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THE USE AND ECONOMY OF GAS ENGINES.

A secondary, but important and instructive feature of the gineers and inventors. recent exhibition of electricity in Paris, was a notable display of gas engines, a type of engines in increasing demand for driving dynamo-electric machinery.

This is not the only way in which the use of electricity for illumination tends to increase the consumption of gas, thus making those apparent rivals, gas and electricity, in reality sively would be much lighter and less bulky than the furmutually helpful allies. One of the first effects of the introduction of electric light is to accustom the public to a much tion of two or three times as much coal as would suffice for greater brightness of artificial illumination than had before a gas engine of equal power. been thought necessary. Where one burner was formerly sufficient two or three are now required, so that the demand for gas is directly increased by the development of electric lighting. And even though electric lights should, in the end, very largely displace gas lights, the employment of gas likely to create a larger demand for gas than now obtains; and the use of gas as a source of power cannot well be stopped with the running of dynamo-electric machines. The increasing attention drawn to the efficiency and economy of gas engines promises not only a very large increase in the the use of coal as a source of power.

lower.

The ordinary furnace, moreover, is ill adapted for the economical execution of the two distinct processes which go on in them, namely, the conversion of coal into gas, and the promises less in the way of increased economy than is skins. secured by the direct development of power in gas engines by the burning of gas explosively.

Exhibition (Scientific American Supplement, No. 316), many, our receipts thereof, for the past ten years, having the theoretical efficiency of a gas engine should be about 75 averaged about \$5,000,000 a year, while for the ten months per cent, if loss of heat by conduction, radiation, convection, to the first of last November they were \$5,874,505. Such and friction could be prevented; this against an efficiency of goods require nice selections and careful assorting in the 20 per cent with a theoretically perfect steamengine. Prof. raw stock, more thorough working by hand, and more par-Ayrton goes on to show, mathematically, from the laws of ticular attention in many minor details than have been found thermo-dynamics, that the practical efficiency of a gas engine could be done with profit here, notwithstanding the duty. should exceed 50 per cent, or five times that of a steam They require but little bark to tan, and a great deal of labor engine.

Touching the relative economy of working the two types the sole leather manufacture. of engines in practice no entirely satisfactory comparison cost of the fuel.

son process. In this case the gas for 300 days' running was made from 39 tons of anthracite worth \$5 a ton. To run of foreign prejudice against the red color of the leather the steam engine 200 days required (including 10 tons of made with it, English tanners claiming that it was not repairs, interest, etc., the coal being reckoned at \$3.75 a water and withstanding wear by attrition, in the soles of in favor of the gas engine using Dowson gas, compared sole leather, and greatly superior to the leather of their with steam, to be 47½ per cent. The economy in working "mixed" tannages, or the generally poor sole leather made cost in favor of Dowson gas, compared with coal gas, was on the continent of Europe. The English boot and shoe 45½ per cent. The saving in weight of coal in favor of manufacturers are now, in consequence, as steady customers requiring 6 pounds of coal per indicated horse power, was turers of standard grades of work in our own country as 217 tons to 39 tons, or (as he figures it) 88 per cent.

other hand, to adapt the comparison to this market there would be a decided gain in favor of gas (by the Dowson calculations being the same, the economy in favor of Dow- in relation thereto. son gas, made from anthracite at the price of such coal here, would be over fifty per cent. In case the gas were manufactured at the coal mine (where coal is cheap and finely

power are well worthy of the attention of mechanical en-

The saving in bulk and weight of coal, in case gasengines should prove to be suitable for marine use, is a matter of great importance where space and floating capacity are so valuable as they are at sea; and the indications are that the apparatus required for manufacturing gas to be used explonaces and boilers needed for generating steam by the combus-

OUR LEATHER INDUSTRY.

The illustrated article upon the sole leather manufacture we this week publish—forming No. 81 in our series on engines for running the machinery of electric lighting is | American industries - can hardly fail to be of general interest in this country, both in and out of the trade, while it is sure to receive marked consideration in many other parts of the world, where our leather and the processes of manufac ture have been conspicuously misrepresented ever since we began to be large exporters in this line, about ten years ago. commercial manufacture of gas, but as marked a change in | In 1870 our total exports of leather were but \$111,077; in 1876 they reached the sum of \$9,343,560. Their aggregate It is well known that as coal is burned for the generation value has fallen off a little since then, because prices are of steam power, there are two inevitable sources of loss, and lower, but there has been an actual increase in the quantity great loss. So much of the energy developed by combustion of goods shipped, and the market for American sole leather is used up in converting the water into steam that a theoreti- in England, in the north of Europe, and on the Mediterracally perfect engine could not utilize more than one fifth the nean, is now as well established as is the demand for our total energy of the coal. In practice the efficiency of the grain and provisions. Germany, in answer to the urgent best large engines is only half that of a theoretically perfect appeals of her tanners, placed heavy duties on our sole engine, or about one-tenth the power of the coal. With small leather in 1878. The tanners there said they would all be engines and ordinary furnaces the efficiency falls much ruined if this were not done, and held conventions in many places, finally compelling the Reichstag to impose the duties; but a good deal of our leather still goes there nevertheless, and our trade with the rest of the continent has increased more than enough to make up for the small simultaneous combustion of the gas as fuel. When these decrease in the German shipments. In France the duty has processes are separated, and the gas properly made and eco- always been practically prohibitive, but in both France and nomically burned, it may be possible to approach somewhat Germany they would be glad to allow our sole leather to more nearly the theoretical efficiency of the perfect steam enter free of duty if we would but put them on the same engine; but, at the best, improvement in this direction basis in regard to their trade here in finished calf and kid

In these goods, though our own productions for actual wear will compare favorably with those imported, much As shown by Prof. Ayrton, in his address at the Electrical of the finest stock used is made in France and Gerin finishing, conditions which are practically reversed in

Whether or not we regard tanning as a distinctively can be made, since no very large gas engines have been con- chemical process, it is conceded that the value of all sole structed, and small gas engines are not so disadvantageous leather is primarily dependent upon the permanence of the in comparison with large ones as small steam engines are combination of tannin with the gelatin of the hide. With Professor Ayrton's tables show, however, the comparative no other tanning agents yet discovered can so positive and working cost of a portable steam engine and an Otto gas fixed a union be effected as is possible with the tanning soluengine, each of 30 horse power, for 300 working days, the tions obtained from oak and hemlock bark. These mateone using (bituminous) coal at \$3.75 a ton, the other coal rials are as yet cheap and abundant here, and will be so for gas at 75 cents a thousand cubic feet. The results show at least a generation or two to come, from the supplies that the cost of running the gas engine was considerably less, afforded by our virgin forests, while in Europe similar tanthan that of the steam engine, notwithstanding the higher ning agents are to be had only in limited supply, at four to five times the cost. This explains why we have now a large A much greater working economy was developed when and steady trade in the export of hemlock sole leather. We the gas engine was run with a cheap gas made by the Dow-did not do much in this line for many years after we commenced tanning with hemlock bark, principally because coal consumed before and after work) 227 tons of coal, tanned, but only colored raw hide. Now, however, they Taking all the items of expense into the calculation (labor, appreciate its excellent qualities, its capabilities for resisting ton), Professor Ayrton found the economy in working cost | boots and shoes, as quite equal to those of the best English Dowson gas and gas engine, compared with steam engine for our hemlock sole leather as are all the large manufac-This red sole leather goes into the bottoms of nearly all the Obviously a liberal deduction must be made from these boots and shoes they make for export to all quarters of the percentages to get a just comparison of the weights of coal world, so that it is probable this one product of American required where the steam is generated under fairly economi- industry finds in this way a wider market than anything cal conditions, the allowance of six pounds of coal per else we make in every quarter of the globe. The strong horse power per hour being two or three times what is re- prejudice which existed against it for many years is being quired with good stationary or marine engines. On the everywhere overcome by a better acquaintance with its actual good wearing qualities; and the description we elsewhere give of one of the great tanneries where such leather process) owing to the relatively greater cheapness of anthra- is made—the largest sole leather tannery in the world—cancite in this country. The other factors of Professor Ayrton's not fail to aid materially in extending sound practical ideas

A Large Steel Sailing Ship.

VII. SHORT-HAND.—A Practical Short-hand for Everyday Use.
By JAMES R'CHARDSON. Need of easier mode of writing.—Requisites for perfect writing.—What an alphabet should represent to Edgments of English speech. Materia available for a scientific alphabet.—Alphabet of Neophonography.—How to write neophonography.—Neostenography.—Neostenography.—Neostenography.—Neostenography.—Neostenography.—Neostenography.—Seestenography.—Illustrations.

broken coal suitable for gas making is a nuisance) and the gas piped to the point of consumption as is now contemplated, the relative economy of gas engines would be still and has been named the Garfield. It will be employed in greater. In any case the problems raised and economics which was an alphabet of a scientific gas piped to the point of consumption as is now contemplated by the relative economy of gas engines would be still gas piped to the point of consumption as is now contemplated at Belfast, Ireland. It registers 2,220 tons, and has been named the Garfield. It will be employed in greater. In any case the problems raised and economics.

What is described as the largest steel sailing ship affoat was an unisance) and the gas piped to the point of consumption as is now contemplated by the relative economy of gas engines would be still and has been named the Garfield. It will be employed in greater. In any case the problems raised and economics.