found no place for their graduated students, in the practical world. Manufacturers openly declared that they much preferred men with practice only to those who had theory alone. Diplomas were no assistance in procuring positions but frequently a hinderance.

This demand for dual training, the one giving strength and skill, and the other wisdom, refinement and ingenuity, is revolutionizing modern education, and the process will not be complete until it reaches the very bottom of our educational system, and industrial training be introduced into our public schools. E. S. R.

FUEL GAS.

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A few years ago the use of gas as fuel was scarcely known; to-day the vast development of natural gas is familiar to all, and the many advantages of gas as a fuel are in consequence everywhere recognized. Still, wide as has been the spread of the discovery and use of natural gas, coal is still, and will long remain, the fuel of the world. Not to mention other reasons, the fact that it is a solid, and can therefore be transported for long distances with little trouble, insures its supremacy. If now, the recognized advantages of gas as a fuel can be obtained by turning the coal into gas, with gain, or even without absolute loss of available heat power, a great point has been gained.

It has been a matter of common remark for years that when a conflagration has gained a certain intensity, the pouring on of water is powerless to check the flames; indeed it is said by many to increase their fierceness. While this latter belief is probably based more on imagination than actual observation, it is doubtless possible for a conflagration to develope a heat intense enough to decompose water in the presence of carbon, and so the water may theoretically at least do no good, the products of its decomposition burning again, and possibly because of their gaseous nature, increasing and hastening the spread of the flames.

Of late years, "water gas" has been much used in the cities for illumination. It is made by bringing steam in contact with heated coal, the non-luminous gases thus produced being charged with light giving gases, usually by passing through an easily vaporized product of petroleum distillation. Fuel gas is the first product, uncharged with luminous gases; non-luminous indeed, but for that very reason better adapted to use as fuel solely.

The chemistry of the process is very simple; the steam coming in contact with the heated carbon, is decomposed, its oxygen combines with the carbon to form carbon monoxides, and its hydrogen is set free. The plant is so arranged and controlled that as far as possible the entire product shall consist solely of these two combustible non-luminous gases.

It is always to be understood, that no actual gain of energy is possible, as a result of this process, which has been characterized as the conversion of coal into gas; as much energy is required to decompose the water as its constituents can yield again by burning; on the other hand, there is a necessary loss, as some part of the coal must be burnt in air, to obtain the requisite heat. This gas, then, can have the advantage in economy over the coal from which it is made, only by a more perfect utilization of its possible calorific power. It can, however, be made on the large scale, from the fine coal, or "slack," which cannot be burnt directly in the ordinary way; a very important fact in an economic point of view. It has, of course, every other advantage over coal as a fuel that natural gas has.

The gas is, however, much cheaper than any other artificial gas. Its cost of production, as shown by actual results, varies from 7 to 25 cents per 1000 feet, according to the size of the plant, and the material used. Even at the higher figure, which may be reached by a small and simple