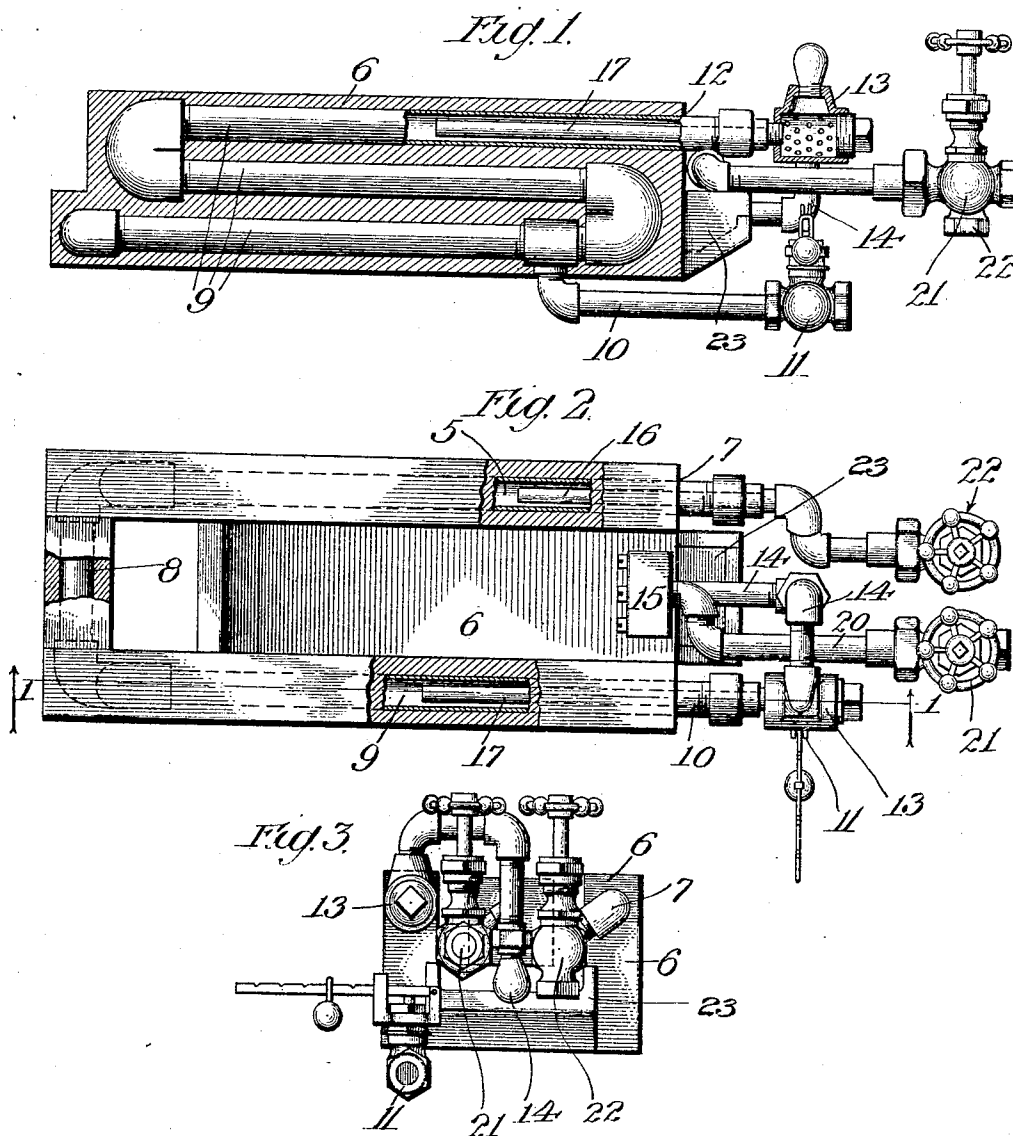


C. A. HAMMEL.  
 COMBINED STEAM GENERATOR AND SUPERHEATER.  
 APPLICATION FILED JULY 23, 1907.

931,866.

Patented Aug. 24, 1909.



Witnesses:  
 J. M. H. Cackler  
 M. A. Jones

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 Attorneys.

# UNITED STATES PATENT OFFICE.

CHARLES A. HAMMEL, OF LOS ANGELES, CALIFORNIA.

## COMBINED STEAM GENERATOR AND SUPERHEATER.

931,866.

Specification of Letters Patent. Patented Aug. 24, 1909.

Application filed July 23, 1907. Serial No. 385,205.

*To all whom it may concern:*

Be it known that I, CHARLES A. HAMMEL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Combined Steam Generators and Superheaters, of which the following is a specification.

My invention relates to a combined steam generator and superheater adapted to be connected to and operated in conjunction with a hydrocarbon burner, and the object thereof is to provide a generator which will supply such hydrocarbon burner with superheated steam under uniform pressure for the purpose of atomization of the oil being fed to the burner. I accomplish this object by means of the device described herein and illustrated in the accompanying drawings, in which:—

Figure 1.— is a vertical section of my improved generator taken on line 1—1 of Fig. 2. Fig. 2.— is a plan view of the same parts being broken away to more clearly illustrate the generator coils. Fig. 3.— is a front elevation of the same.

Referring to the drawings, 5 designates a pipe completely embedded in a casting 6 of iron or similar material. As best seen in Figs. 1 and 2 the pipe enters the casting at 7 and passes to the far end of the casting being bent back on itself twice to pass again to the back end of the casting where a pipe 8 connects it with a similar pipe 9 on the other side of the casting. Pipe 5 forms the generating coil and pipe 9 the superheating coil. The lowest part of pipe 9 is provided with a connection 10 to a safety valve 11 where any excess pressure in the pipes may be blown off. The upper end of pipe 9 emerges from the casting at 12 where it is connected with a strainer 13 which is in turn connected by pipe 14 to burner 15 of usual construction. The ends of pipes 5 and 9 are provided with smaller pipes 16 and 17 projecting into the ends of the larger pipes and which form the inlet and outlet respectively for pipes 5 and 9. Pipe 16 is shorter than pipe 17 so that the cushion afforded by the vapor behind the end of pipe 16 is less than afforded by the vapor behind the end of pipe 17. This is so arranged because the pressure at the outlet end of pipe 9 is greater than that at the inlet end of pipe 5, the lengths of pipes 16 and 17 being proportioned accordingly. By means of these cush-

ions any sharp variation in pressure is avoided and the pressure at the burner is rendered more nearly constant.

Oil is supplied to the burner by means of pipe 20 controlled by valve 21. The water supply is controlled by valve 22 and the relative amount may be regulated after the burner has been started so that an even flame of complete combustion is obtained at the burner. The heat generated by the combustion of the oil supplied to the burner is sufficient to generate steam in pipe 5 from the water supplied so that the resultant vapor may be highly superheated in pipe 9. A starting pan 23 is provided on the front of the casting in which fuel may be poured and ignited to start the burner. The cushions in the coils render the pressure of the superheated steam generated free from any sharp variations while the safety valve provides for the relief of any excessive pressure which the heat of the burner may generate. After the burner has been started the amount of water supply may be regulated so that an even pressure is kept up within the coils without the necessity of the safety valve relieving the pressure from time to time.

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

1. In a steam generator and superheater for a hydrocarbon burner, a steam generating coil on one side of the burner, a steam superheating coil on the other side thereof, said coils being connected together, said generating coil being provided with a water inlet tube projecting inwardly into the coil, said superheating coil being provided with a steam outlet tube projecting inwardly into the coil, said steam outlet being connected to the burner.

2. In a steam generator and superheater for a hydrocarbon burner, a steam generating coil and a steam superheating coil arranged adjacent the burner, said coils being connected together, said generating coil provided with a water inlet at a distance from the end thereof, said superheating coil provided with a steam outlet at a distance from the end thereof, said steam outlet being connected to the burner.

3. In a steam generator and superheater for a hydrocarbon burner, a steam generating coil on one side of the burner, a steam superheating coil on the other side thereof, said coils being connected together, said

generating coil being provided with a water inlet tube projecting inwardly into the coil, said superheating coil being provided with a steam outlet tube projecting inwardly into  
5 the coil, the steam outlet tube projecting into its coil farther than the water inlet extends into the generating coil, and said steam outlet being connected to the burner.

4. In a steam generator for hydrocarbon  
10 burners, a substantially U-shaped body of heat conducting material, a generating coil in one leg of said body, a superheating coil in the other leg, a union for said coils in the

connecting piece of said body, a burner arranged between the open ends of the legs 15 and directed toward the closed end, a water inlet for the generating coil, and a steam outlet for the superheating coil, said steam outlet being connected to said burner.

In witness that I claim the foregoing I 20 have hereunto subscribed my name this 15th day of July, 1907.

CHARLES A. HAMMEL.

Witnesses:

EDMUND A. STRAUSE,  
TRIMBLE BARKELEW.