

(No Model.)

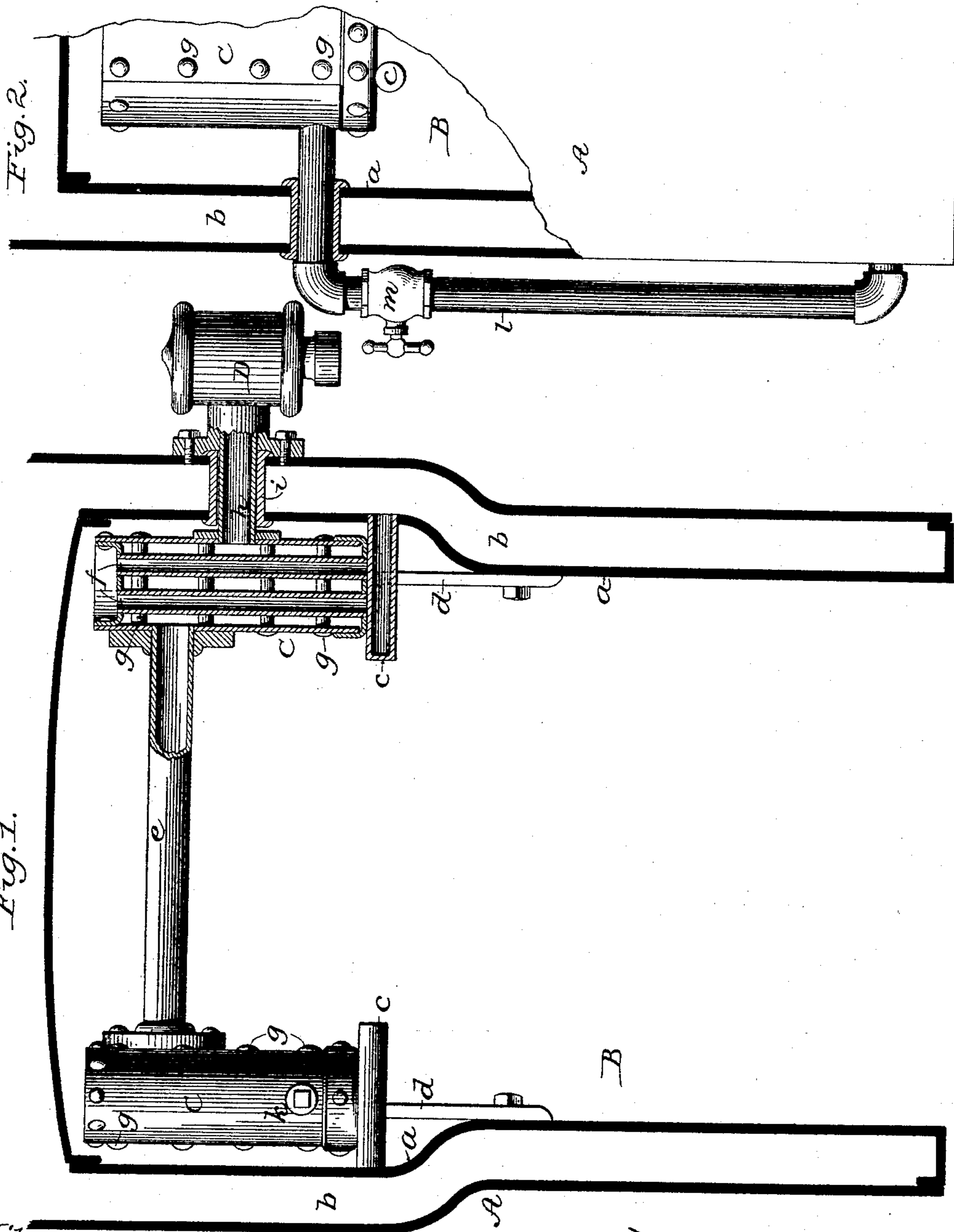
2 Sheets—Sheet 1.

D. M. BORNARTH & T. W. HEINTZELMAN.

FEED WATER HEATER.

No. 327,994.

Patented Oct. 13, 1885.



Witnesses:

Gas. F. Duffanel
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Inventors:

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Fig. 3.

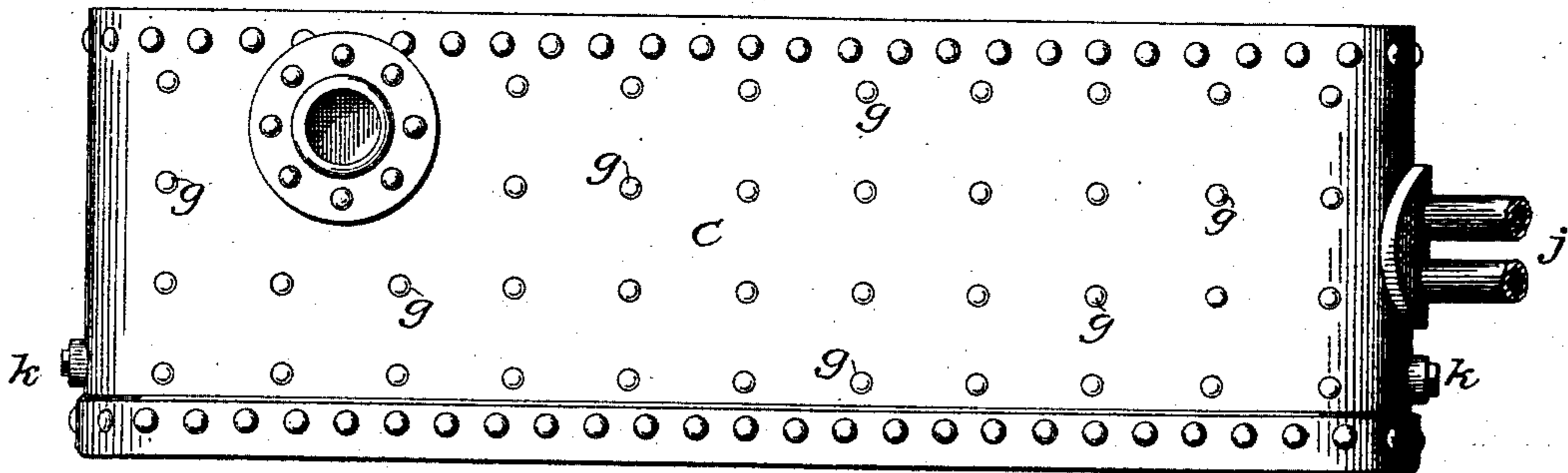


Fig. 4.

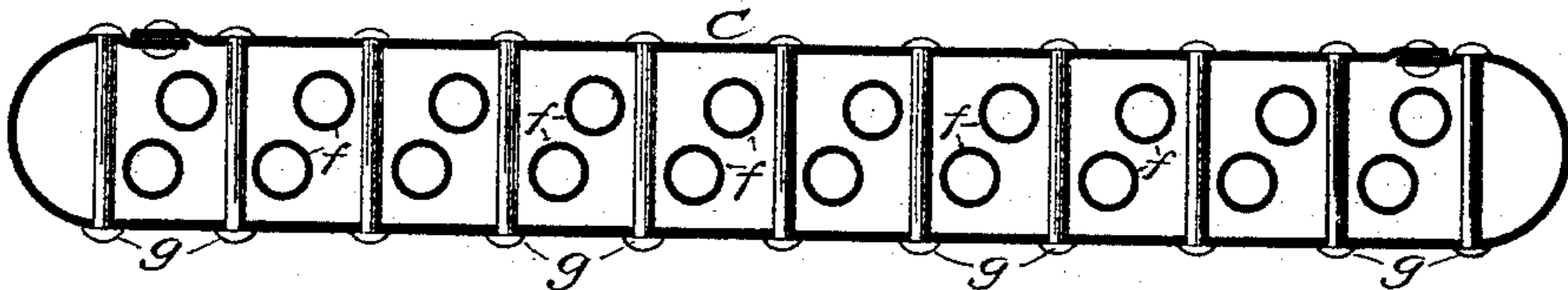
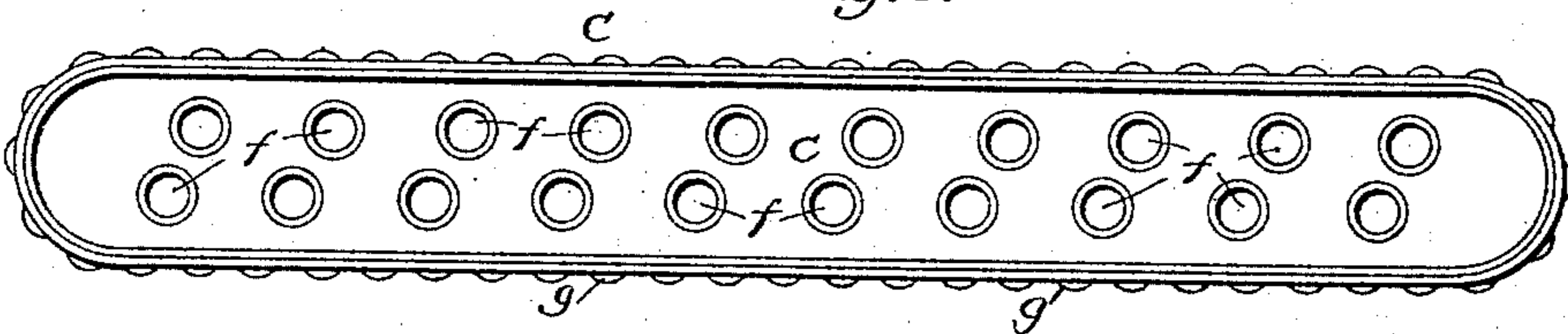


Fig. 5.



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UNITED STATES PATENT OFFICE.

DANIEL M. BORNARTH, OF SHAKOPEE, AND TAYLOR W. HEINTZELMAN, OF MINNEAPOLIS, MINNESOTA.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 327,994, dated October 13, 1885.

Application filed May 23, 1885. Serial No. 166,494. (No model.)

To all whom it may concern:

Be it known that we, DANIEL M. BORNARTH and TAYLOR W. HEINTZELMAN, residents of Shakopee, Scott county, and of Minneapolis, in the county of Hennepin and State of Minnesota, respectively, have invented certain new and useful Improvements in Feed-Water Heaters for Boilers, of which the following is a specification.

10 This invention relates to feed-water heaters for steam-boilers; and it consists in a novel construction and arrangement of parts, as hereinafter fully set forth.

15 In the drawings, Figure 1 is a transverse vertical sectional view through the fire-box; Fig. 2, a side elevation partly in section; Fig. 3, a side view of the heater; Fig. 4, a horizontal section, and Fig. 5 a bottom view, of the same.

20 The object of the invention is to provide a feed-water heater that shall be simple in construction and operation, due regard being had to economy in fuel and space.

A indicates a boiler, and B the fire box of the same, provided with the plates or walls *a*, inclosing a water space or chamber, *b*. Upon and projecting from the inner walls of the fire-box B are tubes *c*, closed at their inner ends and screwed into the walls of the fire-box, as indicated in Fig. 1. The tubes *c* communicate with the chamber *b*, and serve to support the heaters or chambers C; and in order to provide additional means for supporting said chamber C, T-shaped brackets *d* are bolted or otherwise secured to the inner walls of the fire-box, and extend upward to the chamber, as also indicated in Fig. 1. It will be thus seen that the chambers or feed-water heaters are firmly supported and entirely out of the way, being in the upper enlarged chamber of the fire-box, and occupying a space that is usually vacant, and in which the heat is lost or wasted. The products of combustion that are generally allowed to pass off are thus utilized to heat the feed-water.

45 There are two of the heaters or chambers C, one at each side of the fire-box, said heaters being connected by a pipe, *e*, extending from the upper portion of one to the other, as

clearly indicated in Fig. 1. The chambers C, 50 as shown, are constructed of boiler-iron plates riveted together, are substantially rectangular in form, provided with a series of vertical fire tubes or flues, *f*, and are suitably braced by transverse tie-bolts *g*. The flues *f* are preferably made of copper, but this is not essential. 55

A pipe, *h*, extends from one of the heaters or chambers C out through the walls *a* of the fire-box, and has attached to its end a boiler-check, D, as indicated in Fig. 1; a thimble, *i*, encircling the pipe *h* where it passes through the chamber *b*, and thus permitting the insertion and removal of the pipe without producing an opening into the boiler. 60 65

At the forward end of one of the heaters C are discharge-pipes *j*, each pipe passing to the smoke-arch or farther end of the boiler and connecting with the latter below the water-line; or they may be connected to the boiler at any other convenient or suitable point. 70

Near the bottom of the heaters or chambers C, at each end, are plugs *k*, which may be removed to permit sediment to be taken out when a deposit is formed. 75

As indicated in Fig. 2, a pipe, *l*, communicating at one end with the lower part of the boiler, is connected with the receiving heater or chamber C, said pipe being provided with a valve, *m*, by which to control the circulation. 80

The water entering the heater C through the pipe *l* becomes heated, and passes to the discharging-chamber of heater on the opposite side of the boiler through the pipe *e*. Thence the water travels through the discharge-pipe *j* into the boiler. The flues *f* of the heaters C being vertical, the flames and gases pass upward through them, and also on both sides of the heaters, thereby insuring a great heat and economizing in fuel and space. The super-heating pipes or tubes *c* also form an additional heating-surface, and tend to a slight extent to increase the capacity of the boiler. It will be noticed that the chambers are entirely out of the way in the fire-box, and are so high as not to impede the throwing of the fuel into the fire-box. The invention can be applied to boilers of every description, and is 95

deemed essentially advantageous for locomotive-boilers, in which space is necessarily limited.

Having thus described our invention, what we claim is—

1. In combination with the fire-box of a locomotive-boiler, the chambers C C, located in the fire-box above the fuel space at a distance from the internal walls of the fire-box, whereby the flames and products of combustion are permitted to pass between the superheaters and the walls of the fire-box.

2. The combination of boiler A, fire-box B, provided with inwardly-projecting tubes c, in communication with the water-space of the boiler, and the chambers C, connected one with the other and with the boiler, and resting upon the tubes c, as shown.

3. The combination, with a boiler and its

fire-box, of chambers C, extending longitudinally in the upper portion of the latter on opposite sides, and connected with each other and with the boiler, as set forth.

4. The chambers C, communicating with each other, as shown, in combination with the water-jacketed fire-box of a steam-boiler.

5. In combination with boiler A, fire-box B, and tubes c, communicating with the water-space of the boiler and projecting inward into the fire-box, feed-water heaters C C, resting upon said pipes and communicating with each other and with the boiler, substantially as shown and described.

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