

(No Model.)

2 Sheets—Sheet 1.

H. R. SCOTT.
STEAM GENERATOR.

No. 571,847.

Patented Nov. 24, 1896.

Fig. 1.

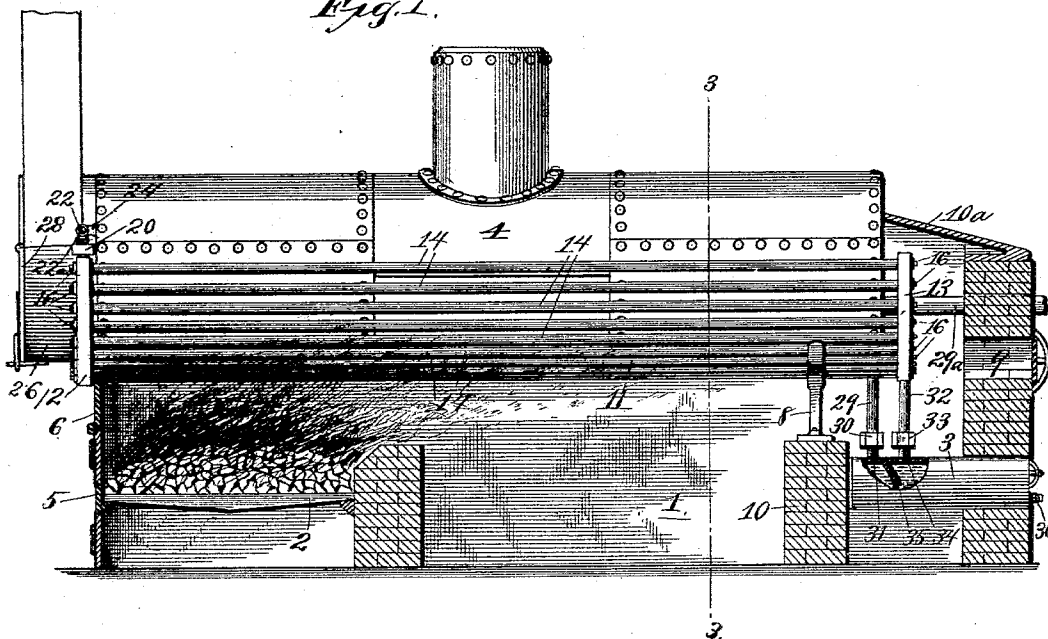


Fig. 5.

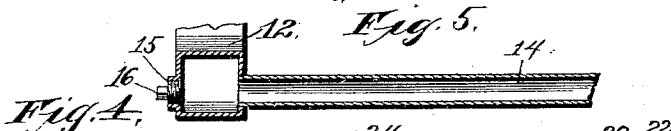


Fig. 4.

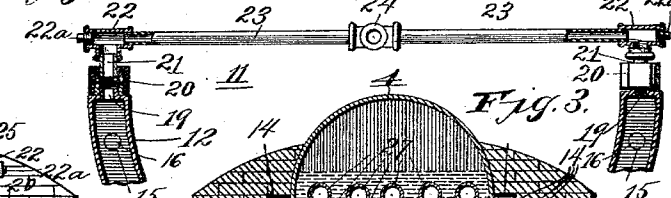


Fig. 3.

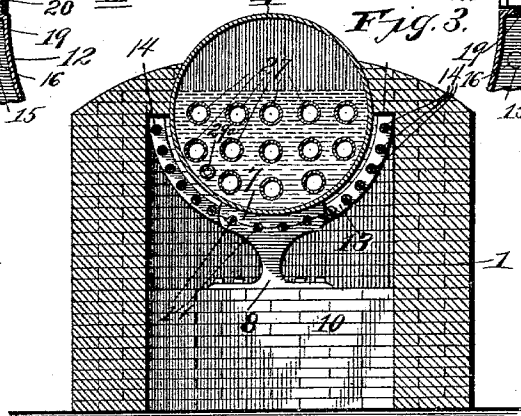


Fig. 2.

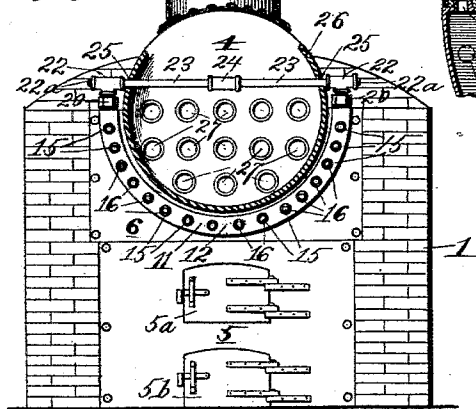
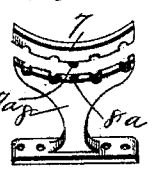


Fig. 8.



Witnesses:
G. S. Thorpe
M. R. Smith

Inventor:
Henry R. Scott

By *Higdon & Higdon*
Attys:

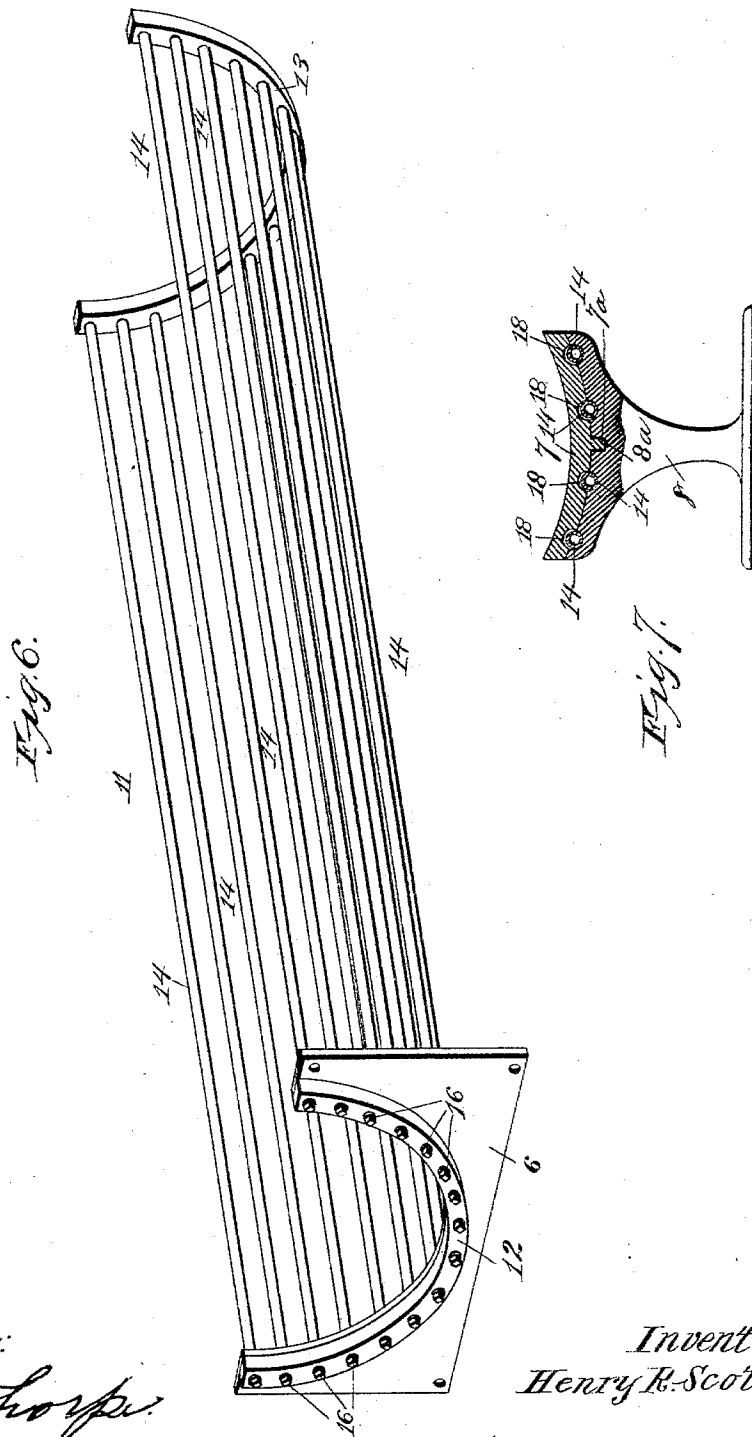
(No Model.)

2 Sheets—Sheet 2.

H. R. SCOTT.
STEAM GENERATOR.

No. 571,847.

Patented Nov. 24, 1896.



Witnesses:

E. J. Thorpe
W. B. Smith

Inventor:
Henry R. Scott

By *Higdon & Higdon*
Attys.

UNITED STATES PATENT OFFICE.

HENRY R. SCOTT, OF KANSAS CITY, MISSOURI.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 571,847, dated November 24, 1896.

Application filed February 3, 1893. Serial No. 460,841. (No model.)

To all whom it may concern:

Be it known that I, HENRY R. SCOTT, of Kansas City, in the county of Jackson, State of Missouri, have invented certain new and useful Improvements in Steam-Generators, of which the following is a clear, full, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to improvements in steam-generators to be attached to steam-boilers; and the object of my invention is for the production and generation of steam in the shortest possible time, and a further object of my invention is to largely reduce the amount of fuel required for such production. This object is accomplished by using a system or series of intermediate water-tubes located between the furnace-grates and the boiler, extending the full length, more or less, thereof, and are semicircularly arranged, so as to conform to the outer surface of the boiler.

To this end and for the above purposes my invention consists in certain peculiar and novel features of construction and arrangement, which will be hereinafter more fully described, and pointed out in the claims.

In order that my invention may be fully understood, I will now proceed to describe it, with reference to corresponding numerals in the accompanying drawings, in which--

Figure 1 is a vertical longitudinal section of a furnace-wall and showing therein a cylindrical boiler of the ordinary construction and showing also a generator embodying my improvement applied thereto. Fig. 2 is a front view of the same and showing also the smoke-box or breeching in section. Fig. 3 is a vertical sectional view taken on the line 3 3 of Fig. 1 and as viewed toward the rear end of the furnace. Fig. 4 is a view, partly in vertical section and partly in elevation, showing one end of the generator and the cross-tubes connecting the generator and the boiler. Fig. 5 is a sectional view showing the water-box at one end of the generator and a tube communicating therewith, and showing also an opening in the water-box arranged opposite to the end of said tube and closed by a removable plug or hand-plate. Fig. 6 is a perspective view of the generator de-

tached from the furnace and boiler and showing therewith the front plate of the furnace, which supports the front end of the generator and front end of the boiler. Fig. 7 is a detached view, partly in elevation and partly in section, of the stand or supporting-bracket for the rear end of the boiler and the rear end of the generator. Fig. 8 is a detail perspective view of the same.

In the drawings, 1 designates a furnace of the ordinary construction provided with grate 2, and preferably with a longitudinally-extending mud-drum 3. The boiler 4, of the usual construction, is arranged longitudinally of said furnace in the ordinary manner, and may be supported by means of the ordinary side brackets, (not shown,) or at its front end upon the front wall of the furnace, said wall preferably being shown as composed of two plates 5 and 6, upon the upper one 6, on which the boiler rests. The lower plate 5 is provided with the usual furnace-doors 5^a and 5^b above and below the grate.

The rear end of the boiler is preferably supported upon a stand or supporting-bracket, which is composed of the upper and lower portions 7 and 8, respectively, the upper portion having its upper surface conforming to the curvature of the surface of the boiler and resting upon the lower portion, which is secured upon the cross-wall 10 of the furnace. The upper portion 7 of the stand or supporting-bracket is preferably provided with a depending lug 7^a, engaging a recess 8^a, formed in the upper surface of the lower portion of said stand, this connection being to prevent any accidental displacement of the upper portion from its position upon the lower portion. The wall of the furnace is provided with the usual manhole 9, arranged near the rear end of the boiler to give access to the same when necessary, and the usual back-wall plate 10^a or other suitable means, bridging the rear end of the furnace from the back wall to the boiler.

The generator 11 consists of the semicircular water-boxes 12 and 13, having openings in their adjacent sides, which openings are connected together by the tubes or pipes 14. The water-boxes are further provided with openings 15, arranged opposite the ends of the tubes, through which tools may be intro-

duced to secure permanently the ends of the tubes therein. The openings 15 in the outer sides of the water-boxes are adapted to be normally closed by a removable plug or plate 16 or other suitable means. In constructing this generator it is preferable to cast the upper portion 6 of the front wall of the furnace with holes or openings corresponding in number to the tubes 14 employed in the generator, and before securing the front water-box 12 on the ends of the tubes the ends of the tubes 14 are first passed through the openings of said upper portion 6 of the furnace-wall, the water-box 12 is then secured in position on the ends of the tubes and the plugs or hand-plates 16 are inserted into the openings 15 to make a perfectly water-tight joint, said construction or its equivalent affording ready access to the tubes from the outside of the furnace. It will thus be seen that the forward water-box is located at the outer side of the furnace, so that should any scale or incrustation form within the generator-tubes it is only necessary to remove the plugs or plates at each end of said tubes and introduce the implement or tool through the openings 16 and into the tubes, wherewith the said scale or incrustation may be scraped from the inner surface of the tubes and removed therefrom.

The upper surface of the generator thus constructed is of semicircular form to conform to the curvature of the outer side of the boiler, and is adapted to be supported thereunder in such position that the tubes of the generator will be in close proximity, but not in contact with the boiler. The stand or supporting-bracket is provided with the registering semicircular grooves, forming openings 18, through which a suitable number of the generating-tubes may pass to form a support for the rear end of the boiler and form a partial support for the rear end of the generator.

The forward or front water-box 12 is provided at its opposite and upper ends with the openings 19, which are preferably surrounded each by an annular shoulder externally screw-threaded. A union-coupling 20 engages at its opposite ends said shoulder and the vertically-depending pipes 21, which communicate at their upper ends with the interior of the T-couplings 22, the channel or passage of which extends transversely of the end of the boiler. The horizontal and transversely-arranged pipes 23 communicate at their opposite ends with the inner ends of said T-couplings and with the opposite ends of a central T-coupling 24, which in turn is connected to and communicates with the interior of the boiler. I do not, however, confine myself to the especial construction shown for connecting the water-boxes with the boiler, as other equivalent means may be used without departing from the spirit of my invention.

The outer ends of the T-couplings 22 are closed by the removable plugs 22^a, to give access to the interior of the pipes 23 and coup-

ling 24, when necessary or desirable to clean or to remove all sediment or incrustation therefrom.

It is to be understood that cross or four-way couplings may be used in place of the T-couplings 22 and 24, the free ends thereof being provided with removable plugs or plates, so that the pipes connected to said couplings and communicating with the upper end of the front water-box and the front end of the boiler may be cleared of all scale or sediment when required. In order that the transversely-arranged pipes and couplings that communicate with the interior of the boiler may be secured and located as described, openings 25 are formed in the opposite sides of the smoke-box or breeching 26, which incloses the outlet ends of the flue-pipes 27 of the boiler, and in order that access may be obtained to the end of the boiler to clean out or repair the flue-pipes 27 the usual door 28 is provided in the end of the smoke-box breeching.

The opposite end of the boiler is provided with the depending discharge-pipe 29, which is coupled with a union 30 to a short tube 31, communicating with the interior of the mud-drum near its rear end.

The rear end of the generator 11 is also provided with a depending pipe or tube 32, which is preferably connected by a union 33 to a short tube 34, communicating with the interior of the mud-drum, and a deflecting-plate 35 extends downward from the upper wall of the mud-drum 3 and is interposed between the lower ends of said tubes 31 and 34. This mud-drum is also provided with the usual discharge-tube controlled by valve 36, and with a hand-hole to give access to the interior thereof.

The operation of the generator is as follows: The fire being started the heated products of combustion first impinge upon and envelop the generating-tubes and heat the water, thus generating steam therein, which steam and the heated water will be displaced by the colder water and will rise toward the upper end of the generator, and passing upward through the pipes at the front end of the boiler will enter said boiler, and simultaneously the colder water in the boiler will pass downward through the discharge-pipe 29 into the mud-drum, the deflector-plate 35 therein tending to deflect all sediment toward the bottom of the mud-drum. The water cleared of such sediment passing said deflector-plate rises through the tube 32 and enters the lower and rear end of the generator, and as it becomes heated again rises and passes into the front end of the boiler, as described, thus causing a constant circulation of the water within the generator and the boiler, and by such circulation preventing the deposition of sediment or other foreign element upon the inner surface of the boiler. In this instance the feed-water for the boiler is preferably introduced into the rear end of

the boiler 4 through the pipe 29^a in the usual manner.

From the above description it will be seen that I have produced a steam-generator that is simple, strong, durable, and comparatively inexpensive of construction, and which is very efficient in operation, and which is so constructed that every portion is convenient of access, so that the parts may be thoroughly cleaned when required and may also be readily attached to and used in connection with boilers already in use.

I claim as my invention—

1. The combination with a boiler of a steam-generator attachment comprising a pair of semicircular water-boxes, and a number of tubes connecting said water-boxes, openings in the outer sides of the water-boxes, removable plugs or hand-plates for closing said openings, horizontal pipes extending transversely of the front end of the boiler and communicating through a central coupling with said boiler, and through couplings and unions with the upper ends of the front water-box, substantially as set forth.

2. The combination with a boiler of a steam-

generator attachment comprising a semicircular water-box located within the furnace below and to the rear of the boiler having its concave side upward, a semicircular water-box located exterior to the furnace having its concave side upward, and each having one continuous and uninterrupted chamber, a series of tubes communicating at their opposite ends with said continuous and uninterrupted chambers of said water-boxes, tubes or pipes connecting the upper ends of said exterior water-box with the upper part of the boiler, tubes or pipes connecting the lower part of said interior water-box with the lower part of the boiler, means for supporting the rear end of the generator and a detachable furnace-section having openings in which rest and are supported the front ends of said tubes for supporting the front end of said generator, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

HENRY R. SCOTT.

Witnesses:

G. Y. THORPE,
M. P. SMITH.