June 24, 1930. N. FORSSBLAD 1,766,989

STEAM GENERATOR

Filed March 30, 1927

FIG. 3

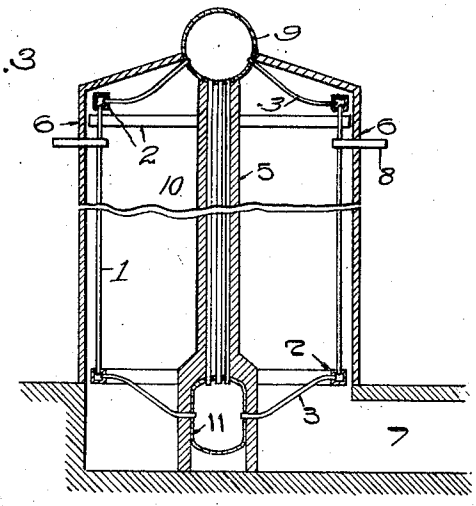


FIG. 1

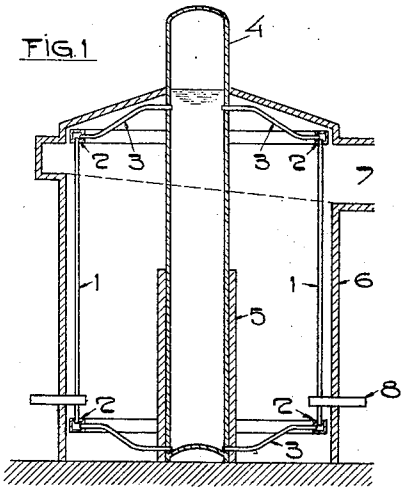


FIG. 4

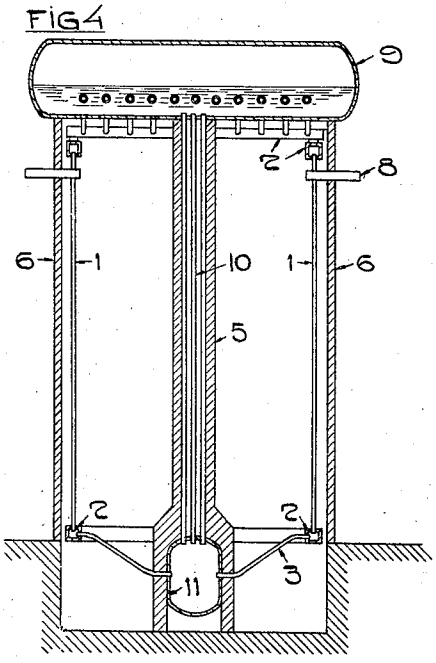


FIG. 2

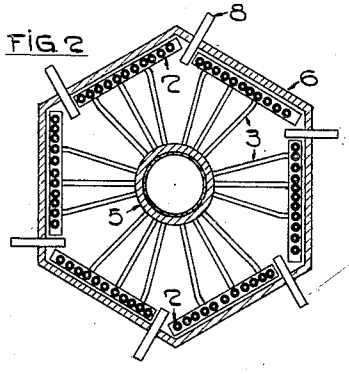
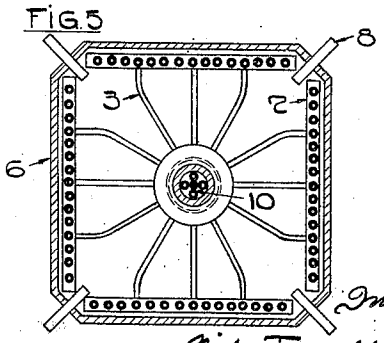


FIG. 5



Inventor:
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Patented June 24, 1930 1,766,989

UNITED STATES PATENT OFFICE

NILS FORSSBLAD, OF VILLA EKBACKA, VASTERAS, SWEDEN

STEAM GENERATOR

Application filed March 30, 1927, Serial No. 179,677, and in Great Britain April 20, 1926.

My invention relates to an improved sectional steam generator, particularly suitable for gaseous, liquid, or pulverized fuel, of the type wherein the walls of the furnace or combustion chamber are directly formed by the water-cooled metal surfaces or heating surfaces of the generator.

It has already been proposed to form the walls of the combustion chamber of such steam generators of vertical tubes rolled or otherwise fixed at their upper and lower ends into horizontal drums. According to my present invention, the walls of the combustion chamber are composed of a number of sections, each consisting of vertical tubes fixed between substantially horizontal headers. The said headers are connected either to one or more vertical drums traversing the centre of the combustion chamber, or to separate upper and lower collecting vessels which are directly connected together by downcomers separate from the vertical steam generating tubes.

In comparison with prior construction, steam generators built according to my invention are simple and less expensive as the number of drums is less. The difference is notable especially at high steam pressure. Further the vertical tubes can be made straight which is not always the case where they are connected to drums. By a central disposition of the collecting vessel, it is possible to construct a generator of very large size, the maximum diameter being practically equal to twice the maximum tube length available for providing the communication between said central vessel and the headers.

An important advantage of my invention is the facility of standardizing the construction attained hereby, the building of steam generators of different sizes from different numbers of equal sections being made possible.

The accompanying drawings illustrate two arrangements of steam generators according to this invention but the invention is not limited thereto. Figure 1 is a vertical section and Figure 2 a horizontal section of one arrangement while Figure 3 is a vertical section, Figure 4 a vertical section at right angles to Figure 3, and Figure 5 a horizontal section of another arrangement according to this invention.

Referring to Figure 1, the walls of the combustion chamber are formed by tubes 1 fixed at their ends in headers 2. These headers, one at the top and one at the bottom for each section of the generator, are connected by means of tubes 3 to a vertical drum 4 which passes down through the combustion chamber. The drum 4 is preferably entirely or partially enclosed with fire bricks or other refractory material 5 protecting it against radiation from the combustion gases. The entire generator is surrounded by a heat insulating cover 6 provided with a flue 7 leading the combustion gases to additional boiler heating surface, or to superheaters, economizers, air preheaters or other accessories, or directly to the chimney. Burners 8 are shown in the lower part of the combustion chamber or furnace, tangentially arranged. They may also be arranged radially.

The drum 4 may be arranged in any suitable manner for collecting the steam, for instance, it may have a hemispherical top portion, or it may be combined with a separate steam collector, if necessary. For high pressures, the drum 4 may be replaced by a number of parallel drums of smaller diameter. The vertical tubes 1 may be of the usual form or provided with longitudinal fins or plates filling the space between them.

In the arrangement shewn in Figures 3 to 5, 1 are the vertical tubes, 2 the headers, 3 the connecting tubes, 6 the outer lining and 7 the flue. Instead of a vertical drum running down through the generator, a horizontal drum 9 may be employed in this arrangement receiving the inner ends of the upper connecting tubes 3, and a corresponding lower drum 11 for the lower tubes 3 is connected to the former by the downcomer tubes 10. The lower drum is shewn in the shape of a vertical cylinder, or it may be horizontal and parallel to the upper drum 9. The down tubes 10 may be placed outside the combustion chamber if desired.

I claim as my invention:—

An internally fired radiant heat boiler consisting, in combination, of an open combustion chamber formed of a continuous water wall made up of independent sections each having an upper and a lower header connected by rows of closely spaced vertical tubes, a central column having a steam and water space therein extending the height of the combustion chamber and insulated throughout a substantial portion of its lower part against the heat of the combustion chamber, and substantially horizontal tubes connecting the said headers of each section to said central column adjacent its top and bottom.

In testimony whereof I have signed my name to this specification.

NILS FORSSBLAD.