

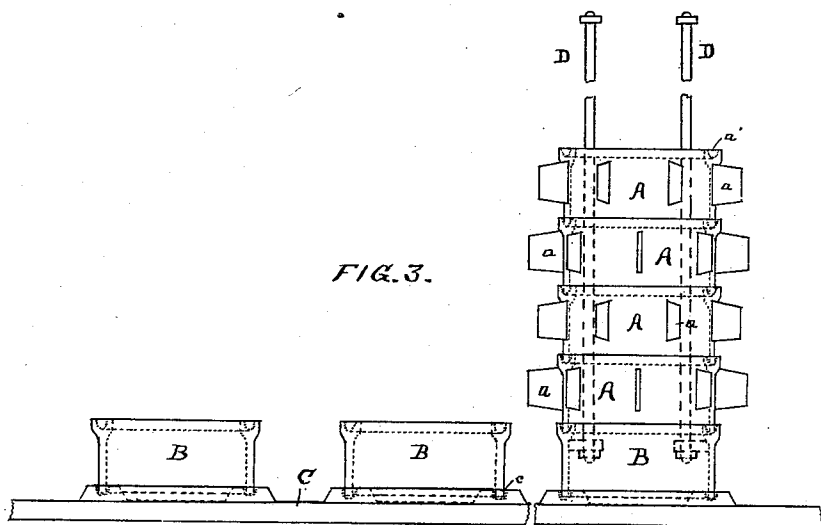
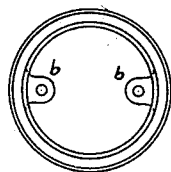
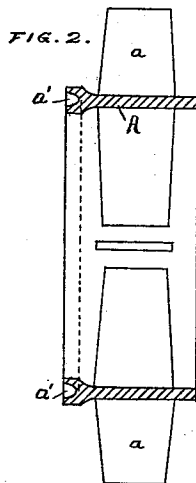
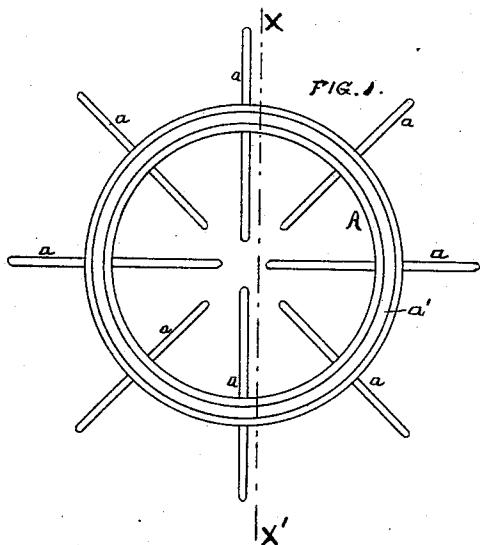
(No Model.)

H. TILDEN.

HEATING TUBE FOR FURNACES.

No. 378,910.

Patented Mar. 6, 1888.



WITNESSES

Jennie C. Warren.
Emma F. Elmore.

INVENTOR,

Henry Tilden.
by J. F. Williamson.
ATTORNEY.

UNITED STATES PATENT OFFICE.

HENRY TILDEN, OF MINNEAPOLIS, MINNESOTA.

HEATING-TUBE FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 378,910, dated March 6, 1888.

Application filed October 11, 1886. Serial No. 215,846. (No model.)

To all whom it may concern:

Be it known that I, HENRY TILDEN, a citizen of the United States, and a resident of Minneapolis, county of Hennepin, State of Minnesota, have invented a new and useful Heating-Tube, of which the following is a specification.

My invention relates to heating-tubes for furnaces and similar purposes; and it consists in the peculiar sectional heating-tube hereinafter described and claimed.

My invention has for its object to provide a simple and efficient means for collecting, conducting, and distributing heat. It was designed primarily for use in connection with a heating-furnace with a view of economizing fuel and heating the fresh air without bringing it in contact with red-hot iron. Red-hot iron, as is well known, has a deleterious effect on air which is to be breathed by living beings. It abstracts the moisture, gives off a poisonous gas itself, and allows the gases of combustion to pass through it. These injurious effects it is essential to avoid, therefore, in the case of a heating-furnace, and its adaptation to accomplish this end is an important feature of my heating-tube. In other uses economy of fuel and quick heating are the desired ends, without regard to the gases produced, and my tube is equally well adapted for such purposes. In the former I do not bring the outside of the tube into direct contact with the fire, and I pass the air through the interior of the tube. In the latter case I might set the tube right in the midst of the burning fuel and pass the material to be heated through the inside, as before. In still other cases I might reverse the operation and conduct the heat from the inside to the outside of the tube by passing the hot material through the inside. The tube, for example, would make an excellent steam-heat radiator. In its construction my heating-tube combines three principles, viz: It gathers the heat by a very large surface, presenting a great number of points exposed to the source of heat; secondly, it conducts the heat on straight lines and on lines at right angles to the planes of crystallization of the cast-iron; and, thirdly, it imparts or radiates the heat by the utmost possible surface, presenting a large number of points

in intimate contact with the material to be heated.

The accompanying drawings—like letters of reference referring to like parts throughout—illustrate my invention.

Figure 1 is a plan view of a section of the tube. Fig. 2 is a section on the line X X' of Fig. 1. Fig. 3 is a side elevation of a tube composed of a series of sections and the means of supporting the same in position, and Fig. 4 is a plan view of the top and bottom section of my heating-tube.

A is a section of a tube of such a length as may be most convenient for casting, and of any desired diameter, preferably from four to six inches.

B is a section different from A, which is used for the top and bottom of the tube.

Section A is provided with a series of radiating-plates set in the periphery on a line normal to a tangent at the point of intersection of the periphery and extending inward to points near the center of the tube and outward any desired distance—as an inch or two—beyond the periphery. As many of these radial plates may be used as desired. The section is also provided with a groove, *a'*, on the top edge or rim of the periphery, and the lower edge or rim is extended below the radial plates for forming the joints. The lower edge or rim of one section sets in the groove on the upper rim of another section, and the groove is filled up with fine sand or cement. In this way a perfect sand joint is formed. By adding similar sections a tube of any desired length may be formed. In putting together the sections the joints or lines formed by the radial plates are broken. The radial plates of any given section fall in a line between the spaces of the radial plates of the next section. In this way a tube is formed wherein the radial plates are in broken lines, a tortuous duct is presented for the air or other material, and there is no open channel. In fact, the plates are so thick that one cannot see through the tube.

When used for a furnace, the top and bottom sections B are made slightly different from the others in this, that the radial plates are not used. The bottom section rests in the sand-joint groove of a cap fitting over a corresponding hole in a bottom plate. The top

section connects by a sand joint with the upper or top plate of the furnace. When a series of these tubes are put together and held in position by suitable upper and lower plates and are heated by heat from fire-pots or other source of heat suitably placed among the tubes and fresh air is supplied to the interior of the tubes by suitable air-ducts below, a furnace is made. The absence of the radial plates on the bottom sections gives access to remove any soot or ashes that may accumulate, and their absence on top sections gives more space for the smoke and gases to pass in their outward course to the smoke-flues.

For some purposes it may be desirable to have horizontal instead of vertical tubes. In that case sand joints of loose sand are impracticable, and I connect the sections by a screw-threaded joint, a screw-thread being cut on the outside of one rim and a reverse thread on the inside of the other rim; or I use cement instead of sand in the grooves, as shown, and hold the series of sections together by rods passing through the sections and secured by bolt-heads and nuts to lips on the top and bottom sections. These rods are shown in position in Fig. 3, and the lips on bottom and top sections are shown in Fig. 4.

I am the inventor of the peculiar furnace herein partly disclosed, and I hereby reserve the right to apply for Letters Patent on the same in another application.

A peculiar fact is revealed by one of the sections of this heating-tube. If heat be applied to one of the radial plates at, say, its outer extremity, it will be felt at its inner extremity much sooner and of much greater intensity than at any point in the rim equidistant from the point where the heat is applied. The explanation herein given is that this is probably due to one of two things—viz., either that cast-iron will conduct heat more readily on lines at right angles to the planes of its crystals

or that heat will be conducted more rapidly on straight lines than on any other. The former is considered the more probable cause. On the process herein disclosed for applying that principle the right is reserved to apply for a patent in a subsequent application.

What I claim, and desire to secure by Letters Patent of the United States, in this application, is as follows:

1. A heating-tube for furnaces and similar uses, consisting of a series of sections provided with a series of radial plates extending inside and outside of said sections and disposed on both sides longitudinally of the axis of said sections, the plates being shorter than these sections and of similar form both inside and outside of the same, the plates of each section being placed to break joints with the plates of the adjacent section or sections, substantially as described.

2. A heating-tube for furnaces, consisting of sections, the sections intermediate the end sections being provided with radial plates extending inside and outside of said sections and disposed longitudinally of the axis of the sections and of the same form on both sides, the plates of each section being placed so as to break joints with the adjacent section or sections, and connections uniting the end sections, substantially as described.

3. A heating-tube for furnaces and similar uses, consisting of a series of sections provided with a series of radial plates extending inside and outside of said sections, the plates inside being of different lengths, but all disposed longitudinally of the axis of the section, the plates of each section being placed so as to break joints with those of the adjacent section or sections, substantially as described.

HENRY TILDEN.

In presence of—

EMMA ELMORE,
J. F. WILLIAMSON.