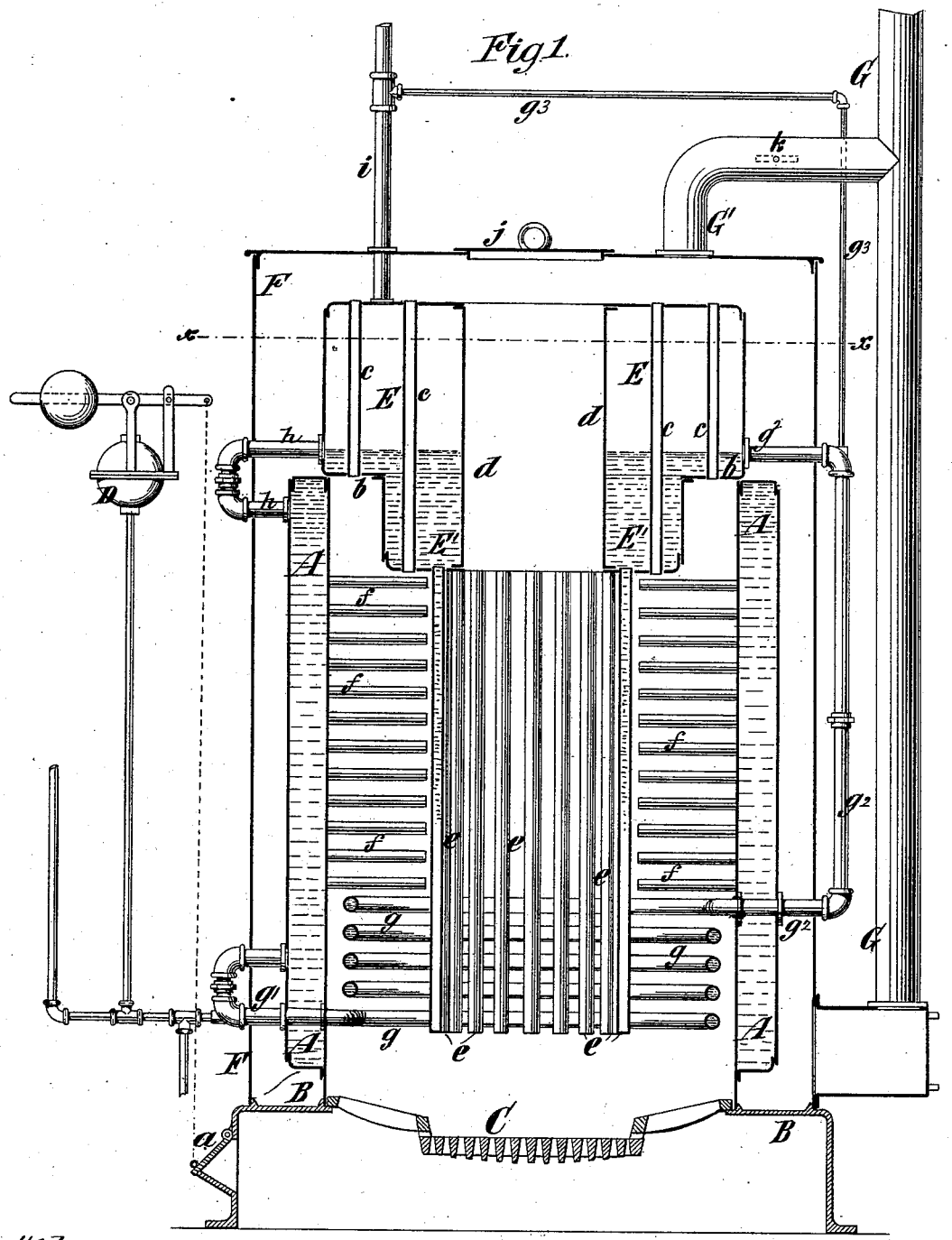
(No Model.) 2 Sheets—Sheet 1.

G. STEELE.

STEAM BOILER.

No. 347,014. Patented Aug. 10, 1886.

Fig 1.



Witnesses.
Emil Horter
C. Sundgren

Inventor.
George Steele
by his Attys.
Brown & Hall

(No Model.) 2 Sheets—Sheet 2.

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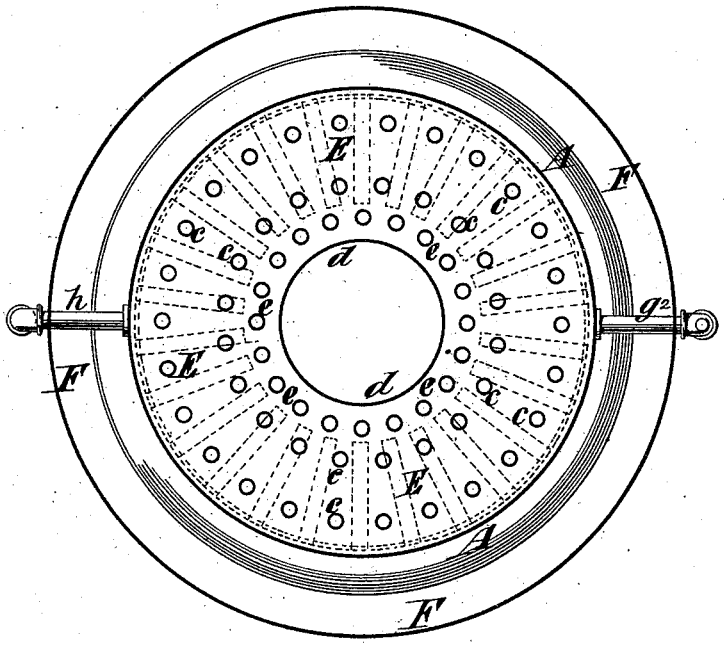
Fig. 2.



Witnesses.
Emil Herter
C. L. Sundgren

Inventor:
George Steele
by his Attys
Brown & Hall

UNITED STATES PATENT OFFICE.

GEORGE STEELE, OF NEW YORK, N. Y.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 347,014, dated August 10, 1886.

Application filed December 12, 1885. Serial No. 185,485. (No model.)

To all whom it may concern:

Be it known that I, GEORGE STEELE, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Steam-Boilers, of which the following is a specification.

My invention is intended more particularly for steam-generators employed for heating purposes; but it may be embodied in steam-generators for other purposes, and also in water-heaters to be used in connection with a hot-water system of heating.

An important object of my invention is to provide a boiler which will have a large amount of effective heating-surface, which is composed of parts, each small in itself and capable of being conveniently transported and placed in position, and the several parts of which may be readily assembled together or taken apart when required to erect the boiler or to make any repairs therein.

The invention consists in novel combinations of parts, which are hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of a boiler embodying my invention; and Fig. 2 is a horizontal section thereof upon the plane of the dotted line *x x*, Fig. 1.

Similar letters of reference designate corresponding parts in both figures.

A designates a circular upright water-jacket, which, as here shown, is of cylindric annular form, and it may be supported upon the base B of the boiler.

Below or at the lower end of the jacket A, I have represented a grate, C, which may be of any suitable construction, and the draft-door *a*, leading below the grate, may be automatically controlled by the damper-regulator D, of any suitable form, and connected therewith in any well-known manner.

Supported above and resting upon the water-jacket A is a boiler structure which is cylindric in form, and comprises two portions, E E′, of unequal diameter, joined by a shoulder, *b*, whereby the boiler portion E E′ is supported upon the upper end of the jacket A. The portion E E′ comprises two or more circular series of heating-tubes, *c*, and it also comprises a central magazine-tube, *d*. From the lower end of the portion E′, which is of smaller diameter, there depends a circular series of tubes, *e*, which are arranged comparatively near together, so that they collectively form a continuation of the magazine-tube *d*, and through said tube *d* and the circular flue formed by the tubes *e* coal is fed to the grate. The tubes *e*, which depend from the portion E′, are closed at the lower end, and may be provided with diaphragms or partitions, or with smaller tubes arranged within them, both of said constructions being well-known equivalents, and producing a circulation through the tubes.

Extending radially inward from the inner wall of the circular water-jacket A are numbers of tubes *f*, which extend horizontally nearly to the circular series of tubes *e*, and each of which may have a circulation maintained within it by a partition or by a smaller inner tube, as above described.

Within the water-jacket A, and below the radial tubes *f*, is a heating-coil, *g*, the inner end of which is connected by a pipe, *g′*, with the water-jacket, and the other end of which is connected by a pipe, g^2, with the boiler portion E E′. I have also represented the upper portion of the water-jacket A as connected by a pipe, *h*, with the boiler portion E E′, and from the boiler portion E E′ leads a pipe, *i*, through which steam may be conducted to the radiator system or to any other locality where it is to be used.

I have here represented the whole boiler as surrounded by a fire-jacket, F, which rests upon the base B, in the top of which is a lid or cover, *j*, concentric with the magazine-tube *d*, and through which coal may be introduced into the magazine-tube.

From the lower portion of the fire-jacket F there extends a smoke-pipe, G, and from the top thereof a branch smoke-pipe, G′, containing a damper, *k*, leads to the pipe G. By the fire upon the grate the heating-coil *g* and the heating-tubes *e f*, as well as the inner surface of the annular water-jacket A and the bottom of the boiler portion E E, are subjected to an effective heating, and the water is caused to circulate rapidly through the tubes *e f* and the coil *g*. The products of combustion and hot gases pass from the heating-tubes *c* into the upper part of the fire-jacket F, and when it is desired to obtain a direct draft the damper *k* in the branch pipe G′ should be opened

and the hot gases and smoke will pass from the upper part of the fire-jacket F directly through the branch pipe G′ and the smoke-flue into the atmosphere. After the fire is well under way and the boiler is in effective operation, the damper *k* may be closed, and the smoke and hot gases passing upward through the tubes *c* into the upper part of the fire-jacket F will be caused to pass downward in said jacket around the exterior of the water-jacket A, and thence to make their escape from the lower portion of the jacket F through the pipe G. The water will circulate rapidly and become highly heated in the heating-coil *g*, and to effect the separation of steam from the water in said coil or in the pipe g^2 therefrom I extend from said pipe g^2 a pipe, g^3, which connects with the steam-pipe *i*, and through which steam may pass into the pipe *i*.

It will be seen that a boiler constructed as above described is simple in its parts and offers a large area of the most effective heating-surface, and at the same time a proper amount of room for water and steam.

The parts of the boiler may be very readily assembled one on another when set up, and if desired, for repair or removal to another locality, the boiler may be taken down or separated into a number of individual parts or structures, none of which are so heavy that they cannot be very readily handled.

From the above description it will be readily understood that so long as any water remains in the water-jacket A it will be caused to circulate through the coil *g* and discharge into the upper boiler structure, E E′, thereby keeping cool those parts which are exposed to the heat of the fire.

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

1. The combination, in a steam-generator, of the portions E E′, of different diameter, comprising heating-tubes and a magazine-tube, the circular water-jacket upon which the portion E, of larger diameter, rests and is supported, and a grate at the lower end of the jacket, substantially as herein described.

2. The combination, in a steam-generator, of the portions E E′, of different diameters, comprising heating-tubes and a magazine-tube, the circular water-jacket extending downward from the portion E, of larger diameter, and receiving within it the portion E′, of smaller diameter, the heating-tubes *f*, projecting radially inward from the inner wall of the water-jacket, and a grate arranged at the lower end of the water-jacket, substantially as herein described.

3. The combination, with the portions E E′, of different diameter, and comprising heating-tubes and a magazine-tube, of the circular water-jacket provided with inwardly-projecting radial heating-tubes *f*, the heating-coil *g*, arranged within the jacket and connected with the jacket and the boiler portions E E′, and a grate arranged below the coil, substantially as herein described.

4. The combination, with the circular water-jacket and a grate at the lower end thereof, of a boiler structure comprising heating-tubes and a magazine-tube superposed on the jacket, an outer fire-jacket inclosing the water-jacket and boiler-structure, and smoke-pipes leading from the upper and lower portions of the fire-jacket, substantially as herein described.

5. The combination, with the circular water-jacket provided with inwardly-projecting radial heating-tubes, of a boiler structure mounted above the jacket and comprising heating-tubes and a magazine tube, and a circular series of heating-tubes extending downward within the water-jacket and forming a continuation of the magazine-tube, a heating coil arranged within the water-jacket below the radial heating-tubes, and connected with the jacket and the said boiler structure, and a grate at the lower end of the jacket, substantially as herein described.

GEO. STEELE.

Witnesses:
M. LINDEMAN,
FREDK. HAYNES.