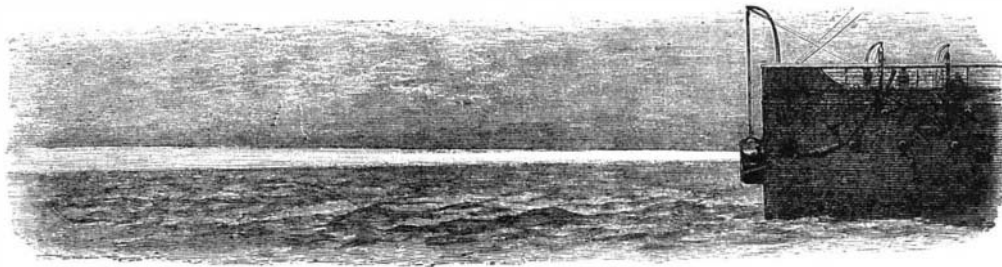


ELECTRIC LIGHTING OF THE STEAMSHIPS VICTORIA AND BRITANNIA.

The magnificent fleet of the Peninsular and Oriental Steamship Company has, during the past few years, been gradually fitted with the electric light, one vessel following another, and each having the benefit of the experience gained in those which preceded it. From the ample opportunities thus placed at his command, Mr. Hall, the head of the engineering and marine department of the company's business, has decided that success is best obtained by the use of machinery which

on to the spindle of a dynamo, as if it were a screw shaft, is the ideal arrangement of Mr. Hall, and this, by the progress recently made in electrical engineering, he has been able to secure for the two splendid new vessels, the Victoria and the Britannia. As long as the minimum speed of a large dynamo was 400 to 500 revolutions per minute, its direct driving by the ordinary type of engine was subject to too many drawbacks to render it preferable to the use of intermediate gearing; but now that machines are made capable of running at two hundred revolutions, and at the

directly on to a Victoria Brush dynamo capable of feeding 450 lamps. Between the crankshaft and the



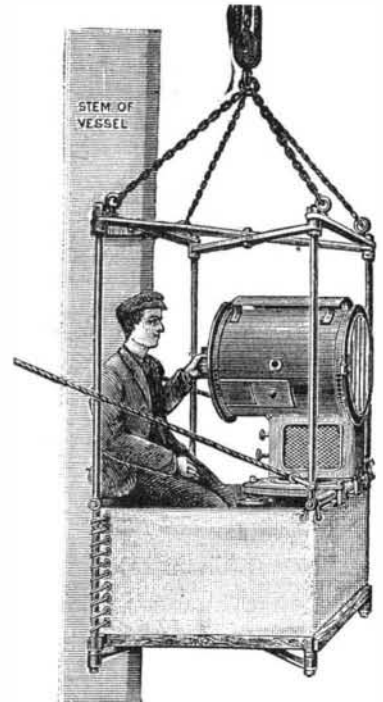
THE ELECTRIC LIGHTING OF THE STEAMSHIP VICTORIA.

conforms to the ideas and habits of thought of ship's engineers, and which they can take charge of without special instruction or explanation. In order to act upon this idea, it is evident that the use of all belting, wheels, and other form of multiplying gear must be abandoned, equally with the various high speed engines which run in closed casings and have more or less complicated arrangements of valves. An engine as nearly of the marine type as possible, driving direct

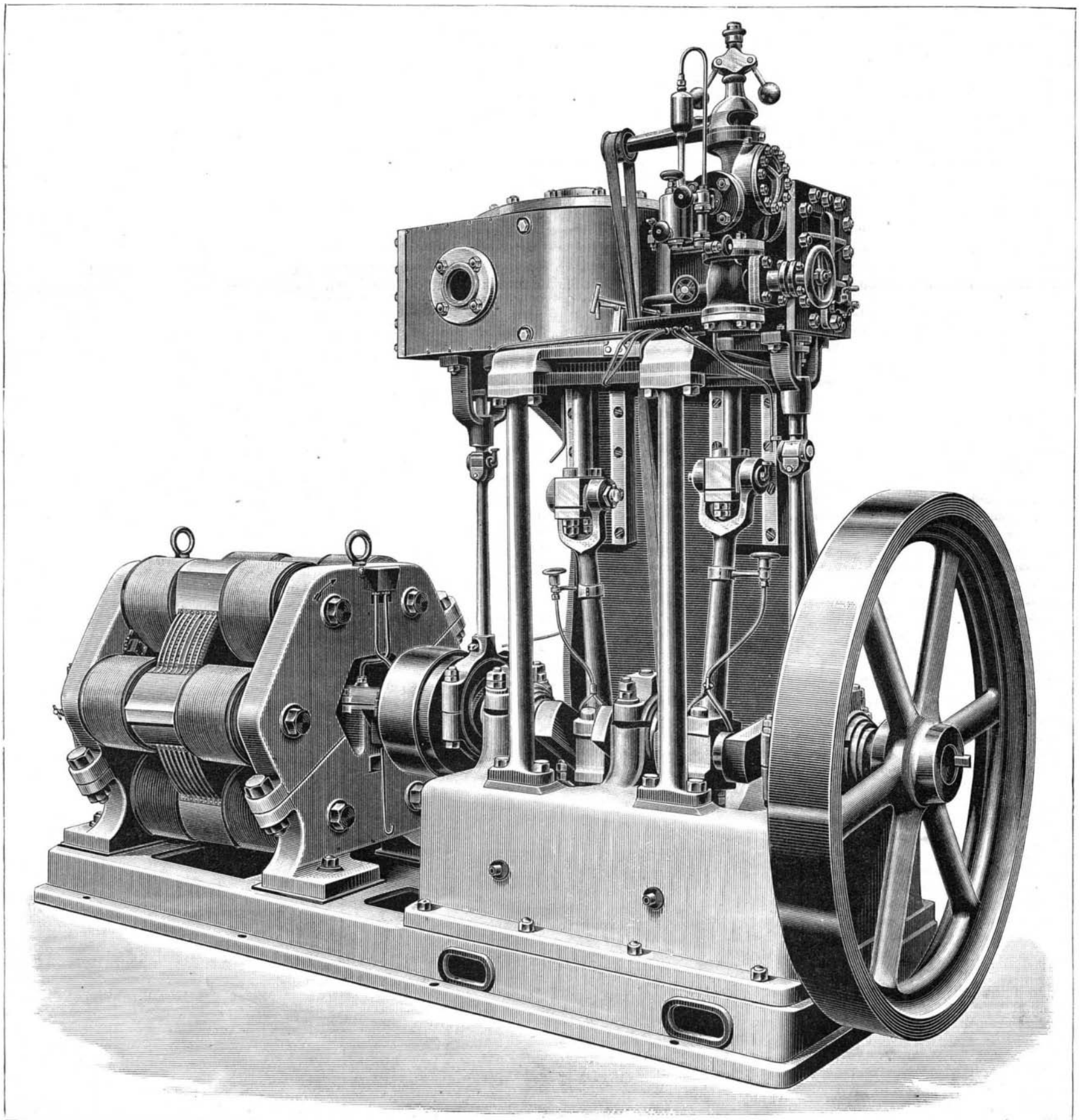
same time of giving a very large output, the case is entirely changed, and there is no longer the need of resorting to driving appliances which are not viewed with favor by the sea-going engineer.

The plant erected on the Victoria and Britannia by the Anglo-American Brush Electric Light Company, Limited, of Belvedere Road, London, consists of a Tangye engine having cylinders 8 inches and 16 inches in diameter respectively, by 10 inches stroke, driving

armature spindle is an improved form of Oldham coupling, consisting of two plate couplings with an



BOW LIGHT-ELECTRICAL-FOR VESSELS.



ENGINE AND DYNAMO FOR THE STEAMSHIP VICTORIA.

intermediate disk. In the face of each plate coupling there are two flattened studs which take into a slot in one face of the intermediate disk, the slots on the opposite sides of the disk being at right angles to each other. A shrouding on one coupling covers the disk and studs. Thus if the two shafts should fail to lie in the same straight line, the coupling permits them both to work freely. The dynamo, which is self-regulating, has six poles, and gives its full output at 200 revolutions per minute.

The plant is entirely in duplicate, each set being capable of maintaining all the lights. The conductors from the dynamos are led to a main switchboard, and are then distributed through the vessel on the single wire system, in which the frames and plating of the ship serve as return conductors to the engine room. The lamps and groups of lamps are turned in and out by the porcelain switches made by Messrs. Dorman & Smith, of Manchester.

The Peninsular and Oriental Company's vessels pass through the Suez Canal, and according to the present regulations they are allowed to steam on at night, instead of being obliged to moor at dusk, if they are provided with search lights. For this purpose the Brush Company provides the apparatus illustrated herewith. This consists of a cage which is suspended over the bows of the vessel and is lowered within 8 feet of the water. In this cage, there is mounted an arc lamp taking a current of 70 amperes and 65 volts. The lamp is regulated by hand by an attendant who sits behind it and feeds the carbons together as they are consumed. The beam is reflected by a mirror 22 inches in diameter and 12 inches focus, and then is spread sideways by a dispersion lens which widens it into a sector subtending an angle of 22 degrees. The direct rays of the arc are prevented from leaving the lantern by a carbon shield, but as the crater is turned toward the mirror there is very little loss from this cause. By the use of this apparatus the time of passing through the canal is reduced from an average of 36 hours to 15 or 18 hours. In the case of a vessel fitted with duplicate plant, the spare dynamo is employed to work the arc lamp in passing the canal. Vessels that are not fitted with electric appliances take them on deck on entering the canal and discharge them at the other end, and thus one set will serve a whole fleet of steamers.—*Engineering*.

Government Meddlesomeness.

In the United States, the recent action of the French government, in providing that nothing shall be bought for public use which is not of domestic production, and which the outside world has regarded as a policy unworthy of an enlightened nation, has had its counterpart and precedent in the previous legislation of quite a number of the States; with this exception, that in France the discrimination is made against foreigners only, while in the United States the discrimination is made against their own countrymen living in different political divisions of the country. Nothing, moreover, can probably be found in Europe to parallel the recent legislation of one of the leading States of the Northwest (Minnesota), and a large part of which was the work of a single legislative session (limited to sixty days) in 1885, and which has thus been described by a recent writer: Prominent in importance were statutes providing for the weighing, handling, and inspection of grain; the construction and location of grain warehouses, the providing of cars and side tracks by railroads, and the regulation of rates of transportation. Next was legislation respecting State loans of "seed grain" to farmers whose crops had been ruined by grasshoppers, for the subsidizing of State fairs from the State treasury, for enabling farmers to avoid the payment of a portion of their debts, for protecting butter makers from the competition of artificial products, such as "butterine," for regulating the details of the cattle industry to the extent of registering and giving State protection to brands and other modes of identification, and of stamping out contagious diseases with small courtesy to the rights and wishes of individual owners, and for regulating the lumber business to such an extent that not a log can float down a stream to the saw-mill for which it is destined without official cognizance. One State board regulates the practice of medicine and the admission of new practitioners, a second the examination of druggists and compounding clerks, as precedent to entering into business, while a third regulates the practice of dentistry. Various enactments prescribe the toll to be exacted for grinding wheat, when one man may slay his neighbor's dog with impunity, how railway companies must maintain their waiting rooms at their stopping places for passengers, the hours of labor, and the employment of women and children, the maximum time for which locomotive engineers and firemen may be continuously employed, what books shall be used in the public schools, forbidding "raffles" at church fairs under "frightful penalties," and making it a crime to give away a lottery ticket, and a misdemeanor "to even publish an account of a lottery, no matter when or where it has been conducted." Among bills introduced, and which found considerable support, but were not enacted, was

one forbidding persons of different sexes to skate together, or even be present at the same hour on the rink floor, and another to license drinkers, which provided that no person should be permitted to use intoxicants or purchase liquors of any kind without having first obtained a public license.—*David A. Wells, in Popular Science Monthly*.

The Modern Military Rifle.

When, in the development of the military musket, the necessity for imparting rotary motion to the ball was realized, rifles were adopted, and at once the question of loading assumed new difficulties. The ball had to be so small that it could be forced down the barrel from the muzzle. Naturally, such a bullet did not adequately take the grooves. Then the idea of expanding its base after it was quite or nearly home was conceived. The *carabine a tige* met the issue in a peculiar way. At the bottom of the bore a solid spindle projected in the center of the chamber. The ball, which had a hole formed in its base, was driven down upon the spindle so that it was expanded. Probably the force of the explosion tended still further to drive the lead outward. This seems a very crude contrivance, and inferior to the Minie principle. In the latter the bullet had a cavity in its rear, back of which an iron cup was placed. The explosion drove the iron cup into the lead, forcing the metal into the grooves. Later it was found that the cup was unnecessary; the simple excavation of proper shape was enough. It is said that in a rifle of the original Minie system, the iron cups have been blown through eight bullets in the same number of successive discharges, leaving the remains of the bullets in the barrel.

When breech loaders were adopted, the trouble disappeared. Yet the now universally adopted arm met with much opposition. It is actually recorded that a breech loading rifle, invented by an American, Mr. Morse, of Louisiana, was reported on unfavorably by a committee of the British army for the following reasons: 1. It fired too quickly, twelve rounds a minute. 2. Its cartridges were metallic. 3. They contained the principle of their own ignition.

Eventually, the Prussian military successes of 1864 and 1866 are thought to have turned the scale in favor of breech loaders, as the needle gun, with all its defects, did great execution.

The movement of the day is in the direction of small calibers and high initial velocity. An ordinary lead pencil represents very closely the favorite diameter of bullet. As a type of the old style the Springfield, still in use by the U. S. Army, may be cited. With a 500 grain bullet it develops an initial velocity of only 1,301 feet per second. In a range of 1,000 yards its trajectory reaches the great height of nearly fifty feet. Its caliber is 0.45 inch.

The Lebell rifle in France and the Hebler rifle in Germany are examples of the modern style of military arm. In both of these the caliber is small, 0.315 and 0.296 inch respectively. An extremely long bullet is adopted, and a new material is used in its construction. The Hebler bullet is 4.46 calibers or diameters, and the Lebell bullet is said to be about 9 diameters in length. The Hebler bullet is of lead covered with a soft steel shell. The Lebell bullet is entirely of steel. The latter bullet, if the above figures are reliable, would be over two and one half inches long. The German arm is credited with an initial velocity of 1,968 feet. For one thousand yards range, it rises in its trajectory only twenty-nine feet, a little over half the height attained by the Springfield.

All of the factors show how inferior a weapon is carried by the United States soldier. This follows not alone from a comparison with the Hebler rifle. The Pieri rifle, now the subject of experiment in Italy, and the Lebell rifle of France are said to still further surpass it. England is thoroughly roused. After adopting a new model of 0.402 inch caliber, and constructing 100,000 of the pieces, she has ordered them to be disposed of and is to adopt a new model of but 0.31 inch caliber.

As the bullet is made far longer, the rifling is made very acute. The Hebler rifling makes one turn every four inches, while in old practice over twenty inches were allowed for a revolution. The increased rotation is requisite to secure enough gyroscopic force to steady the long bullet in its flight.

The magazine principle so successfully applied to the Henry, now the Winchester, rifle is also invading the military field. It is among the probabilities that nearly all Europe will be armed with magazine rifles. The force of recoil is utilized in the Maxim and in the Paulson rifles. The former works like the machine gun of the same inventor. A single pull upon the trigger sustained for the proper period causes the automatic discharge in regular succession of all the cartridges in the magazine. In the Paulson system the force of recoil extracts the shell, and if a magazine is used, the same force effects the loading.

The stories told of the use of smokeless powder in the Lebell rifle giving a very slight report read somewhat like a myth. Yet it is known that this is possible. By increasing the length of the barrel, the same character

may be imparted to the discharge of a gun loaded with gunpowder and bullet. In some experiments conducted by the U. S. Ordnance Department, it was found that with a barrel 112 inches, or nearly ten feet, in length the bullet was discharged with hardly any noise or smoke. With a five inch barrel there was a great abundance of smoke and a very loud detonation. Thus the account of the French powder may be correct.

Fortunately, America is not dependent on an armed peace. But it would seem well for the nation to do something in the way of improving the armament of her soldiers. The same administration that is creating a new navy might do something toward supplying a more efficient rifle to the army.

The smaller bullets tend to increase the number of wounded men, and decrease the number of killed. This want of fatal execution is considered a good feature. One wounded soldier requires two unwounded ones to take him to the rear. It is humorously said that such assistance is always to be had for the asking.

The Sensitiveness of Tea.

A costly evidence of the sensitiveness of the tea leaf was given to the brokers round about Front Street recently. A new lot of tea was put on sale by the various firms to which it was consigned. Tasting it, the first process through which it is put by the broker, developed the fact that every pinch of tea with its dash of hot water made a sweetened beverage. It was evident at once that it had not been tampered with since the box was opened, and investigations were at once begun. It was thought at first that a mixed cargo had been stowed by some stupidity, and that the tea had come over side by side with raw sugar.

This would have explained the taste, but it was found that the tea was brought over by the tramp ship Mosser, and formed the only cargo, saving a comparatively small lot of Chinese curios. It was, however, proved that the previous cargo had been raw sugar from Manila, and that it had done the detected damage, the protestations of the captain that the hold had been thoroughly cleansed and whitewashed to the contrary notwithstanding.

It has not yet been ascertained, of course, how much of the cargo has been damaged, but at present it looks as if a considerable portion had been tainted and its value correspondingly decreased. If this is proved and no settlement is effected, suits will be instituted and the ship will be libeled. The cargo consisted of 294,595 pounds of Formosa, 175,880 pounds of Japan and 575,000 pounds of Foo-Chow and the curios above mentioned, and, being of various grades, probably amounted in value to about \$250,000. It is no small matter, it will easily be seen, and should suit be instituted there will probably be a very lively fight over the matter, as the captain and those concerned are already declaring that such an effect is absolutely impossible to have come without cause.

The last case at all similar to this was about twelve years ago, when tea was packed in the same hold with camphor. The tea was sold for less than half its value and so gotten rid of, but it left a strong impression upon the captains and consignees concerned. Another interesting thing brought out by the discussion of the sensitiveness of the tea leaf is that its only rival is another plant with an odor of its own fully as strong. A leaf of tobacco laid for two hours within six feet of open kerosene will be found to be as rank as possible with the smell and flavor of the oil, and even when dried and pressed into heavy hogsheads will take the odor from other articles in the hold of a ship, even from sugar.

Among those particularly interested in the matter at present are Busk & Jevon, Pordon & Wiggin, and Fearon, Low & Co. They are some of the consignees most heavily involved.—*N. Y. World*.

A Theory as to the Origin of Petroleum.

Professor Mendeleef has recently advanced the theory that petroleum is of purely mineral origin and that the formation of it is going on every day. He has, moreover, succeeded in producing artificial petroleum by a reaction that he describes, and he states that it is impossible to detect any difference between the natural product and the manufactured article. His theory is as follows: Infiltrations of water, reaching a certain depth, come into contact with incandescent masses of carburets of metals, chiefly of iron, and are at once decomposed into oxygen and hydrogen. The oxygen unites with the iron, while the hydrogen seizes on the carbon and rises to an upper level, where the vapors are condensed in part into mineral oil, and the rest remains in a state of natural gas. The petroleum strata are generally met with in the vicinity of mountains, and it may be granted that geological upheavals have dislocated the ground in such a way as to permit of the admission of water to great depths. If the center of the earth contains great masses of metallic carburets, we may, in case this theory is verified, count upon an almost inexhaustible source of fuel for the day when our coal deposits shall fail us.—*Annales Industrielles*.