J. B. RIVERA.

Duplex Steam-Boiler.

No. 196,597 Patented Oct. 30, 1877.

Fig. 1.

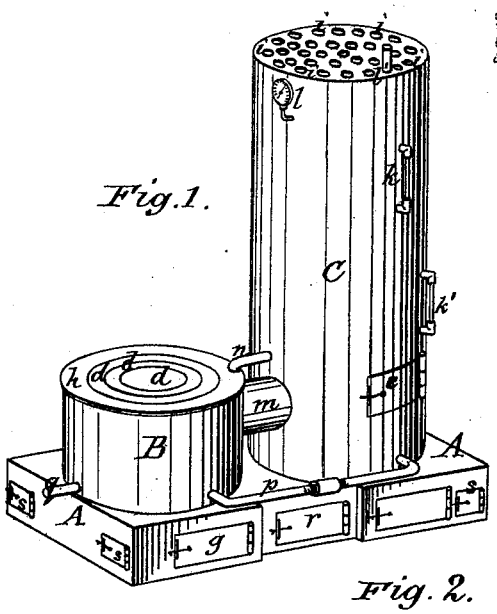


Fig. 2.

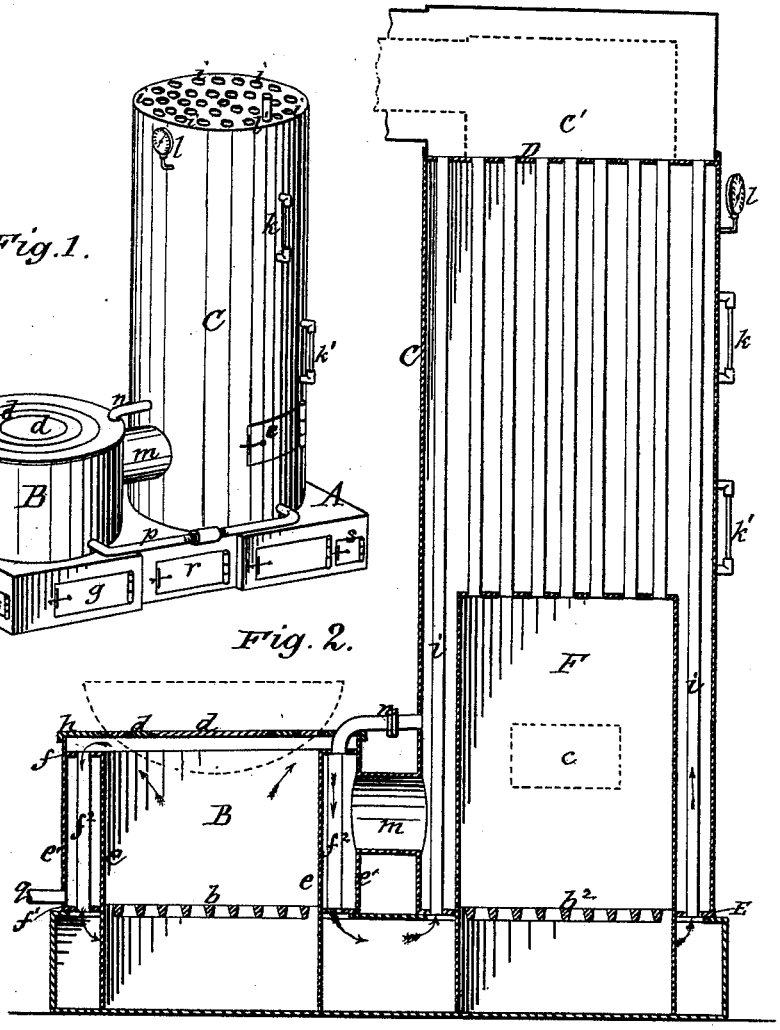
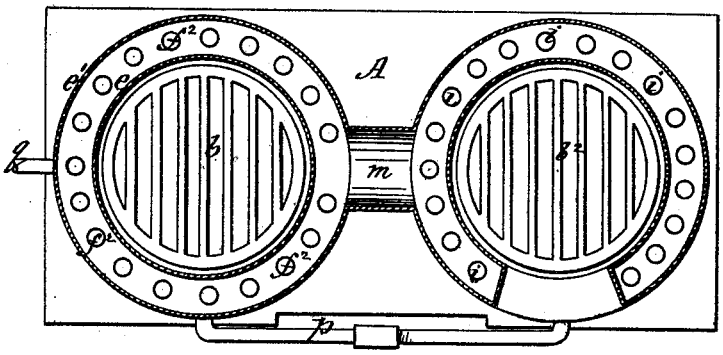


Fig. 3.



Witnesses

S. S. Masson

W. B. Shaffer

Inventor

James Barrera Rivera

by E. E. Masson

atty.

UNITED STATES PATENT OFFICE.

JAMES BARRERA RIVERA, OF BALTIMORE, MARYLAND.

IMPROVEMENT IN DUPLEX STEAM-BOILERS.

Specification forming part of Letters Patent No. **196,597**, dated October 30, 1877; application filed September 29, 1877.

To all whom it may concern:

Be it known that I, JAMES BARRERA RIVERA, of Baltimore, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Duplex Steam-Boilers; and that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a perspective view of the steam-boilers. Fig. 2 represents a vertical central section of the same. Fig. 3 represents a horizontal section of the same.

My invention relates to steam-boilers to be used by confectioners and others, in which the direct action of the fire can be employed to evaporate liquids or cook substances in pans placed above the fire, and the heated gases and products of combustion that would otherwise be wasted are used to generate steam to operate a steam-engine, and, in connection with revolving pans, used in making comfits or other confections requiring to be dried by heat. The steam thus generated may also be used for heating rooms or other purposes.

My invention consists in a vertical annular steam-boiler having an interior furnace or fire-place (open above when desired) connected, by means of descending flues and the base of said boiler, with a distinct vertical boiler or steam-reservoir having vertical flues extending from the base to the top.

It also consists in a vertical steam-boiler having an interior fire-place and vertical flues above said fire-place, connected by two or more water-pipes or passages with an annular vertical boiler, and a hollow base connecting the smoke-flues of both boilers, as will be hereinafter more fully described.

In the drawings, A represents a hollow base or support for the boilers. It is made, preferably, of cast-iron, and is used as a connecting smoke-flue between the boilers B and C. For this purpose its top is formed with two circular openings a little smaller in diameter than the outer shell of either boiler. The boiler B is annular in form, and open at the top and bottom. It is furnished with a grate, *b*, upon which the fuel is placed from above by removing one of the covers *d*. This boiler may be provided with an opening and door on the side, as shown at *c* on the boiler C, without departing from the spirit of my invention; but it would make it more complex and reduce the heating-surface, and I prefer it without a door on the side. The inner shell *e* of this boiler is united to the outer shell *e'* by two horizontal annular plates, *f* and f^1, to which are attached the vertical flues f^2, that carry the products of combustion downward into the hollow base A. The shell *e* extends down to the bottom of said base, and forms a circular ash-pit, out of which the ashes are removed through an opening that can be closed by a door, *g*. The shell *e'* extends down to the top of said base A, upon which it rests; but it extends upward above the top plate *f*, and supports an annular plate, *h*, that can be made of cast-iron, either solid or hollow. It is flanged on the outside and on the inside to support a series of covers, *d*, graduated in size to support various-sized pans; or a pan of large size can be made to rest on the edge of the plate *h*, as shown in dotted lines in Fig. 2. The space between the plate *h* and the top *f* of the boiler forms a passage for the flame and heated gases to pass and enter the vertical tubes f^2, through which they descend into the hollow base A, from which they ascend again through the vertical tubes *i*, extending to the smoke-chamber *c'* at the top of the boiler C'. This boiler is four or five times higher than the boiler B. It is made out of a cylindrical shell, C, closed at the top by a plate, D, and riveted at the bottom to an annular plate, E. It contains a cylindrical fire-chamber, F, riveted to the annular plate E, and extending down to the bottom of the hollow base A, forming the ash-pit under the grate b^2. The top plate of the fire-chamber is connected by a series of tubes or smoke-flues with the top plate D, as in ordinary vertical boilers. The boiler C is provided with two sets of water-gages, the upper one, *k*, being located about eighteen inches above the lower one, *k'*, in a full-sized boiler, about five or six feet high, for purposes that will be explained hereinafter. The boiler is also provided with a steam-gage, *l*, and a safety-valve pipe, *l'*. The boilers B and C are connected by two or more pipes to insure a perfect circulation of water between the two. In the present instance, they are securely united by a large pipe, *m*,

about midway between the top and bottom of the boiler B, and an additional pipe, *n*, connects the top of the boiler B with the boiler C for the hot water and steam to escape into the latter. The two boilers are also connected at the bottom by means of the pipe *p*, to clear the boilers of any sediment, and let it escape through the blow-off pipe *q* when desired. The side of the boiler B adjacent to the other boiler is made one-half of an inch or an inch higher than the opposite side, to insure its being full of water, and guard against burning of the top plate *f*.

These boilers are peculiarly adapted to the requirements of confectioners and others requiring an open furnace and nearly constant fire over which to heat the contents of pans, and the use of steam for various purposes. In the current of trade there are varying seasons of activity, requiring more or less steam-power. I have found, by experiments, that with a steam-boiler, as shown at B, of sixteen inches inside diameter and fifteen inches high, and a very moderate fire, I can generate steam equal to three or four horse power, and that the steam thus generated, being superheated in the boiler C by the surrounding flues *i*, gives me, with thirty pounds pressure, the same degree of heat on revolving drying-pans as forty pounds pressure with an ordinary boiler. When the boiler B is heated singly, the water in the adjacent boiler reaches only up to the lower water-gage *k'*, leaving a large steam-chamber above, where the steam is kept dry and superheated by the surrounding pipes *i*, and can be maintained at eighty pounds pressure while using it for half an hour or so, as required in making some kinds of confections, as caramel, rock-candy, &c. If both boilers are used together, with distinct fires, the water is admitted up to the upper gage *k*, and steam produced in a very short time equal to twelve or fourteen horse power. The space between the boilers can be filled with bricks, and the boilers felted and provided with exit steam-pipes, cocks, &c., in the usual manner. The smoke-chamber and flues above the boiler C may be divided, as shown by dotted lines, although I have found it not to be necessary with a chimney having a good draft. The base A is provided with doors *r* and *s*, closing openings through which the interior can be cleaned.

Having now fully described my invention, I claim—

1. A vertical annular steam-boiler having an interior furnace or fire-place (open above when desired) connected, by means of descending flues and the base of said boiler, with a distinct vertical boiler or steam-reservoir having vertical flues extending from the base to the top, substantially as and for the purpose described.

2. In combination with an annular steam-boiler, as above described, a vertical boiler having an interior fire-place and vertical flues above said fire-place, said boilers being connected by two or more water-pipes or passages, and a hollow base connecting the smoke-flues of both boilers, as and for the purpose described.

JAS. BARRERA RIVERA.

Witnesses:

THOS. WHELAN, Jr.,

GEO. MCCAFFRAY.