

(No Model.)

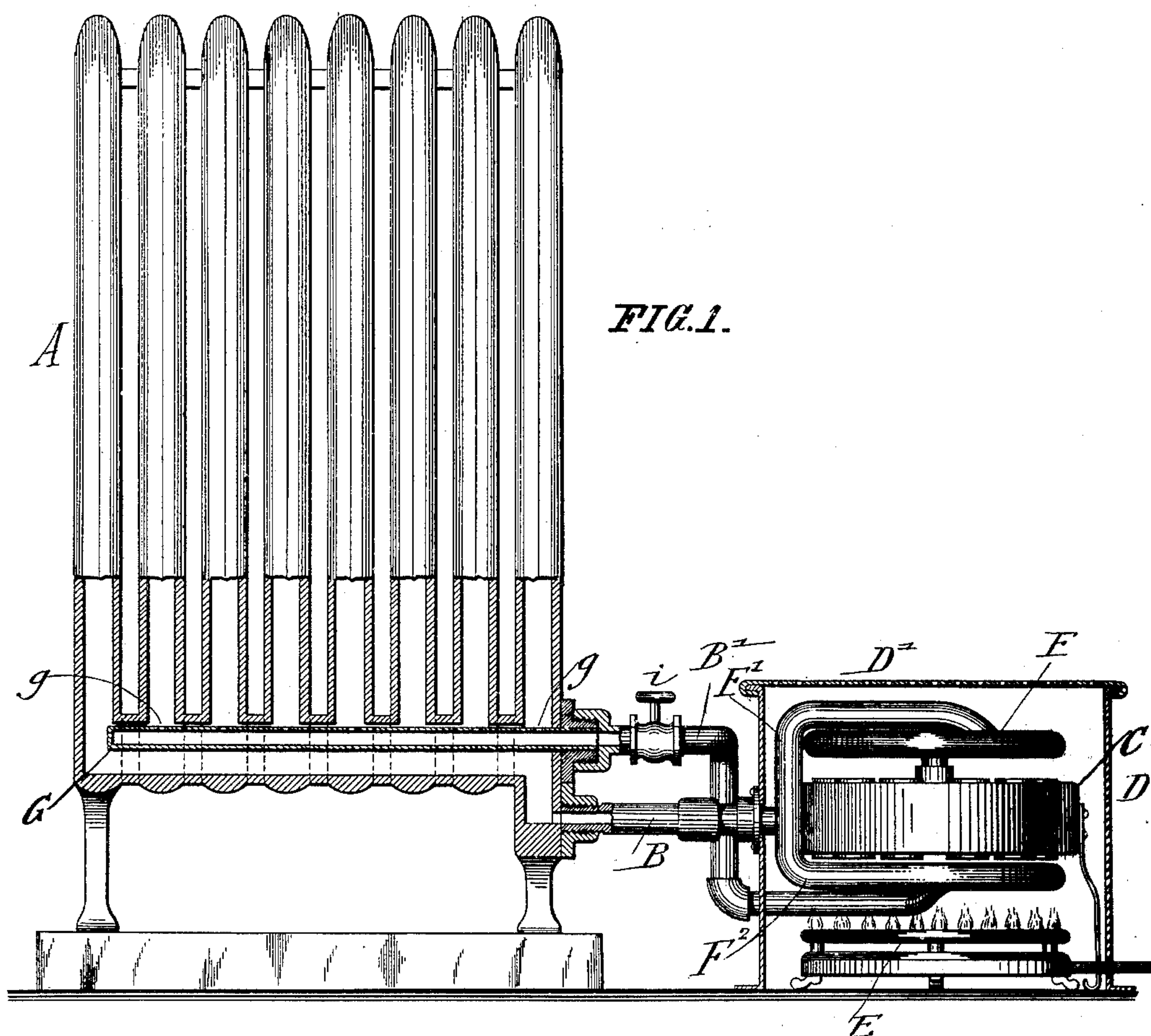
2 Sheets—Sheet 1.

H. HENNIG.

CLOSED CONTINUOUS SYSTEM FOR GENERATING STEAM.

No. 595,101.

Patented Dec. 7, 1897.



WITNESSES:

*Bruno von Bülowgslöwen*  
*Geo. W. Jackel*

INVENTOR

*Henry Hennig*  
BY *George R. Reger*  
ATTORNEYS.



(No Model.)

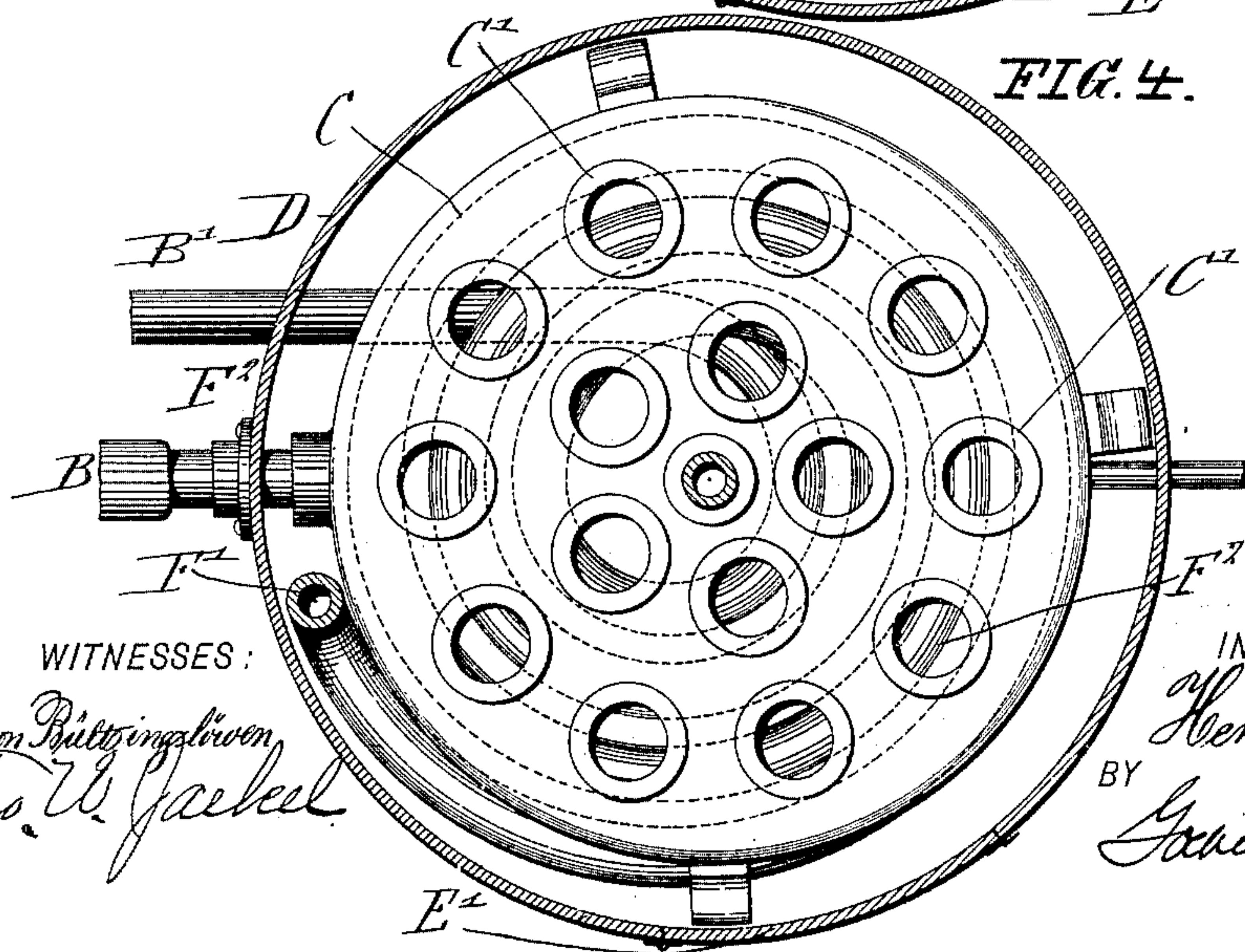
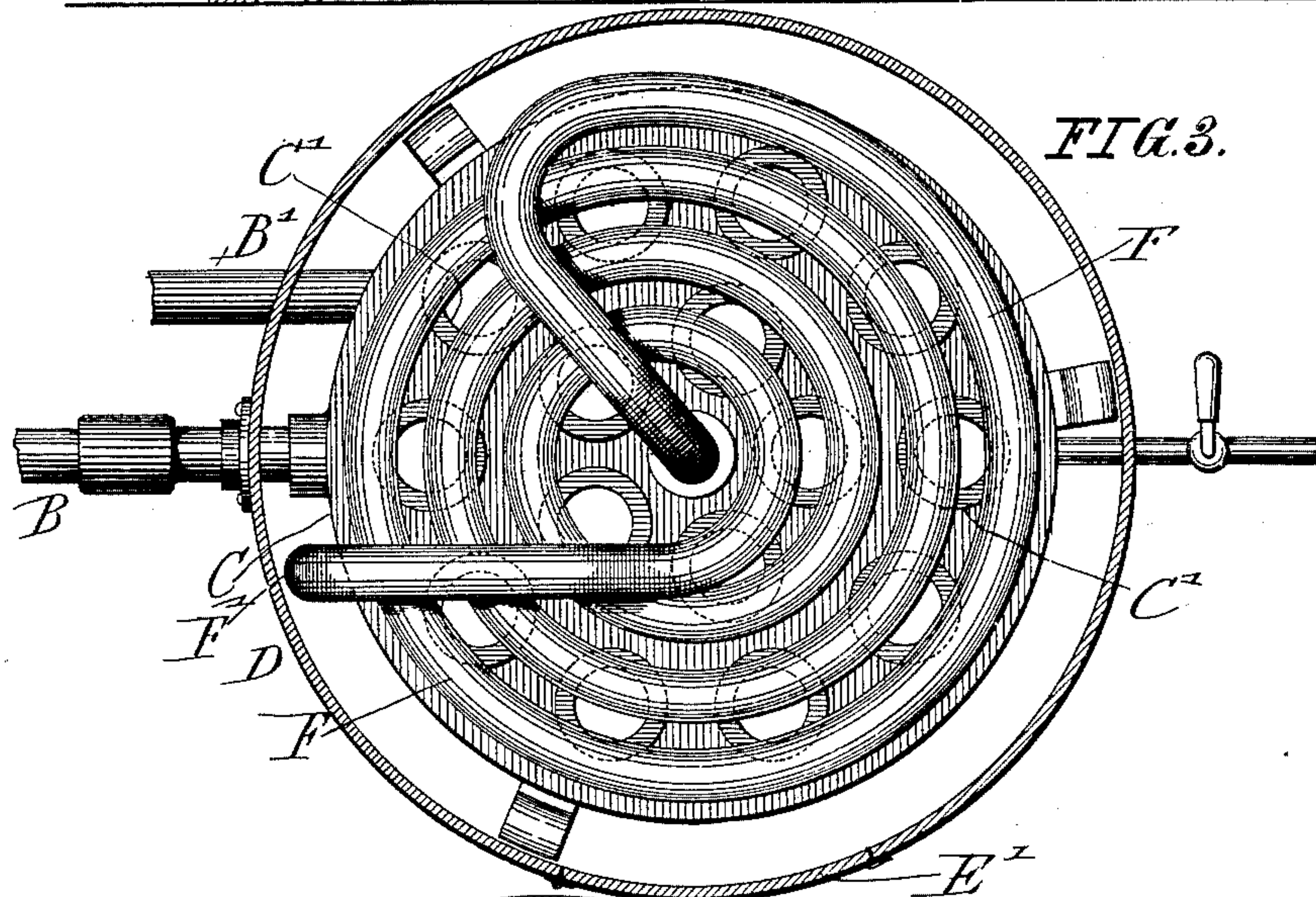
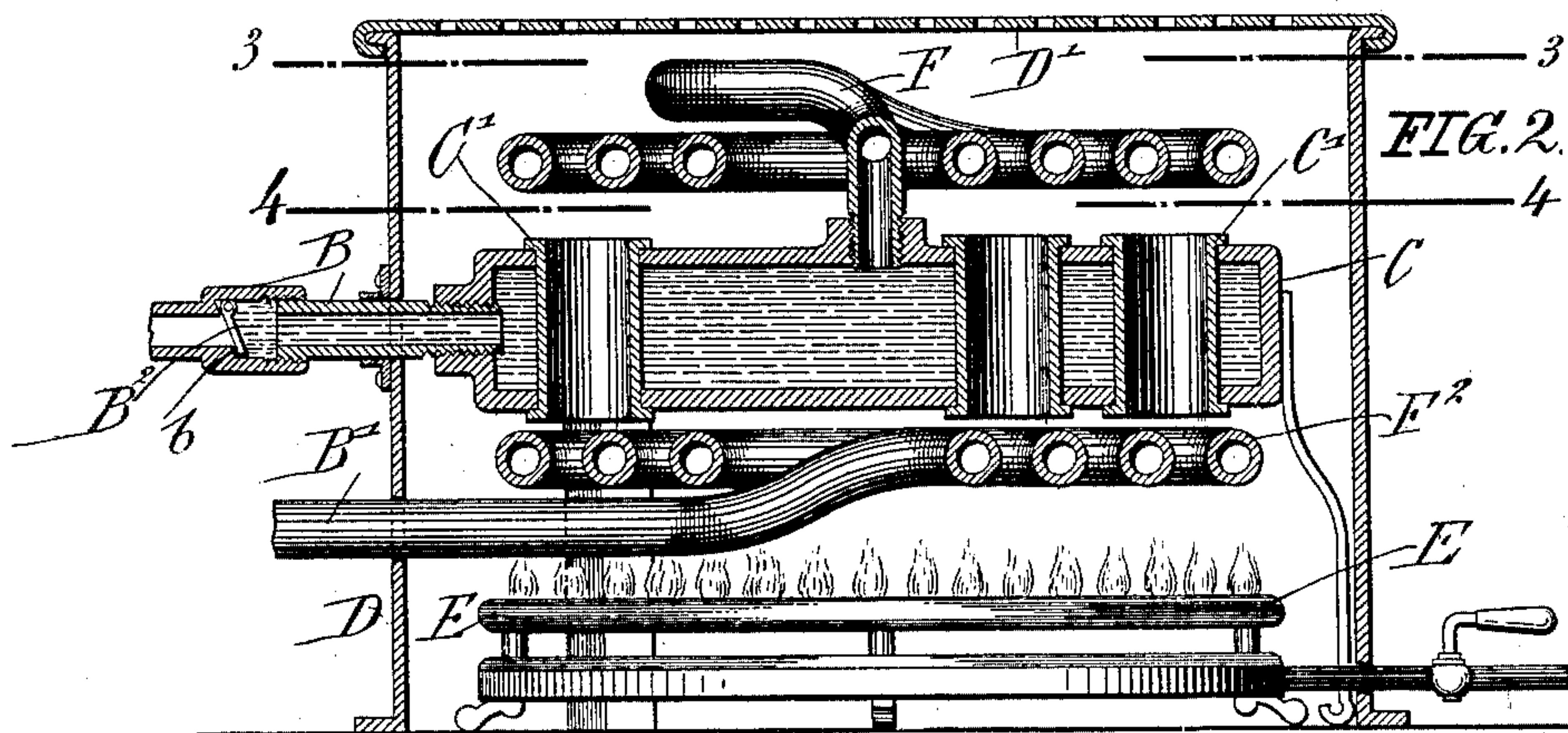
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WITNESSES:

*Prunster Rüttgenlöwen*  
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# UNITED STATES PATENT OFFICE.

HENRY HENNIG, OF PATERSON, NEW JERSEY.

## CLOSED CONTINUOUS SYSTEM FOR GENERATING STEAM.

SPECIFICATION forming part of Letters Patent No. 595,101, dated December 7, 1897.

Application filed August 11, 1897. Serial No. 647,811. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY HENNIG, a citizen of the United States, residing at Paterson, in the county of Passaic, in the State of New Jersey, have invented certain new and useful Improvements in Closed Continuous Systems for Generating Steam, of which the following is a specification.

This invention relates to a closed continuous system for generating steam; and the object of the same is to provide an attachment for steam-radiators of dwellings, business buildings, and the like which works effectively for the production in a short period of time of sufficient heat for the room in which the radiator is located, so that the invention is applicable to steam-radiator systems which are already fitted into a building and connected with a boiler in the cellar.

To these ends my invention consists of a water-heating chamber, an expansion-coil arranged above the same, a superheating-coil arranged below the water-heating chamber and connected with the expansion-coil, and pipes leading to the water-heating chamber and from the superheating-coil for connection with a steam-radiator, all as will be more particularly described hereinafter and then pointed out in the claims.

In the accompanying drawings, Figure 1 is a sectional side elevation of my apparatus. Fig. 2 is a vertical cross-section of the generator proper of the attachment. Fig. 3 is a horizontal section on the line 3 3 of Fig. 2, and Fig. 4 is a horizontal section on the line 4 4 of Fig. 2.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A indicates a steam-radiator of any suitable type, which may be detached from the ordinary heating apparatus in the building, or it may be entirely detached therefrom. Connected with the lower portion of the radiator A by means of a pipe B is a water-heating chamber C, through which passes vertical tubes C'. This water-heating chamber is arranged in horizontal position within a suitable casing D, provided with a perforated or other suitable cover D', said casing D also containing a suitable gas or other burner E, which is arranged below the water-heating chamber C. Access

may be had to the interior of the casing D for lighting the gas through the medium of a suitable door E'.

Connected with the water-heating chamber C at the center of its top is a horizontal expansion-coil F, which by means of a pipe F' is connected with a superheating-coil F<sup>2</sup>, arranged below the water-heating chamber, and which superheating-coil is in turn connected, by means of a pipe B', with the lower portion of the radiator A. The pipe B', being for conducting the superheated steam into the radiator, is attached to the radiator at the point above that from which the pipe B, for conducting off the water of condensation, is connected. Projecting from the steam-inlet pipe B' into the open base portion of the radiator is a perforated steam-jet nozzle G, the perforations *g* of which deliver steam upwardly into the radiator-tubes, as shown. At a point adjacent to the water-heating chamber the passage through the pipe B is controlled by means of a check-valve B<sup>2</sup>, which, while it permits water to flow into the water-heating chamber, prevents the water flowing back through the medium of the valve-seat *b*, against which the said valve acts and is forced by the back pressure.

The attachment proper may be attached directly to the radiator in the same room therewith, as shown in dotted lines in Fig. 1, or it may be arranged in the room or cellar below.

The operation of the apparatus is as follows: A body of water sufficient to fill the open base portion of the radiator and also the water-heating chamber C is placed in the same, so that the level of the water will not rise into the expansion-coil F. The valve *i*, controlling the steam-inlet pipe B', is now opened and the gas-burner E lighted. The heat of the gas-flame now gradually heats up the water in the heating-chamber C, which expands into the expansion-coil F, where, by reason of the small diameter of the coil and the heat which rises through the tubes C' of the water-heating chamber, the water is converted into steam. From the expansion-coil F the steam passes into the coil F<sup>2</sup>, arranged below the water-heating chamber C, where it is subjected to the direct heat of the flame and converted into superheated steam, which passes through the steam-inlet pipe B' to the steam-jet noz-



zle C, arranged in the radiator, from whence it is emitted in steam-jets into the said radiator. The radiator now gradually becomes heated and the heat is imparted to the room in which it is arranged. When all, or about all, of the water in the water-heating chamber has been converted into steam, (the back pressure thereof in the meantime keeping the check-valve B<sup>2</sup> closed against the admission of a fresh supply of water,) the pressure in the water-heating chamber and coils becomes less and the water of condensation in the lower part of the radiator overcomes the reduced pressure and automatically opens the check-valve B<sup>2</sup>, so that an additional supply of water is fed into the water-heating chamber. In this way the exhaust and supply of water from and to the water-heating chamber is intermittently carried on so long as the heating-chamber is subjected to the action of the heating-flame. After the water-heating chamber and the lower portion of the radiator have been supplied with feed-water, it will be found in practice that it is unnecessary to replenish the same for a considerable length of time, as the same water is used over and over again.

Having thus described my invention, what I claim is—

30 1. In a closed continuous system for generating steam, the combination with a radiator, of a steam-generating attachment connected therewith, the same consisting of an outlet-pipe attached to the radiator, a water-heating chamber connected with said pipe, an expansion-coil arranged above the water-heating chamber and connected with the same, a superheating-coil arranged below the water-heating chamber and connected with the expansion-coil, and a steam-inlet pipe connecting the superheating-coil with the radiator at a point above the said outlet-pipe of the radiator, substantially as set forth.

2. A steam-generating attachment for steam-radiators, consisting of a water-heating chamber, an expansion-coil connected with the water-heating chamber and arranged above it, a superheating-coil connected with the expansion-coil and arranged below the water-heating chamber, and inlet and outlet pipes connected respectively with the water-heating chamber and the superheating-coil, substantially as set forth.

3. A steam-generating attachment for steam-radiators, consisting of a water-heating chamber, a pipe leading into the same and provided with a check-valve adapted to close the passage in said pipe against back pressure, an expansion-coil connected with the water-heating chamber and arranged above the same, a superheating-coil arranged below the water-heating chamber and connected with the expansion-coil, and a steam-pipe leading from the superheating-coil, substantially as set forth.

4. A steam-generating attachment for steam-radiators, consisting of a water-heating chamber provided with vertical tubes extending through the same, an expansion-coil arranged above the water-heating chamber and connected with it, a superheating-coil arranged below the water-heating chamber and connected with the expansion-coil, pipes connected respectively with the water-heating chamber and the superheating-coil, and means arranged below the superheating-coil for subjecting said parts to heat, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

HENRY HENNIG.

Witnesses:

GEO. F. WHEELLOCK,  
GEO. W. JAEKEL.