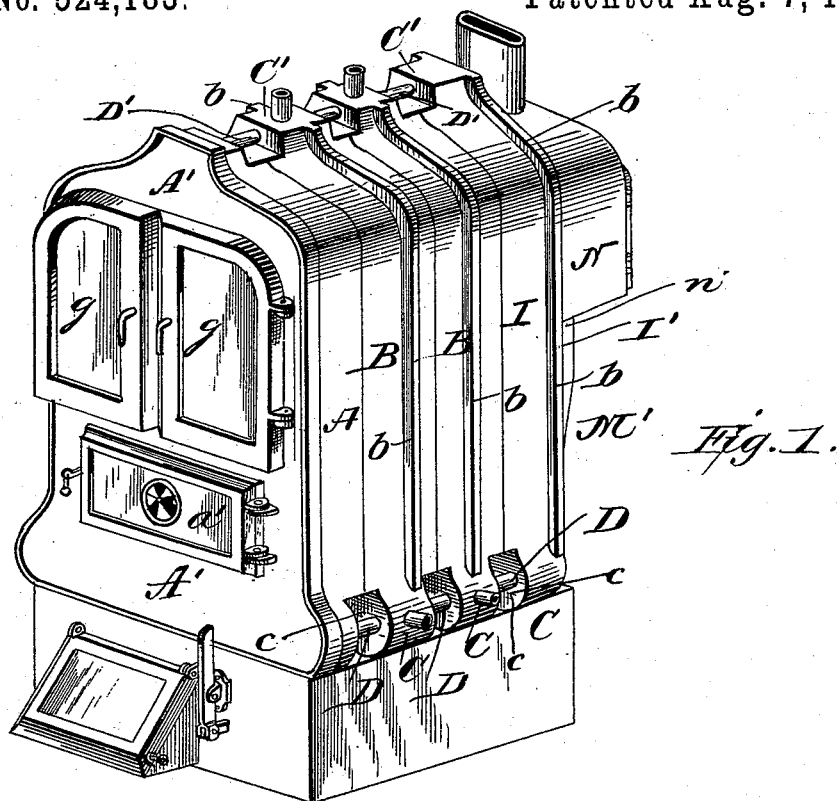
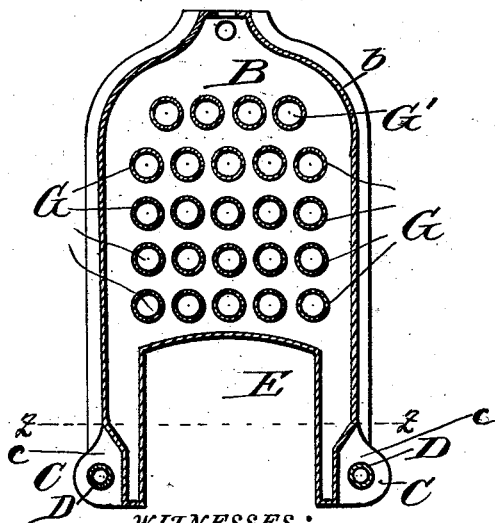


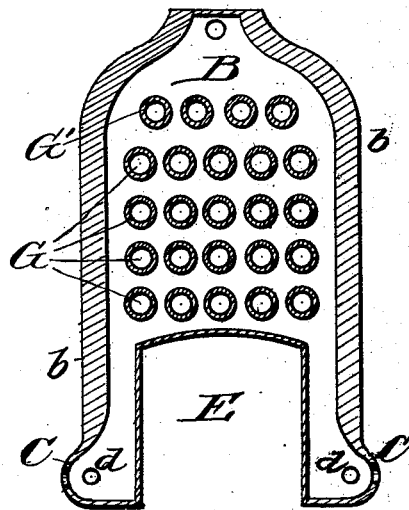
Fig. 3.



WITNESSES:

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Fig. 4.

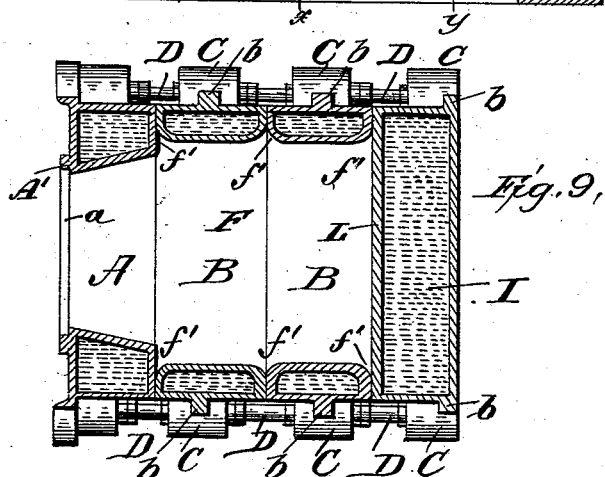
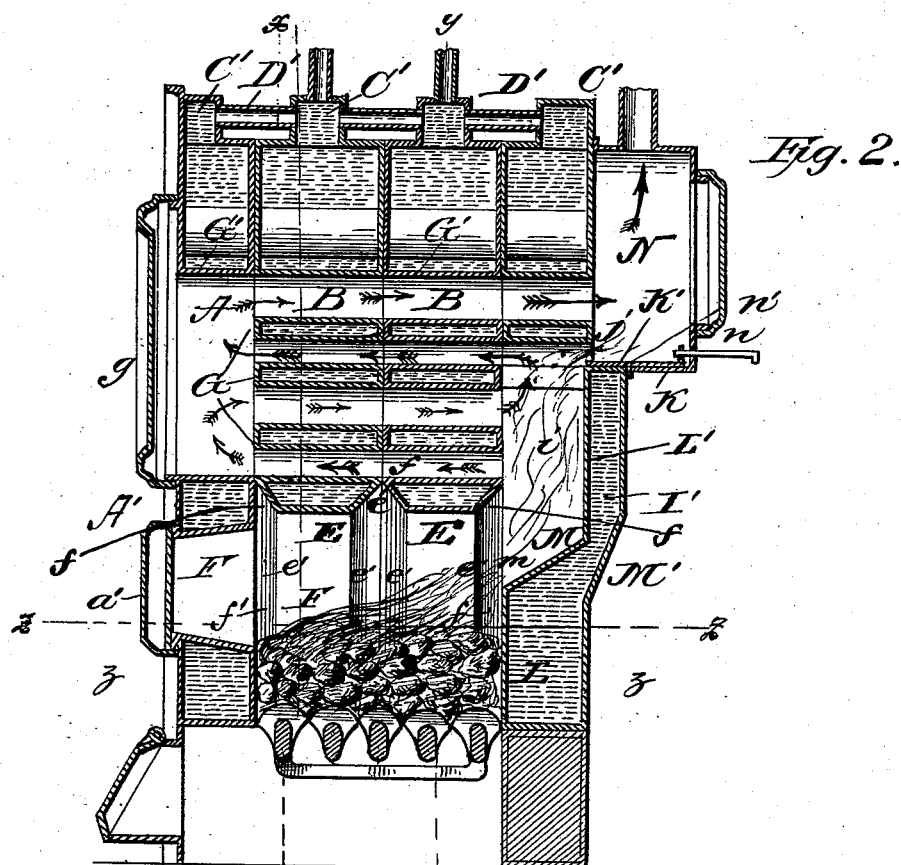


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Fig. 5.

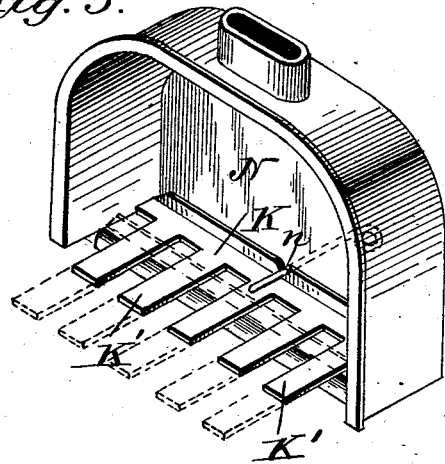


Fig. 6.

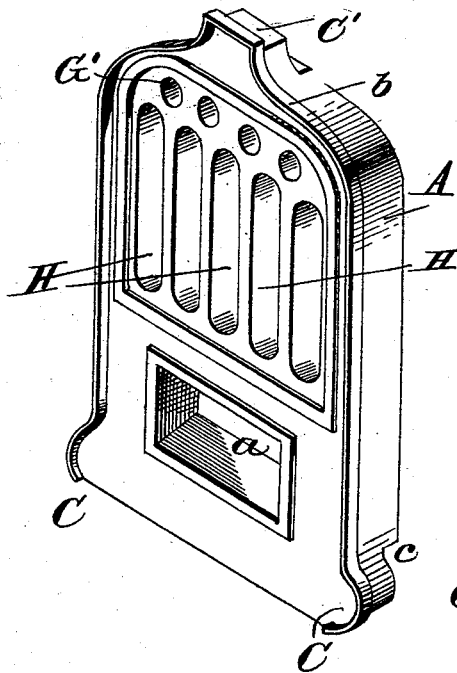


Fig. 7.

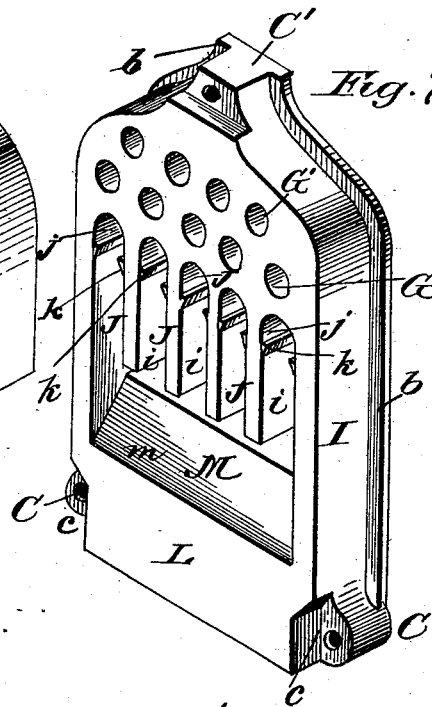
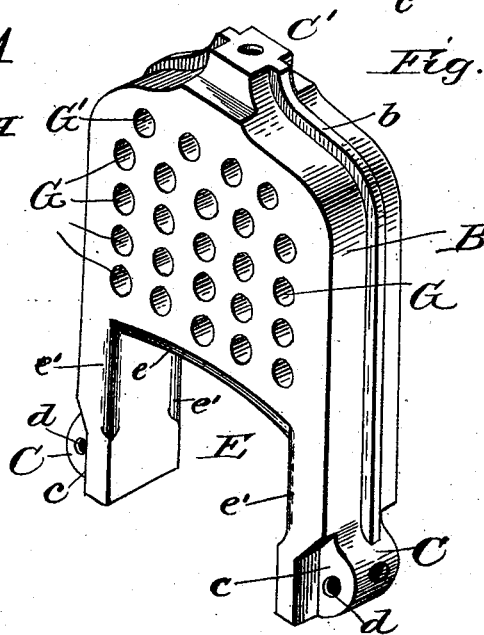


Fig. 8.



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UNITED STATES PATENT OFFICE.

HORACE M. NORTON, OF EASTON, PENNSYLVANIA.

SECTIONAL STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 524,183, dated August 7, 1894.

Application filed April 19, 1894. Serial No. 508,140. (No model.)

To all whom it may concern:

Be it known that I, HORACE M. NORTON, a citizen of the United States, and a resident of Easton, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements in Sectional Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of my improved sectional boiler; the outside asbestos-covering or jacketing having been removed. Fig. 2 is a longitudinal sectional view of the same, on a vertical plane through the middle thereof. Fig. 3 is a transverse sectional view on the plane denoted by the broken line marked $x-x$ in Fig. 2. Fig. 4 is a similar view, on the parallel transverse plane denoted by the broken line marked $y-y$. Fig. 5 is a detail view of the damper attachment, or draft-regulating device. Fig. 6 is a perspective view of the front section of my improved sectional boiler. Fig. 7 is a perspective view of the rearmost section of the boiler. Fig. 8 is a perspective view of one of the intermediate body-sections of my improved sectional boiler or steam-generator; and Fig. 9 is a sectional view (looking downward) on the horizontal plane denoted by the broken line marked $z-z$ in Figs. 2 and 3.

Like letters of reference designate corresponding parts in all the figures.

This invention relates to sectional steam-boilers, or safety-boilers, of that type which are intended, more particularly, for hot-water and steam-heating systems adapted for dwellings, schools, churches, factories, and buildings of all kinds; and my improvements consist in the novel construction and combination of parts of a boiler or steam-generator of that class as will be hereinafter more fully set forth, whereby I not only materially increase the capacity and efficiency of the boiler, but also increase the durability of the same and avoid the liability to leakage, besides economizing both space and fuel; all most important desiderata, and effected by my improvements without increasing the cost

of the boiler over the cost of other boilers of the same capacity.

On the accompanying three sheets of drawings, I have shown a boiler made up of only four hollow sections, viz., a front and rear section, and two intermediate or "body" sections; but it will be obvious that the number of the intermediate sections (all of which are hollow and constructed alike) may be increased at will, according to the capacity which the boiler is to have in a given case. The construction of these intermediate "body" sections being, as stated, exactly alike, the description of one will apply to them all.

As will appear by reference to the drawings, each intermediate hollow section, B, is provided with an exterior packing-flange b , and bottom recesses $c c$, one on each side, leaving projecting bosses $C C$, by means of which, in conjunction with the tubular nipples $D D$, the several sections are connected to one another on both sides. A projection or head C' , on the top of each section, forms, in conjunction with the tubular nipples $D' D'$, the top-connection between the several sections. But as these features form the subject-matter of another application of even date herewith, to wit: my application Serial No. 508,139, further description of these improvements is not deemed essential to my present application.

The lower part of each hollow section B is cast with an open-bottomed recess E at its lower end, which, when the several sections are assembled and united, forms a continuous fire-box, as usual in this type of boilers; but with this difference, that the top and sides of these recesses $E E$ in the body-sections B B are beveled on the top and sides, as shown at e and e' , respectively, so that, when the sections are properly juxtaposed, triangular sub-recesses, f and f' , will be formed in the roof and sides of the fire-box F between the several sections, whereby the heating-area of this is considerably increased. Above the beveled fire-box recesses E , each hollow section B is provided with a series of transverse flues $G G'$, arranged in parallel rows and extending from above the fire-box recess to the top of the section, below its head C' .

The hollow front section A, which corresponds in size and configuration to the body-sections B B and rear section I, has the usual

opening *a*, forming an entrance to the fire-box *F*, and closed by a door, *a'*, in the front wall *A'* of the boiler. But instead of the flues *G* arranged in several parallel rows, one above the other, this section is cast with only the top row of flues, *G'*, registering or coinciding with the uppermost row *G'* of the body-sections *B* and rear section *I*; the flues *G* *G* of the adjacent section *B* opening up into vertical oblong openings *H* *H*, which coincide with the contiguous vertical rows of flues *G* *G* of the adjacent section *B*; each vertical row of flues *G* *G* opening up into its appropriate coinciding oblong opening *H*, which thus, it will be observed, forms a connection between all the flues *G* *G* (leaving out the topmost return-flues *G'*, which are arranged to "break joints" with the vertical rows of flues below) of its appropriate vertical row or series.

The rearmost section, or back-section, *I*, differs both from the front section *A* and intermediate or body-sections *B* in several important particulars, although it is of the same general size and outline, and is, like these, provided with side-recesses *c* *c*, side-bosses or projections *C* *C*, and a top-projection or head *C'*, whereby, by means of the side-nipples *D* *D* and top nipples *D'*, it is connected to the sections in front of it. This back-section *I*, which is cast hollow like the rest and provided with a packing-flange *b*, has two rows of flues, *G'*, *G*, one of which registers with the top row of return flues *G'* in the other sections, while the one next below registers with the second row of flues *G*, from the top, in said several sections, as will appear more clearly by reference to Fig. 2 on the drawings, in which the arrows represent the course of the products of combustion through the flues and their connections when the damper or draft-regulator *K* is closed. In said Fig. 2, the damper *K* is shown as open, thus permitting the flame and smoke from the fire-box *F* to enter the sheet-flue *m* and pass up into the smoke-box *N* through the vertical flues *i*, without passing through the series of horizontal flues and return-flues *G*, *G'*. Below the second row of flues *G*, section *I* is cast with a series of parallel depending partitions, *J* *J*, the upper rounded ends *j* *j* of which coincide with the third horizontal row of flues (counting from the top) of the adjacent sections, and are provided with horizontal side-flanges or ledges, *k* *k*, forming bearings for the sliding damper, or draft-regulator *K*, to be hereinafter described. The lower ends of the depending partitions terminate just below the lowermost row of flues in the adjacent body-section, in horizontal alignment with the roof of the fire-box *F*, and immediately above the slope or incline *M*, above the sheet-flue *m* and back-wall *L*.

By reference to Fig. 2, it will be seen that the fire, smoke, and other products of combustion, striking the incline *M*, are deflected up through the sheet-flue *m* into the vertical flues *i* *i* formed between the depending par-

titions *J* *J*, from which they pass through the open tops *j* *j* into the smoke-box *N* and up into the chimney or smoke-stack, provided that the damper is left open so as to provide for a direct draft, as indicated in full-line in Fig. 2. To close the damper *K* and shut off the direct draft, the projecting damper handle *n* is pushed inwardly, which slides the damper-fingers or plates *K'* *K'* forwardly above the sheet-flue so as to close direct communication between this and the smoke-box; the damper-fingers *K'* *K'* sliding upon the side-ledges *k* *k*. By closing this damper, as indicated in dotted lines in Fig. 5, the fire and gases are compelled to pass from the fire-box *F* and sheet-flue *m* up through the vertical flues *i* *i*, and forwardly through the lowermost row of flues *G* *G* into the vertical flue-openings or connections *H* *H* in the front section *A*; and then up to the uppermost rows of flues *G* *G* and top-row *G'*; said top-row of flues, *G'*, being supplied with heat and gases through the space formed by the cleaning-out doors, shown at *g*, which are set back sufficiently to permit the gases to enter this topmost row of flues from the front. Through the three uppermost rows of flues, *G'*, *G* *G*, the products of combustion then finally, having given off all or the greater part of their available heat, pass to the smoke-box *N* and from it up into the chimney or smoke-stack.

The back-section *I* is cast with a projecting chamber *I'*, which forms a hollow water-back of the sheet-flue *m* and above the same; the inner wall *L'* of said water-back being set back to make room for the row of parallel vertical flues *i* *i*, which impinge upon said back-wall; the projecting back-wall of said chamber *I'* being cast sloping to conform to the inside slope or incline *M* of the sheet-flue *m*, as shown at *M'*. The closed top of the water-back *I'* is in horizontal alignment with the under side of the third row of flues from the top, and forms a rearwardly-projecting ledge, *n'*, which forms a rest or support for the smoke-box *N*. This hollow water-back not only forms a support for the smoke-box; but, being always filled with water when the boiler is in use, it prevents the heat and fire, as it strikes the inclined back-wall *M* and is deflected up through the sheet-flue *m* into the vertical flues *i* *i*, from burning out, warping or cracking the flame-sheet or crown-sheet *L'* back of the vertical flues; besides which the projection *I'* adds rigidity and strength to the back-section as a whole.

Of course, it will be understood that all the sections are cast hollow, and have a water-space not only surrounding the flues in the upper part of each section, but also immediately above the fire-box and on both sides of the same; in fact, every place where the fire and heat strike is backed by a body of water. By opening the cleaning-out doors *g*, in front of the vertical flues or flue-connections *H* *H* and top-row of flues *G'* in the front section, access may readily be had to all the

flues for cleaning; and by constructing the back-section I with a large open sheet-flue and open-bottomed vertical flues *ii*, these can also readily be reached and cleaned through the open fire-door from the front, by raking the soot down upon the incline M and into the rear end of the fire-box.

By constructing the sections with beveled recesses E E, to form the triangular sub-recesses *f* and *f'* within the fire-box F, the heating-area of this is, as already stated, considerably increased without proportionately increasing the size of the boiler; besides which the beveled edges of the section-recesses E E facilitate the casting of the sections and make a stronger and better finish.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a sectional boiler or steam generator,

the hollow back-section I cast with a series of parallel depending partitions J J; a sheet-flue *m* having an inclined back-wall M; and a rearwardly-projecting water-back I' having a sloping bottom M' coinciding with the inner back-wall M; substantially as and for the purpose shown and set forth.

2. The combination with the back-section I, constructed as described and provided with the inside flue-flanges or side-ledges *k k*, of the smoke-box N and sliding damper K K'; substantially as and for the purpose shown and described.

In testimony that I claim the foregoing as my own I have hereunto affixed my signature in presence of two witnesses.

HORACE M. NORTON.

Witnesses:

C. T. CAMPBELL,

C. L. D. KONN.