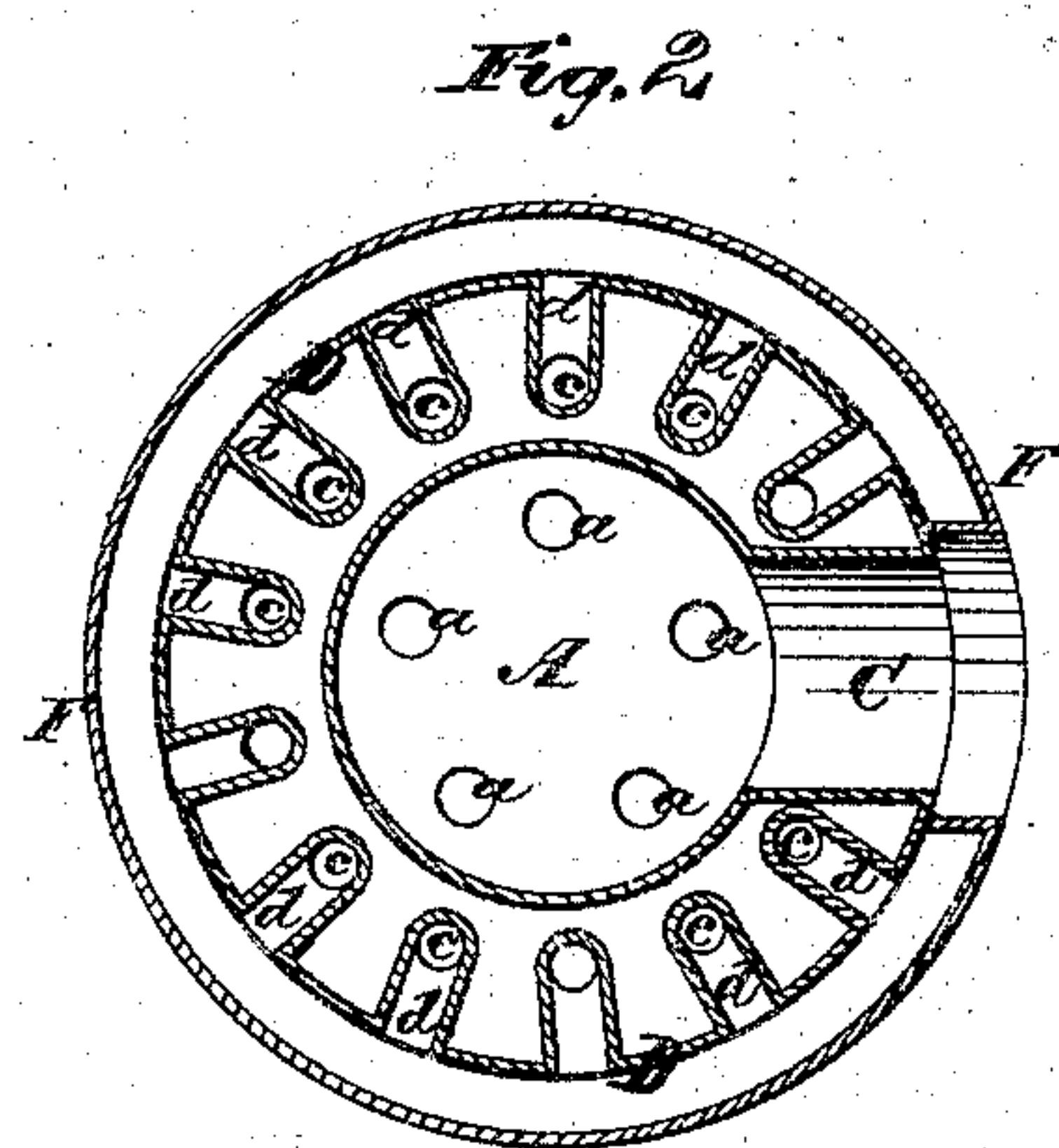
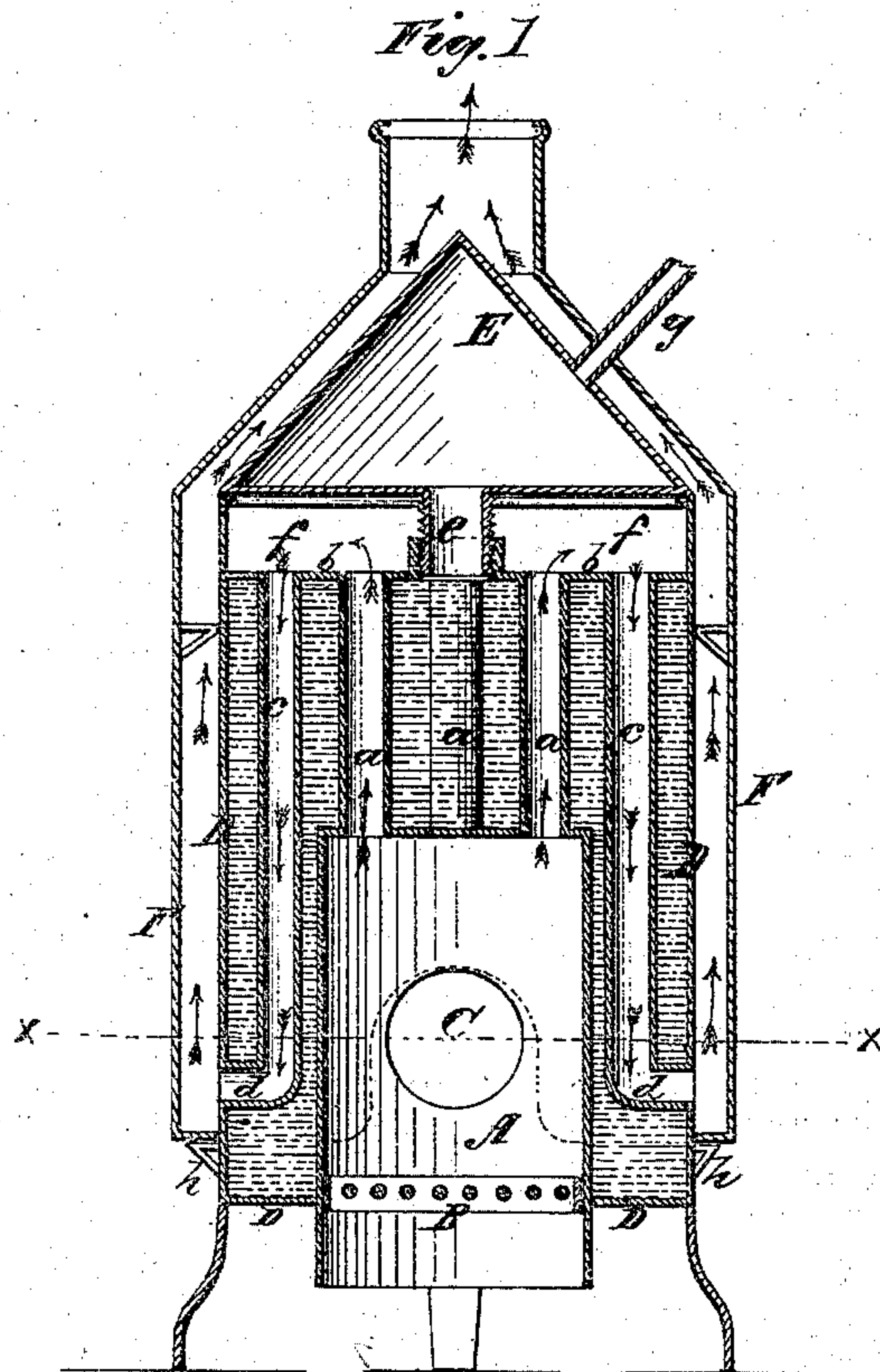


S. FREEMAN.
Upright Steam-Boilers.

No. 156,697.

Patented Nov. 10, 1874.



Witnesses:
James Martin Jr.
J. N. Campbell

Inventor:
Stephen Freeman
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UNITED STATES PATENT OFFICE.

STEPHEN FREEMAN, OF RACINE, WISCONSIN.

IMPROVEMENT IN UPRIGHT STEAM-BOILERS.

Specification forming part of Letters Patent No. **156,697**, dated November 10, 1874; application filed October 6, 1874.

To all whom it may concern:

Be it known that I, STEPHEN FREEMAN, of the city and county of Racine and State of Wisconsin, have invented a new and useful Improvement in Upright Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a vertical transverse section of my improved boiler. Fig. 2 is a horizontal section of the same looking toward the steam-dome in the line *x x* of Fig. 1.

The nature of my invention consists in an upright boiler, having a fire-box or combustion-chamber which extends up some distance into the water-space, short flues connecting directly with the combustion-chamber, a horizontal flue-space between the steam-dome and the top flue-plate of the boiler, long diving-flues which connect with the short flues by means of the horizontal flue-space, and extend down in the water-space below the top of the fire-box to near the bottom of the water-space, and by means of elbows pass out through the side of the boiler, an elevated superheating steam-dome, having its bottom exposed to the heated products of combustion, passing through the short flues and horizontal flue-space, and an outer chamber, formed by a jacket, which almost entirely incloses the steam-dome and boiler, the parts named being constructed, arranged, and combined so as to make a very compact stationary upright steam-boiler, which also has a large amount of heating-surface, and which is heated by an economical consumption of fuel.

By my invention, which involves the construction of the steam-dome above the flue-plate, and with a broad flat base equal in diameter to the boiler proper, and with tapering sides—and further involves the construction of the upper part of the outer casing or jacket with sides corresponding or parallel to the sides of the dome—the broad sheet of flame circulating through the annular chamber, which is between the plate and steam-dome, will impinge against the bottom of the dome,

and still have immediate passage down through all the long flues, and then, when the flame has passed into the outer jacket, its heat will be caused to impinge upon the outside of the conical steam-dome by the tapering portion of the jacket, and thus made to assist in superheating the steam in the dome.

To enable others skilled in the art to make and use my invention, I will proceed to describe it.

A is the fire-box or combustion-chamber, having a grate, B, near its bottom, and a door or fuel-passage, C, on one side, as shown. D is the boiler proper. It is represented as about twice as high as the fire-box, and it surrounds the same from about the plane of the grate upward. This boiler has short fire-flues *a* extending down from its flue-sheet *b* to the top of the fire-box, and communicating with the same. It also has long fire-flues *c* extending down outside of the fire-box, and, by means of the elbows *d*, passing laterally out through the side of the boiler. In the center of the flue-sheet *b* a collared screw-tapped passage, *e*, is formed, and into this passage a hollow screw-stem of a conical steam-dome, E, is inserted, as shown. The bottom of the steam-dome is elevated by this means above the flue-sheet, and a horizontal flue-space, *f*, between the flue-sheet and the steam-dome, is thus formed. The steam-dome has an escape-steam passage, *g*, in its top at any proper point, as represented. Around the dome, and around nearly the whole vertical depth of the boiler, a jacket, F, is placed, so as to form a circular chamber or space all around the boiler and dome. This jacket incloses the ends of the elbows of the long flue-pipes, and is air-tight at all points where it is fitted to the boiler, and it is sustained in position by lugs *h*, or in any other suitable manner. At the place where the fuel-door is formed, and also where the escape-pipe from the dome is located, passages are cut in the jacket to adapt it for use on the boiler. The upper portion of the jacket is in form similar to the steam-dome, and terminates in a draft-chimney of cylinder or other shape.

From the foregoing description and accompanying drawing, it will be seen that the flame

first passes through the short flues, strikes the bottom of the steam-dome, passes through the horizontal passage or chamber, and then descends into the long flues, and passes out into the jacket, and from thence into the chimney.

The water in the boiler is exposed to the fire-box, to the short flues, long flues, and to the flame passing through the horizontal flue, and also to the flame or hot gases passing through the chamber of the jacket, which latter prevents the steam condensing rapidly from contact of air against the outside of the boiler proper. The action of the flame against the bottom of the steam-dome causes the steam which passes into it from the water-space, by means of the contracted neck *e*, to be superheated, and this operation is continued by the direct impingement upon the outside of the conical dome of the escaping hot products of combustion, such impingement being caused by the contraction into a conical form of the

outer jacket at the point where it immediately incloses the dome.

The whole arrangement is simple, effective, and compact.

What I claim as my invention is—

The combination of the superheating steam-dome, having a conical form, and constructed with a base equal in diameter to the boiler, and with a projecting neck, *e*, the flue-plate *b* constructed below the dome, and having a central orifice to receive the neck of the dome, the combustion-chamber, constructed within the water-space of the boiler, the short pipes *a a*, and long pipes *c*, having elbows *d*, and the jacket *F*, having a conical contraction where it incloses the steam-dome, all as shown and described, and for the purpose set forth.

STEPHEN FREEMAN.

Witnesses:

ALVIN RAYMOND,
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