If the price of petroleum is 10 cents a gallon, instead of 6 cents, the difference in favor of the gas will be, per annum, $1,705.

Thus:

Interest on capital	$80 00
Labour	365 00
Lime	40 00
Petroleum	401 50
Coke	146 00
	$1032 50
1,095,000 c.ft. coal gas, at $2 50 per 1000,	$2737 50
Diff. in favor of petroleum gas, per ann.	1705 00

In works, where twelve coal gas retorts are in operation day and night, each being charged with 150 lbs. of coal they can produce 36,000 cubic feet of gas in 24 hours. This quantity can be yielded by two petroleum retorts in twelve hours. Thus:

2 petroleum retorts yield 1000 cubic ft. per hour.

In 12 hours the yield will be 12,000 feet.

The equivalent of 12,000 feet of petroleum gas is equal to 36,000 feet of coal gas.

If reduced to the same unit of time, namely, 24 hours, two petroleum retorts, of the same dimensions as coal gas retorts, will yield 24,000 cubic feet of petroleum gas, the equivalent of 72,000 ft. of coal gas, or as much as 24 ordinary coal retorts charged with 150 lbs. of coal each, every five hours, can produce in 24 hours.

There are other facts which make the production of gas from petroleum more economical than from coal. The quantity of lime required for purifying is not so great by one-half. The amount of water needed for cooling and washing is very considerably less, and the tar produced is small in quantity when the yield of gas is taken into account. The gas is more free from those noxious sulphurous compounds which render badly purified coal gas so disagreeable and prejudicial.

The destruction of retorts in the manufacture of coal gas is immense. This arises in a great measure from the formation of graphite in the inside of the retorts, which accumulates in concentric layers, and sometimes forms a coating one or two inches thick. The retorts also suffer to a great extent by the entrance of air when introducing the charge of coal. This source of rapid destruction is avoided altogether in the petroleum retorts, which do not communicate with the atmosphere when in a heated state, and only require to be occasionally opened to remove the deposited carbon or graphite, which, by the way, can very conveniently be removed by partially filling the petroleum chamber with fire brick, whereby the heated surface to which the rich hydrocarbon vapours are exposed is greatly increased, and their conversion into permanent illuminating gases much facilitated. The deposition of carbon is materially diminished by reducing the pressure of the gas on the retort, and this by a simple adjustment of the water joints in the petroleum apparatus may be reduced to a minimum.

The use of water in the process by which the result described in the preceding pages is produced, is for the purpose of converting the volatile hydrocarbon vapours of petroleum into permanent gases. It is thrown into its spheroidal condition the moment it strikes the interior of the retort, and in this state its spheroids continually develope steam of very high temperature and great reducing power. The rich petroleum gas may be largely diluted by the formation of the so-called water gas, but this has been shown to be an expensive process, and it is far more economical to employ a one-foot burner with a highly luminous gas than a three or four-feet burner with a diluted gas. The use of water gas as a diluant for rich hydrocarbon gases, which will burn without smoke or smell, and give a brilliant light from a small burner, is of not only very questionable economy, but it is thought by some to be a dangerous expedient, on account of the admixture of poisonous carbonic oxide into the gas, which, if leakage should by any accident occur in dwelling houses, might be followed by those fatal results to human life which have occurred time and again in every country where coal gas is manufactured, and particularly where water gas is used either with hydrocarbons or in any other form. Water gas, in order to be economical, implies the conversion of the carbonic acid produced into carbonic oxide, the one being a feeble illuminator, the other not only an incombustible, but so prejudicial to illumination that one per cent. of carbonic acid in coal gas diminishes its illuminating power by 6 per cent. The use of water gas has been interdicted by several European governments, on account of the poisonous properties of the carbonic oxide it contains. In the petroleum process, only so much water is used as will ensure the conversion of the volatile hydrocarbon vapours into permanent gases by their reduction to a lower hydrocarbon condition; and an analysis of its constituents shows that it contains much less carbonic acid than common coal gas. Its great illuminating power is derived from a very large per centage of olefiant gas, together with carbonetted hydrogen.

Mr. G. Howitz, the manager of the Copenhagen gas works, obtained 1000 feet of water gas by the combustion of 140 lbs. of coke in the furnace, and about 20 lbs. of charcoal (15 lbs. pure carbon) in the retort. The water gas consisted of the following: