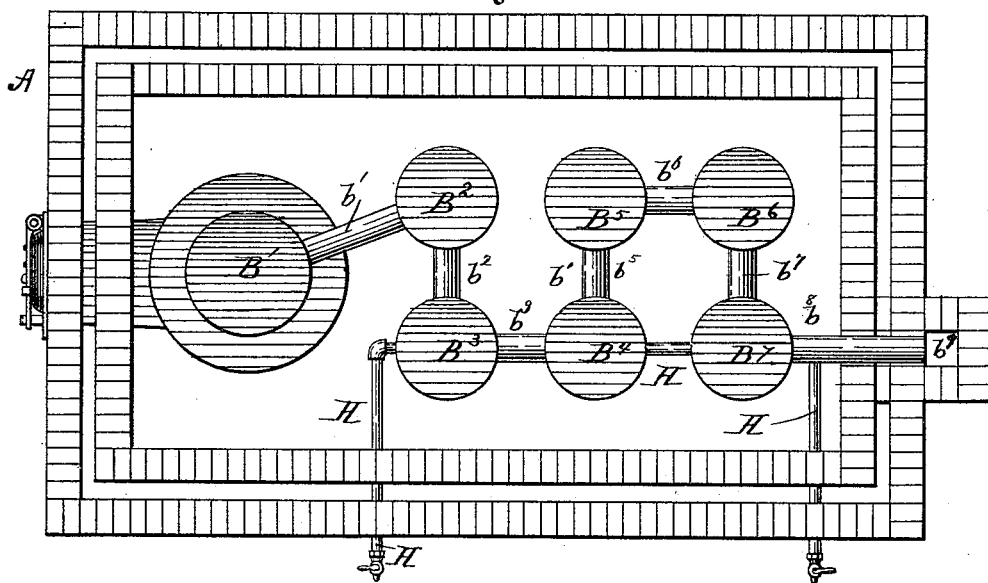
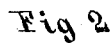


J. N. MAC GONIGLE:  
GAS HEATING FURNACE.

No. 346,297.

Patented July 27, 1886.



W. B. Mason  
L. C. Hills,

John N. MacGonigle  
By his attorney  
James C. Boyce

(No Model.)

2 Sheets—Sheet 2.

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Fig 3

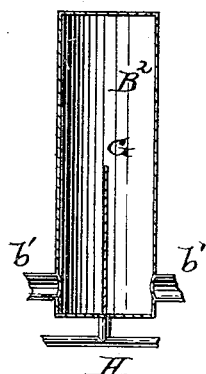


Fig 4

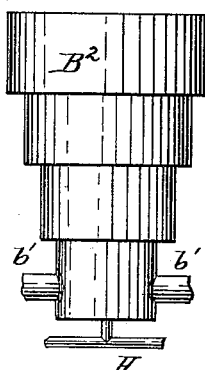


Fig 5

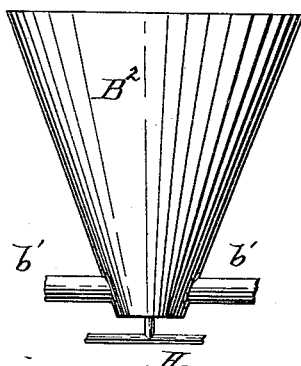
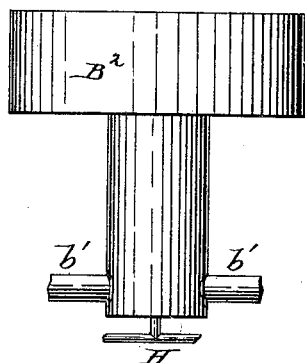


Fig 6



Witnesses;

W. B. Masson  
L. C. Hills,

Inventor;

John N. MacGonigle  
By his attorney  
James C. Boyce

# UNITED STATES PATENT OFFICE.

JOHN N. MACGONIGLE, OF OIL CITY, PENNSYLVANIA.

## GAS-HEATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 346,297, dated July 27, 1886.

Application filed December 4, 1884. Renewed April 3, 1886. Serial No. 197,753. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN N. MACGONIGLE, a citizen of the United States, residing at Oil City, in the county of Venango and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Heating Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to provide a furnace wherein gas, either natural or manufactured, can be economically used for heating purposes.

Figure 1 is a vertical longitudinal section of my improved furnace having a single row of drums. Fig. 2 is a plan view, the top of the casing being removed, the inlet-pipe  $b^2$  being shown uncovered, and the drums arranged in two parallel rows. Figs. 3, 4, 5, and 6 are plans of different shapes of drums.

A represents a furnace-casing, which may be either of brick, metal, or any other material, and of any desired shape and capacity. Cold air is admitted into the interior in any suitable way. Such air comes into contact with the heated drums  $B^1, B^2, B^3, B^4, B^5, B^6$ , and  $B^7$ , and ascends and escapes through the apertures  $a' a^2$ . The gas to be consumed is introduced through the gas-pipe C to the burner D, which may be of circular form. The burner should be constructed on the principle of the Bunsen burner—that is to say, that atmospheric air should be mixed with the gas before consumption. The gas then burns with a pure flame without smoke, and no draft is needed to secure perfect combustion.

The burner D is placed in the combustion-chamber E. When the gas is ignited, the walls or sides of the combustion-chamber are heated, and the air surrounding them is warmed. The products of combustion ascend to the small drum  $B^1$ , and are conducted by the pipe  $b'$  to the bottom of the drum  $B^2$ . In that drum they ascend to the top, and in their progress give up a portion of their heat through the walls of the drum to the air outside. As they are thus cooled, they are continually followed by heat-waves, and the first or cooled portions descend in the drum and then escape through

the pipe  $b^2$  into the drum  $B^3$ . This process is repeated in the other drums.

As many drums as are needed to abstract all the heat units from the current of heated gases may be employed.

In Fig. 1, which shows the drums arranged in a single line, the drum  $B^3$  communicates through horizontal pipe  $b^3$  with drum  $B^4$ , and the latter discharges through similar pipe,  $b^4$ , into the outlet-flue  $b^9$ .

In Fig. 2 the pipe  $b^2$  extends across from drum  $B^2$ , which is in one row, to drum  $B^3$ , which is in the other. Another pipe,  $b^3$ , extends from drum  $B^3$  to drum  $B^4$ , which is in the same row with it.  $B^4$  is similarly connected by pipe  $b^4$  to drum  $B^5$ , the latter being in the other row. The remaining drum,  $B^6$ , is connected by pipes  $b^6$  and  $b^7$  to drums  $B^5$  and  $B^7$ , respectively. Pipe  $b^8$  leads from drum  $b^7$  to the outlet-flue  $b^9$ . All the above connections with the drums are made near their lower ends.

The drums and combustion-chamber and connecting-pipes should be made of material that will radiate heat freely, and on this account sheet-iron is to be preferred.

The drums may be arranged in a single row, as shown in Fig. 1, or in two rows, as shown in Fig. 2. In either case the last drum of the series discharges into the outlet-flue  $b^9$ .

The drums may be placed quite near each other; but between their tops and the upper casing of the furnace there should be a chamber, F, of suitable size, where the air, which will be warmed unequally by the different drums, may be thoroughly mixed together and delivered through the registers  $a' a^2$  of uniform temperature.

The drums may be made of any desired form or shape, either in a series of gradually-increasing sizes, like Fig. 4, or in the frustum of an inverted cone, like Fig. 5, or with a comparatively large upper portion, like Fig. 6, or a plain cylinder, like Fig. 3.

A separating-wall or partial diaphragm may be inserted in the drums, as shown at G in Fig. 3, so as to direct the heated current upward, and prevent its direct passage out of the exit-pipe.

As there will be some water condensed in the heaters, a drip-pipe, H, is provided, whereby the drums may be drained.

In order to prevent the products of the combustion of the gases from escaping into the interior of the furnace, the combustion-chamber must be so constructed that no such escape can take place.

What I claim as my invention is—

1. The burner D and combustion-chamber E, in combination with a drum, B', raised thereon, a pipe connecting said drum with the lower part of a second drum, B<sup>2</sup>, a series of additional drums and connecting-pipes, the latter making communication between the lower parts of the drums, an outlet from the lower part of the last drum, and the pipe H and its branches, substantially as set forth.

2. The pipe H and its branches, arranged in the flooring, in combination with a series of drums, a burner and combustion-chamber for supplying them with products of combustion, and inclosing casing and an outlet-flue, said branches of pipe H communicating with the bottoms of said drums, respectively, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JNO. N. MACGONIGLE.

Witnesses:

F. W. HAYS,  
JAMES C. BOYCE.