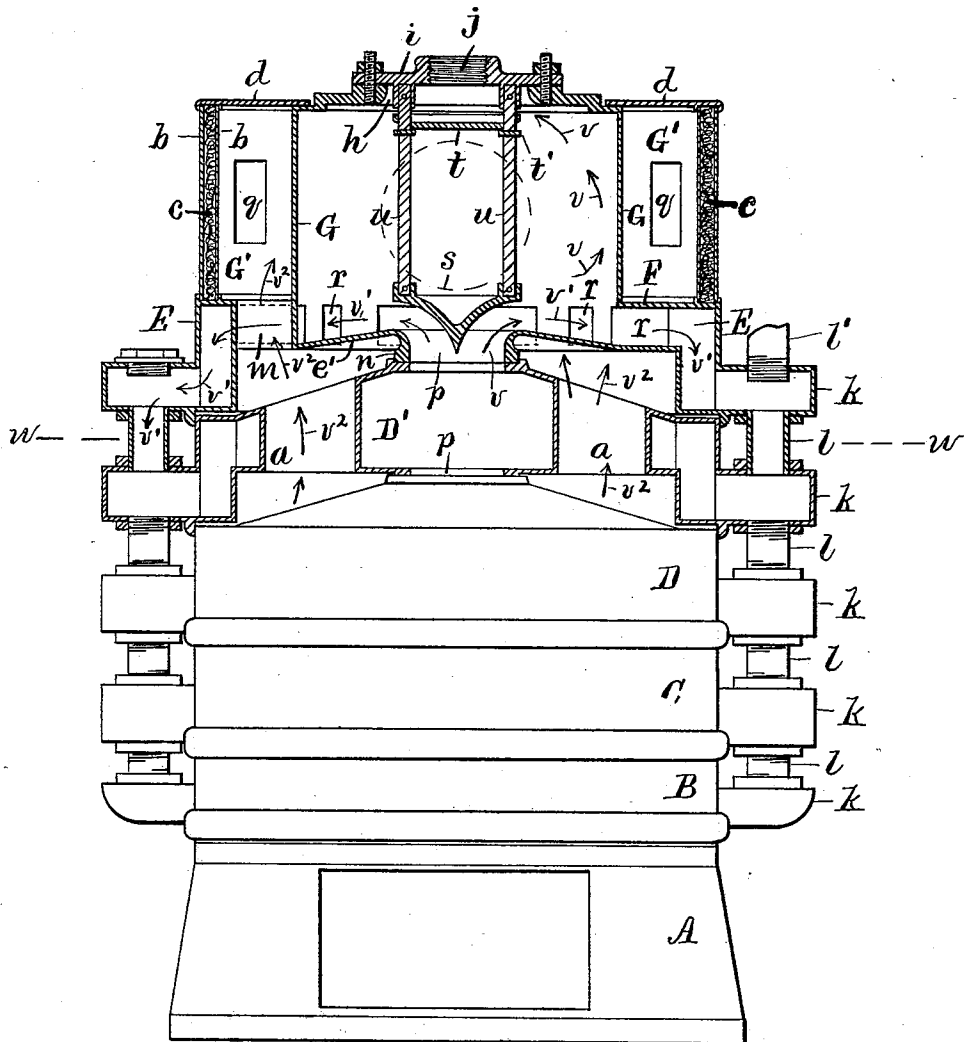


J. J. HOGAN.  
STEAM DOME FOR BOILERS.

No. 520,883.

Patented June 5, 1894.

Fig. 1.



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Edward Quincy

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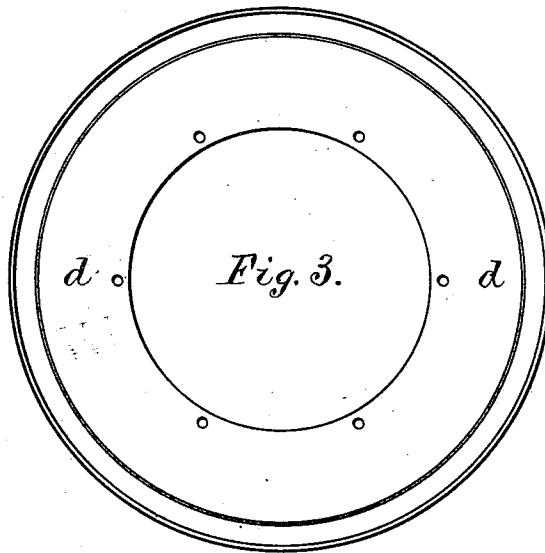
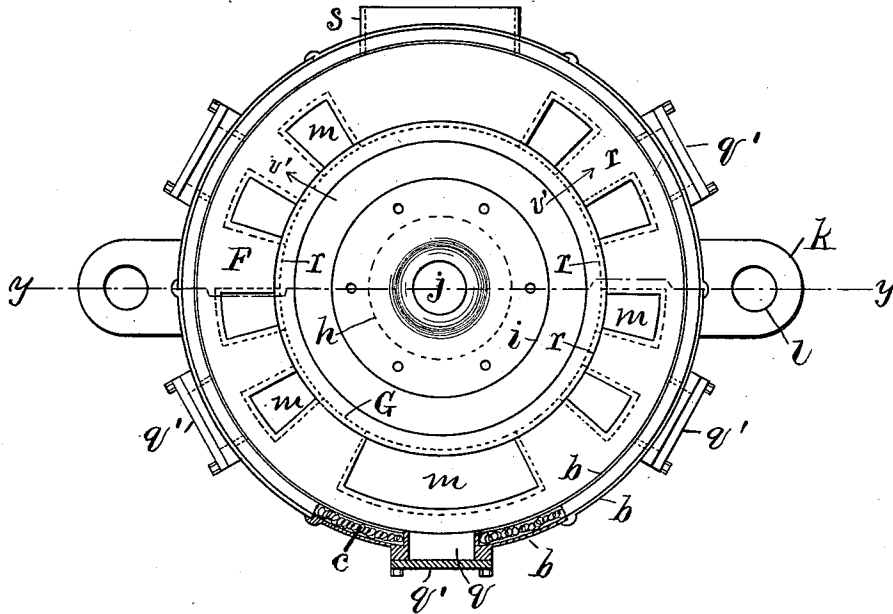
J. J. Hogan, per  
Craine & Miller, attys

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Fig. 2.



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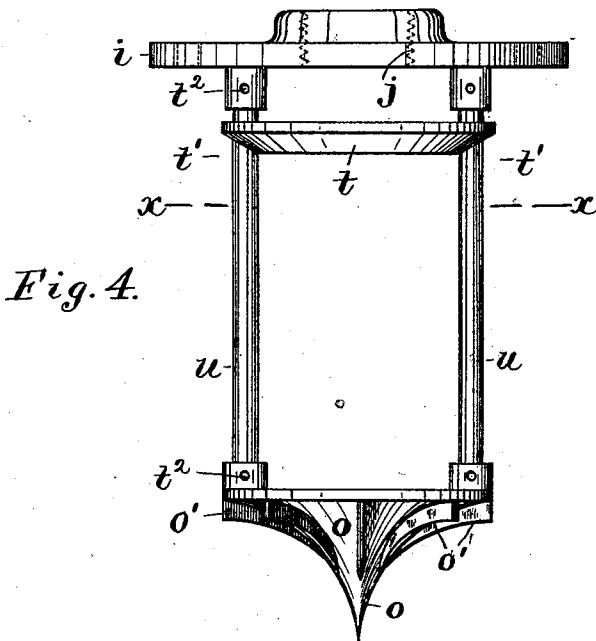


Fig. 4.

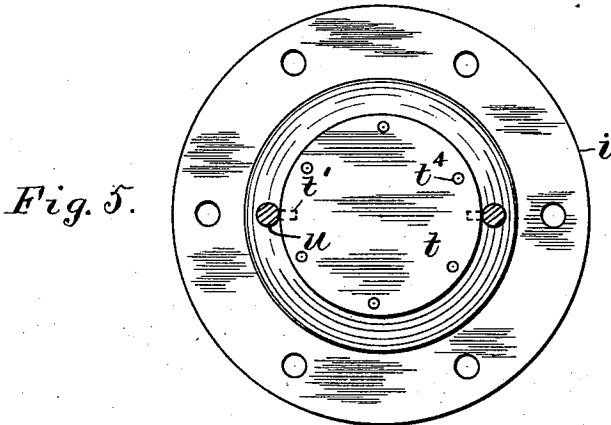


Fig. 5.

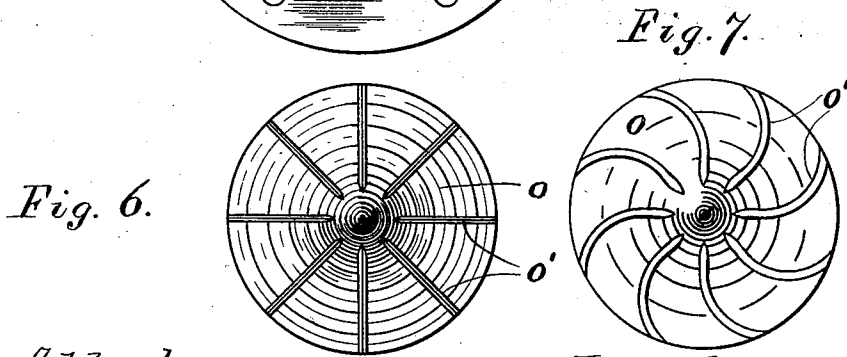


Fig. 6.

Fig. 7.

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# UNITED STATES PATENT OFFICE.

JOHN J. HOGAN, OF BROOKLYN, NEW YORK.

## STEAM-DOME FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 520,883, dated June 5, 1894.

Application filed March 26, 1892. Renewed November 4, 1893. Serial No. 490,008. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN J. HOGAN, a citizen of the United States, residing at Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Steam-Domes for Boilers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The object of this invention is to furnish a steam dome with an anti-priming device in such boilers as are provided with a vertical central passage for upward circulation. Such boilers are described in my Patent No. 425,944, dated April 15, 1890. I have found in practice that my said patented boiler has very great efficiency in heating and circulating hot water, and that a great advantage results from the central passage, in promoting circulation within boilers used to supply heating radiators, as great injury sometimes results to boilers by overheating when the external circulation is cut off. As the central passage induces a rapid movement of the water upward therein, it is desirable, when the boiler is used for generating steam, to furnish a drier or steam chamber in which the steam and water may be separated so as to deliver dry steam to the radiators.

30 My present invention furnishes such a device and is adapted to any boiler provided with a central vertical passage through which an upward circulation is actively maintained during the generation of steam.

35 The invention consists partly, in a steam dome or chamber applied to the top of the boiler above the central passage, with a curved deflector sustained over the central aperture, and partly, in a series of radial passages extending outward from the bottom of such chamber to conduct the water (which is separated from the steam) to the lower part of the boiler.

45 The invention also consists in means for removing the deflector with the pipe flange upon the top of the steam chamber, in means for circulating the heated gases around the steam chamber, and in means for passing such gases upward between the water passages 50 which lead the water downward from the deflector.

In the annexed drawings, Figure 1 is a side elevation of a boiler having my improvements applied thereto, the portions which are hatched being shown in section upon line *y, y* in Fig. 55 2. Fig. 2 is a plan of the same boiler with the cover over the annular smoke chamber removed. Fig. 3 is a plan of the cover inverted. Fig. 4 is a side elevation of the pipe flange and deflector. Fig. 5 is a cross section of the same on line *x, x*, in Fig. 4 looking toward the pipe flange, and anti-priming plate. Fig. 6 is a view of the under side of the deflector and Fig. 7 a similar view with curved ribs.

The boiler shown herein is of the class described in my said Patent No. 425,944, formed of horizontal cast iron sections with a fire box in the bottom and passages through the several sections conducting the smoke and gases upward to the top section. Each section is provided at its margin with opposite hollow lugs connected by pipes to form a downward passage from the top to the bottom of the boiler.

A is the base of the boiler, B a fire-pot section, C a combustion chamber, and D, D' are water sections provided with vertical smoke passages *a*. The several sections are provided with central passages *p* for the upward circulation of the heated fluid, and the top section E is formed with a nozzle *n* fitted upon the section D' and provided with such a central passage. The under side *e'* of the section E, adjacent to the nozzle *n*, is sloped downwardly, and the section is formed with a hollow marginal ring to which the letter E is applied, a perforated hollow plate F extended inwardly from the ring, and a central upright steam chamber G. The chamber is covered at the top and provided with an aperture *h* closed by a pipe flange *i*, with threaded hole *j* in the center for the outlet pipe. The sections B to E inclusive are formed with hollow lugs *k* upon opposite sides, which are connected by the pipes *l* to form a water connection between the top and bottom of the boiler. A double walled casing *b* provided with a non-conducting packing *c* is extended upward from the margin of the section E to the top of the steam chamber G, and is closed at the top by a cover *d*. Smoke passages *m* are formed through the flat portion F of the top

section thus admitting the smoke and gases to the annular smoke chamber G' around the steam chamber G. A smoke outlet *s* is formed upon one side of the casing to discharge the smoke to a suitable flue, and hand-holes *q* provided with covers *q'* are formed through the casing to permit the cleaning of the smoke passages within. Peripheral openings *r* are extended from the bottom of the steam chamber into the hollow portion F in the top section, and the water is thus conducted between the upward smoke passages *m* to the marginal ring *e* whence the water falls by its gravity to the lower portion of the boiler through the pipes *l*. The water level in such boiler may be at the level of the dotted line *w, w*, in Fig. 1, by which the bottom of the section D' would be covered with water and its upper part serve as a steam space, from which the water would be discharged of the steam chamber G through the central passage *p*. The ebullition of the water in the lower sections of the boiler tends to force the water upward into the section D' while the escape of steam therefrom tends to lift particles of the water up into the drum G. To prevent such particles of water reaching the pipe outlet *j*, I provide a conical deflector having concave surfaces *o* adapted to throw such particles of water radially toward the aperture *r*.

The bottom of the steam chamber being sloped downwardly from the central passage the particles of water flow readily into the openings *r* and thence into the ring E and section D' below. Such particles of water as may be carried upward by the steam toward the pipe outlet are still farther arrested by an anti-priming plate *t*, which is sustained centrally beneath such pipe outlet and provided with few steam holes *t'*. Rods *u* are projected downward from the pipe flange *i* and the anti-priming plate is sustained by pins *t'* near the upper ends of such rods, while the deflector is attached to the lower ends of the rods in such proximity to the central opening as to throw all the fluid laterally which rises therefrom. The deflector and anti-priming plate are each made larger than the passage to which it is applied, and the mixed steam and water which rises through the central passage is thus prevented from passing directly to the pipe outlet *j*, but is thrown by the deflector to the periphery of the steam chamber, while it is thence compelled to pass between the edges of the anti-priming-plate and the aperture *h'* to reach the pipe outlet.

Arrows *v* show the movements of the steam to the pipe outlet, and arrows *v'* the movements of the water which is discharged through the openings *r*. Arrows *v<sup>2</sup>* are also applied to the passages *a* and *m* to indicate the movement of the currents of gas, and it will be readily understood that the gas rising through the smoke passages *a* will heat the sloping surface *e'* upon the bottom of the steam chamber, while the circulation of the

steam and gases, through the passages *m*, and within the smoke chamber G' tends to still further heat the steam chamber G and to dry out the steam, or evaporate the particles of water therein.

The deflector and anti-priming-plate are shown upon a larger scale in Figs. 4 to 7 inclusive, and the deflector in those views is shown formed with curved or radial ribs *o'* to direct the particles of water toward the peripheral openings *r*.

The sides of the passage *p* in the top section are rounded where they join the bottom plate *e'*, and the conical surface of the deflector is made concave and is preferably made nearly concentric with such rounded corners.

In Figs. 4 and 5, the pipe flange *i* is shown wholly removed from the steam chamber, with the deflector and anti-priming plate suspended therefrom by means of the rods *u*. By such construction these fixtures may be manufactured with more economy; or applied to the boiler or removed therefrom for repairs with greater facility than if they were attached to the body of the steam chamber; while the suspension of the deflector, by the rods *u*, sustains the deflector above the central passage without employing any pins or supports which would serve as obstructions to the flow of steam. The rods are shown secured to the pipe flange and the deflector by pins *t*, but any other means may be employed.

The entire device furnishes a cheap and effective attachment for boilers in which there is an active upward central circulation, and which are therefore liable to deliver wet steam.

The essential elements of the invention are: the steam chamber arranged over the central passage, a deflector sustained above the same, and water outlets from the bottom of the chamber connected with the lower part of the boiler; and it is obvious that these elements may be somewhat modified in form for application to boilers of different construction than that described herein.

The feed pipe *v'* is shown in Fig. 1 herein to illustrate a modification of the construction shown, for heating the feed water, in my application, Serial No. 432,855, filed May 13, 1892.

The present construction mingles the feed water with the heated fluid discharged from the steam chamber, and conducts the same to the lower part of the boiler; thus showing how the feed water can be heated, in a circulation passage, in a boiler materially different from the upright tubular boiler shown in that application.

It will be readily understood that the steam dome described herein is not limited in its operation to boilers made in horizontal sections; nor to any other special construction of boiler, provided the boiler is furnished with a vertical passage through which all the fluid rising

in the boiler is discharged. The steam dome would, in such case, perform all the functions described herein and would thus be the same in its functions and in its relation to the boiler as that shown herein.

Having thus set forth the nature of the invention, what is claimed herein is—

1. The combination, with a steam boiler having a central vertical passage for upward circulation, of a steam chamber arranged over such passage, a deflector sustained above the passage, and water outlets from the bottom of the chamber connected with a lower part of the boiler.

2. The combination, with a steam boiler having a central vertical passage for upward circulation, of a steam chamber arranged over such passage, a smoke chamber around such steam chamber to heat the same, a deflector sustained above the passage, and water outlets from the bottom of the chamber connected with a lower part of the boiler.

3. The combination, with a steam boiler having a central vertical passage for upward circulation, of a steam chamber arranged over such passage and having its bottom sloped downwardly from the central aperture, with water outlets communicating with the lower part of the boiler, a smoke chamber around the steam chamber, and a deflector sustained above the central passage, as and for the purpose set forth.

4. The combination, with a steam boiler having a central vertical passage for upward circulation, of a top section applied to such boiler and formed with the hollow ring E, steam chamber G and hollow plate F provided with smoke apertures *m*, the annular smoke chamber above such plate provided with a smoke outlet, the peripheral openings *r* through the plate F for the discharge of water from the steam chamber, and the concavo-conical deflector suspended within the cham-

ber above the central passage and adapted to direct the water toward the openings *r*.

5. The combination, with a steam boiler having a central vertical passage for upward circulation, of a top section applied to such boiler and formed with the hollow ring E, steam chamber G, and hollow plate F provided with smoke apertures *m*, the casing *b* provided with hand-holes *q*, the cover *d* fitted to the casing and the top of the chamber, the peripheral openings *r* connecting the bottom of the chamber with the hollow ring E, water connections from such top section to a lower part of the boiler, and a deflector sustained within the chamber above the central passage and adapted to direct the water toward the openings *r*, as and for the purpose set forth.

6. The combination, with a steam boiler having a central vertical passage for upward circulation, of a steam chamber arranged over such passage, an aperture in the top of such chamber closed by a removable flange, a deflector suspended from such flange over the central passage, and water outlets from the bottom of the chamber connected with the lower part of the boiler.

7. The combination, with a steam boiler having a central vertical passage for upward circulation, of a steam chamber arranged over such passage, an aperture in the top of such chamber closed by a removable pipe flange, rods suspended from such flange with a deflector at their lower ends, and an anti-priming plate upon the rods adjacent to the pipe outlet, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN J. HOGAN.

Witnesses:

ELBERT O. HASKINS,  
THOMAS S. CRANE.