(No Model.)

C. A. SAWIN.

STEAM OR HOT WATER HEATING APPARATUS.

No. 558,665. Patented Apr. 21, 1896.

FIG. 1.

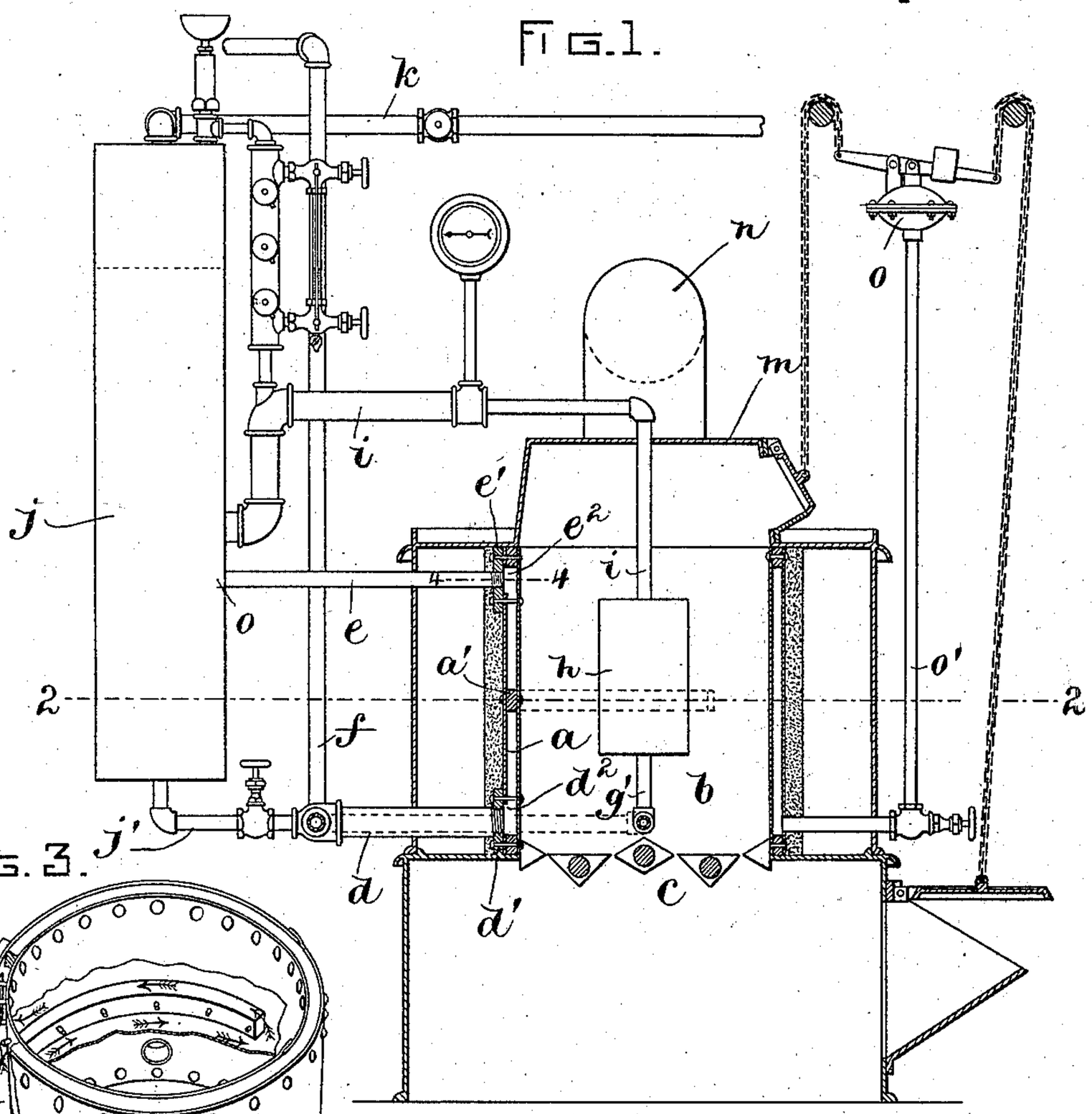

FIG. 3.

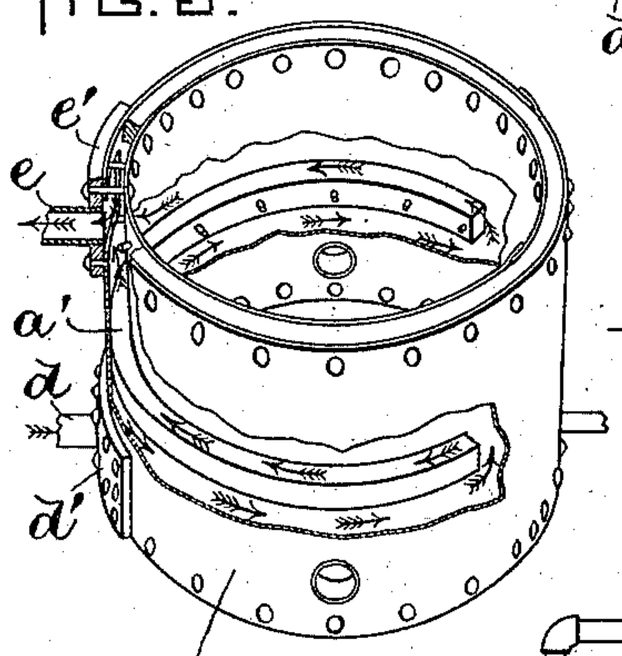

FIG. 2.

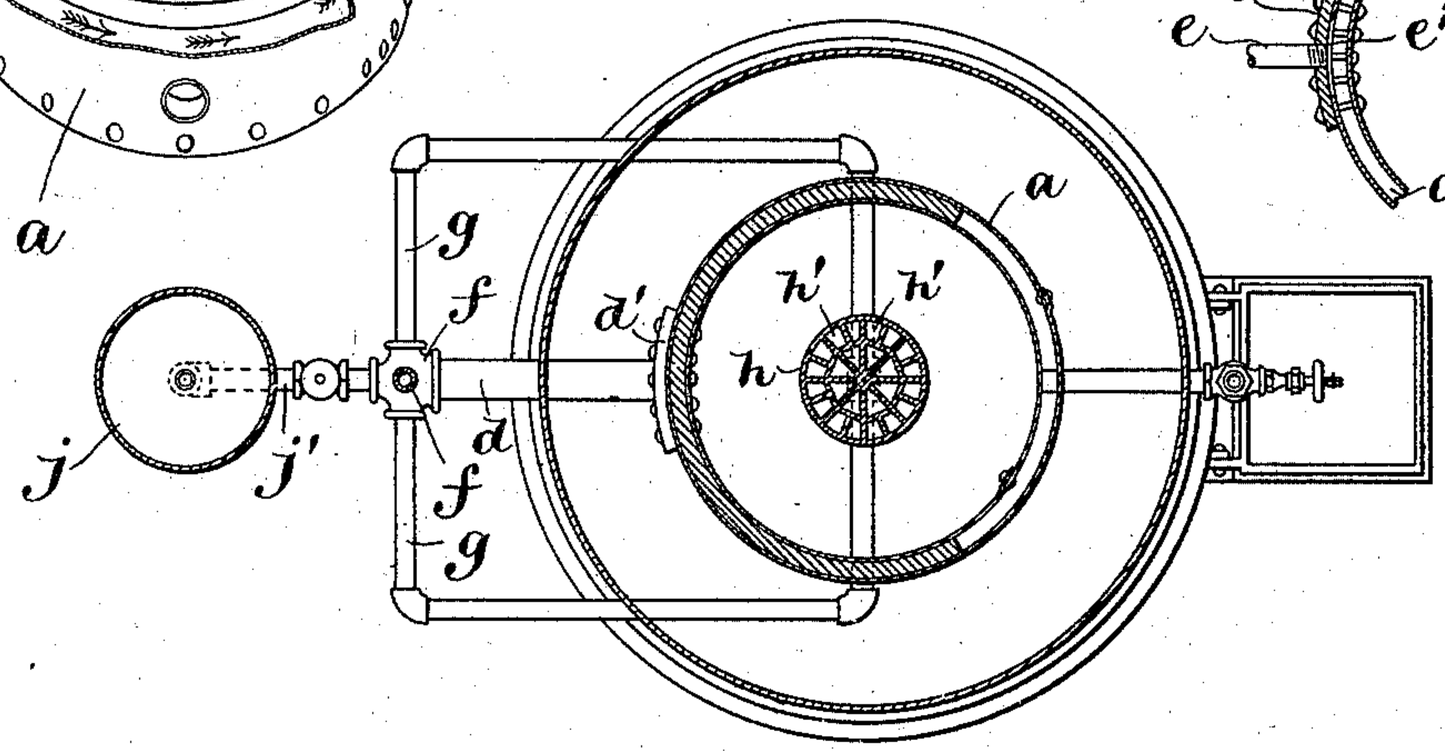

FIG. 4.

WITNESSES:
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CHARLES A. SAWIN, OF WALTHAM, MASSACHUSETTS.

STEAM OR HOT-WATER HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 558,665, dated April 21, 1896.

Application filed October 14, 1895. Serial No. 565,565. (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 Steam or Hot-Water Heating Apparatus, of which the following is a specification.

This invention has for its object to provide certain improvements in apparatus for heating by steam or hot water, said improvements looking to rapidity of circulation of the heating agent, economy of fuel, absence of noise or hammering, and simplicity of construction.

My invention consists in the several improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a partial section and partial side elevation of a heating apparatus embodying my improvements. Fig. 2 represents a section on line 2 2 of Fig. 1 and a plan view of the parts below said line. Fig. 3 represents a perspective view of a portion of the apparatus, the same being shown partly in section. Fig. 4 represents a section on line 4 4 of Fig. 1.

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

In the drawings, *a* represents an annular casing or water-jacket, which constitutes the wall of a fire-box *b*, the bottom of said fire-box being a suitable grate *c*. The annular water-space in the casing or jacket *a* is made comparatively thin, so that it presents a thin sheet of water to the burning fuel in the fire-box.

d represents a water-inlet or return-pipe entering the lower portion of the water-jacket *a*, and *e* represents an outlet or flow pipe connected with the upper portion of the water-jacket, said pipes communicating with the same side of the jacket, as shown in Figs. 1 and 3. Between the pipes *d* and *e* I provide the jacket with a horizontal semipartition *a'*, which extends partly, but not entirely, around the jacket and compels the water entering at the return-pipe to pursue a sinuous course, as indicated by the arrows in Fig. 3, the water flowing practically around the entire circumference of the water-jacket before reaching the flow-pipe *e*. The pipes *d* and *e* are engaged, respectively, with collars *d' e'*, which are bolted to the exterior of the water-jacket *a*, the outer wall of said jacket being provided with enlarged orifices $d^2 e^2$ at the points where the pipes *d e* are connected. The pipes *d e* do not enter the outer wall of the water-jacket, but terminate in the collars *d' e'*, the result being the formation of water-spaces at the ends of the pipes *d e* which are wider than the general width of the water-jacket, the object of these wider spaces being to prevent the hammering noise that would be liable to be caused by the action of the water if the spaces where the pipes *d e* enter the water-jacket were not thus widened, or, in other words, if the width of the water-space which is desirable for the jacket were continued at the points where the pipes *d e* enter the jacket.

f represents a return-pipe, through which the return-water is conducted to the pipe *d* from the radiators, said pipe entering a coupling *f'*, with which are connected the pipe *d* and the branch pipes *g g*, which are connected by a short vertical pipe *g'* with a conduit *h* of cylindrical form located at the center of the fire-box. Said conduit is composed of a cylindrical casing having numerous vertical internal partitions subdividing its interior into a plurality of narrow passages *h'*, Fig. 2, which conduct the water through the conduit, the water entering through the pipe *g'* and passing from the upper end of the conduit through a pipe or conduit *i*, which communicates with a vertical reservoir *j*. Said reservoir extends considerably above the water-jacket, the pipe or conduit *i* entering the reservoir at a point considerably below its upper end, so that the discharge end of the conduit *i* is always below the water-level in the reservoir. The flow-pipe *e*, communicating with the upper portion of the water-jacket, also enters the lower portion of the reservoir *j* and discharges into the reservoir below its water-level.

k represents a pipe communicating with the upper portion of the reservoir *j* and connecting the latter with the radiators, the steam or hot water passing from the reservoir *j* to the radiators through said pipe *k*. In practice there will be as many pipes *k* as there are radiators; but for the sake of convenience I

have shown but one. The same may be said of the return-pipe *f*.

m represents a dome secured to the upper end of the water-jacket and constituting an extension of the fire-box, the fire-door *m'* for the reception of fuel being located in said dome at a point above the water-jacket. The flue *n* for the escape of smoke and other products of combustion extends from the top of the dome. It will be seen that by this construction I provide a deep fire-box the door of which is at the upper end in close proximity to the outlet-flue. I am therefore enabled to readily check the draft by opening the door and permitting the air to pass through the body of fuel without subjecting the water-containing parts—namely, the water-jacket and the conduit—to the currents of cold air, said parts being covered and protected by the body of fuel. I therefore check the combustion without rapidly reducing the temperature of the water.

The door *m'* may be automatically opened and closed to regulate the draft by means, such as a diaphragm, located in a chamber *o*, which is connected by a pipe *o'* with the water-jacket. The diaphragm is connected, through a system of levers and connecting devices in a well-known manner, with the door *m'*, the arrangement being such that an increase in the temperature and pressure of the water will automatically open the door, while a decrease in temperature will close the door.

The lower portion of the reservoir *j* is connected by a pipe *j'* with the coupling *f'*, so that water from the reservoir can enter the pipe *d* and the branch pipes *g g*, and thus supply the water-jacket and conduit.

The water entering the annular jacket *a* and conduit *h* from the return-pipe and from the reservoir is subdivided into thin streams in said jacket and conduit, and becoming rapidly heated passes through the pipes *e* and *i* into the reservoir, entering the body of water therein. When the apparatus is used for steam-heating, the steam separates from the water in the reservoir and passes to the radiators through the pipe *k*. When the apparatus is used for heating by circulation of hot water, the more highly heated portions of the water rise and flow through the pipe *k*. In either case two currents are formed in the reservoir, one rising and the other, comprising the cooler water in the reservoir, falling and returning to the lower portions of the water-jacket and conduit. There is, therefore, a rapid circulation of water through the water-jacket and conduit, the presence of a body of water in the reservoir above the conduit and water-jacket keeping said parts full of water and preventing the formation of steam therein. Hence I am enabled to conduct the water in thin streams through the water-jacket and conduit without liability of explosion and without the hammering noise that would be a result of the presence of steam in said parts.

It is very desirable for rapid heating and circulation that the water be conducted in as thin streams as possible along the heated surfaces; but the chief difficulty in the way of such distribution of the water has been the liability of the formation of steam-spaces, and this I avoid by the reservoir arranged, as described, relatively to the water-jacket and conduit. The partition *a'* in the water-jacket, by compelling the water to flow in a sinuous course, greatly increases the effectiveness of the apparatus.

The annular fire-space formed between the cylindrical conduit and the annular water-jacket is an important feature of my invention. It provides for the maintenance of a sufficiently bulky body of fuel between the conduit and the water-jacket to insure efficient combustion and prevent the deadening of the fire by the absorption of heat from it, which would result if the conduit or water-jacket or both were provided with arms or projections encroaching upon the fuel-space.

I claim—

1. A heating apparatus of the character specified, comprising a thin annular water-jacket, a conduit within the space inclosed by the water-jacket and subdivided into narrow vertical channels, said conduit and water-jacket being separated by an annular fuel-space of substantially uniform width, a return-pipe connected with the lower portions of said water-jacket and conduit, a reservoir located mainly above the said water-jacket and conduit, connections between the lower portion of said reservoir and the upper portions of said water-jacket and conduit, and a flow pipe or conduit connected with the upper portion of said reservoir.

2. A heating apparatus of the character specified, comprising an annular water-jacket, a conduit surrounded by said jacket and separated therefrom by an annular fuel-space, a dome located above and communicating with said space, said dome being also located above the water-jacket and conduit and provided with a fire-door and a smoke-outlet, whereby a current of air may be permitted to flow over the fuel to check combustion without cooling the surfaces of the water-jacket and conduit, said surfaces being protected by the fuel in said fuel-space.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 9th day of October, A. D. 1895.

CHAS. A. SAWIN.

Witnesses:
A. D. HARRISON,
ROLLIN ABELL.