A MODERN GAS POWER PLANT.

By HORACE ALLEN, C.E.

THE gas generator plant reported on below is of 300 horse power capacity, and works on the Thwaite patent continuous cycle. The apparatus consists of two cylindrical vessels side by side. The fuel is fed into the hopper at the top, and air is supplied by a fan driven from the main engine. The gas, as it leaves the bottom of the second generator, has a high temperature, and is made to heat the incoming air by means of a recuperator apparatus, thus restoring a considerable amount of heat to the generators. From the recuperators the gas passes through a physical purifier to the pressure governor holder, which automatically governs the supply of gas to balance the demand, and from which the gas engine receives its supply. The analyses of the gas,

crosswise, was not shaken down. The photograph shows the teeth on the fly wheel into which the pinion of the small starting engine gears; this engine is of the vertical type, having a cylinder 6 in. diameter.

The balancing of the crank has produced very steady turning, the timing valve is simplicity itself, and the best point of firing can be instantly ascertained. The lubrication is on the circulating principle, a small pump effecting this. Both tube and electric ignition gear are applied to the engine. The engine house is covered with a water tank, which feeds the circulating mains of the engine. The hot water is used in the dye vats, so that there is no loss of heat from this source. Another heat loss of ordinary plants is that of the sensible heat of the gases evolved from the gas generators. In the plant under consideration this heat, representing 20 per cent. of the total heat of the fuel, is

the novice working steel down to a black heat under the steam hammer, not only destroying the structure of the steel, but the hammer dies also.

"A man working at the fire next to mine continually had complaints coming to him about his tools being burnt; in fact, his tools would come back broken off about one-half inch from the point, showing a coarse, black structure, similar to a piece of overheated or disintegrated steel. The poor fellow was hammering away on cold steel all day long. Finally he said to me, 'Why is it that they all tell me that my tools are all burnt, when I work them at a much lower heat than you do; yours do not break short, mine do.' I told him that his tools were not burnt, but improperly manipulated on the anvil, i. e., worked too cold, and not properly hardened after being brought to the proper shape. He replied: 'If I were to bring steel to the heat you do,

ONE HUNDRED AND FORTY HORSE POWER DUPLEX GAS ENGINE.

and its thermal value, prove the excellence of the system.

The gas engine, made by Messrs. Hartley & Petyt, is of the duplex type, having two cylinders 16 in. diameter, side by side, the length of the stroke being 2 ft.; and as they are arranged for the Otto cycle, there is one firing stroke every revolution when fully loaded. The speed is 140 revolutions per minute. The charge of gas and air is compressed to about 90 lb. per square inch above the atmosphere, and the pressure of the explosion is about 300 lb. per square inch above the atmosphere. To facilitate the starting of the engine it is necessary to reduce the pressure due to compression; for this purpose a cam is provided which allows a portion of the charge to escape into the exhaust. The design is thoroughly mechanical, and the physical proportions of the machine are adequate for their purpose. There is so little vibration that a penny stood on edge on the cylinder, either lengthwise with the engine or

restored for two purposes, one of which is the drying of the textile materials—an important industrial function—and the other is the restoration of the heat to warm the air used in the gasification process, and for the purpose of increasing its moisture absorbing characteristics; this last development is covered by one of the Thwaite patents.—The Engineer.

WORKING AND HARDENING STEEL.

"NEARLY all persons, in writing on the proper method of working steel, lay too much stress on overheating, or what they term 'burning steel.' During my experience, I have found that there are more steel tools destroyed by working too cold, or improperly manipulating on the anvil, than from any other cause. The uninitiated have heard so much about burning steel that they are really afraid to bring a piece of steel to the proper heat for forging purposes. I have often seen

they would all break off about three-fourths inch from the point.' He then showed me many of his tools broken off as described. I examined the tools which were not broken, and which had given good service after the last dressing, and found that nearly all of them had been reinforced about three-fourths inch back from the point; this compression is almost imperceptible to the naked eye, but can easily be felt by passing this part of the tool between the thumb and finger. I informed him that the next time he dressed these tools they would break at the point mentioned as soon as put in service, and show a dark, coarse structure, similar to overheated steel; the men using the tools would upbraid him for burning the tools.

"The cause of so many tools breaking at this point is improper hardening, or rather, the hardening and tempering are done too quickly, leaving a hard and soft section in conjunction with each other; consequently, the hard section is driven into the soft, displacing the