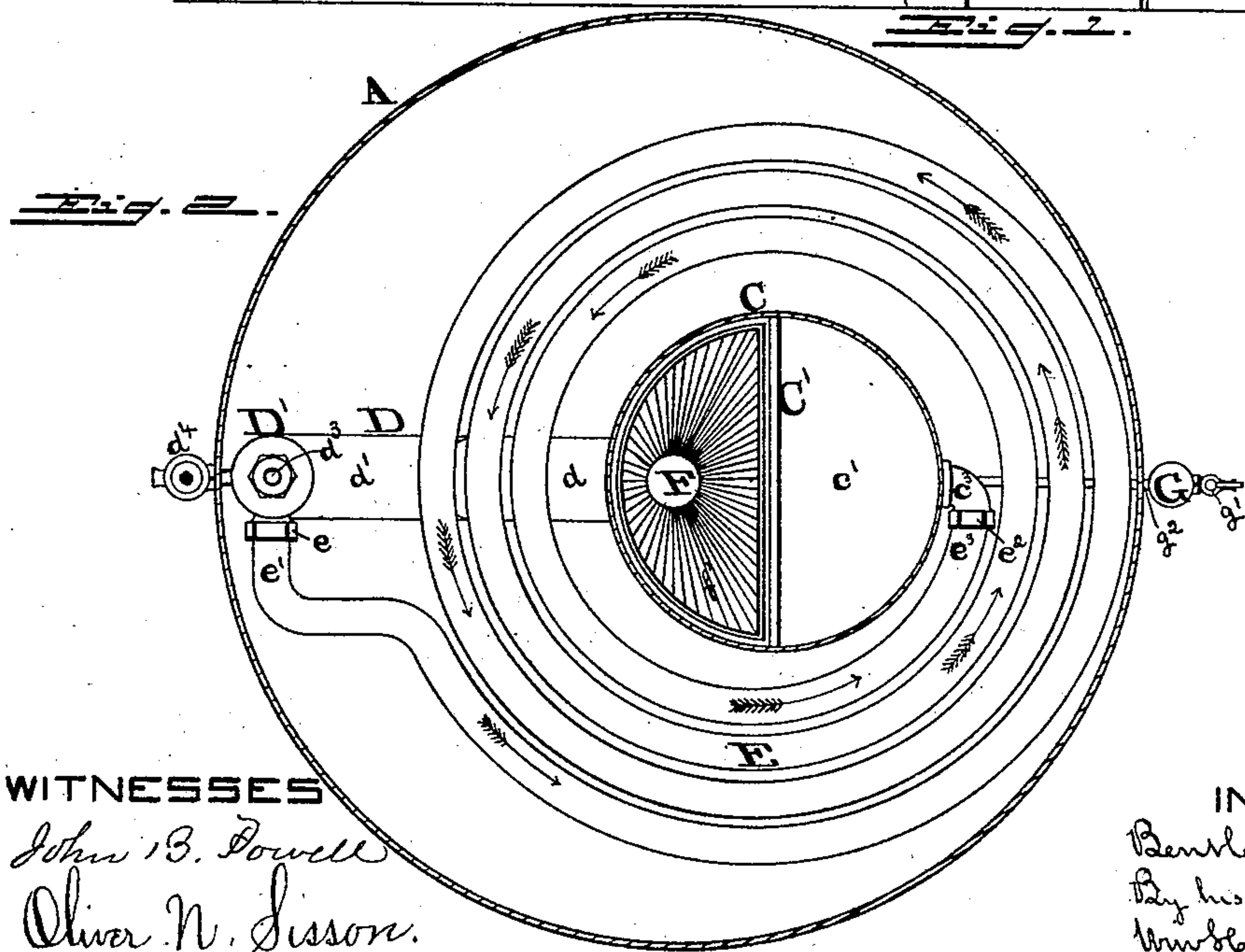
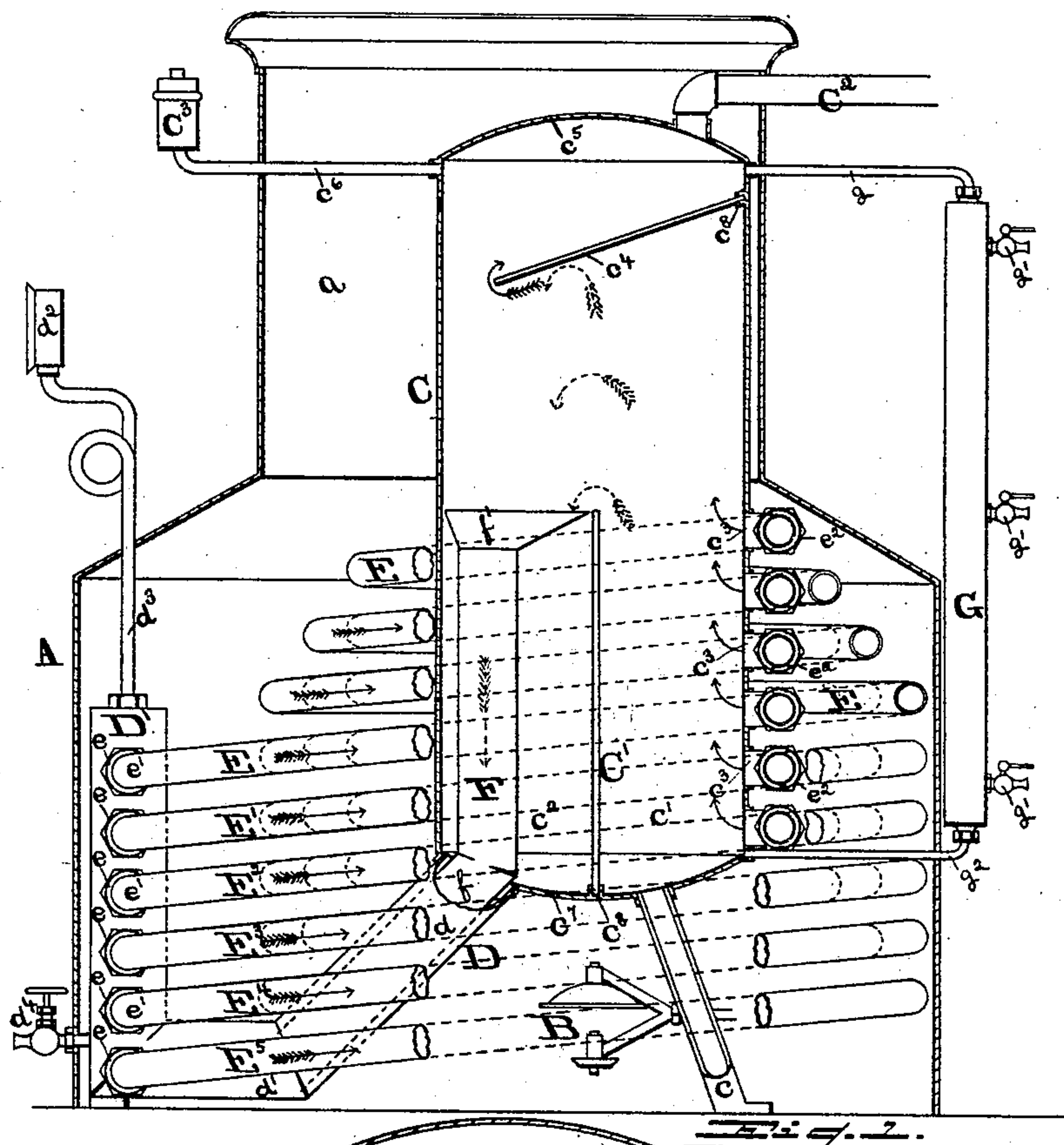


(No Model.)

B. L. RINEHART.
STEAM BOILER OR GENERATOR.

No. 453,391.

Patented June 2, 1891.



WITNESSES

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UNITED STATES PATENT OFFICE.

BENTLEY L. RINEHART, OF CAMDEN, NEW JERSEY.

STEAM BOILER OR GENERATOR.

SPECIFICATION forming part of Letters Patent No. 453,391, dated June 2, 1891.

Application filed September 24, 1890. Serial No. 365,972. (No model.)

To all whom it may concern:

Be it known that I, BENTLEY L. RINEHART, a citizen of the United States, residing at Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Steam Boilers or Generators, of which the following is a specification.

My invention has relation to steam boilers or generators, and has for its object to improve their construction and increase their efficiency, to the end that the result may be the production of steam of the highest degree of dryness and a consequent saving in the amount of fuel necessary therefor.

My invention consists in the details of construction and in the combinations of parts, as hereinafter more fully described, and particularly illustrated in the accompanying drawings, wherein—

Figure 1 is a side elevation, partly in section, of my invention complete, and Fig. 2 is a plan view, partly in section, of the same.

A represents the shell or casing, of a shape best suited to the character of its contents and surmounted by the smoke-stack *a*.

B represents a petroleum-vapor burner, located in the base or fire-space of the casing A, for generating the necessary heat, and which may be of any character other than that shown in the drawings, as any special form of fire apparatus is not part of my invention.

C is an upright cylinder or drum supported by legs *c*, which are hollow and full of water to prevent their being burned off, and the pipe D on the bottom of the casing, said cylinder having therein a vertical partition or diaphragm *C'*, extending from the bottom *c'* and secured in the groove *c''* therein, or otherwise conveniently secured, and extending upwardly to about the middle of the cylinder, thus dividing its lowest portion into two compartments *c'* *c''*. The pipe D, which forms one of the supports for the cylinder C, is substantially L-shaped, having the inclined portion *d* and the longitudinal or horizontal portion *d'*, the latter terminating in an upright drum or manifold *D'* of the same diameter as the pipe D.

e e are unions or couplings secured in vertically-aligned openings in the manifold for

the reception of the ends *e'* of the spiral coils E E' E² E³ E⁴ E⁵, all of which are of the same size and have their respective coils of the same diameter, are arranged nest-like, one above the other in such manner as to bring the smallest coil of one spiral up into the space beneath the coils of another spiral and just below the smallest coil of the latter without touching the same, thus permitting of a multiplicity of spirals being employed without taking up much room.

e² are other vertically-aligned unions or couplings secured to the short sections *c³*, secured in openings in the side of the cylinder C for the reception of the inner ends *e³* of the spiral tubes E E', &c., such openings being in the part of the cylinder which is divided by the partition *C'* into compartment *c'*. The other compartment *c''*, which opens into the pipe D, which is secured in a suitable opening in the bottom of the compartment, has therein a vertical pipe F, of somewhat less outer diameter than the inner diameter of the pipe D, and having its lower end or extension *f* of the same angle of inclination as the inclined portion of the pipe D and resting and supported within such portion in such manner as to allow of a clear space between the extension *f* and the portion *d*, such clear space opening into the horizontal part *d'* of pipe D at one end and at the other end opening into the compartment *c''*. The upper end of the pipe F is surmounted by a flaring or funnel-shaped mouth *f'*, which at its upper edge is hemispherical in outline or of the same shape as the plan of the compartment *c''*, such edge almost filling the space between the partition *C'* and the walls of the cylinder. As will be observed, the manifold D is provided with the usual gage *d²*, supported on the pipe *d³* and the cock *d⁴*.

c⁴ is a downwardly-inclined deflector or fender secured inside of and near the top of the cylinder C in the lugs *c⁵* or in any other convenient manner, which deflector extends almost entirely across and nearly fills the upper part of the cylinder, projecting entirely across the compartment *c'* and almost across the compartment *c''*, leaving a little space between its outer edge and the wall of the cylinder, so that the steam from the tubes E E', &c., will strike against the deflector *c⁴*, and

any water therein will thus be thrown into the funnel of the pipe F, and so find its way eventually to the manifold D' and again to said tubes, the dry steam in the meantime having escaped around the edge of the fender and into the steam-pipe C². The upper part of cylinder C has also a tube c⁶, secured in an opening therein and having an outlet into a safety-valve C³, and another tube g, leading into the usual gage-tube G, the latter being provided with ordinary gage-cocks g' and at its lower end communicating through the tube g² with the lower part of the cylinder C.

The operation is as follows: The tube C being filled with water up to the point a little below the upper edge of the partition C', and the fire started, as soon as the tubes E E', &c., become sufficiently heated, the water therein being also correspondingly heated, the steam bubbles formed in such water will travel upwardly, owing to the upward inclination or tendency of said tubes, and avoid thereby the danger of burning the tubes, which would result were such bubbles to remain in any one position for a time, the travel of the steam bubbles continuing in the direction indicated by the arrows in full lines until they pass out of the inner ends of the tubes and into the water in the compartment c', and finally through such water until they burst at the surface, whereupon the steam therefrom will rise until it strikes against the fender c⁴, when it passes around the edge of the fender, as shown by the arrow at the edge of the latter, and finally into the steam-pipe C². Should any water be carried by the steam as far as the fender, the same will be deflected and thrown into the mouth f' of the pipe F, as shown by the dotted arrow just below said fender, while the water that spurts upwardly above the surface of the water in compartment c' in the steam-making process will fall into said mouth, as shown by the dotted arrows just below the first-mentioned dotted arrows. The water above mentioned in its passage through the pipe F on its way to the manifold D and the outer ends of the tubes E E', &c., will produce a good and steady pressure in such tubes, and thereby conduce to a good circulation, while the space between the pipe D and said pipe F will, by reason of the water being therein, prevent the heating of the latter pipe to such extent as to cause the formation of steam bubbles therein, which, in passing up through the water in such pipe, would interfere with the downward flow of the same and prevent a free circulation. The diaphragm C' being opposite the discharge-openings of the tubes E E', &c., prevents the steam bubbles therefrom from passing over into the position of the compartment c², where their upward passage would be impeded by the pipe F with its funnel-shaped mouth.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a steam-generator, the combination of

a main cylinder divided into compartments, a manifold or supplemental cylinder adjacent to and communicating with one of the compartments, a coiled tube or tubes leading from the manifold or supplemental cylinder to the other compartment, and a burner or other means for heating the tubes, substantially as specified.

2. In a steam-generator, the combination of a main cylinder, a manifold or supplemental cylinder adjacent to the main cylinder, a vertical flaring-mouthed pipe inside the latter and communicating with the former, a coiled tube or tubes leading from the manifold or supplemental cylinder to the main cylinder, and a burner or other means for heating the tubes, substantially as specified.

3. In a steam-generator, the combination of a main cylinder, a manifold or supplemental cylinder adjacent to the main cylinder, a pipe leading from the latter to the former, a vertical flaring-mouthed pipe inside the main cylinder and the first-mentioned pipe, a coiled tube or tubes leading from the manifold or supplemental to the main cylinder, and a burner or other means for heating the tubes, substantially as specified.

4. In a steam-generator, the combination of a main cylinder divided into compartments, a manifold or supplemental cylinder adjacent to the main cylinder, a vertical flaring-mouthed pipe inside one of the compartments and communicating with the manifold or supplemental cylinder, a coiled tube or tubes leading from the latter to the other compartment, and a burner or other means for heating the tubes, substantially as specified.

5. In a steam-generator, the combination of a main cylinder divided into compartments, a manifold or supplemental cylinder adjacent to the main cylinder, a pipe leading from the latter to the former, a vertical flaring-mouthed pipe inside one of the compartments and the first-mentioned pipe, a coiled tube or tubes leading from the manifold or supplemental cylinder to the other compartment, and a burner or other means for heating the tubes, substantially as specified.

6. In a steam-generator, the combination of a main cylinder, a manifold or supplemental cylinder adjacent to and communicating with the main cylinder, a coiled tube or tubes leading from the former to the latter, a deflector inside the main cylinder above the tube-outlets, and a burner or other means for heating the tubes, substantially as specified.

7. In a steam-generator, the combination of a main cylinder divided into compartments, a manifold or supplemental cylinder adjacent to and communicating with one of said compartments, a coiled tube or tubes leading from the manifold or supplemental cylinder to the other compartment, a deflector inside the main cylinder above the tube-outlets, and a burner or other means for heating the tubes, substantially as specified.

8. In a steam-generator, the combination of

a main cylinder, a manifold or supplemental cylinder adjacent to the main cylinder, a vertical flaring-mouthed pipe inside the latter and communicating with the former, a coiled tube or tubes leading from the manifold or supplemental cylinder to the main cylinder, a deflector inside the latter above the tube-outlets and flaring mouth, and a burner or other means for heating the tubes, substantially as specified.

9. In a steam-generator, the combination of a main cylinder, a manifold or supplemental cylinder adjacent to the main cylinder, a pipe leading from the latter to the former, a vertical flaring-mouthed pipe inside the main cylinder and the first-mentioned pipe, a coiled tube or tubes leading from the manifold or supplemental cylinder to the main cylinder, a deflector inside the latter above the tube-outlets and flaring mouth, and a burner or other means for heating the tubes, substantially as specified.

10. In a steam-generator, the combination of a main cylinder divided into compartments, a manifold or supplemental cylinder adjacent to the main cylinder, a vertical flaring-mouthed pipe inside one of the compartments

and communicating with the manifold or supplemental cylinder, a coiled tube or tubes leading from the latter to the other compartment, a deflector inside the main cylinder above the compartments, and a burner or other means for heating the tubes, substantially as specified.

11. In a steam-generator, the combination of a main cylinder divided into compartments, a manifold or supplemental cylinder adjacent to the main cylinder, a pipe leading from the latter to the former, a vertical flaring-mouthed pipe inside one of the compartments and the first-mentioned pipe, a coiled tube or tubes leading from the manifold or supplemental cylinder to the other compartment, a deflector inside the main cylinder above the compartments, and a burner or other means for heating the tubes, substantially as specified.

In testimony that I claim the foregoing I have hereunto set my hand this 6th day of September, A. D. 1890.

BENTLEY L. RINEHART.

Witnesses:

WM. H. POWELL,

R. DALE SPARHAWK.