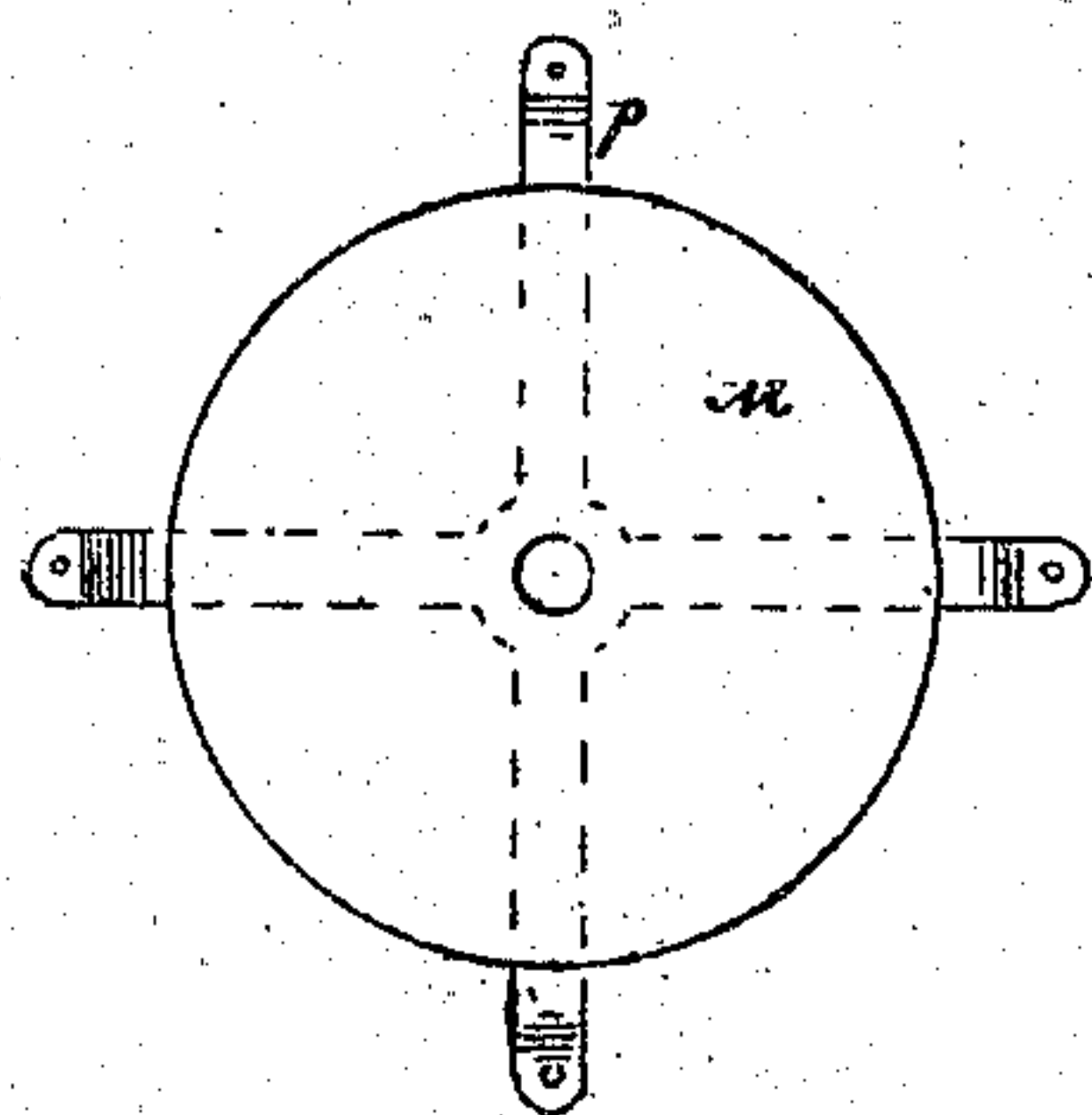
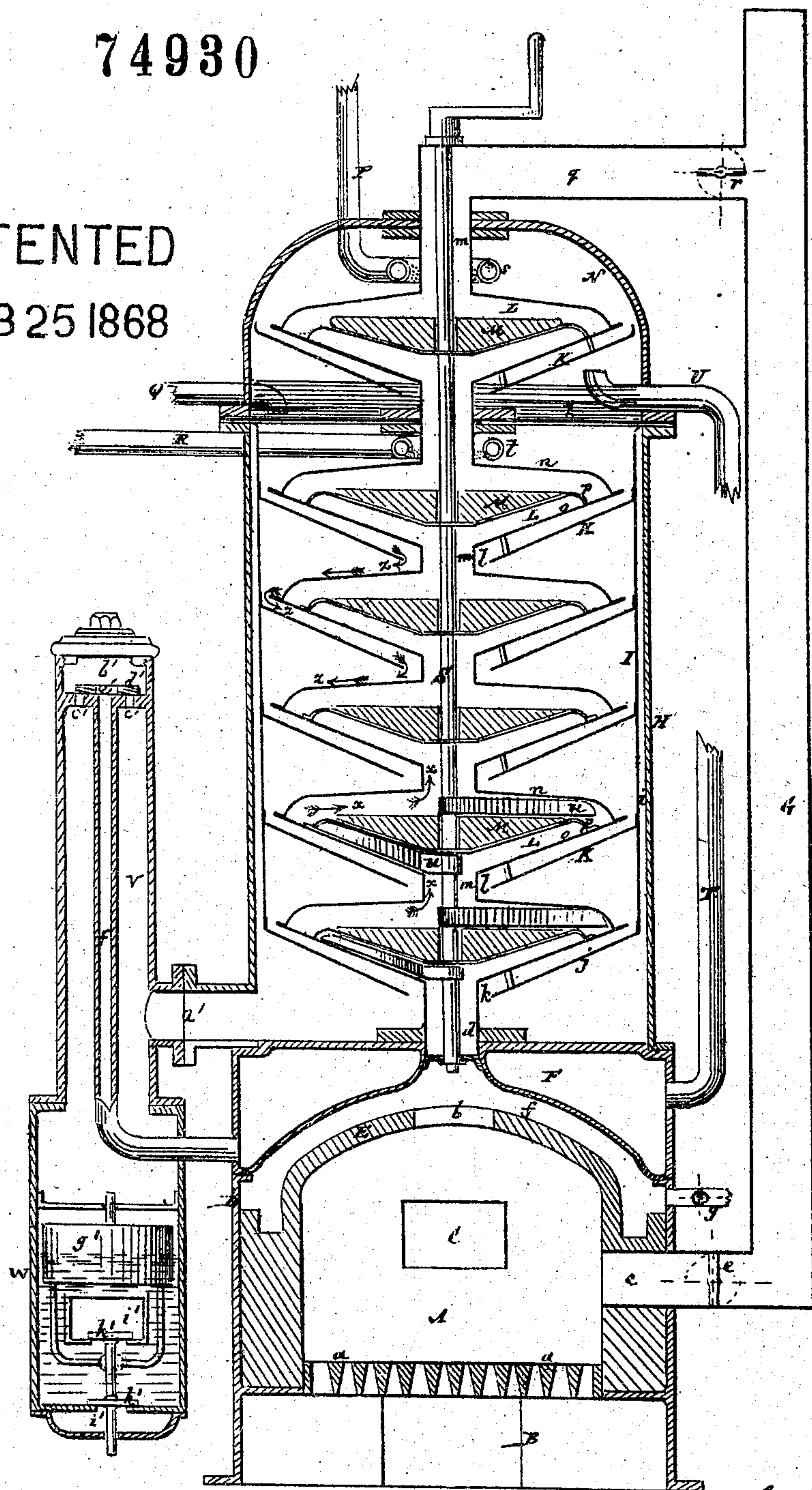


M. Newman, V.F. Lasso & C.W. Mac Cord's Steam Generator.

Fig. 1.

74930

PATENTED
FEB 25 1868



Witnesses:

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Attest

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Fig. 2.

United States Patent Office.

MARCUS NEUMANN, OF NEW YORK, VALDEMAR F. LASSOE, OF BROOKLYN,
AND C. W. MAC CORD, OF NEW YORK, N. Y.

Letters Patent No. 74,930, dated February 25, 1868.

IMPROVEMENT IN STEAM-GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that we, MARCUS NEUMANN, of the city, county, and State of New York, VALDEMAR F. LASSOE, of Brooklyn, in the county of Kings, same State, and C. W. MAC CORD, of the aforesaid city of New York, have invented a new and useful Improvement in Steam-Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing forming part of this specification, and in which—

Figure 1 represents a sectional elevation of a steam-generator constructed according to our improvement; and

Figure 2 a plan of one of the flue-dividing disks or draught-deflectors detached, with its supporting-bracket or stand.

Similar letters of reference indicate corresponding parts.

This, our improvement, has reference in its leading or main feature of action to a steam-generator of vertical character, and in which a spray or thin current of water is converted into steam as it passes down and over heating-surfaces or plates; and our invention consists in a novel combination of flue-enlargements within the generator, containing draught-deflectors, in combination with lower-water courses or dividing-plates to the generator provided with suitable outlets or escapes, and whereby the water is converted into steam in its progress down through the generator. Our invention also consists in the combination of a sprinkler or feed-water distributor, with a generator constructed as above described. Likewise our invention consists in an arrangement of a cold-air space between a super-heater and the fire-box arch of the generator. It also consists in a novel construction of feed-water heater in an automatic pressure-regulator for controlling the supply of steam to the superheater.

Referring to the accompanying drawing, A represents the fireplace of the generator, and *a a* the grate-bars thereof; B is the ash-pit, and C the door for feeding in the fuel. This portion of the generator may be formed of an outer metallic box or case, D, with fire-brick sides and arch or roof E, having an upper or central draught-outlet, *b*, and side draught-passage *c*. Mounted upon this box or case is a steam super-heating vessel or chamber, F, through which the draught is established by an opening or pipe, *d*, into and through the generator proper, when it is desired to thus pass the smoke and gaseous products of combustion, wholly or in part, in preference to allowing their escape through the side passage *c* into a main flue, G, forming or connected with the chimney, and provided at or near its bottom with a damper, *e*. Between the superheater F and arch E of the fireplace is an air-passage, *f*, communicating with the upper or central draught-outlet *d*, and provided with one or more cold-air inlets *g*, having valves or dampers for opening, shutting off, or regulating the supply of external air to the passage *f*. Mounted again upon the superheater is the steam-generator proper, consisting of an outer shell or case, H, to which *h* is the top or roof, and inner cylinder or case I, leaving a steam-space, *i*, around it, and extending from the roof or top *h* to near the base of the outer shell H, and formed with a sloping or inverted conical-shaped bottom, *j*, having a central opening, *k*, in it, surrounding the draught-pipe *d*, of a size to form an annular space around the latter.

Arranged or connected with and supported by the inner cylinder I, at a suitable distance apart, one above the other, are any desired number of sloping or inverted conical-shaped dividing-plates or deflectors K, similar to the bottom, *j*, and extending from the sides of the inner cylinder, with a central opening, *l*, through them, of a size which will leave an annular space around pipes or vertical branches *m*, that form continuations, as it were, of the draught-pipe *d*, and which serve to connect vessels or chambers, L, arranged in succession above the dividing-plates or deflectors K. These vessels or chambers L are of a close character, being formed of a top-plate, *n*, and inverted conical-shaped bottom-plate, *o*, and are of a size which will leave a free space above, below, and around them; and establish communication between the openings *l* of the deflectors K. Within each of these chambers or vessels L, is a flue-dividing disk or draught-deflector, M, supported in an insulated manner by a bracket or stand, *p*, and preferably of a configuration corresponding to the interior of either vessel L, but smaller than it, so as to leave a free flue-space under, over, and around each disk.

Seated on the top, *h*, of the shell or case II is a feed-water heater, N, provided internally with one or more of the vessels L, hereinbefore described, with draught-deflector M, lower dividing-plate K, and pipes or branches *m*, the latter connecting the vessel L, or, in a case of a duplication or series of them, one above the other, vessels L with the corresponding vessels in the generating-cylinder below, and with an upper branch-pipe, *q*, leading to the main flue or smoke-pipe G, and provided with a damper, *r*. U is an overflow-pipe, for the surplus water from this feed-water heater.

To work the generator, a quick or direct draught may be got on first starting the fire, by opening the damper *e*, and closing or partly closing the damper *r*, which dampers may afterwards be regulated at pleasure, as circumstances in the working require; but when it is desired to concentrate heat in the generator, the lower damper *e* should be closed, and the upper one, *r*, opened. Water to work the generator is first pumped, forced, or let into the heater N, and the supply to the latter kept up as required by a pipe, P, provided with a perforated distributor or sprinkler, *s*, arranged over the one or upper vessel L in the heater, by which means a more equable division of the incoming water, and better diffusion of it over and around the heating-vessel L, is or are secured; thereby diminishing the cooling effect of it upon the water lying at the bottom of the heater N, which is kept warm or hot by the heat of the steam in the cylinder or case I below, and by the passage of the products of combustion through it.

The several chambers or vessels L, with their deflectors M, and connecting-branches *m*, it will be seen, operate to give an extended heating-surface or action, as the smoke and heated gases work their way upwards, as indicated by the arrows *z*, through said vessels L, which, by the transverse position that they occupy within the case I, and by the aid of the deflectors M, exercise a general spreading or diffusing action, so that on water being drawn from the heater N by a pipe, Q, and forced, by pump or otherwise, through a pipe, R, and sprinkler *t*, into the upper portion of the cylinder I, it, in coursing its way over, around, and beneath the vessels L, arranged in said cylinder, and over the dividing-plates K therein, as indicated by the arrows *z*, will, by the extended plate-heating surface to which it is exposed, and comparatively slow or long detour given it, be, or for the most part, converted into steam prior to reaching the outlet *h*.

Of course this introduction of the water in a spray form, or in any other way that will cause it to circulate over the upper vessel or vessels L and plates K of the cylinder I, in a thin sheet or succession of sheets, largely contributes to this result, and whereby water, or at least any large body of it, never need remain in the generator, and steam may be produced in a most rapid manner, and that either constantly or at intervals, as the demand requires, by simply establishing, for the period, as steam is required, the feed of water through the pipe R. When it is not desired to generate steam, and the feed of water is shut off, then the upper flue-damper *r* should be closed, and the lower one, *e*, opened.

It will be obvious that various changes may be made in the construction or shape of the parts without departure from the principle of the invention, such as the shape of the cylinder I, dividing-plates K, and vessels L, with their deflectors M, but it is important that the draught should be established around or beneath and over the latter, and that the water-course should be over the vessels in which they are located.

To clean the generator, it may be provided with a central vertical shaft, S, worked from the exterior, and provided with arrows or scrapers *u*, arranged so that on rotating the shaft, they will sweep the interior surfaces of the vessels L, and exterior faces of the deflectors M, or either, the one arm or scraper which works under either deflector, preferably being curved to sweep inwards, while the next arm or scraper above it is shaped to sweep outwards, so as to establish a ready clearance, notwithstanding the close character of the deflectors M at their centre.

The steam generated as described, may, if desired, be drawn direct from the cylinder I, which it occupies and surrounds, but it is preferred, before using it or supplying the engine, supposing the generator to be applied to driving an engine, to pass it to or through a super-heater, F, arranged over the fireplace, and the temperature of which, as well as the cooling and preservation of the arch E of the fireplace, and combustion of the escaping gases, may be regulated by the admission of cold air through the pipe or pipes *g*. From this super-heater, the steam may be drawn off to the engine, or for any other required purpose, by a steam-pipe, T. Though it may be done, if desired, it is not proposed here, however, to pass the steam from the cylinder I or outer case H, direct to the superheater F, but to lead it thereto through an automatic regulator of pressures between the generator and superheater. Thus, for instance, the steam is passed off from the case H, at or near its bottom, by a branch or pipe, *a'*, into a cylinder or tube, T, having an upper compartment, *b'*, into which the steam enters through orifices *c'*, on its lifting a valve, *d'*, covering said orifices, and from which it is passed through an aperture, *e'*, to the superheater F by a pipe, *f'*.

By this or other equivalent arrangement it will be seen that an equilibrium of pressures or quantities is kept up between the generator and the super-heater, for, on the super-heater being drawn too heavily upon, the pressure of the steam from the generator lifts the valve *d'*, and this supplies the super-heater with additional steam, but, on the super-heater containing abundance of steam at the required pressure, the valve *d'* is kept closed against any further supply from the generator by the pressure of the super-heated steam passing up the pipe *f'*, and acting on the back of the valve *d'*. In this way the super-heater is made self-regulating, so far as regards the pressure of steam in it, being maintained at, or rather not being allowed to fall below, that of the pressure in the generator.

At the bottom of the tube V, say, is a steam-trap, W, fitted with a float, *g'*, and balance-valve, *h' h'*, controlling escape-openings or passages *i' i'*, for the purpose of passing off any water working its way down the cylinder I, or otherwise escaping with the steam in its way to the super-heater, and for passing off condensed steam or surplus water of any kind from the apparatus, by the raising of the float *g'* whenever there is over a certain and fixed amount of water in the bottom of the trap.

What is here claimed, and desired to be secured by Letters Patent, is—

1. A steam-generator, provided or fitted with vessels L, forming flue enlargements, arranged one above the other, and containing draught-deflectors M, in combination with water-courses or generator-dividing plates K, situated below the vessels L, and having escape-outlets or openings I, in such manner as that water injected on to said vessels, or the upper one thereof, is converted into steam in its passage over them and the dividing-plates, by the detour given to the smoke and heated gases beneath and over the deflectors, substantially as specified.

2. The combination of a sprinkler or feed-water distributor, z, with the flue-enlargements or vessels L, containing deflectors M and water-courses or generator-dividing plates K, provided with escape-outlets I, for operation together as herein set forth.

3. The combination, with the superheater F and arch E of the fire-box or chamber, of the cold-air passage f, arranged to communicate with the main or central flue, and controlled or supplied by suitable inlets from the outside, essentially as described.

4. The feed-water heater N, arranged essentially as specified, and fitted with one or more flue-enlargements or vessels L, containing deflectors M for operation in combination with a feed-water sprinkler, s, or distributor, as herein set forth.

5. In combination with a steam-generator and separate superheater, the automatic pressure-regulator, interposed between the generator and super-heater, and operating to supply the latter with steam on the pressure in the generator exceeding that in the super-heater, as herein set forth.

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