

siderably upon the properties of the materials used in their manufacture, and thus upon the part of the country in which they are made. The fire-bricks for lining generators must be made according to the drawings, as it is necessary that each brick should fit its place nicely with a clearance of about one-sixteenth of an inch.

The interior of the generator consists of two parts, the fire space or retort proper, and the heating space. The heating space is

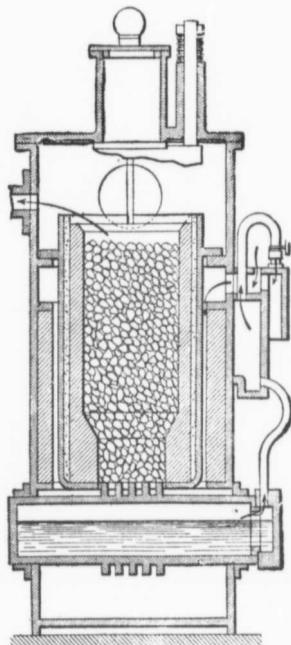


Fig. 2—Bernier Producer Showing Bernier Style of Grate.

above the annular space arranged for the collection of gas. In this space the coal is heated before falling into the space below. Sometimes, as in the case of the generator shown in Fig. 1, the coal rests against the lining of the chamber; whereas in other cases the feeding hopper extends down from the charging box in the top of the generator, into this heating space, and then the annular space for the collection of gas is usually coincident with the space around the feeding hopper. In this arrangement a considerable amount of the heat in the gas can be utilized to pre-heat the coal.

In the top part of some generators, and in suitable places in the sides, small openings are provided which permit the introduction of iron bars for the removal of the slag which clings to the generator lining.

GRATES AND ASH PITS.

The grates and the support for the lining of the generator, are in contact with the hottest part of the fire, and therefore are liable to deteriorate rapidly. For this reason it is necessary that they be removable. There are many types of grates, but because of the rapid deterioration it would appear that

the grate with the removable bars would be preferable, although for small producers the plain cast iron grate is quite suitable. For large grates, however, it is practically essential that the bars be separate, so that should one bar burn out it would be necessary to replace this one bar only.

These bars are composed of a special hard iron.

Some grates are stationary, while others are movable and may be turned about in a horizontal direction or tilted in order to remove ashes and refuse.

There are special styles of grates, patented in some instances, and two of these are well worthy of our attention.

One of these is the patented cone-shaped grate, used in the pressure plant made by Crossley Bros. The apex of the grate projects into the fire space, while its base rests on the bottom of the ash pit. The grate-bars are concentric around the cone shaped grate. The grate is designed so that it may be rotated by means of bevel gears, whereby the ashes are caused to slide down to the ash-pit.

The other special grate is a "French one," that invented by M. Bernier, in 1898, and although this is one of the oldest forms of grate construction, it has so many admirable features that it is of considerable interest at the present time. This grate is shown in Fig. 2 and consists of a hollow cast iron cylinder, passing through the shell of the ash-pit and supported in two journals, which allow the grate to be revolved. The central part of this cast iron cylinder which is directly below the fire space is closely studded with short square projections or teeth that carry the fuel, and form a substitute for the grate bars. On the bottom of the ash-pit a comb-like contrivance is fixed, the prongs of which enter the clearances between the teeth. By turning the cylinder occasionally the teeth are successively brought in contact with the fire, whereby the wear is distributed equally over a large surface. Water is constantly passed through the hollow of the grate cylinder to keep down destructive temperatures; this water is afterwards used in the production of steam; so that the heat taken from the grate is not wasted. As may be seen in the illustration referred to, water vapor is produced in the grate and rises to a chamber above.

In some generators a space is left between the grate and the support of the lining, as shown in Fig. 3. This arrangement has the merit of allowing only finely divided and completely burnt ashes to pass to the ash-pit; then again a large grate surface can be obtained, thus facilitating the passage of the mixture of air and steam. This space between the retort support and the grate is provided with a door through which slag and cinders can be removed.

In the other generators the grate rests either on the support of the generator lining, as shown in Fig. 1, or upon a projection embedded in the lining. Some special generators have wide hollow grate bars, through which water circulates.

Certain producers have no grates, the fuel being held in the retort by the ashes, which form a cone resting on a sheet-iron base. In order that the fire may be stirred from below without entirely destroying the cone of ashes, the generator is supplied with a poker

comprising a central fork, which is worked with a lever.

Ash-pits, as well as the grates, are exposed to the destructive effect of the high temperatures, and moisture, and should preferably be made of cast iron, sheet-steel being liable to corrosion quickly.

Some ash-pits are dry while others contain water, as shown in the typical plant in Fig. 1. Such ash-pits formed as water-cups are fed by the overflow from the vaporizer, and the ash-pits themselves are provided with an overflow consisting of a siphon tube forming a water seal. The water in the ash-pit serves a good purpose, in that the vapor rising from it tends to cool the grates; and under conditions such as these it is possible to pre-heat the air, and also to superheat the steam to a greater extent than if the ash-pit were dry, since then the damp steam in the mixture is relied upon to cool the grates.

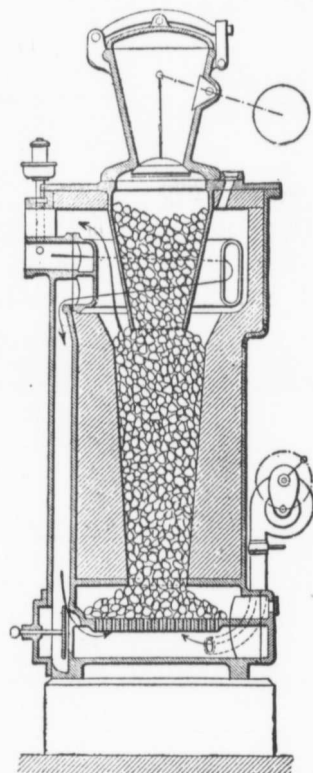


Fig. 3—Producer in which there is a space Between the Grate and the Support for the Lining.

If it is possible to preheat the air considerably and to highly superheat the steam more of the otherwise wasted heat from the gas can be utilized, and thus the thermal efficiency of the producer plant can be increased.

The doors of the ash-pit, and also the doors of the fire space in the generator, are usually made of cast iron or cast steel and are strongly constructed, since they as well as the grate