No. 677,788. Patented July 2, 1901.

W. MacFARLANE.

PIPE BOILER

(Application filed May 31, 1900.)

(No Model.)

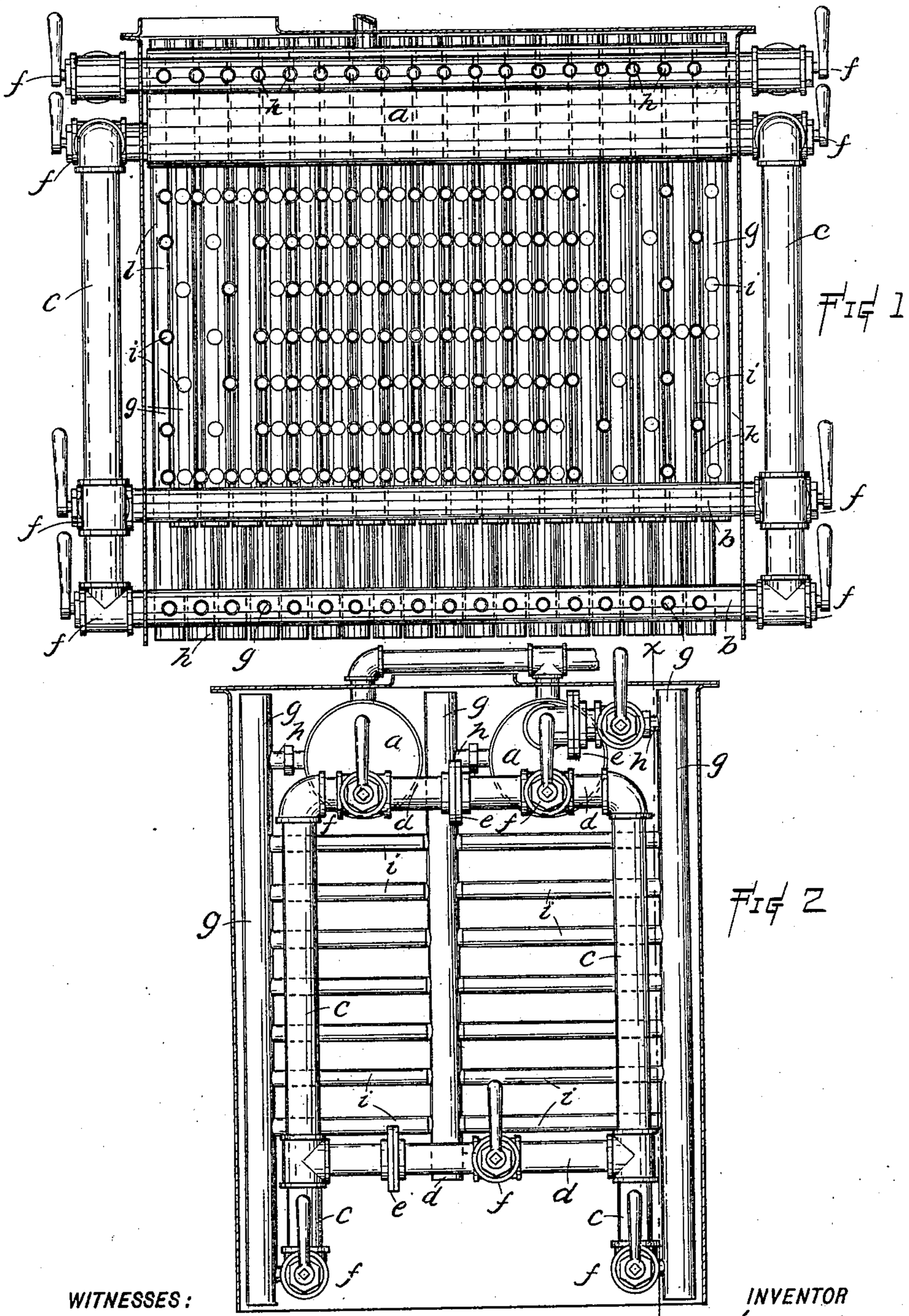

FIG 1

FIG 2

FIG 3

WITNESSES:

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WALTER MACFARLANE, OF SEATTLE, WASHINGTON.

PIPE-BOILER.

SPECIFICATION forming part of Letters Patent No. 677,788, dated July 2, 1901.

Application filed May 31, 1900. Serial No. 18,624. (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.

This invention relates to improvements in pipe-boilers; and one object is to provide a boiler of this class wherein the pipes are so arranged that the heating-space is divided by horizontal walls of pipes or quills arranged in close order, so as to force the gases of combustion to pursue an extended course between such pipes, while permitting of ready accessibility and removability of said pipes.

A further object of the invention is to enable any section or part of the pipe system to be instantly shut off from the rest in case of accident, so as to limit the danger of explosion as much as possible.

In the accompanying drawings, Figure 1 is a vertical section of a pipe-boiler embodying my invention, the same being taken on the line *x y* in Fig. 2. Fig. 2 is an end elevation of the boiler with the casing in sections. Fig. 3 is a detail horizontal section of a portion of the piping.

The improved boiler comprises one or more sections, each section including a steam-drum *a*, a water-drum *b*, and downflow-pipes *c*, connected to each end of said drums and to the downflow-pipes of adjacent sections by pipe connections *d*, the cross connections between adjacent sections being provided with flange-couplings *e* where necessary to enable detachment of each section. Quick-closing valves *f*, adapted to be instantly operated by hand, are included in the connection between each downflow-pipe and the steam-drum and between such downflow-pipe and the water-drum.

Connected to each set of steam and water drums is a series of vertical pipes *g*, closed at top and bottom and arranged in close order, so as to form a wall. Each of these pipes is connected above to the steam-drum and below to the water-drum by short sections of smaller pipe *h* with right and left hand threads, permitting detachment of the corresponding pipe. These vertical pipes, arranged on each side of the boiler, constitute the side walls for the heating-space, and preferably they extend down, as shown, so as to form water-tube walls for the fire-box. The intermediate row or series of vertical pipes, if there be any, serve as partitions dividing the heating-space above the fire-box, and, if desired, the fire-box itself, with any desired number of compartments. Each of these compartments is divided in the space above the fire-box, and in horizontal planes, by walls or partitions formed by pipes or quills *i*, arranged in horizontal rows or walls, with openings or blank spaces so distributed as to form a return-current passage for the hot gases. These horizontal quill-pipes project from the vertical pipes on either side of the corresponding heating-space, and the quill-pipes extending from each side alternate and interlock with those extending from the other side. When all of the parts are in position, these interlocking pipes form a practically continuous wall; but if any one section of vertical piping, with its attached quills, be detached by uncoupling joints *e* and connections *h*, then, by reason of the alternate arrangement above referred to, the quill-pipes on each of the sections so separated will be in open order—that is, separated sufficiently to enable convenient access to and individual removal of the same. It will be understood that each of these quill-pipes is of the construction usual in the art—that is, it is closed at the outer end and has an internal means to promote circulation.

To form the openings or passages in these horizontal walls, I simply omit alternate pipes for a short distance. Thus open spaces are shown as left at *k* in the three lower rows of quills at the back of the boiler, the fourth row, however, being intact at that point, so as to force the gases to pass from the fire-box up through openings *k* and forward between these three lower rows. At the front end of the boiler open spaces are left at *l* in the fourth to sixth rows, the seventh row being intact, and the gases being thus forced back again between such rows of quill-pipes to the rear of the boiler, whence they pass up through open spaces *m* to the space around the steam-drum and to the stack. As many more reversals of gas-current as may be de-

sirable may be secured by providing a sufficient number of horizontal rows of quill-pipes, and the number of such rows of quill-pipes for each draft-compartment (here shown as three) may be varied as desired from one to any notable number—that is to say, in the construction shown all quills except those in the first, fourth, and seventh rows may be omitted, or, on the other hand, more than two rows of pipes may be inserted between each of said rows, the first, fourth, and seventh rows serving to direct the draft and the intermediate rows acting only to divide the gas-currents and to give more surface.

In case the attendant notices any defect or accident in any of the boiler-sections he can at once close all the quick-closing valves *f* leading to that section, thus cutting it out altogether. In this way the seriousness of the resulting explosion, if any occurs, will be mitigated, so as not to endanger life, as it will be confined to that section.

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

1. In a pipe-boiler, the combination with steam and water drums, of vertical pipes connected to said drums and arranged in close order to form walls, and horizontal quill-pipes connected to said vertical pipes and arranged in plurality of horizontal rows, with spaces therein, adjacent to the front and rear of the boiler, to form return-current channels for the passage of the gases of combustion.

2. In a pipe-boiler, the combination with steam-drums *a* and water-drums *b*, of vertical pipes *g* connected in close order to said drums and arranged in series to form walls, and horizontal quill-pipes *i* connected to said vertical pipes and arranged in a series of horizontal rows, with open spaces between the pipes so disposed as to form a return-current channel for the gases of combustion, with some of the quill-pipes interposed as partitions in such channel.

3. In a pipe-boiler, the combination with steam and water drums, of vertical pipes detachably connected to said drums and arranged in a plurality of series to form walls, and horizontal quill-pipes connected alternately to vertical pipes on opposite sides and interlocking with one another to form a horizontal row or wall of pipes.

4. In a pipe-boiler, the combination with steam-drums *a* and water-drums *b*, of vertical pipes *g* arranged in close order to form walls and connected to the said steam and water drums, and horizontal quill-pipes *i* connected to said vertical pipes and arranged in close order to form channel-walls with open spaces so disposed at the ends as to reverse the current of the combustion-gases in the channels alternately from the rear and front of the boiler.

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

WALTER MACFARLANE.

Witnesses:
PIERRE BARNES,
JAMES MCWILLIAMS.