

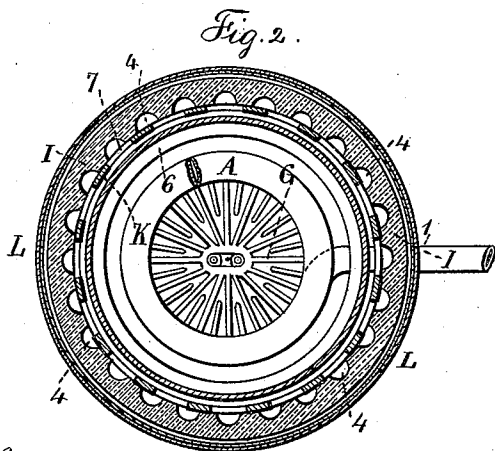
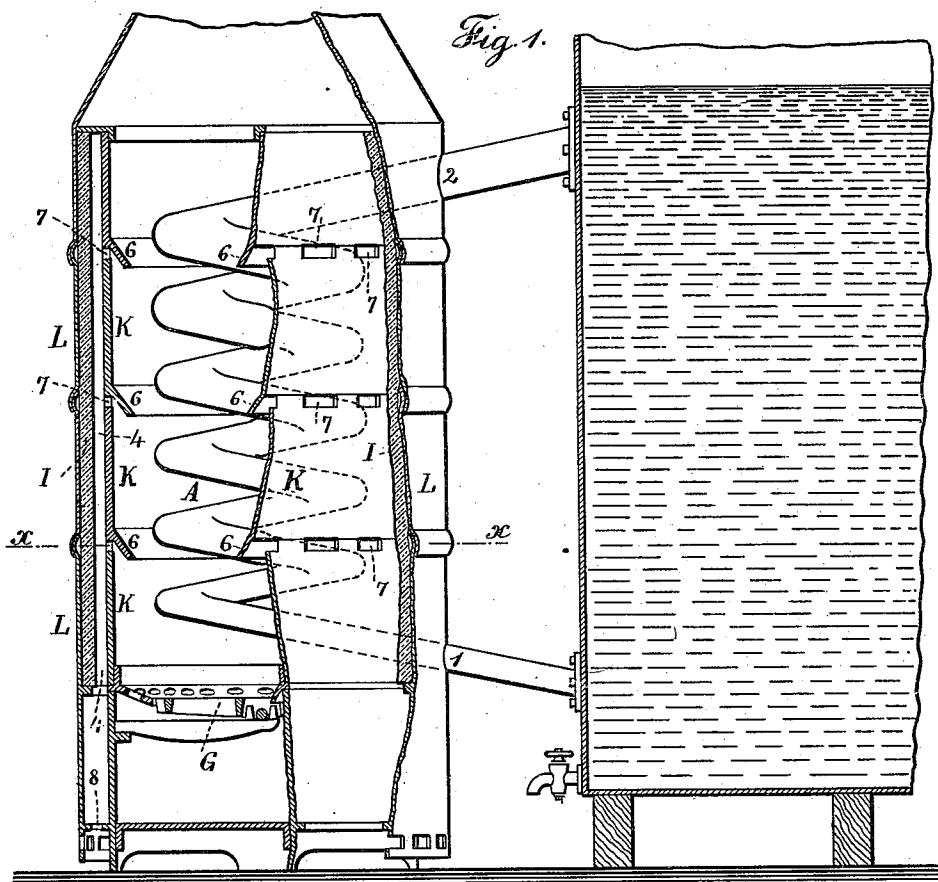
(No Model.)

W. C. BAKER.

HEATING AND STEAM GENERATING APPARATUS.

No. 466,552.

Patented Jan. 5, 1892.



Witnesses:
J. Staib
Charles Smith

Inventor:
William C. Baker
per Lemuel W. Serrell
att'y

UNITED STATES PATENT OFFICE.

WILLIAM C. BAKER, OF NEW YORK, N. Y.

HEATING AND STEAM-GENERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 466,552, dated January 5, 1892.

Application filed September 10, 1890. Serial No. 364,563. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. BAKER, a citizen of the United States, residing at the city and State of New York, have invented an Improvement in Heating and Steam-Generating Apparatus, of which the following is a specification.

In railway-car heaters a coil of pipe has been made use of within the fire-chamber and this has contained water usually saturated with salt, and the coil is connected at one end to a rising column and expansion-vessel and at the other end to the radiating-pipes passing around the car.

In practice it is found that difficulty sometimes arises in heating up the circulating water and the action of the fire appears to generate steam in the column of water within the coil of the fire-chamber, and this reacts to force the warm water backwardly and downwardly instead of simply rising to the expansion vessel or boiler, and in cases where steam is generated in the coil of the fire-chamber the circulation of the water is to that extent interrupted. In order to prevent this difficulty, I make use of a coil formed of a pipe, gradually increasing in diameter from the lower end to the upper end, so as to prevent any downward or reactionary operation by the expansion of the water or the development of steam, because the pipe increases in size in the direction of the circulation, thereby giving space for the water as its volume is increased by the heat, and also giving space for the displacement resulting from the development of bubbles of steam. I also find that in cases where the coil of pipe is introduced within the fire-chamber the depth of coal surrounding such coil is often sufficient to prevent a supply of oxygen reaching the upper portions of the fuel. Hence the carbon, in place of being perfectly consumed, passes off in vapor along with the carbonic acid and carbonic oxide resulting from the combustion, whereby there is a loss of fuel. To prevent this I combine with the fire-chamber containing the coil air-inlets at different elevations vertically, so as to supply fresh air to the body of the fuel surrounding the coil.

In the drawings, Figure 1 is an elevation, partially in section, representing my improved apparatus; and Fig. 2 is a section at

x x, showing the construction of the fire-pot and the manner in which the air is admitted laterally.

The coil of pipe A is of any desired size, and the lower or supply end 1 is usually about an inch and a quarter in diameter, and the upper or delivery end 2 is about two inches in diameter, more or less, so that the passage-way for the water through this coil increases in sectional area from the supply to the delivery end. I make use of sections of pipe passing at their ends one into the other and welded together, and then such pipe is coiled into the conical or cylindrical form required for the fire-chamber, and a stand-pipe may extend from the upper end 2 of the coil to the expansion-vessel used in railway-cars, and from this vessel a pipe usually passes downwardly and to the radiators or heating devices that are warmed by the water circulating through the same.

It is advantageous to incline the lower end 1 of the coil downwardly to the water-supply and to incline the end 2 of the coil upwardly to the discharge. It is necessary to make the coil a gradual incline and to avoid any horizontal portions in such coil to allow the bubbles of steam to separate from the water as rapidly as possible and escape to the steam-chamber or expansion-vessel, and thereby maintain the circulating medium throughout the entire apparatus free from detaining influences. I have represented the pipes 1 and 2 as opening into a boiler or generator. They may, however, connect with the radiator-coils in a car.

The grate G at the bottom of the fire-chamber may be of any usual character. It is generally preferable to make the same slightly conical and pivoted in the middle, so that it may be reciprocated for shaking out the ashes, and around the grate G there may be a perforated ring, through which ring and the grate air may pass to the fuel in the lower portion of the fire-chamber, and this portion of the fire-chamber is generally the hottest, as the combustion is the most perfect.

I employ a fire-pot or inner casing K and an outer casing L, between which is fire-brick I, with channels 4 in its surfaces, through which channels air is caused to pass between the fire-brick and the fire-pot K. The fire-

pot K is made of two or more sections, and each section is provided with a downwardly-projecting flange 6 over the openings 7 through the fire-pot for preventing ashes and clinkers passing into the channels 4, and these openings allow air to enter through the openings 7 and pass beneath the lower edge of the flanges 6 into the fire. The metal casing is to be made of any desired number of sections, so as to introduce air to the fire at two or more ranges of openings, and it is preferable only to provide fire-brick between the pot K and casing L from the level of the grate upwardly, so that there is an air-space between the casings and around the ash-pit, to which air is admitted from outside through suitable openings at the lower part, and such air passes through the channels 4 in the fire-brick and through the openings 7 and reaches the fuel at numerous places. Hence the combustion of such fuel is rendered more perfect than heretofore, and the gases are consumed and there is very little of carbonic oxide passing off to the chimney. The openings at the bottom part of the casing may be through an intermediate perforated ring or between flanges at 8, or the openings may be made through the casing L. When this coil and fire-chamber are used for generating steam, the boiler should be vertical and adjacent to the furnace, and the pipe 2 should pass into such boiler near the water-line, and the pipe 1 should enter near the bottom of such boiler.

I am aware that horizontal zigzag ranges of pipes have been employed, such ranges being connected one to the other and the range being of successively larger pipes. This is not

adapted to a circulating column of water, as the horizontal zigzag layers detain the bubbles of steam and interfere with the circulation.

I am also aware that in stoves the fire-box has had openings with downwardly-projecting flanges.

I claim as my invention—

1. A water-circulating coil composed of a pipe having a gradual and continuous upward inclination and of smallest diameter at the lower end and of progressively-increasing diameter to the upper end, substantially as specified.

2. The combination, in a heating apparatus, of a water-circulating coil, a grate below the same, a casing surrounding the coil and having ranges of openings and inclined protecting-flanges, fire-bricks surrounding the casing and having air-channels in their surfaces, and a surrounding casing inclosing the fire-brick, substantially as specified.

3. The combination, with a water-heating coil and a grate below the same, of an inclosing fire-pot formed of sections, each section having an inwardly-inclined flange and openings, the openings in one section being protected by the inclined flanges of the next section, and a surrounding case with an intermediate space for air to pass to the openings, substantially as specified.

Signed by me this 5th day of September, 1890.

W. C. BAKER.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.