

No. 741,575.

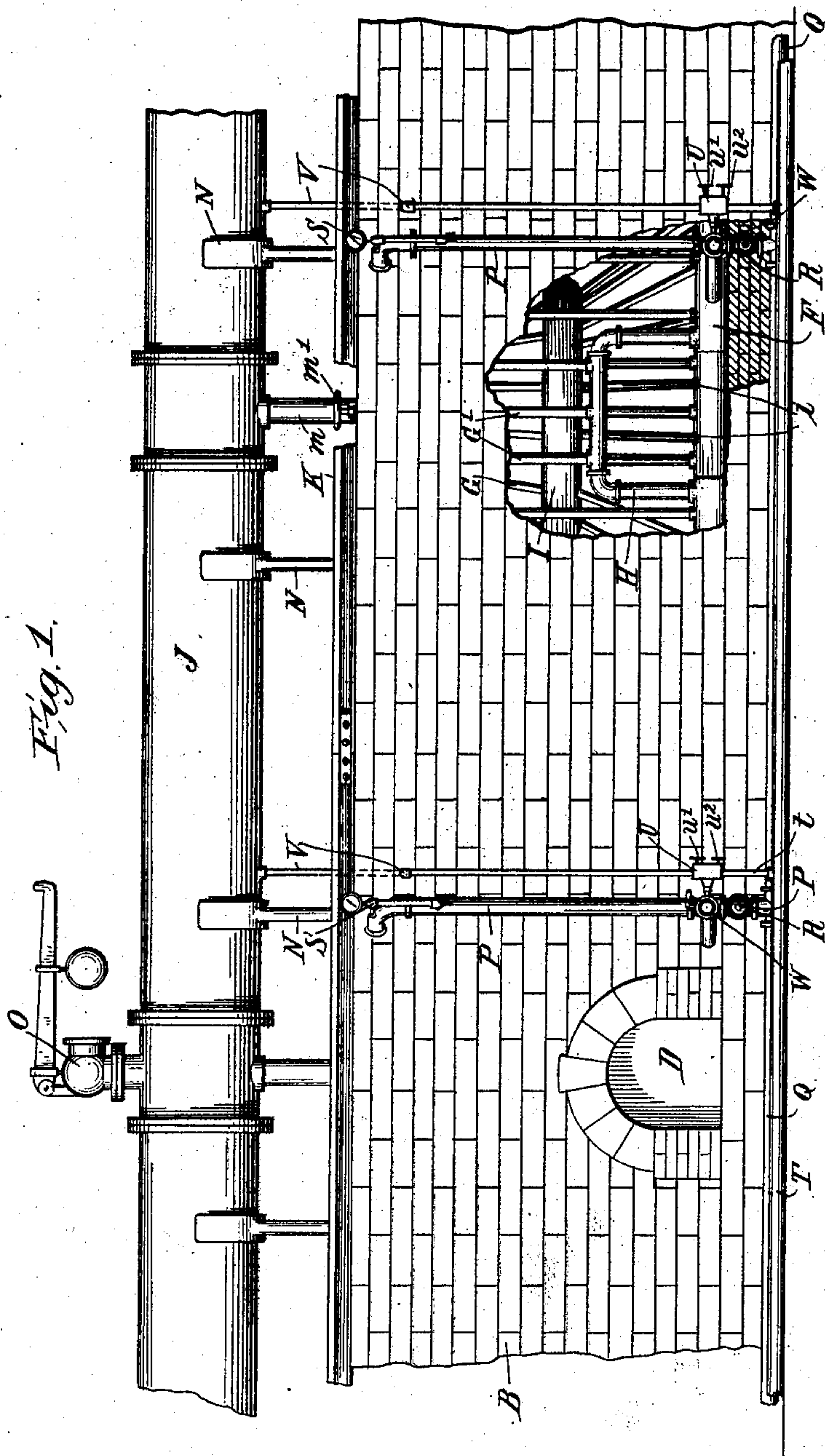
PATENTED OCT. 13, 1903.

J. B. BEAM.
STEAM BOILER.

APPLICATION FILED JAN. 26, 1903.

NO MODEL.

2 SHEETS--SHEET 1.



Witnesses

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A. M. Parkins.

Bij

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2 SHEETS—SHEET 2.

Fig. 2.

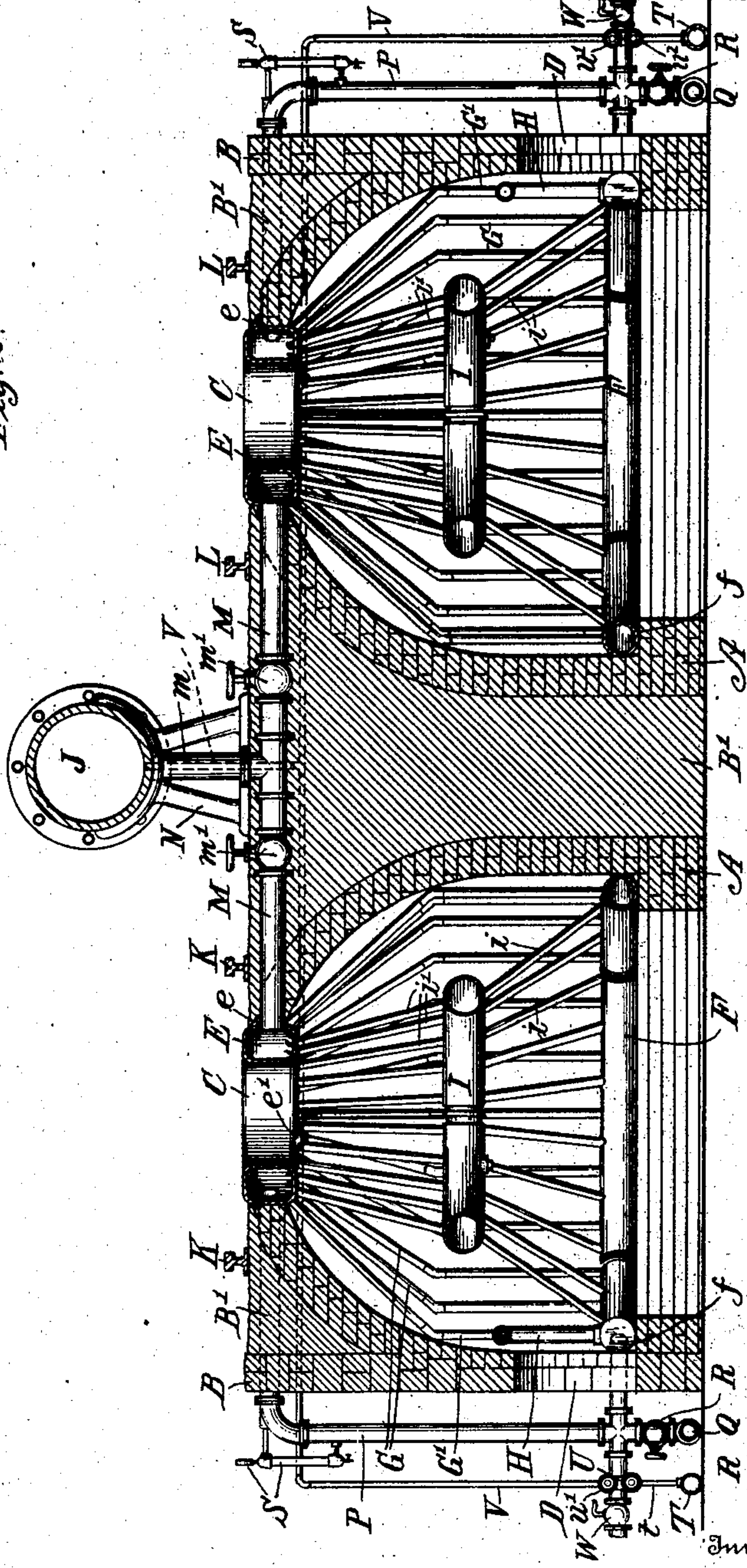
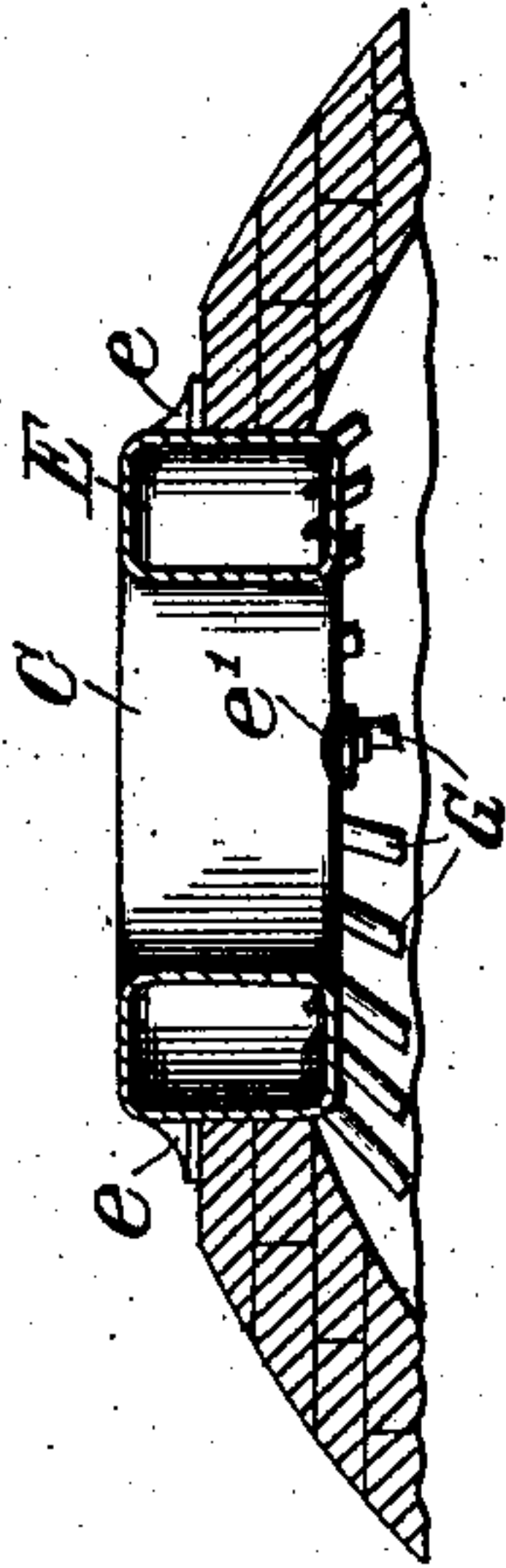


Fig. 3.



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UNITED STATES PATENT OFFICE.

JACOB B. BEAM, OF BIGRUN, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO CHARLES W. HUGHES, OF ELEANOR, PENNSYLVANIA.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 741,575, dated October 13, 1903.

Application filed January 26, 1903. Serial No. 140,640. (No model.)

To all whom it may concern:

Be it known that I, JACOB B. BEAM, a citizen of the United States, residing at Bigrun, in the county of Jefferson and State of Pennsylvania, have invented certain new and useful Improvements in Steam-Boilers for Coke-Ovens, of which the following is a specification.

The object of my invention is to provide coke-ovens with steam-boilers of suitable construction which will not interfere with the ordinary use of such ovens and will in a measure save what has heretofore been waste heat.

In carrying out my invention I do not contemplate any change in the general construction of the ovens. Indeed, I have sought to so construct steam-boilers therefor that they may be applied to them as ordinarily constructed and without any change in the manner of their operation or use.

At the manhole or filling-orifice of each oven I arrange an annular chamber or water-drum, through the central opening of which the coal may be introduced, and I connect this upper chamber with one or more annular water chambers or drums below it by means of water-tubes so arranged as to provide efficient circulation of water without interfering with the introduction of coal or the passage of gases while coking. The boilers are connected with a steam-dome, from which steam may be drawn and used whenever required. Water is introduced into the boilers by an injector or injectors from a water-supply pipe, and suitable means are provided for blowing off steam, connecting and disconnecting a battery of boilers with each other and with the steam-dome, and for maintaining the water-level in a battery of boilers when one injector only is employed.

In the accompanying drawings, Figure 1 shows a front elevation of a portion of adjacent coke-ovens with my improvements applied. Some of the parts are broken away in order to better illustrate other parts. Fig. 2 shows a transverse section through two adjacent ovens with my improvements applied. Fig. 3 is a detail view showing the manner of supporting the upper annular water-chamber at the manhole of an oven.

As before stated, I do not contemplate any material change in the general construction of the ovens. As is well known, a long series of ovens are commonly arranged beneath a railway-track and over which coal-cars are run to supply the ovens through manholes in the tops thereof. It is also common to build two or more parallel series of ovens, two railway-tracks being employed for the cars which supply the two series of ovens. I have borne these general conditions in mind when organizing steam-boilers adapted for coke-ovens of the usual construction and arrangement.

Each oven has a fire-brick lining A and an outer stone wall or casing B. The intervals between the fire-brick and the casing may be filled with material B' of any desired kind. Each oven has a manhole C and a door D. Within each manhole I arrange an annular water chamber or drum E. This drum may be provided with flanges e, which may be adapted to rest on a suitable annular ledge on top of the fire-brick around the manhole. In the bottom of the water-chamber E a plugged opening or manhole e' may be provided for cleaning it. Near the bottom of the oven and supported on a ledge f of the fire-brick I arrange an annular water chamber or drum F. This is at such an elevation as not to interfere with the coking, and it is connected to the upper water-drum E by means of a multiple series of water-tubes G, which while quite close to the fire-brick walls of the oven are not in contact therewith; but sufficient space is left between them and the fire-brick to allow the products of combustion to circulate around them, and thus heat them to a high temperature. Most of the tubes G extend directly from the upper drum E to the lower drum F; but at the door I provide special pipes H, which extend around the edge of the door and which are connected with the upper drum E by means of shorter water-tubes G'. In order to provide for the generation of more steam, I may employ a third annular water chamber or drum I, preferably located about midway between the upper and lower drums and connected to the lower water-drum by water-tubes i and to the upper drum by water-tubes i'. The arrangement,

however, is such that a free space is left within the center of the oven, so that coal introduced through the manhole may pass freely through all the water chambers or drums E, I, and F.

The steam-dome J preferably consists of a large horizontally-arranged pipe located between the two tracks K and L. Of course if only one series of ovens is used the steam-drum would be located to one side of the track. Each steam-drum E is connected with the steam-dome J by means of pipes M *m*. Each pipe M is provided with a valve *m'*, by means of which communication between the steam-dome and the boiler may be opened and closed. The dome is preferably supported at a slight elevation by means of standards N of suitable construction, and one or more safety-valves O may be employed in the steam-dome wherever needed.

Each upper water-chamber E is connected with a corresponding inner or lower water-chamber F by means of a pipe P, which provides for the proper circulation of water within the water chambers and tubes, and each of said pipes P is connected with a common pipe Q, running along the series or battery of ovens in the manner indicated in Fig. 1. Each of said pipes P is provided with a valve R, by means of which communication may be shut off between said pipe P and the pipe Q. Each pipe P is provided with a water-gage and steam-gage S of usual construction. In order to supply the boilers with water, I employ a water-supply pipe T, which is connected by means of branch pipes *t* with injectors U, and each injector is connected by means of a pipe V with the steam-dome. The injector is provided with suitable valves *u'* *u''*. If the valve R of any boiler is closed, the injector may be operated in a well-known manner to cause water to be drawn from the supply-pipe T and forced into the lower water-chamber F and thence to the other water-chambers and water-tubes. One injector may, however, be employed for filling all the boilers by leaving the valves all open. This may be done when the boilers are all on substantially the same level. If they are not, separate injectors should be operated for filling the boilers.

The several water chambers and pipes may be constructed in sections and coupled together in well-known ways.

While the arrangement of water-tubes shown in the drawings is preferred, the arrangement may be somewhat varied without departing from my invention. The central or middle water-chamber I and the pipes *i* *i'* may be omitted, if desired, and a larger number of circulating-pipes P may, if preferred, be employed. Additional safety-valves may be used, if required, and blow-off cocks W may be used to relieve the boilers when it is desired so to do.

I claim as my invention—

1. The combination with a coke-oven pro-

vided with walls of masonry and having a manhole at the top, an annular water-chamber let down into the manhole and having a free passage through it for the products of combustion, a steam-dome connected with said annular chamber, an annular water-chamber within the oven above the floor on which the fuel is supported, water-tubes within the oven connecting the water-chamber at the manhole with the water-chamber within the oven, and a pipe outside the oven connecting the two water-chambers, substantially as described.

2. The combination of a coke-oven provided with walls of masonry and having a manhole at the top, an annular water-chamber let down into the manhole, and surrounded by the walls thereof, a steam-dome outside the oven connected with the annular water-chamber, an annular water-chamber within the oven, water-tubes within the oven connecting said two water-chambers, a pipe outside the oven connecting said chambers, a water-supply pipe, T, an injector with which it is connected, connections between the injector and the steam-dome, and connections between the injector and the outside connecting-pipe between the water-chambers within the oven.

3. The combination of a coke-oven provided with walls of masonry and having a manhole at the top, an annular water-chamber surrounding the manhole, a steam-dome outside the oven connected with this chamber, an annular water-chamber within the oven, pipes extending around the front door of the oven, water-tubes connecting said pipes with the annular chamber at the manhole, and other pipes within the oven connecting the annular chamber at the manhole with said annular chamber within the oven.

4. The combination of a coke-oven formed with walls of masonry and having a manhole at the top, an annular water-chamber let down into the manhole, a steam-dome connected with this chamber, an annular water-chamber within the oven, water-tubes within the oven connecting the water-chamber at the manhole with the water-chamber within the oven, a pipe outside the oven connecting the annular chamber at the manhole with the annular chamber within the oven, another oven similarly provided with water-chambers and water-tubes, a water-supply pipe connected with the water-chambers of one of said ovens, an injector connected with said water-supply pipe, a pipe connecting the water-chambers of one oven with those of the other oven, and valves for the pipes.

5. The combination of a coke-oven having a manhole at the top, an annular water-chamber surrounding the manhole, a steam-dome connected with this chamber, an annular water-chamber near the bottom of the oven, water-tubes connecting these two water-chambers, a third water-chamber located between the two first mentioned, and water-tubes connecting this middle water-chamber with the

upper and lower ones, said tubes and chambers inclosing an unobstructed space.

6. The combination of a coke-oven formed with walls of masonry and having a manhole
5 at the top, an annular water-chamber let down into the manhole, a steam-dome connected with this chamber, an annular water-chamber near the bottom of the oven, but arranged above the floor thereof on which the
10 fuel is supported, water-tubes connecting these two water-chambers, but lying close to the walls of the oven, a third water-chamber of less diameter than that at the bottom of the oven and located between said bottom

water-chamber and the one at the manhole, 15 and water-tubes connecting this middle chamber with the upper and lower ones, there being a free space inclosed by the three water-chambers and the tubes for the passage of fuel through the manhole to the bottom of the 20 oven.

In testimony whereof I have hereunto subscribed my name.

JACOB B. BEAM.

Witnesses:

HENRY J. WILSON,
HENRY J. BEAM.