

UNITED STATES PATENT OFFICE.

E. T. INGALLS AND JAS. R. NICHOLS, OF HAVERHILL, MASSACHUSETTS.

STEAM-WARMING APPARATUS.

Specification of Letters Patent No. 20,068, dated April 27, 1858.

To all whom it may concern:

Be it known that we, ELIAS T. INGALLS and JAMES R. NICHOLS, of Haverhill, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in the Construction of Steam-Warming Apparatus; and we do hereby declare the following to be a full, clear, and exact description of the nature and operation of the same, reference being had to the annexed drawings, making a part of this specification.

Figure 1, is a perspective view of the whole arrangement, A being the portable steam generating apparatus, which is so constructed that the top and outside cylinder may be removed, showing the interior arrangement of boiler, grate, furnace, flue, &c. C, C, C, show places for attachment of pipes for conveyance of steam to radiators. B is a radiator made with a hinge so that it may be opened to show its interior construction.

Fig. 2, is designed to show more clearly the construction of the device for feeding water to the boiler.

Fig. 3, is a sectional view of the steam generator, exhibiting its interior arrangement and construction.

The large and small letters of each figure will more fully explain the different parts.

D, is the ash door, which exposes and covers two openings, one F into the chamber around the boiler, the other G, into the ash pit. E is the partition which divides them.

H, H, H, is a pipe leading from the bottom of the boiler to a point two feet above the top of the same, which is allowed to remain open, and to which is affixed the device for controlling the valves, which admit air to the furnace, and to the flue around the boiler. This device consists of the metallic vessel I holding about one quart of water, the flexible pipe J, the rod K, spiral spring L, tube M. superior and inferior valves O, O, spring P, small annular pieces of metal Q, Q, soldered to rod K.

The device for feeding water into the boiler consists of the reservoir R which may, or may not be attached to pipe H, H, H, the bent metallic pipe S, flexible rubber pipe T made to subserve the purposes of a valve, by the action of the pieces of metal U, U, the rod V connected with the vessel W to which pipes Z, Z, are attached forming a communication with the boiler at Y, Y. *t t* are rods

attached to the base of apparatus, for holding the pipes in place.

X, is a cover through which fuel is fed to the furnace.

v is a safety valve, so constructed as to lift readily at $1\frac{1}{2}$ pounds pressure to the square inch.

In Fig. 2, similar letters refer to similar parts as in Fig. 1.

In Fig. 3, *i i i i* show the form of construction, and arrangement of the boiler, the arrows indicating the draft and the direction of the smoke and heated gases, circulating over and around the boiler. *k, k, k,* a cylinder of iron, which is made to move freely up and down in another cylinder *j j j j* for the purpose of increasing or diminishing the amount of fuel to be kept in a state of combustion. *m, m, m,* is a ratchet device for graduating the cylinders, and keeping it in place. *l,* the handle upon which to place the hand when changing its position. *n, n,* is unignited coal, which from its position above the draft cannot burn, until by its gravity and the consumption of coal, it falls below the opening of the graduating cylinder which contains it. *o, o,* is coal within the influence of draft and consequently ignited. *p, p,* a circle of fire brick upon which the boiler rests. *q q* the grate, turned by the handle *r.* *s, s, s, s,* the external cylinder which incloses the boiler, and forms the smoke passage over its exterior surface.

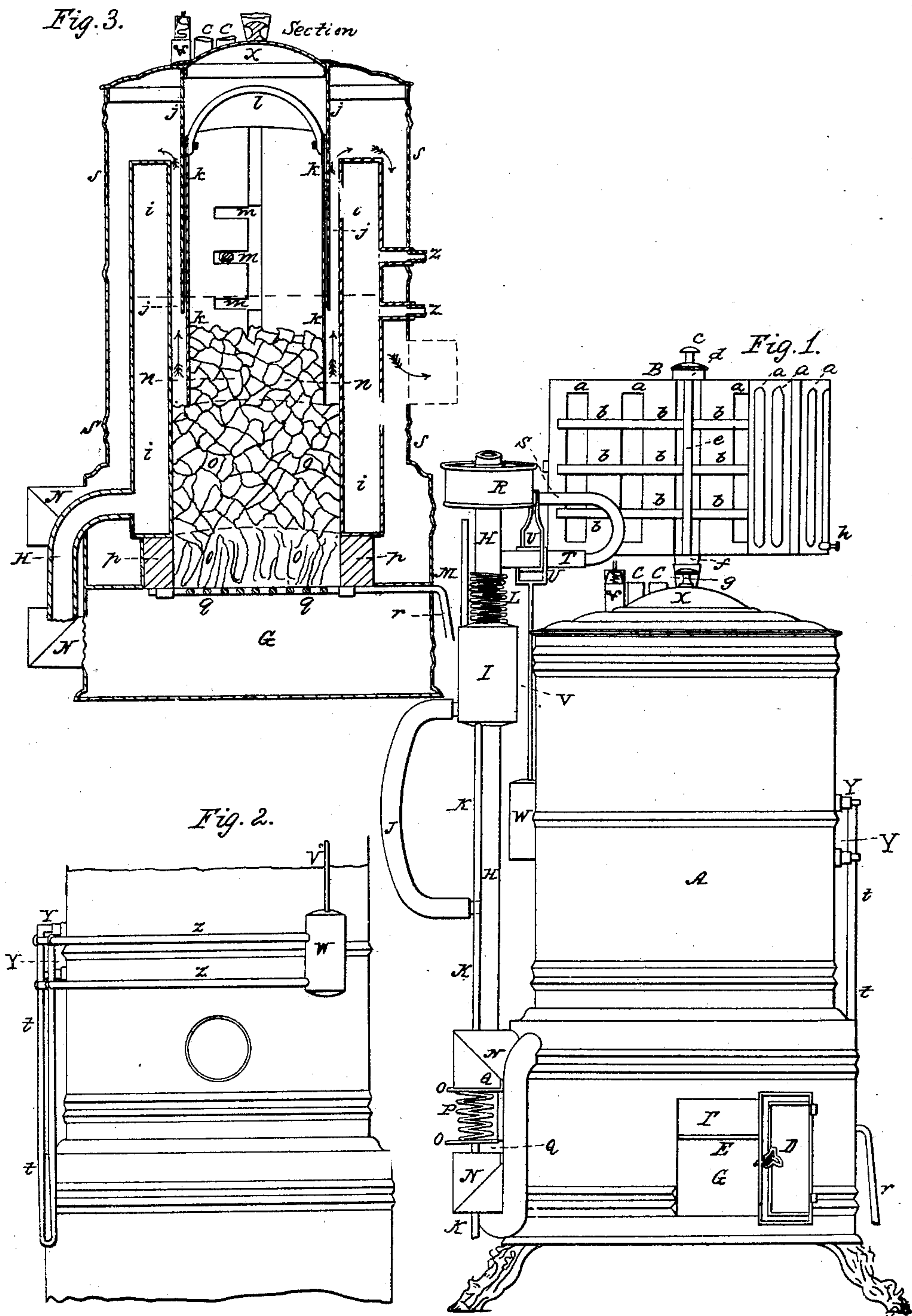
In the heat radiator, connected with Fig. 1, *a, a, a, a,* represent flutings in the thin metal plates about a half inch in depth which pass across the whole width of the radiator. They are placed about two inches apart upon the interior surface of both plates, and are prevented from spreading out when under steam pressure by the strips of metal *b, b, b, b.* They are securely soldered to the iron plates at the points indicated by the position of the letters *b, b, b, b,* and stretch across all the flutings and hold them in place. *c,* is a knob of metal connected with the rod *e,* upon which to place the hand, when opening or closing the valve *f.* *d,* is a packing screw steam tight, through which the rod *e* passes. *g,* is a metallic socket attached to the steam pipe, into which the valve *f,* enters, and a tight joint is made by rubber packing. *f,* is a metallic plug valve for the admission of steam to the radiator, and is opened and

INGALLS & NICHOLS.

Steam Heater.

No. 20,068.

Patented April 27, 1858.





go, and so turned that it will be held in place, by the ratchet device *m, m*. In the severe weather of winter when more heat is required, it may be raised so as to place
 5 a larger body of coal within the influence of draft. The low state of combustion in which the coal is maintained, together with the cooling properties of the unignited mass in close contact with it, will serve to pre-
 10 vent the rapid oxidation of the cylinder. Should it however in process of time become burned, another one can be readily supplied by removing the top of the apparatus and affixing it.

15 The form of fire grate which we prefer is one that is constructed in two parts turning upon axles in the center so that one part may be maintained in place to support the coal while the other is let down that the ash
 20 may fall. This adjusted, the other half is turned so that the ash may be removed, while that part of the grate supports the superincumbent mass of coal. With the use of this form of grate, the fire may not be
 25 allowed to be extinguished during an entire season. We have not shown it in the drawings.

In admitting steam to flow to the radiators in different apartments it will be necessary to open the valve *f*, by placing the hand
 30 upon knob *c*, and drawing up the rod. The air cock *h* must also be opened, to let the air pass out of the radiator. To shut off steam, thrust down the knob *c*.

35 The boiler is of the utmost simplicity of construction being simply a double cylinder, without tubes, chambers or flues. By its arrangement in combination with cylinders, a draft flue is formed, which compels the flame
 40 and heated gases to travel up in close contact with its interior surface, across its top, and down upon its exterior, to near the support upon which it rests, thus bringing the whole influence of heat to bear upon it, pro-
 45 ducing great efficiency and power in operation. The top of the apparatus can be lifted, removing the cylinders and exposing the boiler for repairs, with great ease.

The apparatus can be constructed no
 50 larger than a parlor stove sufficient for warming two or three rooms, or it may be made of sufficient capacity, to heat large public buildings.

The size or arrangement of radiators, does
 55 not differ from others in use. The peculiarity consists in the method adopted to main-

tain the flutings in position, when subjected to steam pressure, and in the form of stop cock for controlling the supply of steam, without the flutings or corrugations or some
 60 equivalent device in the iron plates, unpleasant noises would be produced, by the contraction and expansion of the metals by heat, and without the strips of metal pass-
 65 ing across, holding them in place they would be distended and obliterated by the force of steam pressure. The form of construction of radiators is cheap and ornamental. The stop cock device possesses three advan-
 70 tages over all others in use. First, it can be operated without stooping down to the floor. Second, it is so attached to the radiators that it cannot leak, a source of much trouble, third, it can be constructed at less
 75 cost. These advantages render it an important addition to radiators.

We are aware that steam warming apparatus has been constructed, consisting of boiler, pipes and radiators, with automatic devices for regulating draft, and water sup-
 80 ply, and also with valves opening into the chamber around the boiler for purposes similar to ours, but the construction and arrangement of them, essentially differ so far as our knowledge extends. 85

We claim—

1. The device as set forth, for increasing or diminishing the capacity of the fire chamber, so as to maintain a larger or smaller
 90 amount of fuel in a state of combustion.

2. We claim vessel I in connection with flexible pipe J, and spring L operating together as described, for controlling a valve or valves affixed to boilers, for regulating
 95 steam pressure. We disclaim so connecting this arrangement, as to control dampers in the smoke flue and draft, in the manner embraced in C. Davenport's patent of March 11th, 1856.

3. We claim the device, constructed essen-
 100 tially as described for supplying water to the boiler.

4. We claim in the construction of fluted or corrugated radiators of thin plates of
 105 iron, placing across the corrugations strips of metal securely fastened, and for the purposes as set forth.

ELIAS T. INGALLS.
 JAMES R. NICHOLS.

Witnesses:

JAMES GALE,
 JAMES E. GALE.