No. 647,504. Patented Apr. 17, 1900.

W. MacFARLANE.

PIPE BOILER.

(Application filed Sept. 22, 1899.)

(No Model.)

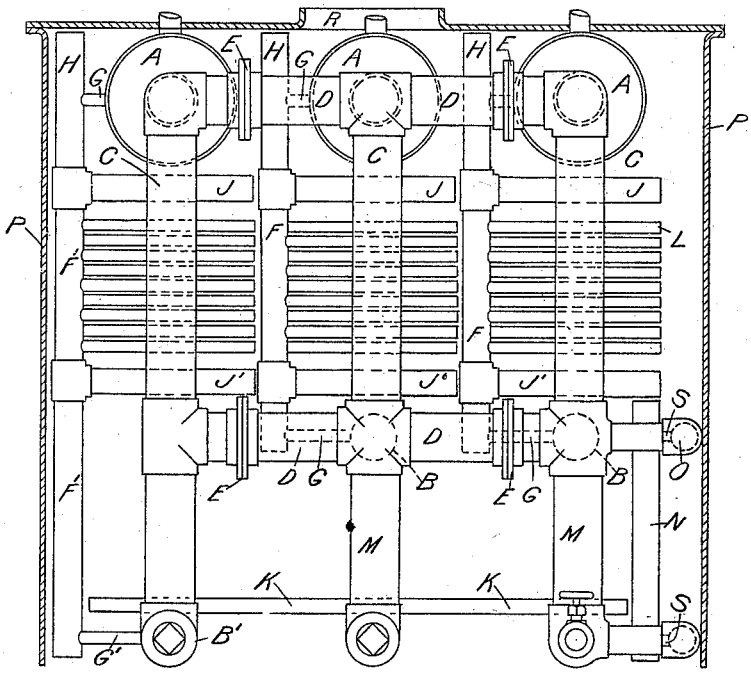

Fig. 1.

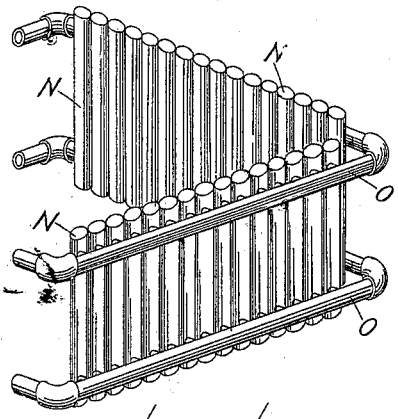

Fig. 2.

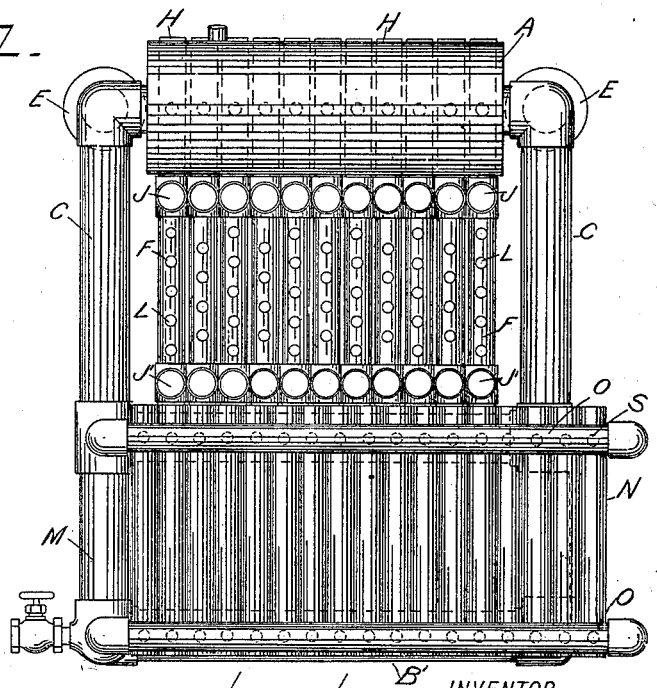

Fig. 3.

WITNESSES:

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WALTER MACFARLANE, OF SEATTLE, WASHINGTON.

PIPE-BOILER.

SPECIFICATION forming part of Letters Patent No. 647,504, dated April 17, 1900.

Application filed September 22, 1899. Serial No. 731,360. (No model.)

To all whom it may concern:

Be it known that I, WALTER MACFARLANE, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Pipe-Boilers, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to new and useful improvements in pipe-boilers; and the object of the invention, generally stated, is to provide a boiler of this type which shall possess advantages in point of simplicity, durability, and general efficiency and having the steam-generating pipes therein so arranged as to absorb and utilize to the fullest extent the caloric products of combustion.

The preferred construction and organization of the boiler will now be more specifically set forth.

Referring to the accompanying drawings, forming part of this specification, and in which similar letters refer to similar parts wherever they occur, Figure 1 is a front end elevation of my invention, the casing being in section. Fig. 2 is a side elevation of the same, and Fig. 3 is a perspective view of a portion of the furnace-wall.

The boiler is composed of sections, each of which consists of a steam-drum A, extending longitudinally to the boiler, water-drum B, longitudinal to the boiler, vertical downflow-pipes C C′, connected to both the steam-drum and the water-drum. Projecting from the downflow-pipes C C′ are horizontal transverse pipes D D with unions E thereon to provide means to connect the several sections one to another to form a complete boiler, as shown, and also to disconnect one or more sections when less steam is required or repairs needed. To one side of each of the steam-drums and water-drums in the several sections are located a series of vertical pipes F F′, sealed at both ends and connected by smaller pipes G G′, having right and left hand threads to the aforesaid steam-drums and water-drums, and above the connection G with steam-drum I extend these vertical pipes, supplying a superheater, and at the same time a pipe partition or wall, to be hereinafter referred to. Intermediate upon the vertical pipes F F′ are series of transversely-horizontal projecting pipes J J′, one end of each separate pipe of which being sealed and the other end in communication with the vertical pipes F F′. These series, composed of vertically and horizontally disposed pipes F F′ and J J′, respectively, are provided to furnish walls or partitions, making compartments or passage-ways by which the combustion products are so directed and confined that the heat thereof may be utilized almost entirely. The horizontal series of partition-pipes J J′ are so located that the lower ones J′ will be at a suitable height above the furnace-grate K to form a crown to the fire-box, while the upper ones J are close to the said steam-drums, making relatively-large compartments therebetween for the insertion of the quill-pipes L, thus permitting a great number to be utilized. The quill-pipes L are, like the horizontal floor-pipes J J′, sealed and communicatively connected with the vertical wall-pipes F F′, but, unlike them, are put in at random or staggered that the hot gases from the furnace may circulate freely thereamong.

It will be noticed that I show the water-drum B′ in one section of the boiler connected to the downflow-pipes C′ at the lower extremities, making the wall F′ extend down to protect the casing from the extreme heat within the fire-box, and for a like purpose I provide upon the opposite side and in the rear of the boiler a system of vertical pipes N, which are connected by short nipples S to horizontal stringer-pipes O, which unites them to the diagonally-opposite downflow-pipes C C.

The water-drums B B in two of the systems I show as being intermediate upon the downflow-pipes C C, making mud-drums or sediment-pockets on the lower extending ends M M; but, if preferred, the water-drums may be located as at the lower ends of C′, thus subdividing the fire-box into two or more furnaces by extending the wall-pipes F F to be connected therewith.

P is the boiler-case, with a stack-opening R.

The advantages of this invention are derived by the use of confining-walls made of pipe that are themselves steam-generating members, by extending the vertical partition-pipes above the connection with the several steam-drums, by having the said connections above the normal level of the water instead of

entering the steam-drum from the under side and below the surface of the water, causing the same to be in a state of ebullition when steam is generating and passing therethrough, and by making the boiler of sections, of which two or more may be used, as required.

A number of schemes for directing the hot furnace-gases within the boiler may be adopted with the arrangement of walls I show. One that I find to be satisfactory is for the hot gases and smoke to pass from the furnace over a bridge-wall, (not shown in the drawings,) entering the central compartment at the rear, through which to the front of the boiler around the vertical pipe-walls to the wing-compartments in the same tier, in which three compartments are the quill-pipes, as shown, thence to the rear and over the horizontal pipe-partitions through the upper wing-compartments to the front of the boiler, then again around the vertical pipe-walls to the upper middle compartment, from which the unconsumed smoke is delivered through the stack to the atmosphere.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pipe-boiler, the combination with steam-drums, downflow-pipes, and longitudinal connections between said downflow-pipes; of partitions formed of vertically-disposed pipes in communicative junction with said steam-drums and said longitudinal connections and having sealed ends projecting beyond said junctions, partitions formed of horizontally-disposed pipes projecting at right angles from and connected to each of the several pipes forming the said vertical partitions and having their projecting ends sealed, and a plurality of quill-pipes with sealed ends projecting from the several said vertical partition-pipes, substantially as described.

2. The combination with a steam-drum, a water-drum, a downflow-pipe at each end of said steam-drum and said water-drum and making communicative connection therebetween, of a system of vertical pipes making communicative connection with said steam-drum and said water-drum, horizontal pipes in communicative connection with the said system of vertical pipes, and side outlets in said downflow-pipes to provide means for connecting said downflow-pipes to other downflow-pipes in like combination to form a complete boiler or to increase the size of one already constructed, substantially as described.

3. The combination with a steam-drum, a water-drum, downflow-pipes making communicative connection therebetween, of a system of vertical pipes making communicative connection with said steam-drum and said water-drum, horizontal pipes in communicative connection with the said system of vertical pipes, and side outlets in said downflow-pipes to provide means for connecting said downflow-pipes to other downflow-pipes in like combination to form a complete boiler or to increase the size of one already constructed, substantially as described.

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

WALTER MACFARLANE.

Witnesses:
WM. H. TAYLOR,
WILLIS D. GORDON.