

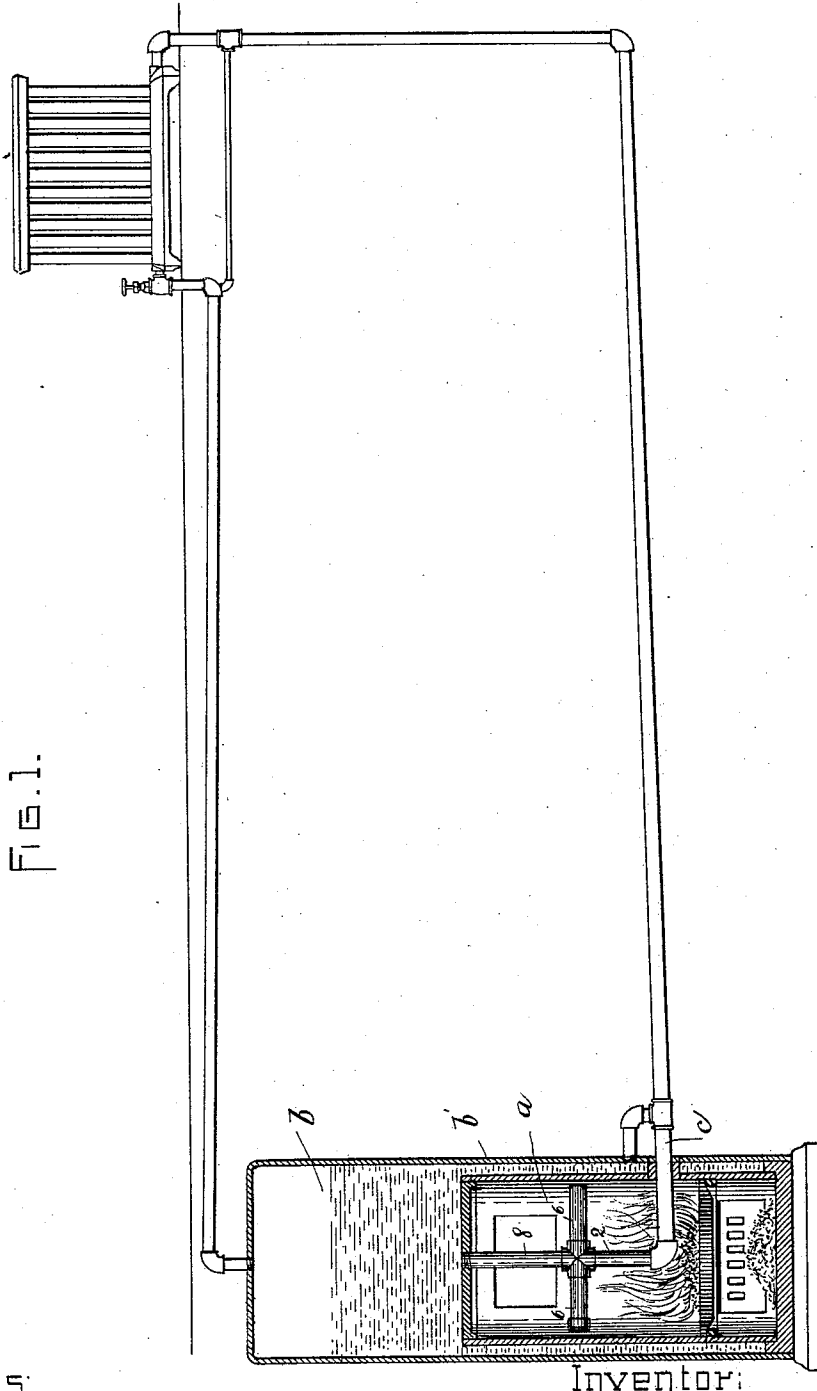
(No Model.)

2 Sheets—Sheet 1.

C. A. SAWIN.
HEATING APPARATUS.

No. 471,754.

Patented Mar. 29, 1892.



Witnesses:
A. D. Harrison
B. A. McShane

Inventor:
C. A. Sawin
by Wright Brown & Co. Atty.

(No Model.)

2 Sheets—Sheet 2.

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HEATING APPARATUS.

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FIG. 2.

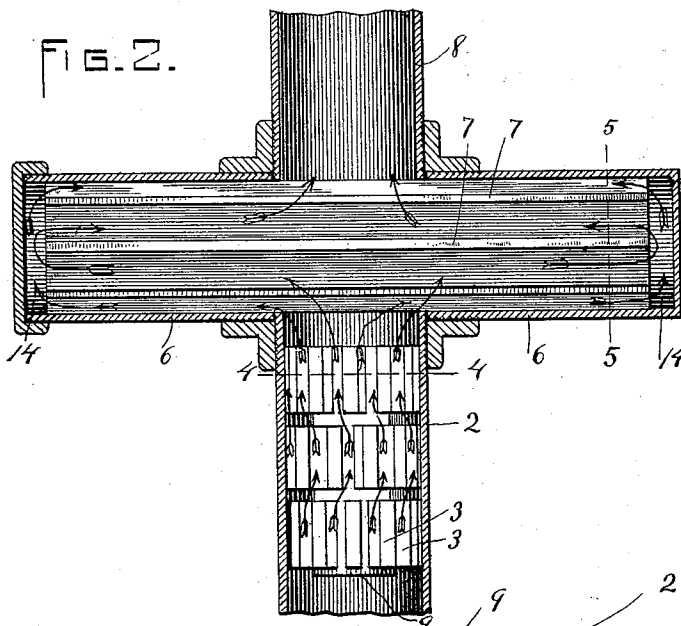


FIG. 5.

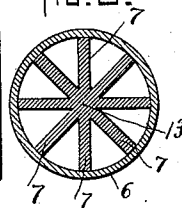


FIG. 3.

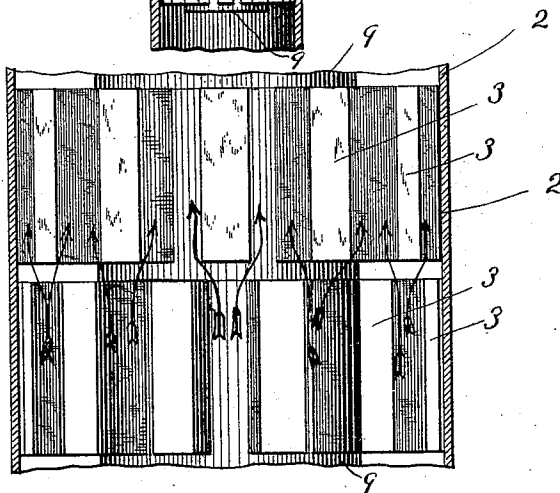
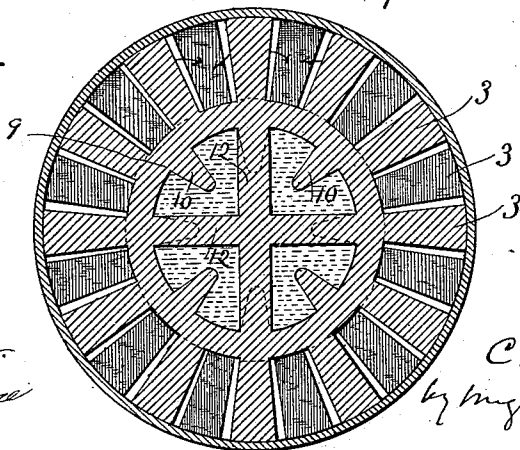


FIG. 4.



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UNITED STATES PATENT OFFICE.

CHARLES A. SAWIN, OF WALTHAM, MASSACHUSETTS.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 471,754, dated March 29, 1892.

Application filed November 27, 1891. Serial No. 413,178. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. SAWIN, of Waltham, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Heating Apparatus, of which the following is a specification.

This invention relates to heating apparatus of that class which comprises a furnace or fire-box, a receptacle for hot water or steam, located above the fire-box, and a conduit, which receives return-water from the radiators or other appliances through which the steam or hot water is conducted from the receptacle, said conduit being arranged to subject the return-water to the action of the heated products of combustion in the fire-box on its way to the receptacle.

The present invention has for its object to provide an improved construction of said conduit; and to this end it consists in the improvements which I will now proceed to describe and claim.

In the accompanying drawings, forming part of this specification, Figure 1 represents a vertical section of a heater and a diagrammatic view of its connections with a radiator. Fig. 2 represents an enlarged sectional view of the conduit in the fire-box of the heater. Fig. 3 represents an enlarged view of a portion of the construction shown in Fig. 2. Fig. 4 represents a section on line 4 4, Fig. 2. Fig. 5 represents a section on line 5 5, Fig. 2.

The same letters and numerals of reference indicate the same parts in all the figures.

In the drawings, *a* represents a furnace or fire-box, and *b* represents a receptacle for hot water or steam or hot water and steam located over the fire-box *a*. In the construction here shown a water-leg *b'* extends downwardly from the receptacle *b* and surrounds the fire-box.

The improved conduit, which is located in the fire-box and communicates at its lower portion with a pipe *c* and at its upper portion with the receptacle *b*, is composed of a vertical pipe or section 2, containing heat-conducting and water-subdividing wings or partitions 3 3, arranged as hereinafter described, two horizontal pipes or sections 6 6, communicating with the vertical section 2 and provided with water-subdividing wings 7 7, and

a vertical pipe 8, which connects the horizontal pipes 6 6 with the receptacle *b*.

Within the vertical section 2 of the conduit are placed the water-subdividing wings 3 3, which are preferably supported by means of a circular hub or collar 9, which extends parallel with the section 2 and is separated from it by an annular space through which the wings 3 3 extend, the outer ends of the wings being in contact with the inner surface of the section 2. I prefer to form the wings 3 3 in short lengths or sections divided into two or more series, as shown in Figs. 2 and 3, three series being the preferred number. The wings of each series alternate or "break joints" with those of the next series, so that the water passing between the wings of one series will be deflected laterally before passing between the wings of the next series, as indicated by the arrows in Figs. 2 and 3, this construction increasing the frictional resistance to the passage of the water upward through the section 2, thus retarding the water and causing it to absorb more heat in its upward passage than would be the case if its flow were more direct. The water also flows through the interior of the hub or collar 9, and is subdivided in said hub or collar by inwardly-projecting wings 10 10 and by transverse partitions 12 12 in the interior of the hub or collar, as shown in Fig. 4. It will be seen that the wings 3, having their outer ends in contact with the section 2, conduct the heat absorbed from said section inwardly to the hub or collar 9 and to the wings and partitions in the latter, so that large areas of heated surface are presented to the water passing through the section 2.

In the horizontal sections 6 6 of the conduit are placed the water-subdividing wings 7 7, which are of such length as to extend continuously across the upper end of the section 2 and are formed to radiate from a central point 13, the outer ends of said wings 7 being in contact with the inner surfaces of the sections 6 6. The wings 7 therefore prevent the water from flowing directly from the section 2 to the outlet-section 8, which is directly opposite the section 2, and cause the water to flow horizontally outward through the spaces between the wings 7 in the lower portions of the sections 6 6 and inwardly through the corresponding spaces between the wings at

the upper portions of the sections 6 6, as indicated by the arrows in Fig. 2, open spaces 14 14 being formed at the outer ends of the sections 6 6, which permit the water flowing outwardly through the lower portions of the sections 6 6 to turn and flow inwardly through the upper portions of said sections. When the inflowing water reaches the inner ends of the sections 6 6, it passes upwardly through the section 8 to the receptacle *b*, said section 8 being preferably open or unobstructed, so that the water flows through it as rapidly as the obstructions in the sections below will permit.

It will be seen that the described construction is very simple and effective, the water being retarded and caused to take a sinuous course in its ascent through the lower section 2 of the conduit and caused to flow horizontally outward and then inward through the sections 6 6 of the conduit. The wings 3 3 in the section 2 and the wings 7 7 in the sections 6 6 may be cast or otherwise formed independently of the said sections and afterward introduced into the sections and suitably secured therein. The horizontal sections 6 6 may be arranged to receive water directly from the pipe *c*, the vertical section 2 being omitted.

I claim—

1. The improved conduit for application to a fire-box or furnace, said conduit comprising in its construction a vertical section 2, containing water-subdividing and heat-conducting wings or partitions, horizontal sections 6 6, containing water-subdividing wings or partitions that extend across the upper end of the section 2 and form passages in the lower portions of the sections 6 6, which guide the water outwardly, and passages in the upper portions of said sections, which guide the water inwardly, and the vertical outlet-section 8, arranged to receive the water guided inwardly in the sections 6 6, as set forth.

2. The combination, with a fire-box or furnace *a* and a receptacle *b* above the same, of a conduit in said fire-box, composed of a vertical section 2, having its lower end connected

with a water-supply pipe and provided with water-subdividing ribs or partitions, the horizontal sections 6 6 communicating at their inner ends with the upper end of the section 2 and provided with water-subdividing ribs or partitions extending across the section 2, and the vertical outlet-section 8, connected at its lower end with the inner ends of the sections 6 6 and at its upper end with the receptacle *b*, as set forth.

3. In a conduit of substantially the construction hereinbefore described, the section 2, having an internal hub or collar 9, and water-subdividing wings 3, radiating from said hub, said wings being divided into series, the wings of each series alternating with those of the next, whereby the water is retarded and caused to take a sinuous course, as set forth.

4. In a conduit of substantially the construction hereinbefore described, the section 2, having an internal hub or collar 9, water-subdividing wings 3, radiating from said hub, said wings being divided into series, the wings of each series alternating with those of the next, whereby the water is retarded and caused to take a sinuous course, and projections or partitions within said hub or collar, whereby the water in the same is subdivided and heated, as set forth.

5. A conduit comprising the horizontal sections 6 6, having radially-arranged longitudinal water-subdividing wings separated by a series of lower passages and a series of upper passages, the latter being connected with the lower passages at the outer ends of the sections, a supply-pipe arranged to deliver water to the lower passages of the series, and an outlet-pipe arranged to receive water from the upper passages, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 23d day of November, A. D. 1891.

CHARLES A. SAWIN.

Witnesses:

FREDERICK BOARDMAN,
FRANCIS P. HAVENS.