(No Model.)

F. H. PULSIFER.

STEAM BOILER FOR HEATING PURPOSES.

No. 302,210. Patented July 15, 1884.

Fig. 3.

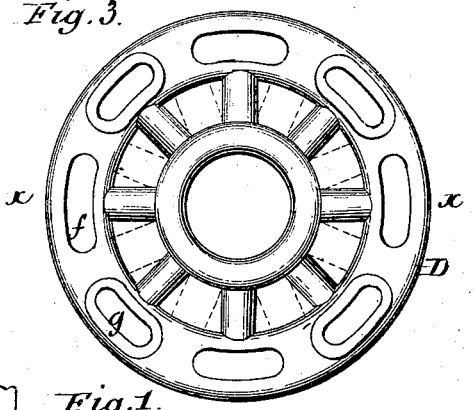


Fig. 4.

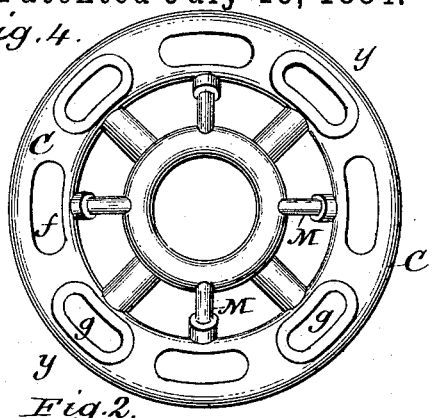


Fig. 1.

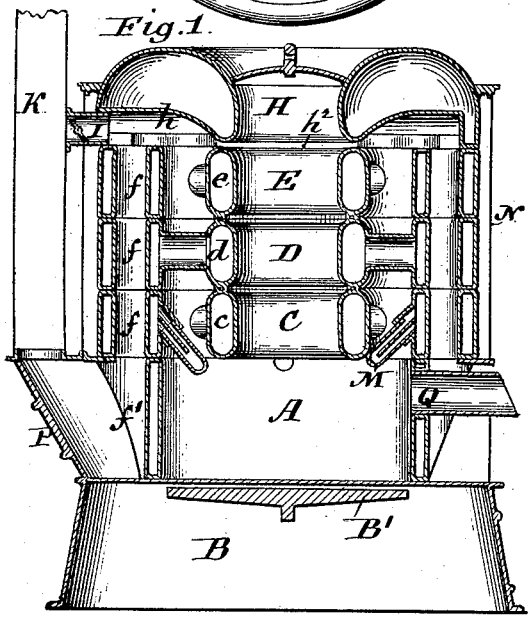


Fig. 2.

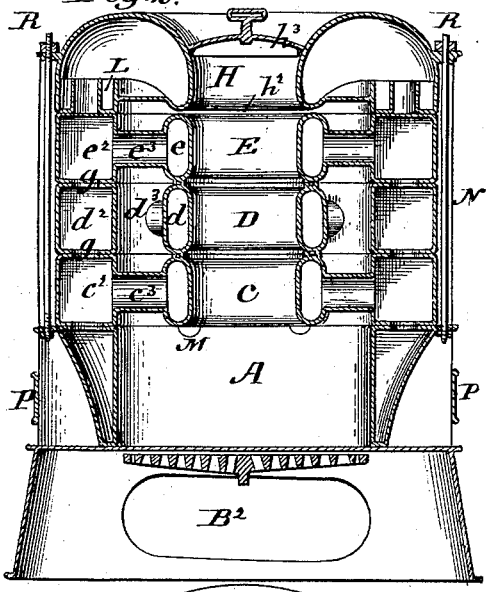


Fig. 5.

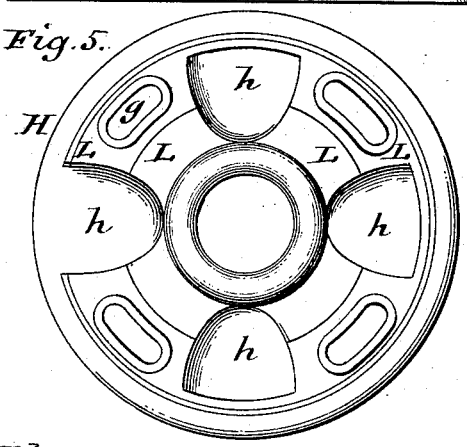
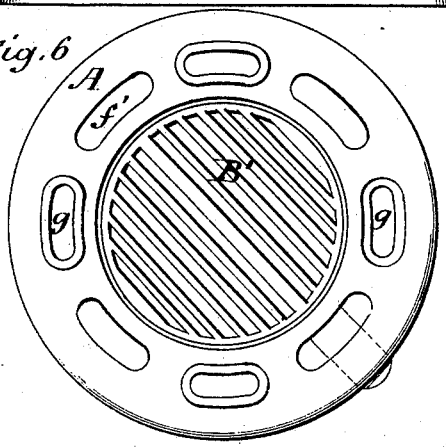


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRANK H. PULSIFER, OF AUBURN, NEW YORK.

STEAM-BOILER FOR HEATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 302,210, dated July 15, 1884.

Application filed April 15, 1884. (No model.)

To all whom it may concern:

Be it known that I, FRANK H. PULSIFER, a citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Steam-Boilers for Heating Purposes, of which the following is a specification, reference being had therein to the accompanying drawings, in which—

Figure 1 represents a vertical sectional boiler constructed in accordance with my invention, showing the passage for the products of combustion cut through line *x x* of Fig. 3. Fig. 2 represents a vertical section cut through line *y y* of Fig. 4, showing the passage for water circulation therethrough. Fig. 3 is a top view of the second section of the boiler. Fig. 4 is a bottom view of the first section above the fire-pot. Fig. 5 is a bottom view of the uppermost section. Fig. 6 is a top view of the lowest or fire-pot section above the grate.

My invention relates to improvements in cast-iron sectional boilers for heating purposes; and the objects of my improvement are, first, to provide a simple and inexpensive boiler, formed of sections constructed with an inner and an outer ring connected by radial hollow arms, through which a thorough circulation of water is effected; second, to produce a magazine for coal from the walls of the inner ring; third, to provide the upper portion of the magazine formed by the sections of the boiler with an annular passage for the escape of gases that may be formed within the magazine. I accomplish these objects by the construction illustrated in the accompanying drawings, in which similar letters refer to similar parts throughout the several views.

The boiler may have a larger or smaller number of horizontal sections than shown in the drawings; but I prefer to have it constructed of the following sections: a bottom section, A, forming the fire-pot of the furnace. This section rest upon a cast-iron base, B, used as the ash-pit. The latter carries the grate B′, and is provided with a door, B^2, for the removal of the ashes passing through the grate. Upon the bottom sections, A, the sections C D E are placed, one above the other. The latter sections are each composed of an inner hollow ring, *c*, *d*, or *e*, and an outer hollow ring, c^2 d^2 e^2, and the rings of each section are connected by a series of hollow arms, c^3, d^3, or e^3, through which water circulates when the boiler is in operation. The inner rings, *c d e*, resting upon each other, form a central magazine for the reception of coal, and the outer rings, c^2 d^2 e^2, are provided with flattened vertical tubes *f*, for the downward passage of the products of combustion, and intermediate openings, *g*, in their top and bottom walls, for the circulation of water from one section to the other. Upon the section E is placed the upper section or top, H, of the boiler. This section has formed in its under surface arches *h*, to direct the products of combustion either to the flue I, leading directly into the uptake flue K, or (according to the damper's position) into the descending passage *f*, and thence, through the lower end of the flue K, into said uptake flue, the outer shell of the bottom sections, A, having for this purpose four recesses, *f*′, in its walls, to prevent any interference with the down flues, and at the same time insures the water circulation within the boiler. In the upper section, H, are formed also a series of pockets, L, to hold condensed steam or water that is returned by gravity through the steam-pipes, while the upper surface of the arches *h* acts as a superheater at the same time. The sections C D E are placed one upon the other in such a manner that the hollow arms of one do not coincide vertically with the arms of the sections immediately above it, to cause the products of combustion to follow a zigzag path among said arms (dotted in Fig. 3) and have the caloric thereof thoroughly absorbed by the arms and surfaces of said sections. The central or magazine portion of the upper section, H, does not rest upon the corresponding portions of the sections E, but a small annular passage, h^2, is kept between them, so that if any gases should collect in the magazine they can escape through said passage into or under the arches *h*, leading to the escape-flues. A cover, h^3, closes, as usual, the upper end of the magazine. The inner rings, *c d e*, of the sections have no connection with each other, except through their arms and outer rings, and thus the necessity of central joints is obviated, and no leaks can occur directly over the fire.

To increase the heating-surface of the boiler, its section C is provided with a series of drop-tubes, M, screwed or cast into a boss projecting at an angle of about forty-five degrees from the inner surface of the outer ring of said section, and within each tube is placed a flat plate, *m*, of iron, terminating within an inch or two of the lower end of said tube, to promote the circulation of water therein.

The inner wall of the fire-pot section A is made vertical, but the outer wall is made wider at the upper part, in order to increase the water-space at the point where the heat is higher, allow the free escape of steam upward into the sections above, and thus produce a good circulation of the water within the boiler. The surfaces of the sections surrounding the water-passage *g* are slightly raised, prepared and coated with cement, as usual, and all the sections are united by four bolts, R, passing through lugs in the upper and lower sections, and the whole is inclosed by a jacket, N, having sliding doors P, to clean the drop-flues, when required. An opening, Q, in the side of the fire-pot is provided with a pipe extending to the outside of the jacket, through which the condition of the fire can be observed and the amount of combustion be regulated by admitting more or less air above the coal in the fire-pot.

Having now fully described my invention, I claim—

1. In a cast-iron heating-furnace, the combination of the horizontal sections C D E, each section formed of concentric rings connected by hollow arms, and the inner rings located one above the other, to form a central magazine for coal, substantially as shown and described.

2. The combination of the horizontal section A, forming the fire-pot of a furnace, with horizontal section C, formed of concentric rings connected by hollow arms, and drop-tubes M, projecting inwardly over the fire-pot from the outer ring of said section C, substantially as and for the purpose described.

3. The combination of the horizontal sections C D E with the upper section, H, provided with pockets L and arched flues *h*, substantially as and for the purpose described.

4. The combination of horizontal sections D E, forming a portion of a central magazine for coal, with top section, H, constructed to form the upper portion of the magazine, and located above the section E in such a manner as to form a horizontal passage, h^2, in the upper portion of the magazine, substantially as and for the purpose described.

5. The combination of a series of horizontal sections composed of concentric hollow rings united by hollow arms, with the fire-pot section A, having its upper portion wider than its lower portion, and provided with recesses *f'* in the walls thereof, corresponding with the flues *f* of the upper sections, substantially as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK H. PULSIFER.

Witnesses:
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