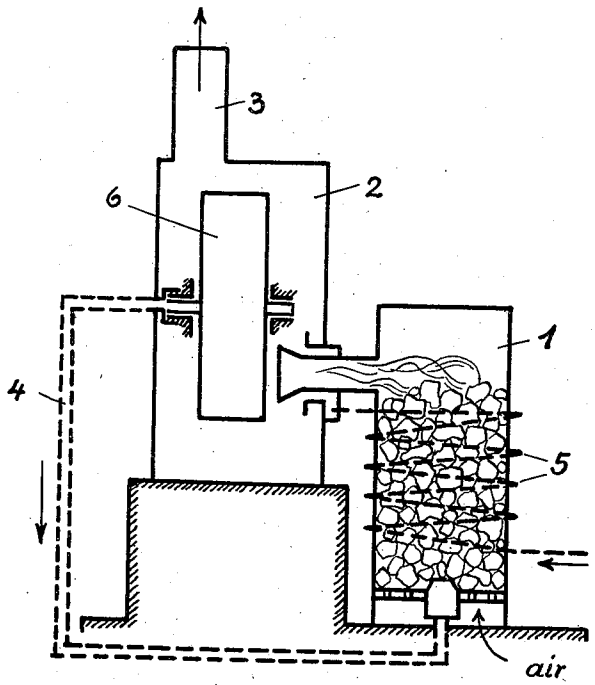
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POWER PLANT

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POWER PLANT

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My invention relates to steam power plants, and more particularly to plants including a rotary steam generator.

It is an object of my invention to improve a plant of the type referred to.

Steam power plants have been constructed in which the steam generator is of the rotary type. In certain cases, the generator has been rotated at a high speed, and has thus produced a strong draft accelerating the flow of the medium employed for heating the generator. The operation has been found reasonably satisfactory when the heating medium was liquid or gaseous, but when solid fuels such as coal or wood were employed for heating directly such a rapidly rotating steam generator, considerable difficulties were encountered. The heating gases obtained from solid fuel always carry with them a relatively considerable amount of unconsumed particles of coal or other solid material, and these particles settle upon rotary parts of the generator unevenly, thus disturbing the balancing of such rotary parts. Moreover, it becomes necessary to provide special arrangements or constructions so that the rotary parts may be readily accessible for a periodical cleaning which is necessitated to remove the said solid deposits. These deposits frequently also have a corrosive action on the metal of the rotary generator. Furthermore, as these small particles are projected against the rotary generator with considerable force, owing to the strong draft produced by the rapidly rotating generator, they have a destructive grinding action similar to that of a sand blast. Such grinding action will generally be uneven, thereby also disturbing the balancing of the rotary parts.

In connection with steam-generators or boilers which are non-rotary, that is, stationary in relation to their support, it has been proposed to heat them with gases such as producer-gas, blast-furnace gas, water-gas or Dowson gas. In such plants, a separate fan or other mechanical draft-producing device is provided to cause the gas to travel from the gas-producer to the steam-generator. The velocity of the heating gases relatively to the non-rotary steam generator is much less than in the case of a rotary steam-generator, and thus the detrimental action of any solid particles that may be carried along by the heating gases is minimized, particularly in view of the fact that these gases are at a relatively high temperature at the time they come in contact with the heat-absorbing surfaces of the steam-generator.

In addition, whenever gases of the character just mentioned, such as producer-gas, blast-furnace gas, or coke-oven gas have been used in piston engines, it has been found necessary not only to wash the gas leaving the producer but also to cool it strongly, for the purpose of reducing its volume, all of which involves loss or waste of heat.

The object of my present invention is to employ a producer of gas of the character heretofore used only in connection with non-rotary steam-generators and to combine such producer, in a novel way, with a steam-generator of the rotary type operated at such a high speed as to produce a draft or suction accelerating the flow of the gases from the producer to the steam-generator. I am thus enabled to dispense with the separate fan or equivalent mechanical device which, as stated above, was required hitherto in plants using producer-gas or similar gas for the heating of steam-generators of the non-rotary type, which is the only type heretofore heated with gases of this character. A plant embodying my invention is therefore of relatively low cost and reliable operation on account of its greater simplicity. Neither washing nor cooling of the hot gases is required in my invention, so that the entire heat may be utilized for the generation of steam. When the rotary steam-generator is transportable, for instance when it is mounted on a vehicle, the advantage of dispensing with washing and cooling appliances is very important, since it would be very inconvenient, and in many cases impracticable, to carry water for washing and cooling purposes on such a vehicle. In view of these difficulties, only liquid fuel, for instance gasoline, was hitherto acceptable for practical use in the heating of rotary steam-generators of the transportable or travelling type, but with the aid of my invention it has become possible to use producer-gas and similar gases successfully under these circumstances. While rotary steam-generators can not be heated satisfactorily by the direct combustion heat of solid fuels, for the reasons explained above, tests with my invention have shown excellent results when steam-generators rotating at a high speed are heated with producer-gas or the like. Notwithstanding such high speed, any solid particles of coal or solid residues of combustion carried along by the gas will have no detrimental effect on the heat-absorbing or heat-exchanging surfaces of the steam-generator.

If Dowson-gas or water-gas is desired for heating the steam power plant, the steam required for

the production of such gas may be taken from the rotating steam-generator itself. Moreover, the heat of the gas producer may be utilized for preheating the supplemental air supplied to the steam-generator chamber to support the combustion therein of the gas sucked from the producer.

The rotary steam-generator with its setting and the gas-producer are preferably constructed as a compact unit. Any well-known or approved construction adapted to be rotated at the desired high speed may be adopted for the rotary steam-generator, for instance constructions such as disclosed in my application for Letters Patent of the United States Serial No. 742,373 filed September 1, 1934, which application has matured into Letters Patent No. 2,075,648 dated March 30, 1937.

The accompanying drawing illustrates a typical example of my invention in vertical section.

At 1 I have shown a gas-producer charged with coal or other suitable solid fuel and provided with openings to admit air to the grate at its bottom. The gases obtained from such fuel pass from the outlet of the producer into the chamber 2 provided with an outlet 3 for the waste gases. In said chamber 2 the rotary steam-generator 6 is supported to rotate about a suitable axis, here indicated as horizontal. The producer gases are discharged against said steam-generator, preferably in a direction parallel to the axis of rotation. Air for supporting the combustion of the producer gases within the chamber 2 is suitably supplied to such chamber, and such air may be preheated by passing it through a pipe or coil 5 arranged to abstract heat from the producer 1. As an alternative, this air might be preheated by the heat of the waste gases discharging through the outlet 3. When it is desired to make Dowson-gas or water-gas in the producer 1, the steam required for this purpose may be taken from the rotary steam-generator 6 through a suitable connection such as exemplified by the pipe 4. The arrows indicate the direction in which the several mediums flow. The steam-generator 6 is rotated at a high speed, so as to produce a powerful draft or suction through the producer 1 and also through the pipe 5, as well as assist the flow of steam through the pipe 4 when the latter is used. The intensity of the draft or suction depends on the speed at which the generator 6 is rotated and also on the construction of such generator.

Various modifications may be made without departing from the nature of my invention as set forth in the appended claims. While in said claims I have referred to a gas-producer, I desire this term to be interpreted broadly so as to include the equivalents mentioned in this specification.

I claim:

1. In a steam power plant, a gas-producer, a chamber connected with the outlet of said gas-producer, and a rotary steam-generator located in said chamber and arranged to be heated with the aid of the gases coming from said gas-producer, and adapted to be rotated at a high velocity to produce a draft accelerating the flow of gases from said producer to said chamber.

2. In a steam power plant, a gas-producer, a chamber connected with the outlet of said gas-producer, means for supplying combustion air to said chamber adjacent to the point of admission of the gases coming from said gas-producer, and a high-speed rotary steam-generator located in said chamber and arranged to be heated by the combustion of the gases coming from said producer, the rotation of said generator at high velocity being adapted to produce a draft accelerating the flow of gases from said producer to said chamber.

3. In a steam power plant, a gas-producer, a chamber connected with the outlet of said gas-producer, means for supplying combustion air to said chamber, and a high-speed rotary steam-generator located in said chamber and arranged to be heated by the combustion of the gases coming from said producer, the rotation of said generator at high velocity being adapted to produce a draft accelerating the flow of gases from said producer to said chamber.

4. In a steam power plant, a gas-producer, a high-speed rotary steam-generator, and a connection to direct gases from the outlet of said gas-producer to said steam-generator, the rotation of said generator at high velocity being adapted to produce a draft accelerating the flow of gases from said producer to the steam-generator through the said connection.

5. In a steam power plant, a gas-producer, a high-speed rotary steam-generator, a connection to direct gases from the outlet of said gas-producer to said steam-generator, the rotation of said generator at high velocity being adapted to produce a draft accelerating the flow of gases from said producer to the steam-generator through the said connection, and a conduit for delivering combustion air to the gases coming from said producer, such conduit extending adjacent to the gas-producer so as to secure preheating of the air flowing through such conduit.

6. In a steam power plant, a gas-producer, a high-speed rotary steam-generator, a connection to direct gases from the outlet of said gas-producer to said steam-generator, the rotation of said generator at high velocity being adapted to produce a draft accelerating the flow of gases from said producer to the steam-generator through the said connection, and a conduit for conveying steam from said generator to said gas-producer.

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