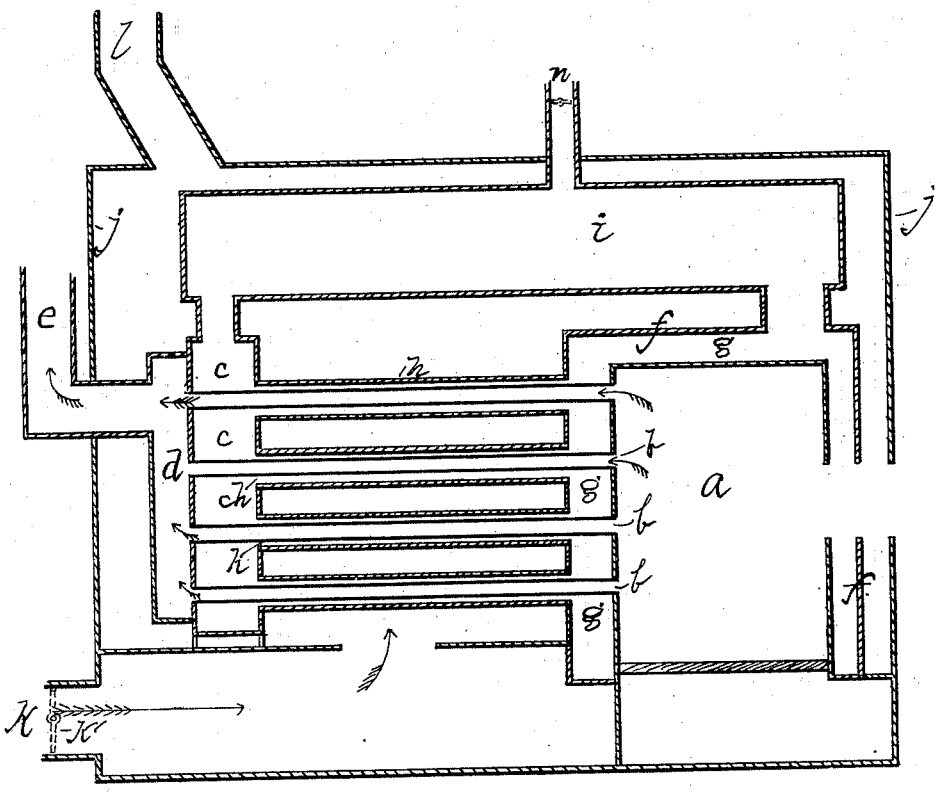
D. SULLIVAN.
Heater.

No. 205,304. Patented June 25, 1878.



Witness
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UNITED STATES PATENT OFFICE.

DANIEL SULLIVAN, OF BANGOR, MAINE.

IMPROVEMENT IN HEATERS.

Specification forming part of Letters Patent No. **205,304**, dated June 25, 1878; application filed May 13, 1878.

To all whom it may concern:

Be it known that I, DANIEL SULLIVAN, of Bangor, in the county of Penobscot and State of Maine, have invented certain new and useful Improvements in Heaters; and I do hereby declare that the following is a full, clear, and exact description of the invention, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification, and in which is shown a longitudinal section of my invention.

My invention relates to an improvement in heaters; and consists of a boiler, substantially of the construction hereinafter described, suitably cased, and adapted to be used either as a steam-generator, for heating by steam by the usual radiators, or as a hot-air heater, the air being heated from boiling water, and distributed by pipes and registers, as in the ordinary hot-air furnace, or as both combined.

It will be understood by reference to the accompanying drawing.

At *a* is shown the fire-chamber, provided with fire-tubes *b*, which extend through a water-back, *c*, into a fire-back, *d*, leading into a flue, *e*. Surrounding the fire-chamber is a casing, *f*, forming a water-space, *g*, around it, also provided with tubes *h*, surrounding the tubes *b*, and connecting with the water-back *c*. Over the whole is placed a steam-drum or reservoir, *i*, connecting at one end with the space *g*, and at the other with the water-back *c*.

The distance between the casing *f* and the water-back *c* (greater or less, as desired) is spanned by the double tubes *b h*, and the whole is inclosed in a casing, *j*, having a cold-air feeder, *k*, and hot-air pipes *l*, leading therefrom, as in the ordinary furnace.

The cold-air feeder may be provided with a damper, *k'*, to stop the supply.

It will be observed that the surface exposed to the fire is entirely surrounded by a water-space, which, in its turn, is surrounded by an air-space, to which air may be admitted or cut off, at will.

The heater may in consequence be used in three ways: First, as a steam-heater, by cutting off the cold-air supply at *k'*, thus preventing condensation in the tubes, &c., and leading the steam from the drum or reservoir *i* to the ordinary radiators; second, by cutting off the steam-conductors *n* and admitting the cold air, which, entering the casing *j* and circulating through and among the tubes and over the chamber and drum, is heated by the boiling water contained therein, and ascends through the hot-air conductors and registers, as in the ordinary hot-air furnace; third, by combining these plans and using both steam and hot air.

My heater may, of course, be provided with any ordinary and proper grates, safety-plugs, draft-regulators, &c.

The double tubes *b h*, together with the water-back *c* and a corresponding water-compartment at the other end, and a fire-back, *d*, may be combined with the common hot-air furnace, greatly increasing its heating power and improving the quality of the hot air. In such case the back of the furnace is removed and the water-back *c* inserted in its place, the flame and heat passing through the tubes *b* to the fire-back and flue, as now.

This invention is an improvement on that for which a patent was granted to me April 30, 1872, in which the outer casing surrounded an ordinary steam-boiler. In this, however, the boiler or heater is made in two sections, connected by the double tubes *b h*, which are incased and exposed to the incoming air.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In combination with a steam-boiler having a water-space surrounding all its fire-surfaces, a body consisting of uncased tubes *b h*, connecting its end sections and the ordinary fittings of a steam-boiler, the casing *j*, inclosing the whole, having a cold-air feed pipe and the ordinary fittings of a hot-air furnace, both the steam-pipes and the cold-air feeder being provided with cut-offs, whereby either steam or hot air may be used for heating singly, or both combined, substantially as set forth, for the purposes specified.

2. In a heater having a casing, *j*, provided with an air-feed pipe, the double tubes *b h*, exposed within the casing to the incoming air, substantially as described, for the purposes specified.

3. A heater constructed substantially as herein described—to wit, having two end sections and connecting-tubes and a fire-chamber, *a*, fire-tubes *b*, and fire-back *d*, surrounded by the casing *f* and water-tubes *h*, uniting said casing with the water-back *c*, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 8th day of May, 1878.

DANIEL SULLIVAN.

Witnesses:
JOHN R. MASON,
WM. FRANKLIN SEAVEY.