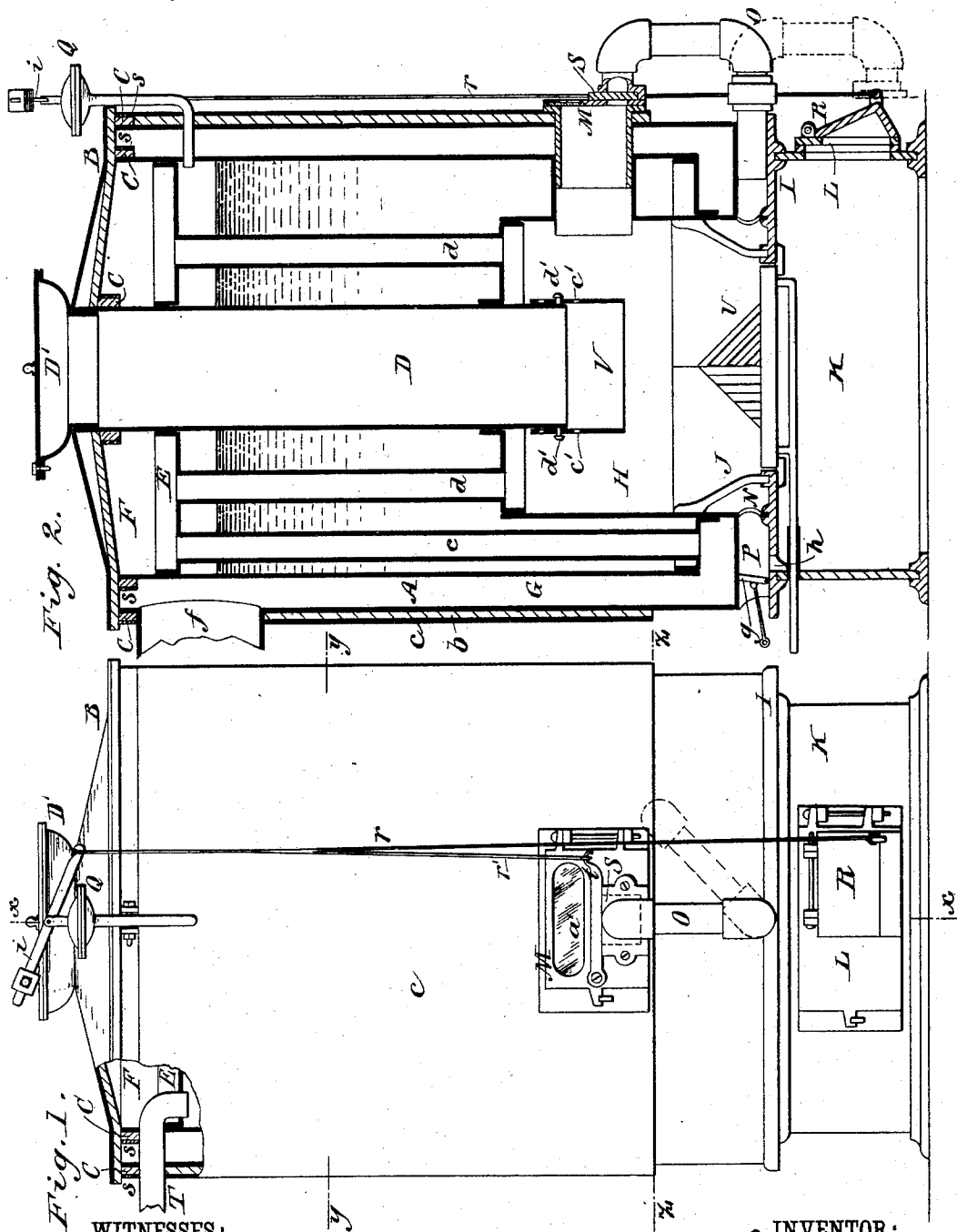


J. H. WATERMAN.

COMBINED HOT AIR AND STEAM HEATING APPARATUS.

No. 371,010.

Patented Oct. 4, 1887.



WITNESSES:
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W. Sedgwick

INVENTOR:
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Fig. 3.

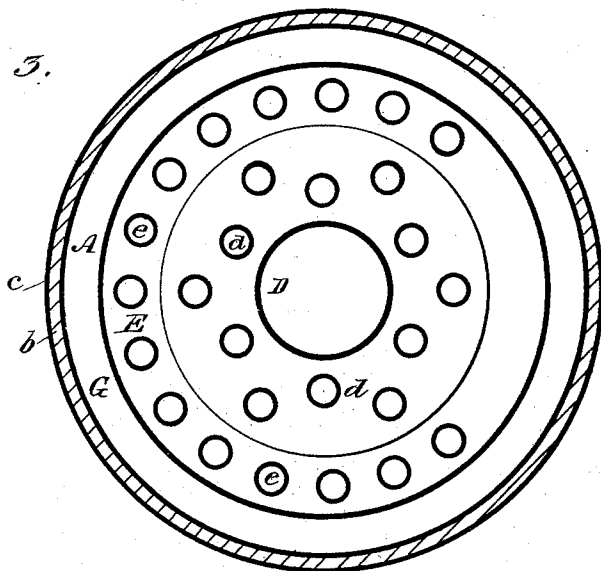


Fig. 4.

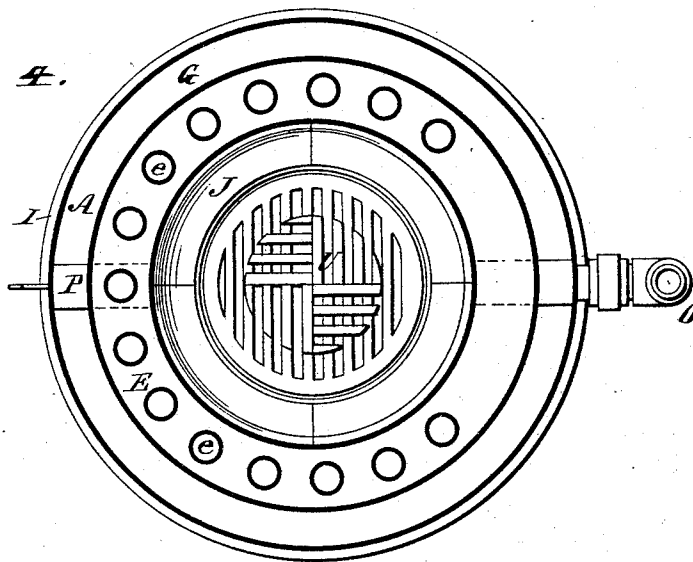
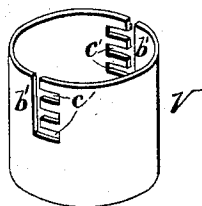


Fig. 5.



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JOHN H. WATERMAN, OF CHEBOYGAN, MICHIGAN.

COMBINED HOT-AIR AND STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 371,010, dated October 4, 1887.

Application filed June 7, 1886. Serial No. 204,351. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. WATERMAN, of Cheboygan, in the county of Cheboygan and State of Michigan, have invented a new and useful Improvement in Combined Air and Steam Heating Apparatus, of which the following is a full, clear, and exact description.

This invention consists in certain novel constructions and combinations of parts in an air and steam heating apparatus mainly designed for heating buildings, substantially as herein-after described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly-broken front elevation of a combined hot-air and steam heating apparatus embodying my invention; Fig. 2, a vertical central section of the same upon the line *x x* in Fig. 1. Fig. 3 is a horizontal section upon the line *y y* in Fig. 1; Fig. 4, a horizontal section upon the line *z z* in Fig. 1, showing the base portion of the heater upon which the boiler stands; and Fig. 5, a view in perspective of an adjustable sleeve used upon the lower end of the magazine of the heater.

A is the outer case or body of the heater, having a covering of felt, *b*, applied to it, and which is in turn incased by a sheet-metal sheathing, *c*, to prevent wasteful escape of the heat into the cellar or apartment in which the heater stands.

B is the top, which consists of a sheet-iron cover and heavy cast-iron lower cover that rests, when in place, upon a self-adjustable asbestos packing, *C*, to prevent the escape of smoke or gas, and which may be applied to other joints of the heater for the same purpose. This packing is made from a sheet of asbestos cut into strips of a suitable length to go round the joint, and bound on the outside of each bent strip by a metal band or binder, *s*, which may, if desired, be a simple wire twisted at its ends to make it close or tight or be otherwise suitably secured.

D is the magazine of the heater for using fuel adapted to it, and D' its top, which is made so as to lift out in order that the top cover or covers, B, of the heater may be removed when required to clean out the boiler.

E is the boiler arranged concentrically within the outer shell or casing of the heater, and F the smoke-box. G is the smoke-space around the boiler, said boiler being a vertical one provided with direct or ascending flues *d* and descending flues *e*.

f is the outlet for the escaping products of combustion.

H is the fire-chamber, and I the base or plate upon which the boiler rests. J is the fire-pot, K the ash-pit, and L the ash-pit door.

M is the fire-hole door.

N is a chamber or space surrounding the fire-pot, and O a pipe connecting said chamber with the fire-chamber for the purpose of conveying hot air through an opening in the fire-hole door M. This pipe O, which is a bent one, is made to turn, as by a union or other lower joint, so as to be capable of being shifted out of the way when necessary to relieve the door. P is a pipe or duct, preferably of dome shape, that admits air from the back or outside of the apparatus to the chamber N. This pipe is controlled by a valve, *g*, capable of manipulation from the exterior and serving either to admit air from the outside directly through said pipe from the ash-pit through an aperture, *h*, or through both, accordingly as said valve is raised or lowered. By this means the air may be tempered in its admission to the chamber N, which serves to supply by the pipe O the combustion or fire chamber above or on top of the burning fuel with heated air for the purpose of consuming the smoke and escaping gases without cooling the boiler, as when cold air is admitted for the purpose. To make such action perfect, however, it is necessary that the volume of incoming air should be regulated according to the condition of the fire. This I do automatically by means of a flexible diaphragm-regulator, Q, connected with the boiler, such as used on other steam-heaters for controlling the damper which regulates the draft, the same being connected with the damper-valve by a lever and chain; but in my application of such a regulator I cause it to simultaneously control both the damper-valve R of the ash-pit and a sliding gate or valve, S, between the pipe O and the fire-door M, where said pipe communicates with the fire-hole. To this end

I so arrange the usual weighted lever, *i*, and chain *r*, by which the ash-pit damper R is controlled, as to admit of said chain or of another chain, *r'*, attached to it, also controlling, by a lever, *t*, the gate or valve S. In this way or by these means both the gate S and draft-valve or damper R fall or close together by their own gravity as the pressure of steam is increased in the boiler and are raised or opened in unison as the steam goes down. Thus both valves work together not only to regulate the draft, but also to control the admission of hot air to the fire-chamber for the purpose of consuming the smoke and gases, and for this there is a good reason, as, for instance, when more air is required to make the fire burn stronger then more hot air will be required to be admitted above the burning fuel to consume the extra amount of gas produced, and when the steam is high enough both valves will be closed tight and no air is admitted from any source, which will cause the boiler to hold its steam much longer.

It may here be observed that the gate or valve S is so made that the chain *r* can be preferably carried by the fire-door M, so that by unhitching the chain from the lever *t* said valve or gate will remain shut and the pipe O may be turned or shifted from disengagement with the fire-door without interfering with the latter. This closing of the opening in the fire-door will be necessary under certain circumstances, and if burning natural gas in the heater, not only should the gate S be closed and pipe O be removed, but also the valve *g* in the pipe P be raised, to prevent the admission of air from the back of the heater, thereby reversing the current of hot air and causing it to come up under the grate for the purpose of burning natural gas. By sliding outward and turning to one side the pipe O, the fire-door may be opened, as required. Said fire-door M may have a peep-hole or glass, *a'*, in it to observe the condition of the fire when the door is closed, and to provide for regulating the volume of hot air to be passed to the fire-chamber of the heater.

T is the pipe by which steam is conveyed from the boiler.

U is a cone-shaped grate for burning sawdust and tan-bark as fuel, and V is an extension-sleeve applied to the bottom of the magazine. This sleeve is to be used when burning sawdust, tan-bark, or different kinds of coal. It is applied to the lower end of the magazine by constructing it with longitudinal and lateral cuts *b' c'* in opposite sides of its upper end, so that said sleeve may be slipped over the lower end of the magazine, and by turning it be made to engage with studs *d'* on the maga-

zine, to hold it in place at varied depths of extension, according to the slot or cuts *c'*, which are made to engage with the stud *d'*. Said sleeve V may readily be removed when not required—as, for instance, when burning natural gas and certain other fuels in the heater—and grates of different construction or character may be substituted one for the other to suit different kinds of fuel used.

In this combined air and steam heating apparatus the fire-pot will be restrained from burning out and the full benefit of the heat will be secured in the boiler; also all or most of the escaping gases be consumed. Furthermore, although here shown as fitted for burning other fuel, it will be found well adapted to burning natural gas.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the body of the heater and its top, of the asbestos packing applied to said body and having applied to its outside a separate metallic binder or band, substantially as and for the purpose set forth.

2. The combination, with the heater, its fire-chamber and fire-pot, of the air-heating chamber N around said pot, a duct for supplying air to the chamber N, and a pipe for passing the heated air from said chamber to the fire-chamber above the fire-pot, substantially as and for the purpose herein set forth.

3. The combination, with the fire-door M, having an air-hole or passage through it, and the air-heating chamber N, having an air-inlet passage, P, of the shifting or adjustable pipe O, made to make and break connection with said door and passage through it, essentially as described.

4. The combination of the fire-pot, air-heating chamber N, surrounding the same and having an aperture, *h*, into the ash-pit, the pipe P, and the valve *g*, closing at will either the pipe P or the opening *h*, substantially as specified.

5. In a combined air and steam heating apparatus, the combination, with the boiler, its inclosing-heater and ash-pit, of an air-supply chamber and pipe for conveying air to or above the fire, a gate or valve controlling said pipe, a damper or valve controlling the draft, and an automatic steam-regulator adapted to simultaneously control both of said valves, essentially as and for the purposes herein set forth.

JOHN H. WATERMAN.

Witnesses:

GEO. E. FROST,
H. J. A. TODD.