

No. 659,837.

Patented Oct. 16, 1900.

R. H. WHITE.
STEAM GENERATOR.

(Application filed Dec. 28, 1899.)

(No Model.)

Fig. 1.

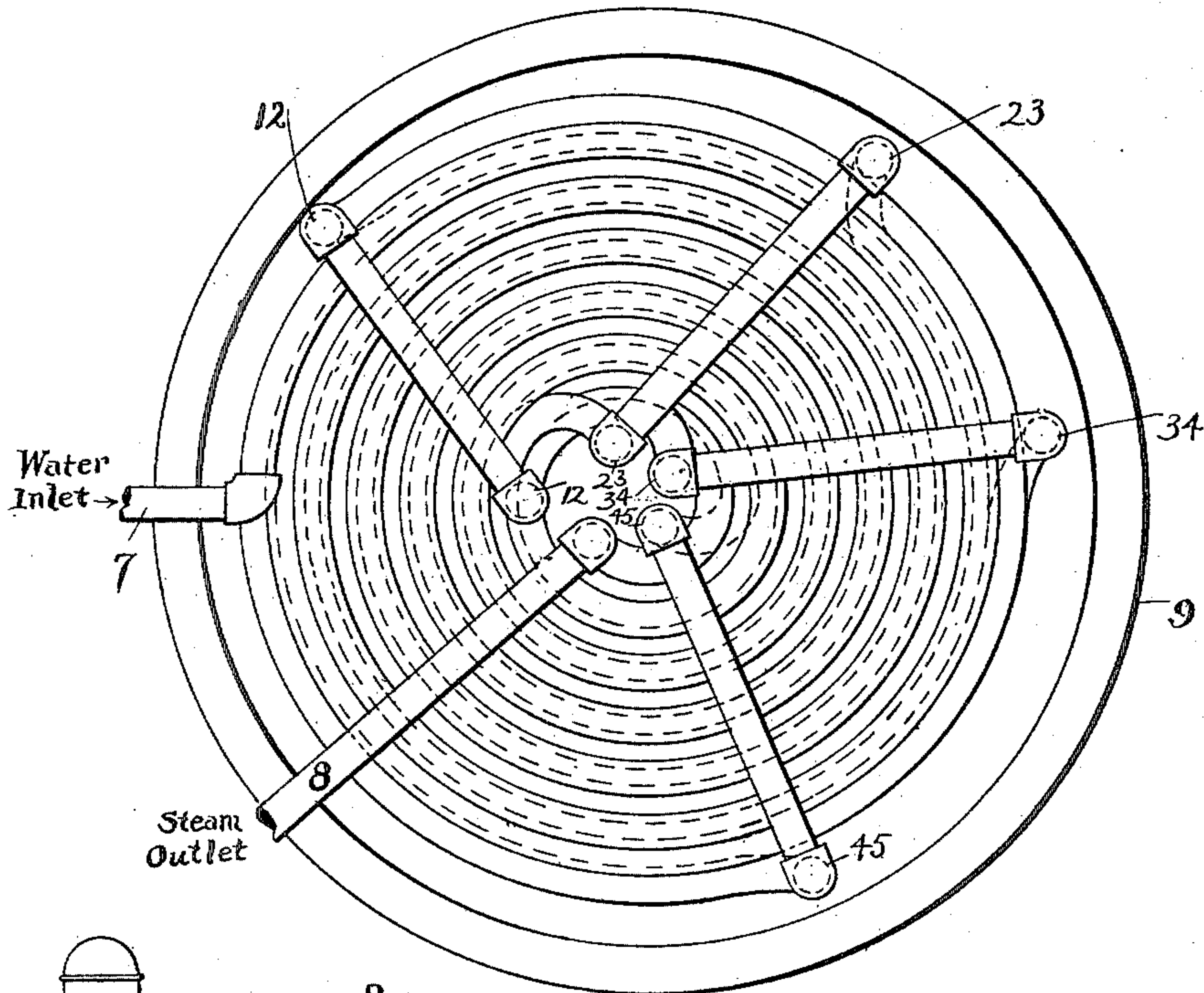
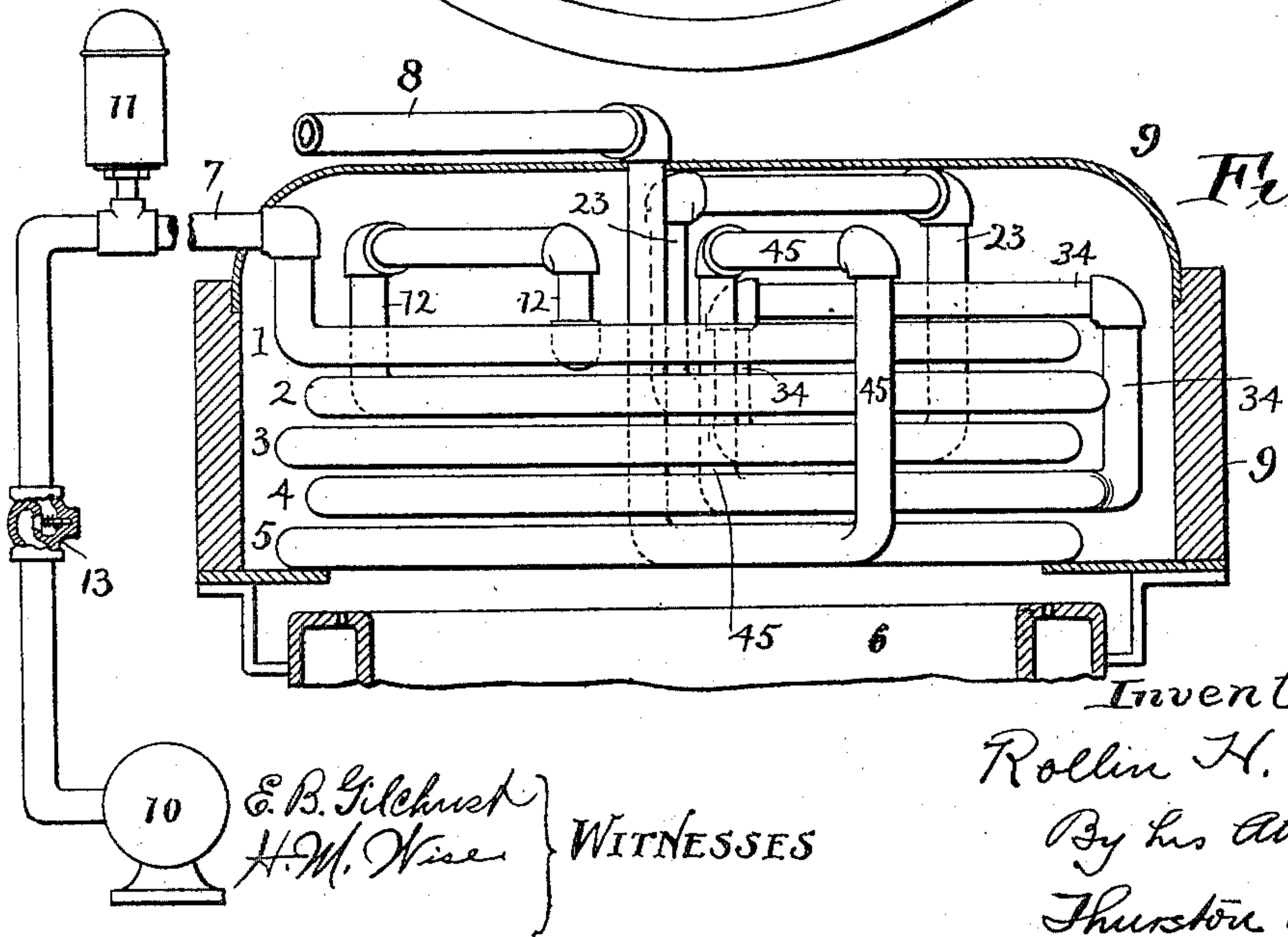


Fig. 2.



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UNITED STATES PATENT OFFICE.

ROLLIN H. WHITE, OF CLEVELAND, OHIO, ASSIGNOR TO THE WHITE SEWING MACHINE COMPANY, OF SAME PLACE.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 659,837, dated October 16, 1900.

Application filed December 28, 1899. Serial No. 741,798. (No model.)

To all whom it may concern:

Be it known that I, ROLLIN H. WHITE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Steam-Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of the invention is to generate steam rapidly, safely, and economically; and the invention consists, primarily, of the boiler made up of a plurality of convolutions of pipes connected in series and arranged one above another over the fire, the upper convolution being connected with a water-inlet pipe and the lower convolution with a steam-outlet pipe and one or more riser-tubes, each of which serves as the connection between a coil and the coil next below it and which extends above the upper coil.

In the drawings, Figure 1 is a plan view of my improved boiler; and Fig. 2 is a front elevation of the same, the inclosing shell and the burner being shown in section.

A plurality of convolutions of pipes 1, 2, 3, 4, and 5 are arranged one above another over the source of the heat, which may be a gas-burner 6. The water is admitted to the upper convolution 1 of the boiler through an inlet-pipe 7, and the steam is delivered from the lower convolution 5 through an outlet-pipe 8. Preferably the several convolutions are spiral coils; but they may have other forms, if desired. It is desirable, however, that each shall present as much surface as possible to the action of the heat, and to that end the coils are preferably horizontal and are arranged so that the pipes in each coil shall be over the space between the pipes in the coil below it. The inner end of each coil, as shown, is connected with the outer end of the coil next below it by a riser-tube passing up over the upper coil. The riser-tubes connecting coils 1 and 2, 2 and 3, 3 and 4, and 4 and 5, respectively, are indicated by 12, 23, 34, and 45. These coils, riser-tubes, and inlet and outlet pipes are inclosed in a suitable shell 9. The water must be forced into the upper coil by some suitable means—as, for example, a pump, (indicated at 10.) A

compressed-air chamber 11 is preferably connected with the inlet-pipe between the pump and the boiler, and a check-valve 13 is placed in the inlet-pipe on the pump side of said chamber. The pump, valve, and air-reservoir are not parts of the boiler, *per se*; but said devices or some substitutes therefor are necessary for the continuous practical use of the boiler and the steam it generates.

It is obvious that the coils are hotter as they are nearer the fire. The water is therefore introduced into the coldest coil 1, whence it passes, through the riser-tubes, into progressively-hotter coils, and the steam is taken from the hottest coil 5. When the boiler is in use, the hottest coil (and perhaps the two or three hottest coils) does not contain water, because the temperature of the water being progressively raised in passing from the several coils, as described, reaches the boiling-point before it arrives at the lowest coil or coils. The purpose of the riser-tubes is to prevent the water in one coil from flowing by gravity into the coil next below it and thence to the lowest coil. It is not therefore necessary that each coil shall be connected by a riser-tube with the coil below it, and especially is it unnecessary that any coil which does not contain water shall be so connected. Just how many and which of these riser-tubes may be omitted and a direct downward connection substituted can only be determined by experiment, having in mind the size of the coils, character of the fire, and the circumstances incident to the use of the boiler. A thoroughly safe construction, however, and one suitable to all conditions, is that shown in the drawings, where the inner end of every coil is connected by a riser-tube with the outer end of the coil next below it, each riser-tube extending over the top coil.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tubular boiler consisting of a plurality of convolutions of pipe arranged one above another and connected in series, and adapted to take water into the upper convolution and to discharge the steam from the lower convolution—at least one of the connections between said convolutions being a riser-tube

which extends above the upper convolution, substantially as and for the purpose specified.

2. A tubular boiler consisting of a plurality of spiral coils of pipe arranged one above another, a plurality of riser-tubes which extend over the upper coil and connect said coils in series, and are connected to the inner end of one coil and to the outer end of the coil next below it, a water-inlet pipe connected to the upper coil, and a steam-outlet pipe connected with the lower coil, substantially as and for the purpose specified.

3. In a steam-generator, the combination of a tubular boiler consisting of a plurality of convolutions of pipe arranged one above another and connected in series, with a steam-outlet pipe connected with the lower convolution, a pump, an inlet-pipe connecting said pump with the upper convolution, an air-chamber connected in said inlet-pipe, a check-valve in said pipe on the pump side of said air-chamber, and a heat-generator below the lowest convolution, substantially as and for the purpose specified.

4. A steam-generator whose heating-surface consists of a plurality of pipe-coils connected in series and approaching a source of heat whereby the water is heated progressively, combined with means for preventing

the gravitation of the water to the lowest coil, substantially as specified.

5. A steam-generator whose heating-surface consists of a plurality of pipe-coils connected in series and approaching a source of heat whereby the water is progressively heated, combined with means for preventing the gravitation of the water to the most heated coils whereby said latter coils become superheaters for the steam generated, substantially as specified.

6. A steam-generator consisting of a plurality of convolutions of pipes arranged one above another, pipes connecting said convolutions in series from the upper to the lowest convolution and adapted to prevent the gravitation of the water to the lowest convolution, a water-inlet pipe connected with the upper convolution, means for forcing water into the generator through said inlet-pipe, a steam-outlet pipe connected with the lowest convolution, and a heater located below said generator, substantially as specified.

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

ROLLIN H. WHITE.

Witnesses:

ALBERT H. BATES,
H. M. WISE.